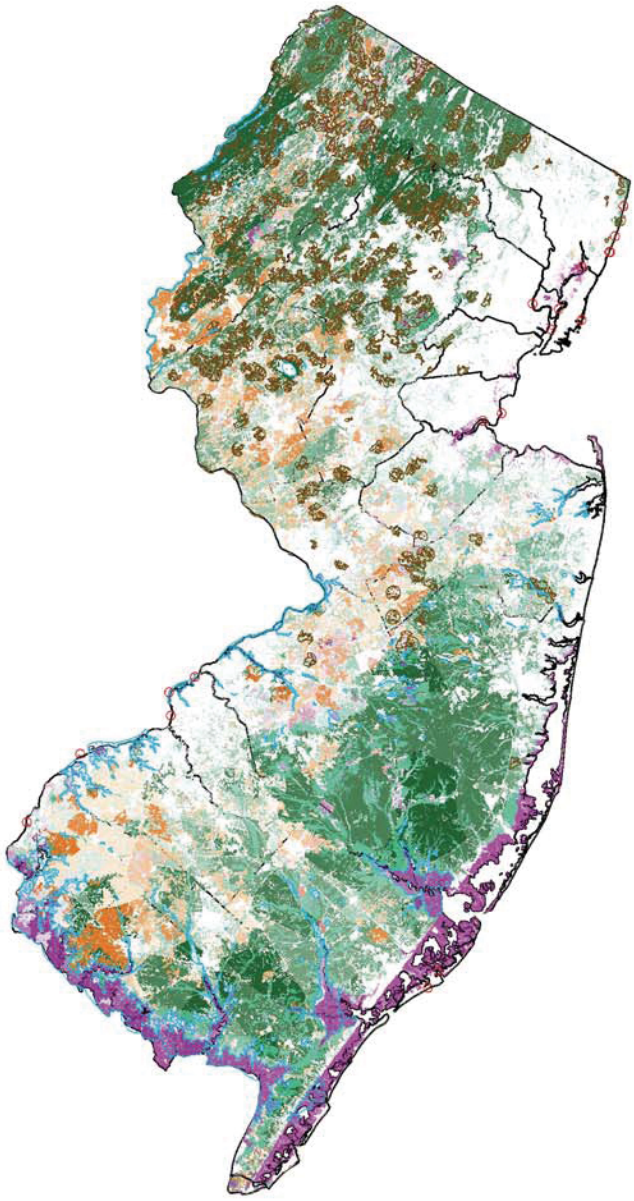
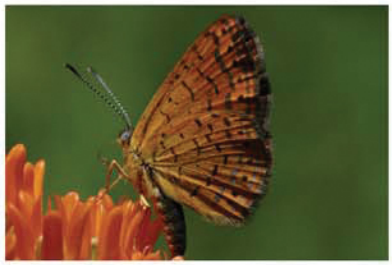
NEW JERSEY WILDLIFE ACTION PLAN

JANUARY 23, 2008





New Jersey Department of Environmental Protection
Division of Fish & Wildlife, Endangered & Nongame Species Program
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New Jersey Wildlife Action Plan
for Wildlife of Greatest Conservation Need

Prepared by the
NJ Department of Environmental Protection
Division of Fish and Wildlife
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Acknowledgments

The NJ Wildlife Action Plan (Plan) is a blueprint for the future conservation of our state's species of greatest conservation need. The Plan was developed through multiple stages, but began with the assistance of a contract planner, Gideon Lachman. We thank Gideon for helping us get the ball rolling and acknowledge the staff of the Endangered and Nongame Species Program (ENSP) within the Department of the Environmental Protection's Division of Fish and Wildlife and the scientific and technical staff of the Conserve Wildlife Foundation (CWF) whose dedicated work over many months shaped the Plan. ENSP and CWF staff include David Jenkins, Acting Chief, Kris Schantz, Kathy Clark, Michael Valent, Amanda Dey, David Golden, Jeanette Bowers-Altman, Naomi Avissar, Melissa Craddock, Michael Davenport, Gretchen Fowles, MacKenzie Hall, Brian Henderson, Chris Kisiel, Kim Korth, Sharon (DeFalco) Petzinger, Todd Pover, Larissa Smith, Peter Winkler, Patrick Woerner, Brian Zarate, Theresa Terry, and Linda Watson. Numerous programs and staff from the Department of Environmental Protection and the various Bureaus within the Division of Fish and Wildlife provided valuable review and input. Special thanks to Director, David Chanda and James Sciascia, Chief of the Bureau of Information and Education, for their continued support and assistance during the development and review of the Plan. We also appreciate significant input from Deputy Commissioner John Watson, as well as the Director of the Division of Policy and Planning, Jeanne Herb, and Marjorie Kaplan; and for continued support from Commissioner Lisa Jackson and Assistant Commissioner Amy Cradic as we begin implementing the Plan statewide.

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A special thank you to the Environmental Law Institute and NJ Future for helping us organize the Wildlife Summit and to the representatives of over 60 federal, state, county, and private agencies and organizations who attended and participated to foster discussion and provide recommendations regarding New Jersey wildlife conservation issues. Duke Farms Foundation

and the Doris Duke Charitable Foundation graciously hosted and sponsored the Wildlife Summit and we appreciate their support on the Plan and other conservation initiatives.

We would also like to thank Martin J. McHugh, former Director of the Division of Fish and Wildlife, and Linda Tesauro, former Executive Director and founder of the Conserve Wildlife Foundation, for their support and assistance during the development of the Plan. We would especially like to thank Larry Niles, Ph.D., former Bureau Chief of the Endangered and Nongame Species Program, for his tireless efforts, innovative thinking, and endless support during the development and planning phase for implementation of the Wildlife Action Plan.

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

I. Preface

A. A letter from Deputy Commissioner Jay S. Watson

New Jersey is fortunate to have a rich diversity of fish and wildlife. Over 900 vertebrate species and innumerable invertebrates populate the state and its coast. However, as the most densely populated state in the nation, New Jersey also faces many challenges ensuring the continued health of our fish and wildlife population. The New Jersey Wildlife Action Plan was created to meet these challenges. The main goal of the planning effort was to outline action we can take to prevent wildlife from becoming so rare that it is expensive or impossible to save them.

The Wildlife Action Plan was developed by a diverse coalition of scientists, ecologists, conservationists, sportsmen, and farmers, with input from the public. It calls on government and non-government agencies, landowners and land stewards, and private citizens to join together in a cooperative effort to preserve the state's diversity of wildlife and the habitat upon which it depends.

While we cannot fully predict the impact of losing any species, we do know that all species play a role in maintaining ecological balance and integrity. By protecting species and their habitat, we also secure the health and quality of life for New Jersey residents by improving water quality; protecting water supply, riparian areas and floodplains; and preserving forests and the natural cooling they provide.

The Department of Environmental Protection's Division of Fish and Wildlife takes great pride in the stewardship of species that are endangered, threatened, rare or have special conservation needs. New Jersey has a history of success bringing wild turkey, white-tailed deer and numerous fish species back from the brink of extinction and has made great strides in the recovery of rare species populations such as the bald eagle, osprey, peregrine falcon, and bobcat. This plan is the state's blueprint for continued success.

On behalf of its employees, I wish to extend our thanks to all the stakeholders that contributed to this Wildlife Action Plan and we look forward to our future work with our partners in conservation on behalf of New Jersey's wildlife.

John S. Watson, Jr.,
Deputy Commissioner for Natural Resources
New Jersey Department of Environmental Protection

B. A letter from Acting Director David Chanda

The New Jersey Department of Environmental Protection's Division of Fish and Wildlife (Division) is responsible for providing a secure and healthy environment for the State's wildlife resources. Managing all of the state's wildlife resources is a task requiring professional and scientific expertise, as well as public support.

Twenty-five years ago when I began my career in wildlife management there was only one nesting pair of bald eagles left in the entire state, peregrine falcons had not successfully nested for many years and the osprey was an endangered species. Today, thanks to the hard work and efforts of a dedicated staff of professionals in the Division's Endangered Species Program (along with the help and support of countless volunteers and conservation groups), there are more than 55 active bald eagle nests. In addition, 18 - 20 pairs of peregrine falcons regularly nest in the Garden State, and the restoration efforts for osprey were so successful that it has the distinction of being the first species in the history of New Jersey to be upgraded from the State's endangered species list to the threatened list.

These success stories are merely a precursor to what can be accomplished as we begin to implement New Jersey's "Wildlife Action Plan." This action plan was created in a collaborative effort that included biologists, conservationists, landowners, sportsmen and women, and the general public. This proactive plan will help conserve wildlife species and vital habitats before they become too rare and costly to protect. As our communities grow, the Wildlife Action Plan will give us the ability to fulfill our responsibility to conserve wildlife and the lands and waters on which wildlife depends so that future generations can also enjoy the rich diversity of wildlife that inhabits the Garden State.

The Division is committed to working for both the wildlife and the citizens of our state to ensure stable and thriving conditions where both can exist in balance with one another. Healthy wildlife populations, habitat and sound wildlife management doesn't just happen. It is the result of a collaborative effort with conservation organizations and professional management provided by the Division. New Jersey's "Wildlife Action Plan" provides a blueprint for future conservation efforts and provides a powerful new tool for wildlife conservation.

I hope that you will join me as we continue to conserve the State's fish and wildlife resources.

David Chanda
Acting Director
NJ Division of Fish and Wildlife

II. Executive Summary

Since early 2004, the NJ Division of Fish and Wildlife staff has been working on a blueprint for the future conservation of our state's wildlife species of greatest conservation need. This blueprint is called the *Wildlife Action Plan* (WAP) and was formerly referred to as the *Comprehensive Wildlife Conservation Strategy* (CWCS).

Each state must submit a Wildlife Action Plan (WAP) to the US Fish and Wildlife Service (USFWS) by October 2005 for review and approval in order to qualify for future federal funds through the State Wildlife Grants program. The New Jersey WAP must be considered a living document to remain relevant and current. Consequently, although we are submitting the required Draft version to the USFWS by October 1 we plan to continue accepting public comments during the review period and taking those comments into consideration in developing the final version of the Plan.

The State Wildlife Grants program provides federal funds to states for the conservation of species that are endangered, threatened, rare or have special conservation needs. New Jersey currently receives approximately $1.2 million dollars of State Wildlife Grants funding each year. Citizen contributions to the Division's Endangered and Nongame Species Program provide the 25% match that enables us to obtain these critical federal funds. Essentially, every dollar donated through the Check-off For Wildlife or through the purchase of Conserve Wildlife license plates leverages three federal dollars in State Wildlife Grants funding.

The New Jersey Wildlife Action Plan lays the foundation for better coordination of wildlife research and management between the programs within the Division of Fish and Wildlife, state and federal agencies, and the many partners in the conservation community (Appendix V). In addition, the conservation strategies developed by each state will collectively offer a strong argument to Congress to provide a stable and permanent funding source for the conservation of rare wildlife.

The New Jersey WAP addresses conservation efforts at scales that range from statewide, to Landscape Regions, to more localized Conservation Zones within each Landscape Region. Citizens interested in a particular region of the state need only to review the Overview (State information), the Regional information, and the Conservation Zone of interest to understand their role in wildlife conservation and how it relates to statewide efforts.

Following Congressional requirements, the WAP focuses on wildlife Species of Greatest Conservation Need (SGCN). These include species with state or federal status and those whose populations are declining and may become threatened or endangered in the future. Congress further required that each WAP address the following eight elements:

1. Identify the distribution and abundance of species of greatest conservation need (SGCN).
2. Describe the location and condition of key habitats essential to the SGCN.
3. Describe the threats to and research needs for SGCN and their habitats.

4. Describe the conservation actions required to conserve the identified species and their habitats.
5. Identify monitoring plans for SGCN, their habitats, and the proposed conservation actions.
6. Describe the review process of the WAP at intervals not to exceed ten years.
7. Coordinate the WAP with other federal, state, and local agencies' wildlife and land management plans.
8. Include a public involvement process in the development and implementation of the WAP.

For additional information regarding the eight elements, please review the *NAAT Evaluation Guide to NJ's Wildlife Action Plan (WAP)* section of the Plan or visit the Teaming with Wildlife website at: http://www.teaming.com/state_wildlife_strategies.htm

The greatest threats to NJ's natural resources include habitat loss, destruction, alteration, and fragmentation. This has been a recurring theme within NJ for years as it is the most densely populated state in our nation with an annually increasing population requiring additional homes, roads, commercial buildings, schools, etc. Additional threats include, but are not limited to, invasive species (flora and fauna, aquatic and terrestrial), pollution, and unsustainable land management practices.

The NJ WAP provides a common comprehensive conservation vision with guidance and specific actions for both long- and short-term management efforts that can be implemented by government and non-government agencies, conservation organizations, land stewards, and private landowners. The WAP will guide partners in conservation in a cooperative effort to minimize the threats and improve habitat quality for NJ's wildlife SGCN.

Recommended conservation actions include:

1. Full recovery of rare species populations through habitat restoration, land acquisition, and landowner incentives.
2. Public education and outreach programs regarding wildlife, critical habitats, and the deleterious effects of invasive species and other threats.
3. Development of effective conservation partnerships among organizations representing diverse interests in wildlife conservation.
4. Continued research and monitoring of SGCN to inform biological databases and NJ's Landscape critical habitat mapping, and direct local and statewide conservation efforts.

The WAP provides a variety of conservation actions at various stages focusing on the conservation of our SGCN and their habitats. The NJ Division of Fish and Wildlife recognizes the daunting task of implementing the WAP. There is truly much work to be done and much to be gained from a statewide effort with a unified vision.

Historically, NJ's financial resources for conservation have been limited. However, in recent years the State Wildlife Grants funding has been a tremendous boon to the NJ Division of Fish and Wildlife, especially to the Endangered and Nongame Species Program. Traditionally, hunting, fishing, and trapping licenses have accounted for nearly 100% of NJ's wildlife conservation funds focused on game and fish species. However, the annually decreasing number of sportsmen within the state has led to a diminished source of financial resources needed to manage such species. In addition, the Endangered and Nongame Species Program, responsible for over 400 nongame and rare species, has relied on private grants, tax checkoff, the Conserve Wildlife license plate, and private donations to support on-going research focused on SGCN.

The State Wildlife Grants program will replenish and provide a source of funding for conservation efforts throughout the state as we begin implementation of the WAP. While the WAP outlines somewhat lofty but much needed goals, we are confident that local, state, and federal governments, conservation organizations, and NJ's citizens will successfully partner and work toward improving NJ's natural communities and conservation of our Species of Greatest Conservation Need.

III. Outline of Contents

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IV . NAAT Evaluation Guide to NJ's Wildlife Action Plan

This guide is provided for the National Advisory Acceptance Team (NAAT) for the purpose of evaluating NJ's Wildlife Action Plan (WAP or Plan) in addressing the 8 required elements.

The New Jersey Plan is organized by five geographic regions with subregions identified within each major region. For ease of review, the Plan's structure is identical for each of the five major regions in describing the region, subregions, its habitats, species of conservation need, threats, conservation goals and actions and partnerships.

Following Congressional requirements, the WAP focuses on wildlife Species of Greatest Conservation Need (SGCN). These include species with state or federal status and those whose populations are declining and may become threatened or endangered in the future. Congress further required that each WAP include the following eight elements:

1. Identify the distribution and abundance of species of greatest conservation need (SGCN)

The process of determining the SGCN is described in the *Overview* (pages 3 - 5). We considered four existing data sources – the Landscape Project of Critical Habitat, the Delphi Species Status Assessment, the State Wildlife Grants Work Plan, and the Endangered and Nongame Species Advisory Committee – as a basis for identifying species and their distribution in the state.

a. The Wildlife Action Plan addresses New Jersey's non-harvested endangered, threatened and special concern species, as well as species of regional priority with or without seasonal harvests. The Division of Fish and Wildlife is currently working on a critical habitat map and a comprehensive plan for all game species. Plans for cold-water and warm-water game fishes already exist.

b. All species that occur within each Landscape Region and Conservation Zone are presented in tables within the *Wildlife of Greatest Conservation Need* sections of each Region and Zone. Federally-listed species are identified in separate tables, and while federal threatened or endangered status automatically confers state endangered status, we did not repeat those species in the state-endangered tables. From these lists we have identified critical habitat types within Zones and have proposed and prioritized actions to protect them.

c. Species and species suites that are present statewide are addressed within the statewide-level goals as well as more specifically within the region and zone goals and actions.

2. *Describe the location and condition of key habitats essential to the SGCN.*

a. All important habitat locations were based on the following databases: Biotics; Landscape Map; NJ Audubon Society's Breeding Bird Atlas; the Endangered and Nongame Species Program's Herptile Atlas and Neotropical Landbird Surveys;

the Division of Fish and Wildlife, Bureau of Wildlife Management's waterfowl and upland game bird surveys; and the Department of Environmental Protection, Office of Land Management, Natural Heritage Program and NatureServe Conservation Status Assessment.

b. Habitat descriptions are provided within the state, regional, and conservation zone sections. Within the *Overview, Section C (New Jersey's Landscape Regions and Conservation Zone),* the WAP describes the general habitat types found within each Landscape Region and their value to wildlife. Within the Regional sections, the *Habitats* portion identifies and prioritizes habitat types within the region and describes their general condition. Each Zone's *Habitats* portion provides further details regarding the condition of unique habitats found within each Zone.

c. The Plan was constructed for the benefit of users. It is linked to the viewable, interactive mapping (the Landscape Map) by the attribute table so users can read the appropriate section of the Wildlife Action Plan (WAP) for a specific map area. The WAP's sections suggest conservation actions for that area. It will also be available in its entirety on the Department of Environmental Protection, Division of Fish and Wildlife's website, www.njfishandwildlife.com.

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

a. The WAP addresses national, interstate, and statewide threats within the *Overview, Section E (Threats to Wildlife and Habitats).* In addition, specific threats to the habitats and wildlife of the regions and conservation zones are included within each Region's *Threats* section and each Zone's *Threats to Wildlife and Habitats* section. The listed threats have been compiled from the state's long- and short-term research and conservation partners.

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

a. The Plan provides conservation actions at all scales from state, to Landscape Region, to the more localized Conservation Zone. At the state level, the Plan identifies goals and prescribes strategies that apply to all areas (*Overview – Section F).* At the Landscape level we propose actions that apply in each distinct Landscape Region, while goals and conservation actions required to achieve those goals are prescribed at the Conservation Zone level (found within the *Conservation goals and Conservation actions* sections of each Zone, respectively).

b. This Plan is constructed to provide a framework for the recovery of endangered, threatened and rare wildlife species, and to maintain the integrity of ecological communities. Targets for each species were chosen at the Region and Zone levels and include maintaining, increasing or restoring/researching populations within a

Region or Zone, This information is presented in tables within the *Wildlife of Greatest Conservation Need* sections of each Region.

5. Identify monitoring plans for SGCN, their habitats, and the proposed conservation actions.

a. Proposed monitoring efforts for SGCN, their habitats, and the implementation of the conservation actions have been provided within the *Monitoring Success* portions of the *Overview, Section F (State-level Objectives)* and within each Zone.

b. Monitoring efforts include both long- and short-term surveys. The results will allow necessary adjustments to be made prior to the scheduled WAP review.

6. Describe the review process of the WAP at intervals not to exceed ten years.

a. The WAP is an on-going, dynamic document, to be reviewed every five years. Details regarding the review process can be found within the *Overview, Section F, Part 8 (State-level Objectives - Review of Wildlife Action Plan).*

7. Coordinate the WAP with other federal, state, and local agencies' wildlife and land management plans

a. The Plan incorporates the priorities of all national plans including: Partners in Flight North American Landbird Conservation Plan (Mid-Atlantic, Piedmont, and Southern New England regions) The U.S. Shorebird Conservation Plan; Waterbird Conservation for the Americas: The North American Waterbird Conservation Plan (Mid-Atlantic/New England Maritime); North American Waterfowl Management Plan; Northeast American Woodcock Management Plan; U.S. Fish and Wildlife list of species of conservation concern (2002); Partners in Amphibian and Reptile Conservation; and U.S. Fish and Wildlife Service Indiana Bat (*Myotis sodalis*) Revised Recovery Plan. In addition, nongame species not well-represented among national or regional plans, nor through New Jersey's Delphi Status Review that are identified with state element ranks S1-S3 and/ or global element ranks G1-G3 through NatureServe Conservation Status Assessment (Appendix I) have been incorporated.

b. The WAP will be used as a basis for the development of new, and revisions to existing, site-management plans such as those used by National Wildlife Refuges, state and federal parks and forests, land stewards, etc. The WAP will also be reviewed and revised as necessary (see element #6 above), however, it will remain a critical goal that all plans for the management of critical habitats and wildlife maintain the statewide vision and rely upon cooperative partnerships between agencies and land stewards.

8. Include a public involvement process in the development and implementation of the WAP.

a. The Division of Fish and Wildlife's process for the development of the Plan is found in the *Overview, Section A (The Unprecedented Challenge Facing Wildlife Conservation in New Jersey) and Section F, Part 8 (State-level Objectives - Review of Comprehensive Wildlife Conservation Strategy).*

b. Opportunities for public participation to implement the conservation actions can be found within the section entitled *Potential Partnerships to Deliver Conservation* that is part of Section F of the *Overview (State-level Objectives section)* and, also, within each Conservation Zone.

c. It will be necessary for the staff of DEP's Division of Fish and Wildlife to work toward integrating conservation actions recommended in the WAP into site-specific management plans. This may involve more interests than those covered in the WAP. However, when used in conjunction with the Landscape Map and the *Endangered and Threatened Wildlife of New Jersey* book, the WAP makes a clear statement of the needs for these species, thus providing a useful proactive measure to help reduce user conflicts with regards to rare wildlife.

V. Overview

A. The Unprecedented Challenge Facing Wildlife Conservation in New Jersey

The rapidly changing landscape of New Jersey creates an unprecedented wildlife conservation challenge for its citizens. Destructive influences on habitat and wildlife populations abound in our state. Some of these influences result from the combined negative pressures of those normally associated with urban states, such as unsustainable development and the inevitable damaging impacts to all wildlife from habitat destruction. Other influences more associated with rural states, include human competition with wildlife for natural resources, declining forest health and the influx of exotic or invasive species.

Since New Jersey has extremely diverse and ecologically significant natural communities, the combined negative impacts of these influences are enhanced. Our larger, unfragmented forest tracts are among the largest on the mid-Atlantic coast and are home to resident bobcats, barred owls, and timber rattlesnakes and provide essential stopover habitat for most of the eastern U.S. migratory population of songbirds and raptors. Similarly, New Jersey's Atlantic and Delaware Bay coastal habitats are home to bald eagles, northern harriers, black rails, and piping plovers and are critical to millions of migratory raptors, waterfowl, shorebirds, butterflies, dragonflies, and fishes. Our woods, wetlands, streams, and fields support a staggering array of wildlife species, including 73 state endangered and threatened species, some of which are recognized as globally rare.

Extraordinary threats in an extraordinary natural landscape present a great challenge to New Jersey residents. Undaunted, our citizens have overwhelmingly supported important initiatives to protect our wildlife and habitat. New Jersey is the first state where every county has a voter-approved land acquisition program. The state itself spends millions of dollars for important land acquisition, more than any other state in our region. New Jersey's public land system is impressive. In fact, we have more land in public ownership than most states, including many that are much larger than New Jersey. In addition, the NJ Department of Environmental Protection's Land Use Regulation Program annually protects thousands of acres from unwise development because we have one of the few statewide programs that protects wetlands, vernal pools, and important coastal habitats.

These significant tools exist to protect and manage all wildlife. However, if we ask whether all of our wildlife species are secure and if they all will be available to our children or to their children, the answer is not likely. The number of species identified as being threatened with extinction in New Jersey grows every year; 14 new species have been listed since 2001. Although we are rapidly buying land to protect throughout New Jersey, these acquisitions do not come close to equaling the amount of land being lost to development. In fact, each year New Jersey loses nearly 4,000 hectares of farmland alone to development. Clearly we need new tools and new methods to address this challenge.

The New Jersey Wildlife Action Plan for Species of Greatest Conservation Need (Plan) is just such a tool. Originally created to meet the eligibility requirement for US Fish and Wildlife Service State Wildlife Grants, New Jersey's Plan has evolved into something much more important. Under the leadership of the Division of Fish and Wildlife's Endangered and Nongame Species Program (ENSP) and with the help of staff of the other Division Bureaus, partner conservation agencies and stakeholder groups, this document is a blueprint for statewide protection of wildlife with special conservation needs. The Plan embodies the collective judgment of the state's conservation professionals regarding which species should receive special attention and what should be done. It identifies tasks for nearly every agency and group that has some influence over land and wildlife. We intend to use the Plan to create a more robust system of rare wildlife and habitat protection that utilizes all appropriate agencies and groups. The Plan is a dynamic tool for landowners of all types, from backyard owners to land stewards of large public forests, to use for the protection of habitat and species of greatest conservation need.

Managing For Biodiversity:
One major premise and seven focus areas underlie the Plan. The major premise is that certain species require new or additional protection and management. The seven focus areas are:

1. Habitat Destruction
Habitat destruction is the greatest threat to New Jersey wildlife. It is the equivalent of actually "taking" or killing wildlife, since an organism denied its ability to feed and/or reproduce can no longer exist. New Jersey is moving to adopt endangered and threatened species rules to further protect endangered and threatened wildlife and their associated habitat. Identification, protection, and, where possible, acquisition of critical habitats for such wildlife are key components of the Plan. Another goal is to further integrate water quality regulations and aquatic habitat delineation into endangered and threatened wildlife protection.

2. Stewardship and Restoration
Managing lands for biodiversity is another key thrust of the Plan. To this purpose, the Plan recognizes the need for dedicated funding for biodiversity land management on both public and private lands. NJ has recently initiated coordinated biodiversity protection on DEP lands. Applying *best management practices* focused on endangered, threatened, and rare species and maintenance or improvement of the ecological integrity of New Jersey's natural communities will be the standard operating procedure on all public lands. Conservation actions throughout the document that address this issue include, but are not limited to, the development of *best management practices*, maintaining and enhancing recognized tracts of critical habitats for suites of wildlife species, and the maintenance and restoration of riparian buffers.

3. Wildlife Management
Control of overabundant species in identified areas, such as white-tailed deer, is an essential component of the Plan. It calls for a statewide, multi-organization effort to increase public education and awareness of the benefits that hunting of certain species has for all wildlife and natural communities. The Plan calls for the development of area-specific deer densities with goals focused on forest health and ecological integrity, innovative methods to increase land accessibility to hunters, and long-term monitoring of habitat health.

4. Government-Wide Invasive Species Policy
Invasive species, both plant and animal, greatly threaten natural biodiversity. Without natural controls, they often out-compete and crowd out native species leaving a less diverse ecosystem. The State's Invasive Species Council has worked to address the threats of invasive species in New Jersey and regionally. The Plan and Council alls for concerted efforts for both the control of invasive species and bioremediation plans to restore natural biodiversity to the New Jersey environment. Conservation actions such as identifying routes of exposure and introduction of invasive species, improving intra- and interstate monitoring efforts, and prioritizing management and eradication efforts are the basis of restoring New Jersey's natural communities to their native state.

5. Recovery Plans for All Species
In our role as good stewards of the land and flora and fauna that inhabit it, recovery plans for all endangered, threatened, and other rare species must be devised and implemented.

6. Data and Scientific Updates
The foundation of the Plan is sound science. To guide the Plan as it evolves, we will rely upon habitat mapping, species surveys, and scientific modeling to determine the most critical habitats and wildlife in greatest conservation need. Regular monitoring to measure progress and refine approaches is also critical to the Plan's success. The Plan calls for ongoing research of rare wildlife, regular updates of the ENSP's Landscape Map used for regulatory and planning purposes, and the completion of accompanying riparian mapping. In addition, the Plan is considered a dynamic document to be formally reviewed every five years.

7. Challenges in Urban and Suburban Environments
As the nation's most densely populated state, our urban and suburban environment presents unique challenges. Among them – how to manage individuals and pairs of endangered and/or threatened species, such as bald eagles and peregrine falcons, which nest or somehow otherwise adapt to and utilize these environments. The Plan also calls for a concerted effort to identify oases of urban wildlife habitat and, where appropriate, to restore natural resources within urban environments. Other goals include identifying and minimizing toxins found in New Jersey's biota (plant and animal life) and to identify and minimize catastrophic risks to wildlife, such as oil spills.

Our Plan Builds on Four Existing Strengths of the Division of Fish and Wildlife's Endangered Species Program (ENSP)
During the recent history of the ENSP, our staff has devoted significant efforts to four programs that are at the heart of the USFWS requirements for the Plan. While they are more fully described later, they are:

1. The Landscape Project
The Landscape Project is a proactive, ecosystem-level, geographic information systems (GIS) approach to identifying and delineating areas critical for imperiled and special concern animal species within New Jersey. The Division of Fish and Wildlife's (DFW) ENSP began the project in 1994 with the goal of protecting New Jersey's biological diversity by maintaining and enhancing imperiled wildlife populations within healthy, functioning ecosystems. To create the

maps, an extensive database of imperiled and priority species location information is combined with the New Jersey Department of Environmental Protection's (NJDEP) land-use/land-cover data. Critical area maps are available to the public for download in ArcView Shape file format and through the DEP's iMAP Internet function. For more information regarding the Landscape Project, see Section B within the *Overview* and Attachment A.

2. Delphi Status Review

Wildlife species are generally assigned a legal status (e.g., endangered, threatened, stable) by state wildlife agencies. That status confers legal protection or management priority within the state. Most states rely on subjective determinations made by a group of experts. We adapted the Delphi Status Review (or Delphi process) to achieve greater objectivity in determining the relative endangerment or stability of a species' population. A systematic method for reaching consensus among experts, the Delphi Status Review is an iterative process characterized by anonymity among the participating experts and controlled feedback via the principal investigator. The results of this status assessment are used to assign the legal status of species in the state. Thus far, birds, reptiles, amphibians, freshwater mussels, butterflies, moths, dragonflies, and damselflies have gone through Delphi Status Review.

3. State Wildlife Grants Work Plan (SWG)

State Wildlife Grants, established in the fall of 2001, is a federal grant program aimed at preventing wildlife of greatest conservation need from declining to the point of becoming threatened or endangered. The United States Fish and Wildlife Service (USFWS) provides funds to state fish and wildlife agencies for research and planning on these species. In preparation for annual submittals, the ENSP developed a comprehensive work plan identifying both the necessary research, survey and management projects necessary to protect wildlife of greatest conservation need and the partnerships necessary to deliver those actions. This work plan was reviewed by the ENSP's Advisory Committee (ENSAC), which includes representatives of most of the state's non-governmental conservation agencies. The efforts outlined within the work plan have been incorporated into the New Jersey Plan.

4. Endangered and Nongame Advisory Committee (ENSAC)

The ENSAC was established in 1973 under the implementation of the state Endangered Species Act (ESA). The composition of the committee, academic (four seats), conservation group leaders (three seats), public (three seats) and veterinary profession (one seat) was originally set by the ESA and aimed to provide an effective review of the actions and plans of the Endangered and Nongame Species Program (ENSP). The committee also reviews all recommendations of the ENSP to change the status of species. As the meetings are open to the public, the ENSAC provides a regular public review of ENSP actions, plans and recommendations and has been very helpful in identifying the strengths and weaknesses of our work. The ENSAC has reviewed the SWG work plan, Delphi Status Review recommendations, the Landscape Project, and now the iterations of the Plan.

The first draft of the New Jersey Wildlife Action Plan has been reviewed by the state's most respected conservation professionals and therefore represents a consensus on the species of greatest conservation need and the actions necessary to protect them.

The first draft was presented to each of the regional ENSP biologists who were asked to create a more specific strategy for each of five landscapes in the state (Figures 1 and 3). These include the Delaware Bay, the Atlantic Coast, the Pinelands, the Piedmont Coastal Plain, and the Skylands Region, which contains the Highlands and Ridge and Valley geologic provinces. Conservation Zones, smaller areas within each Landscape, were established using watershed boundaries and geographical landscape features determined by ENSP biologists. Threats and goals were then developed along with actions necessary to protect or recover species from threats from three perspectives: statewide; within each of the five landscapes; and within each of the Conservation Zones. Based on these three perspectives, many iterative reviews by our staff yielded the first draft, which was presented for internal and external peer review.

This phase of the review process was initiated with other bureaus within the Division of Fish and Wildlife. After incorporating suggestions from the Bureaus of Freshwater Fisheries, Wildlife Management, Land Management, Marine Fisheries, and Information and Education, a draft was presented to the ENSAC, which began the external peer review. Shortly thereafter, a review was requested from all relevant federal and state agencies, and the state's larger conservation non-governmental organizations (NGOs).

Drafts two through seven incorporated input from peer reviews and public comments represented by a diverse assemblage of groups and organizations involved directly or indirectly in the conservation of New Jersey's wildlife. These comments comprised– to the maximum extent possible – a consensus of the state's wildlife conservation community on the actions necessary to protect species of greatest conservation concern. A list of participants assisting in the development of the Plan can be found in Appendix V.

The official public comment period was held from September 21 – September 28, 2005, during which time, mostly online comments were submitted. The public had been notified through the NJ Register of the September 1 – September 28 initial comment period, but the Plan was not posted until September 21. Due to the limited time frame, however, the ENSP extended the comment period until December 31, 2005, and continued to accept comments through January 15, 2006, for review and potential incorporation into the revised Plan. The extension was broadcast to the public via the Division of Fish and Wildlife's eight list-serves containing approximately 28,000 – 30,000 members, including many who are members of the news media. Although there is certainly some overlap among the recipients, based on the specificity of each list the majority are from different audiences including sportsmen/women, anglers, educators, those interested in rare wildlife, and outdoor writers.

During the thirteen-week public comment period, the Division of Fish and Wildlife received thirty-seven online comments and approximately 300-350 letters. Of these letters, three form letters were sent that had been sent by 250-300 people; nearly 200 people signed one of the letters. The comments were reviewed and summarized into fifty general issues or concerns (Appendix VI). Thirty-eight of these comments indicated opposition to the feral cat issue and

the trap-neuter-release (TNR) programs detailed in the September 2005 version of the NJ Wildlife Action Plan and were of anti-hunting sentiment. The remaining twelve comments consisted of potential partnerships, issues regarding off-road vehicles, emergency response planning, additional research, and etcetera.

The ENSP incorporated many of these comments and recommendations into the current revised version of the NJ Wildlife Action Plan (dated July 26, 2006). Included in the revision is a change in the state's approach to dealing with feral cat colonies and TNR programs. State biologists are currently working with organizations to develop protocols and identify the areas where feral cat colonies would pose the greatest risk and ensuring that local regulations that implement TNR programs avoid these areas or allow for alternatives to TNR. We have not altered our goals and strategies regarding deer hunting because state biologists and conservation partners agree that deer management is a critical component in maintaining healthy forests and biodiversity within our state.

The revised NJ Wildlife Action Plan (dated July 26, 2006) was posted online for review and comments, as the Plan is considered a dynamic document. The citizens of NJ were notified of their opportunity to comment on the Plan through the publication of a notice in the NJ Register and through the Division of Fish and Wildlife's list serves. Comments were reviewed, considered, and, as appropriate, incorporated by the Division of Fish and Wildlife and its associated advisory committees and councils each year. Since then, the Plan has continued to undergo revisions including refinement of actions for clarification and focus on measurable outcomes; the most recent available version of the Plan posted online for public viewing and comment. The state's conservation partners will conduct formal review of the Plan's effectiveness every four – five years at a "partner summit," after implementation of the Plan has begun. The next Partner Summit is expected to take place during the winter of 2010 – 2011, but may be rescheduled to the following winter due to delays in implementation statewide.

The second phase of the process, which is already underway, involves Plan implementation. The NJDFW is sponsoring outreach programs to encourage the use of the Plan by all of the state's conservation, planning and regulatory groups, and citizens.

During the spring of 2006, the Division of Fish and Wildlife met with stakeholders (the state's conservation partners) from around the state to develop an implementation plan for the NJ Wildlife Action Plan. During that process, the NJDFW was able to incorporate additional comments and recommendations regarding the goals and strategies outlined in Section F of the Plan's Overview. The results of these meetings can be viewed within Attachments B and C.

The success of our Wildlife Action Plan depends on our ability to attract resources to implement the Plan through a wide array of existing partners who have influence on wildlife and habitat and new partners who have resources to contribute to the conservation goals.

Our goal is to deliver the Plan to those who have some role in the protection of habitat and/or wildlife or have a mandate to fund conservation initiatives. We want a dialogue that will help us

incorporate actions within the Plan that will facilitate implementation by all relevant agencies and groups. To that end, we have conducted or are conducting two major actions:

1. **Partner Summit:** In spring 2005, we hosted a partner summit to develop the best methods of implementation for all partner agencies and groups. Nine breakout sessions were held within the summit dedicated to important topics, including: Municipal Land-Use Planning, Regional and State Planning, Invasive and Overabundant Species Management, Public Land Management, Land Acquisition (public and private), State and Federal Private Land Incentive Programs, Infrastructure, Habitat Mitigation and Land Use Regulation, and Habitat Restoration and Management. The workshop represented a sincere effort to embrace the ideas of our partners in order to create realistic implementation additions to our Wildlife Action Plan. The ENSP staff incorporated the comments and results of the summit, as well as comments we received from the public, into the Plan. After a final review by the Commissioner of the DEP, the draft Plan was sent to the USFWS for formal review.

Partner Summits will be held every four to five years, after implementation has begun, as a way of monitoring the Plan's effectiveness, and to revisit the Plan's implementation priorities.

2. **Online:** The Wildlife Action Plan will be made available online so that it is easily accessible for all interested citizens. The online Plan is available in a format that enables anyone to find any specific portion of the Plan in which they are interested. NJ citizenry will be able to submit comments and recommendations on a continual basis.

The Plan is a dynamic document and it is our intention to continue to refine and revise the Plan as appropriate. This will result in a Wildlife Action Plan that represents a true consensus of what should be done, and by whom, for the species that are so important to all of us. County libraries will be notified of the federally approved Wildlife Action Plan and provided with the Division of Fish and Wildlife's Web site where it will be made available to the public. Revised versions of the Wildlife Action Plan will be submitted to the US Fish and Wildlife Service as appropriate.

3. **Public Forums and Open-house Opportunities:** The Division of Fish and Wildlife will hold a minimum of three open-house opportunities throughout the northern, central, and southern regions of the state, during 2008 calendar year to share the Wildlife Action Plan with NJ's citizens, provide information and educational opportunities, and recruit partnerships in conservation. Public forums will be scheduled for the year prior to future formal reviews to provide an opportunity for citizens to provide additional comments and recommendations for Plan revisions, gain additional support for the Plan, and continue to develop partnerships at a more local level. The next series of forums are tentatively scheduled to be held during 2010, prior to the first formal review, expected to be held in 2010 - 2011. The third series would be held in 2015, the year prior to the second formal review (2016). Issues raised at the public forums will be addressed during the formal review periods.

B. New Jersey's Landscape Project

The Landscape Project is a proactive, ecosystem-level, geographic information systems (GIS) approach to identifying and delineating areas critical for imperiled and priority concern animal species within New Jersey. The Division of Fish and Wildlife's Endangered and Nongame Species Program (ENSP) began the project in 1994 to protect New Jersey's biological diversity by maintaining and enhancing imperiled wildlife populations within healthy, functioning ecosystems.

Landscape Project mapping, the cornerstone of the Wildlife Action Plan, explicitly identifies critical habitat for wildlife of greatest conservation need. New Jersey's critical habitats were delineated by first collapsing the NJ Department of Environmental Protection (DEP) aerial photography-based land-use and land-cover information into five habitat categories: forest, grassland, forested wetlands, emergent wetlands, and beach/dune. Next, contiguous patches of habitats were determined from boundaries between different habitat categories and major roads (county level "500" roads). These habitat patches were then intersected with documented occurrences of nongame wildlife species, which are maintained in Biotics. Biotics is NatureServe's biodiversity data management software, which in New Jersey is managed jointly by the NJ Department of Environmental Protection's Office of Natural Lands Management's Natural Heritage Program and the Division of Fish and Wildlife's ENSP. Occurrence records were – and continue to be – derived from a variety of sources, including ENSP surveys, DEP staff reports, private consultant reports and reports from the general public. Habitat patches were then ranked based on the conservation status of the wildlife records and the following ranks assigned: (5) for federal endangered or threatened species, (4) for state endangered species, (3) for state threatened species, and (2) for wildlife species of special conservation concern. A rank of (1) was assigned to patches that have not adequately been surveyed to determine the presence or absence of rare wildlife. Detailed methodologies regarding species models and mapping methodology are provided in the Landscape Project Report (Niles et al. 2004). NOTE: In the map figure "imperiled species" is a convention adopted by ENSP to capture endangered and threatened together (both federal and state).

The Landscape Project is dynamic and can be used at multiple spatial scales to investigate novel approaches to wildlife conservation and wildlife conflicts. The GIS datasets are available to the public for free, allowing a multitude of users to overlay critical habitat with any other GIS layer important to their project. This has allowed users to incorporate critical habitat maps in their planning processes like never before. Landscape Project mapping is the primary source of endangered, threatened and rare wildlife data to private and public organizations and is currently used for land-use regulation, land acquisition through the NJ Department of Environmental Protection's Green Acres Program, state and private land management, private land trusts' management and acquisition, county and municipal planning, and open space acquisition.

More information about the Landscape Project can be found in Attachment A and is available from the NJ Division of Fish and Wildlife's Web site:

www.njfishandwildlife.com

Or by contacting:

The Landscape Project
NJ Division of Fish and Wildlife
Endangered and Nongame Species Program
P.O. Box 400
Trenton, NJ 08625
(609) 292-9400 or (609) 984-1414 (fax)

Figure 1. Critical landscape habitats identified through the Landscape Map (v2).

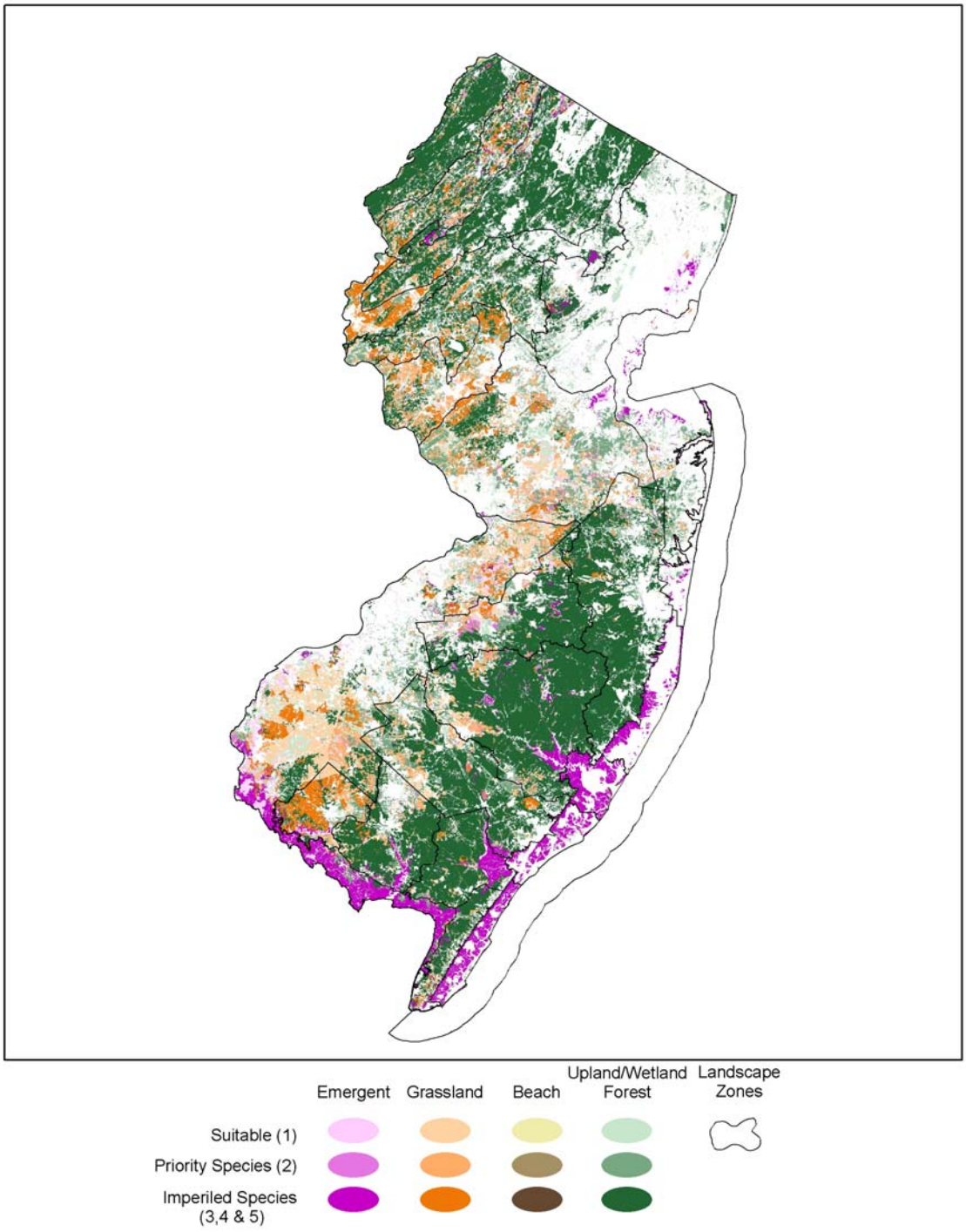
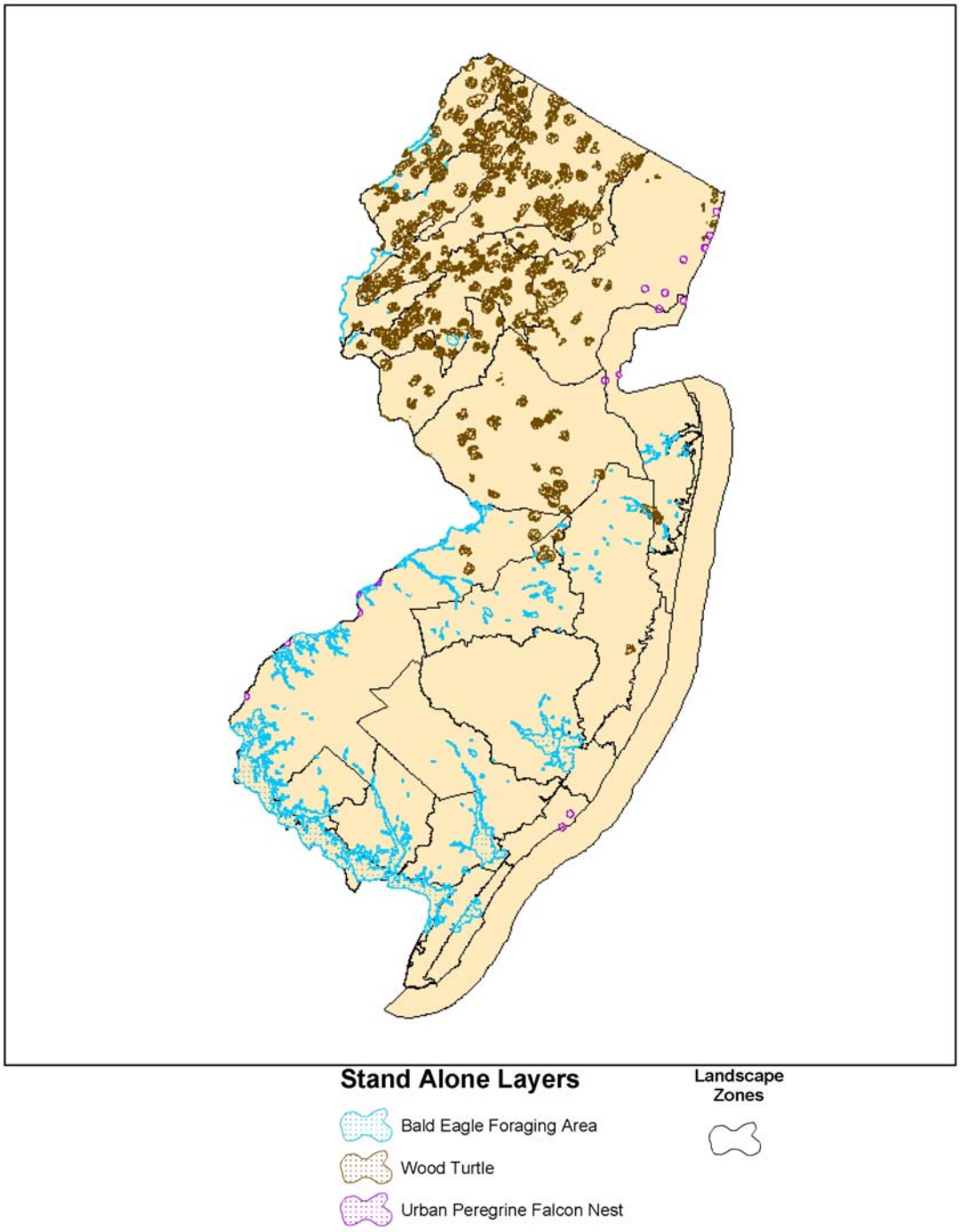


Figure 2. Stand-alone species' specific critical areas identified through the Landscape Map (v2).



C. New Jersey's Landscape Regions and Conservation Zones

Once glacial ice retreated and the Atlantic Ocean stabilized at its present shoreline, New Jersey blossomed into a state of diverse and unique habitats. Today's dunes, beaches, tidal marshes, cedar swamps, thick pitch pine forests, extensive grasslands, peat bogs, maple-oak forests, pitch pine ridge tops, brackish bays, rivers, streams and the Atlantic Ocean support an amazing array of wildlife. That is true despite the fact that New Jersey is the nation's most densely populated state and home to more than eight million people and much of its diverse landscape has been converted for agriculture or development, fragmented, degraded and altered. Nonetheless, there are tremendous opportunities for conservation of its rich array of wildlife and habitats.

In a state with 10 cities of more than 80,000 people and more than 19,165 square kilometers (7,400 sq. mi.), where should conservation be focused? New Jersey's Landscape Project answers that question by identifying areas of greatest conservation need.

Landscape Regions

Land forms, soils, vegetation and hydrological regimes were used to delineate five ecoregions or landscape regions in New Jersey: the Skylands, Piedmont Plains, Atlantic Coastal, Pinelands and Delaware Bay landscapes.

Skylands Landscape

This landscape region combines two of New Jersey's physiographic regions, the Ridge and Valley and the Highlands. It encompasses all or parts of Sussex, Warren, Hunterdon, Somerset, Passaic, Essex, Bergen, and Morris counties. The region contains extensive tracts of contiguous upland and wetland forests that support diverse animal populations including red-shouldered hawk, northern goshawk, cerulean warbler, timber rattlesnake, long-tailed salamander, and the state's only known wintering populations of Indiana bat. Bog turtles and great blue herons inhabit the extensive freshwater wetland systems found throughout the region.

Piedmont Plains Landscape

This landscape region also combines two of New Jersey's physiographic regions, the Piedmont and the Inner Coastal Plains. It encompasses all or parts of Burlington, Gloucester, Salem, Mercer, Middlesex, Monmouth, Hunterdon, Somerset, Union, Essex, Hudson, Passaic, and Bergen counties. It is dominated by the Delaware and Raritan rivers and is characterized by farmed areas, extensive grasslands, fragmented woodlands and tidal freshwater marshes that are among the world's most productive. Imperiled species within this landscape include grassland birds such as the endangered upland sandpiper and woodland raptors such as the barred owl and Cooper's hawk.

Atlantic Coastal Landscape

This landscape encompasses parts of Monmouth, Ocean, Cape May, and Atlantic counties. New Jersey's Atlantic Coast beaches and marshes are among the most productive coastal habitats in the country. Despite heavy development, they support important portions of Atlantic Coast populations of colonial nesting birds, such as common tern, little blue heron and great egret, and endangered beach-nesting birds such as least tern and piping plover. The coastal habitats also

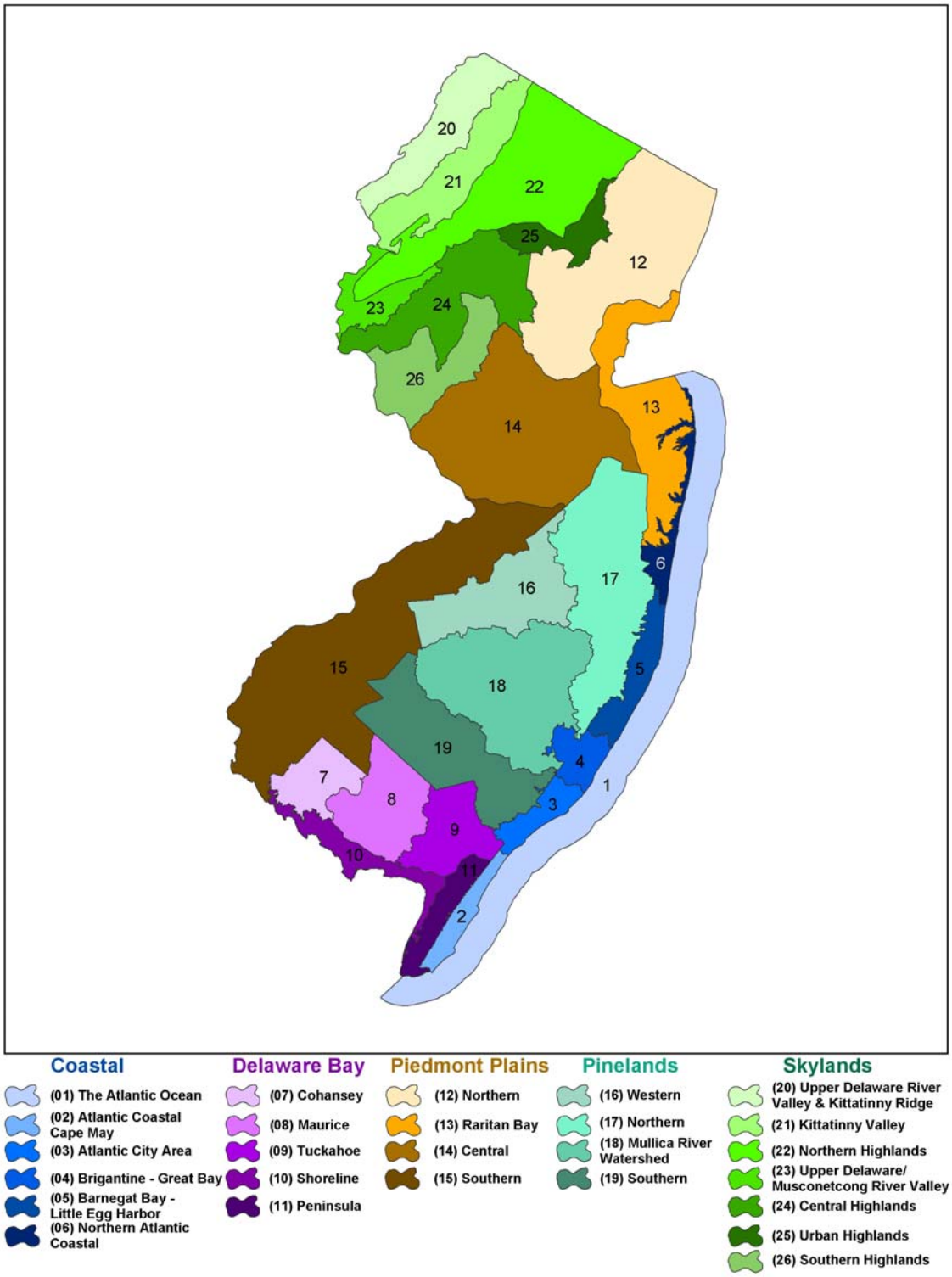
support most of the state's ospreys, peregrine falcons and northern diamondback terrapins, as well as a large number of northern harriers and large concentrations of wintering waterfowl.

Pinelands Landscape
This landscape encompasses all or parts of Atlantic, Ocean, Burlington, Camden, and Gloucester counties. An internationally recognized ecosystem, the Pinelands supports extremely diverse reptile, amphibian and invertebrate populations including northern pine snake, corn snake, Pine Barrens treefrog, Pine Barrens bluet and arogos skipper. Extensive cedar swamps and wetland systems contain numerous insect species, as well as sustainable populations of many neotropical birds. Its waterways support aquatic communities unique among mid-Atlantic states.

Delaware Bay Landscape
This landscape encompasses all or parts of Cape May, Atlantic and Cumberland counties. It features significant populations of bald eagle, barred owl, eastern tiger salamander, Cope's gray treefrog and 30 other endangered and threatened species. The vast woodland tracts of this region are among the largest in the state and support a large portion of New Jersey's neotropical birds and interior-forest bird populations. The extensive saltwater marsh and sandy overwash beaches support a significant horseshoe crab breeding area and shorebird migration, including the red knot, of worldwide ecological significance. Despite the heavy loss of habitat, the Cape May Peninsula remains one of the country's most important migratory "stopovers" for hundreds of bird and insect species. The expansive habitat mosaic of rivers and streams flowing into the tidal Delaware Bay supports concentrations of rare wildlife and wintering waterfowl.

Conservation Zones
Habitats are variable within each landscape region. Therefore, the regions have been further divided into *Conservation Zones* to identify specific habitat threats and conservation goals. The zones were created using geographic (rivers, ridgelines, watershed boundaries, etc.) and manmade features (roads – county level or larger) within each region.

Figure 3. Landscape regions identified by the Landscape Map (v2) and conservation zones within the regions.



D. New Jersey's Most Vulnerable Wildlife

This Plan focuses on species of greatest conservation need and many have a legally defined state status, which conveys a special conservation need.
The Endangered and Nongame Species Program has solicited the input of biologists to determine the status of each of New Jersey's nongame wildlife species by using the Delphi Status Review. It brings experts together to build consensus – in this case, about the condition of nongame wildlife species (and in some cases, game species) in New Jersey. Bird, reptile and amphibian, freshwater mussel and butterfly biologists participated in different Delphi Status Reviews and provided their opinions about the status of New Jersey species as well as justification for designating these species as endangered, threatened, special concern, secure/stable or unknown. Experts considered the distribution and abundance of wildlife, the condition of their habitats and the threats and problems they might face. Consensus was reached and the review process was completed when 85 percent of the experts agreed on a status for a species.

The Endangered and Nongame Species Advisory Committee recommends the legal status for nongame wildlife in New Jersey, and has followed the results of the Delphi Status Review.

The species of greatest conservation need (Appendix I) include those species that have been identified through scientifically sound data and review processes as species in need of special attention because continued (or further) habitat degradation or modification would result in population losses detrimental to the species' existence within New Jersey, regionally or nationally. The Wildlife Action Plan focuses on endangered, threatened, special concern and regional priority species, species of unknown status (based on the Delphi Status Review recommendations and the New Jersey state legal status), and species identified as extirpated as the result of the Delphi Status Review. The Plan also includes game species of regional priority, as well as game species that have limited population status information within New Jersey. Nongame species that have been reviewed through the Delphi process and do not have state or regional status, but have been identified by NatureServe Conservation Status Assessment (NatureServe, 2004) as species with a global element rank of G1-G3, have been included among the species of regional priority (Appendix I, Table W6). In addition, species that have not been reviewed through the Delphi process but hold a global element rank of G1-G3 and/or a state element rank of S1-S3, as identified by NatureServe Conservation Status Assessment and the ENSP, have been included among the species of special concern and regional priority (Appendix I, Table W6); this means they are potentially at risk for state and/or regional listing. Definitions for global and state element ranks are shown in Appendix I and can be viewed through NatureServe's web site: http://www.natureserve.org/explorer/.

The regions where such priority species occur are identified in Appendix I, Tables W3 – W9. A complete list of New Jersey's nongame priority species and their associated legal status, current as of August 2005, is shown in Appendix II. The wildlife species addressed in the Plan are those of greatest conservation concern, specifically those with endangered, threatened, and special concern status in the state. Species of regional priority for which no harvest is permitted are included among the state's species of special concern (Appendix I, Table W6). Through input from DFW's Bureaus of Wildlife Management and Freshwater Fisheries species of regional priority with seasonal harvests within New Jersey have been identified within Table W7

(Appendix I); nongame fish species currently without state or regional status have been identified within Table W8 (Appendix I); and species with seasonal harvests, currently without state or regional status, have been identified within Table W9 (Appendix I). Since, ENSP regularly conducts species status assessments using the Delphi Status Review process, a species legal status can change. Therefore, the most current status can be found at www.njfishandwildlife.com or by contacting the ENSP office.

The Plan consolidates the results of the Delphi Status Review with ENSP-identified jobs, objectives and approaches outlined in the New Jersey State Wildlife Grants Proposal (ENSP, 2002). The Plan also uses the fine-and-coarse-filter approach by grouping nongame and game wildlife species into ENSP-identified management suites, with common objectives and approaches to conservation (Appendix I, Table W10).

Detailed conservation goals and strategies for each of the wildlife species of greatest conservation need are available in the New Jersey State Wildlife Grants Proposal (ENSP, 2002).

E. Threats to Wildlife and Habitats

For a complete literature review on impacts of habitat loss and fragmentation, please see New Jersey's Landscape Project Report, Appendix III.
www.njfishandwildlife.com/ensp/landscape/lp_report.pdf

Contents

Global threats such as global warming and reduced air and water quality continue to jeopardize the future of our natural systems and quality of life in New Jersey. During the Wildlife Action Plan Implementation Meetings held on February 23 and April 6, 2006, stakeholders and partners in conservation recognized that while global warming and air quality are important issues, the magnitude of these threats are too great for one state to address. However, NJ's partners in conservation acknowledge that in order to determine the effects of global warming on our wildlife and their habitats long-term research and monitoring is required. Therefore when appropriate, future research will collect data addressing global warming threats such as increased water temperatures, rising sea level, vegetation changes, changes in food source emergence (e.g., insects), changes in migratory routes and timing, and appearance and disappearance of climate sensitive species.

Additionally, the NJ Department of Environmental Protection continues to be a strong advocate for decreasing both air and water pollution through strict regulations that will ultimately protect water quality in important waterways that support sensitive species. DEP has been a leader in such regulations and considers protection of our quality of life and natural resources an important priority.

1. National and Interstate Threats:

- Invasive species (both native and exotic terrestrial and aquatic animals, plants, invertebrates, and exotic pathogens) cause significant impacts and permanent loss of terrestrial and aquatic ecosystems. The cost of restoring habitat destroyed by invasive species can be prohibitive and requires persistent and long-term dedicated management. Without swift and significant intervention, losses of natural communities and wildlife may be permanent.
- Suburban "sprawl" and large-acre zoning cause extensive habitat loss and fragmentation. Many communities limit development by creating large-acre zoning. While large-acre zoning (usually five-plus acres) limits the human population within a locality, it dramatically fragments existing habitat, rendering remaining habitat remnants unsuitable for area-sensitive forest and grassland species. Driveways and roads can fragment habitat and limit movement of many wildlife species. Additionally, development degrades patches of adjacent habitat through an increase in predators associated with humans (e.g., raccoons and foxes), and point- and non-point source pollutants (road salt, motor oil, fertilizers, and pesticides). Development may also isolate habitat patches and prevent wildlife movement between patches, which can be particularly devastating to populations that are long-lived and produce few young (such as turtles and snakes). These cumulative impacts of development on wildlife populations and habitats are rarely considered at the regional scale.

- Motorized recreation vehicles on or near public natural lands and waterways (e.g., off-road vehicles and personal watercrafts) cause disturbance and habitat destruction and are major threats to wildlife and their habitats. One of the most destructive aspects of motorized recreation is that it occurs mainly during spring and summer when animals are attempting to breed and plants are in their primary growing season. Acute and chronic noise disturbance can cause animals to abandon suitable breeding areas and/or result in reproductive failure. Motorized vehicles also cause direct mortality of wildlife, especially to reptiles and amphibians.
- Free-roaming and feral house cats kill millions of birds, small mammals and reptiles each year in the United States. Feral cat "colonies" contribute to the problem of anthropogenic (caused by man) wildlife mortality and can pose a serious threat to local wildlife populations. Policies and local ordinances that seek to address the public health, nuisance and animal welfare concerns of free-roaming and feral cats must consider and effectively address impacts to wildlife.
- Oil spills threaten freshwater and salt marsh ecosystems and the wildlife that rely on them. The Atlantic states host an abundance of species that are dependent on riverine and estuarine systems, including larval fish, horseshoe crabs, migratory shorebirds, breeding eagles and large populations of wintering waterfowl. Heavy oiling kills wildlife, but ingestion of lesser amounts of oil impacts reproduction and survival. In addition, the impacts to aquatic habitats are difficult to quantify and monitor.
- Contaminants from point and non-point sources degrade habitat and in wildlife cause developmental and behavioral abnormalities and reproductive failure. Substances from point- and non-point sources (e.g., road salt and oil, residential and agricultural fertilizers/pesticides, PCBs and other environmental estrogens and organochlorines, heavy metals, and municipal and commercial wastes) are sources of contamination that can cause aquatic habitats to become unsuitable for invertebrates and vertebrates, cause physical abnormalities in amphibians and chronic reproductive failure in raptors via embryonic death or wasting disease of their hatchlings.
- Overharvesting of horseshoe crabs has diminished the abundance and availability of horseshoe crab eggs, a critical food source for the red knot *(Calidris canutus rufa*). The dramatic decline in red knot numbers on the Delaware Bay has resulted in the call for federal listing of the red knot. The strong reliance of red knots on horseshoe crab eggs has been evidenced by the declines in red knots concurrent to the declines in horseshoe crabs and horseshoe crab eggs (Clark et al. 1993).

2. Statewide Threats:

Virtually all of the threats faced by New Jersey's wildlife are ultimately linked to human activities. For convenience or organizational clarity, human impacts can be described as "direct" or "indirect". Direct impacts include intentional killing or destruction of animals or their nests or homes, human disturbance, and collection. Without discounting the importance of direct impacts, indirect human impacts pose the greater threat to wildlife. The majority of these are linked to the pattern of human changes to New Jersey's landscape, especially the vast changes brought about by sprawl development over the past half century. Indirect human impacts include habitat destruction, alteration, fragmentation, invasive species' infestation and contamination. Moreover, the NJ Comparative Risk Project Report, written by an independent panel, listed habitat loss and fragmentation as the top risks to NJ ecosystems.

Human activities resulting in changes, including changes to the landscape, can benefit some species. However, species that benefit from human activity can, in turn, negatively affect other species or their habitats.

Direct Human Impacts

- Illegal collection of reptiles, butterflies, and freshwater mussels.
- Wanton (and illegal) killing of snakes.
- Vandalism to mines and caves supporting colonies of wintering bats, which are highly susceptible to large-scale mortality during hibernation.
- Recreational use of caves and mines poses a major threat to hibernating Indiana and other wintering bats. These disturbances force bats to unexpectedly arouse from hibernation, thereby depleting critical fat reserves needed to support them through the winter.
- Recreational rock climbing and rock scrambling can make habitats unsuitable for habitat-sensitive, cliff-nesting peregrine falcons, and basking/gestating timber rattlesnakes and northern copperheads.
- Recreational use of some beaches disturbs beach-nesting birds, resulting in diminished nesting success and brood survival, and interferes with the foraging and resting of migratory shorebirds.
- Mechanical beach cleaning reduces substrates necessary for foraging by beach-nesting birds and migratory shorebirds.
- Vehicle use on beaches, including permitted private vehicles and "official" vehicles, creates disturbance, harms foraging habitats, can destroy habitats for northeastern beach tiger beetles and causes direct mortality of beach-nesting birds.
- Unlawful off-road vehicle (ORV) use on public land has become a major threat to wildlife habitat. Human disturbance and wildlife mortality from vehicles occur in the most important and intact wildlife habitats in the state. Heavy ORV use renders habitat unsuitable for most wildlife. Other impacts include damage to vegetation, soil compaction, soil erosion and siltation from dirt trails.
- Many commercial fishing practices, including long lines and gill nets, are a threat to sea turtles, whales, pinnipeds (such as seals), pelagic birds, and some fish species such as Atlantic sturgeon. Impacts of aquaculture and back-bay hydraulic crab dredging on marine habitats are largely unmeasured and poorly understood.
- Over-fishing in riparian, estuarine and oceanic systems can reduce reproductive success of colonial waterbirds, bald eagles, ospreys, and red knots due to depleted food resources.
- Personal watercraft and recreational boating can cause reduced reproductive success or abandonment of nesting areas and interfere with bird foraging (waterbirds, bald eagles and ospreys).
- Ship strikes pose a threat to sea turtles, pinnipeds, and especially whales. Ingestion of plastic (pollution/ litter) also threatens these species.
- Burgeoning predator populations, especially of species that are human-subsidized and/or that are accidentally or purposefully provisioned by people (e.g., feral cats, red foxes, crow species, gull species, raccoons, and skunks), severely impair nesting success and productivity of beach-nesting birds, colonial waterbirds, northern diamondback terrapins, freshwater mussels, songbirds, small mammals, reptiles, and amphibians.
- Unleashed dogs may disturb nest sites and breeding areas of birds, reptiles, amphibians, and small mammals.

- Controlled water releases from reservoirs, along with illegal releases from impoundments, may negatively impact fishes, freshwater mussels, dragonflies, and damselflies, and other aquatic organisms by altering natural flow regimes. Water releases can also affect dissolved oxygen levels downstream during summer months.
- Illegal draw-downs of lakes and ponds during the spring can cause desiccation of spawning nests and egg mortality in fishes. Freshwater mussels, amphibians, and other aquatic species are also at risk.
- Although the potential impacts of offshore wind energy development to migratory and pelagic birds, migratory bats, sea turtles, and marine mammals are poorly understood at this time, offshore wind structures may pose significant threats to these wildlife.
- Water intake systems (e.g., power plants) pose a threat through the entrainment and impingement of aquatic organisms.
- Acoustic effects in freshwater, such as pile driving and underwater drilling can deter migrating anadromous fishes such as American shad and river herring.

Development

Development eliminates terrestrial and aquatic species habitat and in most cases is irreversible. Moreover, in New Jersey, natural public lands have become a magnet attracting development that surrounds, isolates, and potentially degrades natural lands. As described above, the impacts on natural communities from adjacent development can be many, but some of the more significant include the following:

- Lotic and lentic systems (e.g., swiftly and slowly moving streams and waterways) are threatened by land development, including erosion and deposition from storm water discharge, alteration of temperature and nutrient regimes from pavement and lawns, ecological disruption from pesticide applications, and decreased flow due to water draw-downs.
- Increased silt loads and shifting stream bottoms caused by erosion threaten freshwater mussel habitats, as do contaminants such as heavy metals, pesticides, and sewage treatment plant effluent. In addition, increased turbidity deters anadromous fish from completing their normal migration to breeding areas.
- Unspoiled headwater streams are one of the most threatened habitats in North America for fishes and aquatic insects, especially rare dragonflies. Removing the forest canopy can increase water temperatures and silt loading, which can reduce dissolved oxygen levels.
- Groundwater withdraws at headwaters can alter stream flow or cause tributaries and seepages to dry completely. At risk are rare dragonflies and damselflies restricted to these habitats.
- Dragonflies, damselflies, and other aquatic invertebrates also are threatened by alteration or removal of upland forests and fields surrounding the aquatic habitat. These adjacent areas provide critical shelter for newly emerged dragonflies and damselflies and are later used for breeding and foraging.
- Clearing upland vegetation from around wetlands exposes wetlands to increased runoff (siltation and contaminants) and increased desiccation and higher temperatures from exposure to wind and sun. It also favors the establishment of invasive and exotic plants.
- Small freshwater wetlands suffer from lowered water tables caused by heavy residential use of ground water.

- Large wetlands become surrounded by development and become degraded from runoff non-point source pollution, impacts from human disturbance, invasive/exotic plants, and introduced mammalian and avian predators, including housecats.
- Removal of snags (e.g., stream cleaning projects), which provide food and shelter for fishes, invertebrates and amphibians, threatens stream communities by decreasing the available detritus that normally accumulates behind stream obstructions.
- Channelization and dredging threatens freshwater mussels, fishes, dragonflies, damselflies, and other aquatic organisms by disrupting stream bottom habitat. These practices also cause higher ranges in tidal volume and a subsequent loss of shallow water habitat, which affects the reproductive success of fish.
- Dams alter the physical, chemical and biological stream environment, sometimes destroying 30-60 percent of the freshwater mussel fauna upstream and downstream of the structure. The most detrimental effect of dams on freshwater mussels, however, is the elimination of host fish species, which disrupts the mussels' reproductive cycles. Dam construction also results in rare stream dragonflies being replaced by common pond species and blocks the migration of anadromous fishes.

Roads

New Jersey's extensive road network fragments habitat, causes significant wildlife mortality and can present significant barriers to wildlife movement. The impact of vehicular mortality on wildlife populations is only beginning to be quantified. However, some of the more significant impacts are:

- Direct mortality of animals that are slow moving (i.e. reptiles, amphibians), long-lived, produce few young, or already have a small population size can severely impact the viability of that population.
- Roads can act as barriers to wildlife dispersal, which can cause inbreeding and prevent movement when habitat is destroyed or becomes unsuitable, resulting in the direct loss of these individuals from the population.
- Declines in freshwater biodiversity have been attributed to in-stream habitat degradation caused by the removal of forest and the construction of roads and impoundments.
- Traffic noise creates disturbances that render adjacent habitats unsuitable for breeding birds.
- Roads promote dispersal of exotic species, degrade the surrounding environment, and tend to result in new developments, deforestation, and habitat fragmentation.
- Runoff from roads and developed areas degrades water quality (contaminants, erosion, silt deposition) and impacts aquatic wildlife and habitats and the terrestrial wildlife that rely upon them.

White-tailed Deer

High densities of white-tailed deer pose a significant threat to forest health and forest regeneration. New Jersey's progressive deer management strategy and the hunter's contribution through increased antlerless deer harvests have reduced the deer herd in many areas of the state. Damage from deer browse coupled with human-related effects described above severely impact some of New Jersey's remaining public and private natural lands. The unintended consequence is the destruction of some of our remaining natural lands.

- Deer directly damage wildlife habitat and can eliminate rare plant communities.

- High numbers of deer find refuge in residential areas or on private land where hunting is not allowed.
- Over-browse by deer eliminates the native shrub layer, which deprives breeding habitat for many species, particularly shrub-nesting birds.
- Deer over-browse creates a favorable environment for invasive plants to germinate and crowd out native species.
- Deer selectively browse on native species, which allows non-native plants to become established and thrive.

Invasive Species and Exotic Pathogens

New Jersey is currently suffering from an onslaught of invasive, non-indigenous species that threaten the state's natural resources and natural diversity. These include terrestrial and aquatic plants and animals (insects, mollusks) and exotic pathogens. These invasives negatively impact our forests, streams, lakes, bays, marshes, and backyards. Over 1,000 non-indigenous plant species have become established in New Jersey and many more occur throughout our region but have not yet found their way into the state. Human actions, both non-deliberate and deliberate, are the primary means of invasive species introductions. Some specific examples that occur statewide include:

- Insects such as the Asian long-horned beetle (*Anoplophora glabripennis*), emerald ash borer (*Agrilus planipennis*), and hemlock wooly adelgid (*Adelges tsugae*) kill off large tracts of trees and may significantly change the composition of our forests.
- Sudden oak death fungus (*Phytophthora ramorum*) may severely restrict oak regeneration within our forests and negatively impact the wildlife that relies on oak mast.
- Japanese barberry (*Berberis thunbergii*), tree-of-heaven (*Ailanthus altissima*), and Norway maple (*Acer platanoides*) likely cause long-term loss of forest regeneration and native understory.
- Common reed (*Phragmites australis*) and purple loosestrife (*Lythrum salicaria*) can severely reduce habitat suitability of freshwater and coastal wetlands for many marsh nesting birds and other species such as bog turtle (*Glyptemys muhlenbergii*).
- Autumn olive (*Elaeagnus umbellate* Thun. var. *parvefolia*), Chinese bush-clover (*Lespedeza cuneata*), Japanese honeysuckle (*Lonicera japonica*), and multi-flora rose (*Rosa multiflora*) impede growth of native grasses, shrubs, and forbs, including host plants and nectar sources for many butterflies.
- Non-indigenous aquatic plant species such as Eurasian water-milfoil (*Myriophyllum spicatum*) and curly-leaf pondweed (*Potamogeton crispus*) reduce the diversity of indigenous aquatic plants, are of less value as a food source for waterfowl and deplete oxygen levels in the water.
- The Asian clam (*Corbicula)* is the most widespread exotic bivalve in North America. Often competing for space and food with native freshwater mussels, *Corbicula* in high densities have been implicated in the decline of native mussels.
- Zebra mussels, not yet reported in New Jersey, pose a significant threat to freshwater ecosystems. All aquatic organisms that are subject to attachment would be at risk. Phytoplankton would also be at risk statewide, as would entire ecosystems that depend on them. All inland freshwater ecosystems could experience dramatic changes in habitat structure and food web dynamics.

- Mute swans (*Cygnus olor*) are established throughout New Jersey and are responsible for excessive herbivory to submerged aquatic vegetation in wetland habitats during key portions of the growing season.
- Exotic fish species, such as the flathead catfish and northern snakehead in the Delaware River drainage, can disrupt aquatic ecosystems by competing for food with native predator species.
- The illegal stocking of carp and grass carp can disrupt benthic (bottom-dwelling) communities and severely impact aquatic vegetation.
- European starlings (*Sturnus vulgaris*) and house wrens compete with many species of woodpeckers and eastern bluebirds for nesting cavities, which is usually the limiting factor for these species.

Unsustainable Land Management Practices on both Private and Conserved Lands and Waters

Approximately 21 percent of New Jersey is protected as federal, state and local lands and through conservation organizations and land trusts (e.g., NJ Audubon Society, The Nature Conservancy, The NJ Conservation Foundation). Although these lands are protected from development, only some lands are actively managed for habitat and wildlife protection. Many natural land areas face the threats listed previously, including over-browse of native plants due to high deer populations, invasive plants replacing native vegetative communities and human disturbance in sensitive areas. At sites where active management occurs, management practices vary according to different organization goals and may not be optimal for maintaining ecological integrity of natural communities, promoting regional biodiversity and protecting critical habitats of rare wildlife. Some practices that could potentially harm native species include:

- Forestry practices, including unsustainable clear cutting and even-aged stand management, can result in forests that are low in vegetative structural diversity, low in living and dead biomass, and consequently, low in biological diversity and ecological integrity.
- Vegetation management, including mowing, cutting and herbicide use on utility rights-of-way and roadsides during the breeding season, increases mortality and reduces productivity of many species, especially birds, invertebrates and small mammals.
- Agricultural use of state lands, particularly Wildlife Management Areas, cultivate crops that do not provide habitat for many species of wildlife.
- Insufficient consideration of the ecology of sensitive habitats when selecting and altering areas for human recreational use causes fragmentation and loss of critical habitat for rare and declining wildlife.
- Lack of active management for wildlife diversity.
- Nutrients from fertilizers used for agriculture, primarily nitrogen and phosphorus, can lead to algae blooms and contribute to eutrophication in aquatic systems. Pesticides, as well as waste from livestock, also threaten waterways. Impacts to aquatic systems and rare species from aquacultural activities are largely unknown, but potential exists for significant negative impacts.

F. State-level Conservation Objectives

Contents of the Chapter on the State-level Conservation Objectives

This section identifies the goals and actions (strategies) necessary to address the threats listed in the previous section. In addition, potential partnerships, monitoring programs, and information gaps have also been identified. Moreover, in an effort to emphasize the connection between local and state conservation goals and actions, a "code phrase" has been assigned to each goal that best describes the goals' general focus. These code phrases have also been assigned to the conservation actions found within the conservation zones throughout this document. The code phrases will assist New Jersey citizens in understanding how local conservation efforts enhance statewide conservation strategies.

1. Addressing National, Interstate, and Statewide Threats

All of the threats identified above reduce or eliminate wildlife populations over the long term through destruction and degradation of habitat, or in the short term by direct destruction of individual animals. To address these threats adequately, partnerships between and among non-governmental organizations, state agencies, federal agencies, private organizations and private citizens must be developed and cultivated. While we have identified key partnerships throughout this document, partnerships are typically evolutionary in nature and therefore will change and increase over time. Every citizen in New Jersey can play a powerful role in protecting wildlife throughout the state beginning with his or her own backyard.

Invasive Terrestrial and Aquatic Species and Exotic Pathogens

a. Conservation Goals

- ***Priority:*** Identify, restore, and protect unique ecosystem processes including the control and/or removal of non-native invasive species, fire management, and delayed and alternate patch mowing. *(Restore habitat - invasives)*
- ***Priority:*** Reduce the adverse impacts of non-native invasive species and over-abundant native species on critical wildlife, natural communities, and habitat quality. *(Conserve wildlife and protect habitat – invasives)*
- ***Priority:*** Conduct long-term monitoring to evaluate habitat and wildlife restoration efforts. *(Evaluate restoration – invasives)*

- Restore and maintain species of special concern wildlife populations through collaborative protection of native species and habitats. *(Conserve wildlife – invasives)*

b. Conservation Strategies

The approach to controlling invasive plants and organisms must be generalized to all agencies and non-governmental organizations (NGOs) and be multi-pronged with identification, eradication and outreach activities carried out concurrently and continually.

- ***Priority:*** Reduce regulatory impediments to restoration and enhancement activities.
- ***Priority:*** Develop management techniques that can safely be used to mimic the historic role of fire in shaping ecosystems.
- ***Priority:*** Increase the area of habitat enhanced by controlled burning techniques that mimic natural wildfires and support legislation to facilitate increased prescribed burning where appropriate.
- ***Priority:*** Using a regional approach, identify and prioritize areas where ecosystem processes are threatened by invasive plants, organisms, and diseases; prioritize the threats relative to the vulnerability of affected wildlife and plant communities.
- ***Priority:*** Reduce the area of phragmites and maintain native vegetation by restoring natural tidal flow in coastal wetlands.
- ***Priority:*** Develop techniques to mimic or replace natural coastal sediment transport processes and integrate into implementation of beach replenishment and other shore protection projects.
- ***Priority:*** Increase area and seral-stage range of successional habitats on managed lands where appropriate as indicated by the Landscape Project map.
- ***Priority:*** Develop and recommend "best management practices" (BMPs) for use of biological control agents to reduce non-native or overabundant pests.
- ***Priority:*** Develop species- and habitat- specific BMPs for management of various communities dependent upon disturbance, and incorporate into existing land-management framework (e.g., forestry, wildlife management, stream stabilization, dune stabilization).
- ***Priority:*** Create aggressive outreach programs for targeted groups (e.g., landscape designers, waterwatch groups, nurseries, etc) that reduce or eliminate the introduction and spread of invasive plants and animals.
- ***Priority:*** Develop species- and habitat- specific BMPs for control of the most common and detrimental invasive species, and incorporate them into existing land-management framework (e.g., forestry, wildlife management, stream stabilization, dune stabilization)
- ***Priority:*** Create and implement a system for reporting and qualifying new locations of priority invasive species.
- ***Priority:*** Create implementation plan for Invasive Species Task Force recommendations when completed.
- Enact legislation to regulate the sale of invasive plants (both native and exotic-native) for ornamental or restoration use. A list of NJ's invasive plants can be found within the appendix of the following web site:
  www.state.nj.us/dep/commissioner/policy/pdir2004-02.htm
  A list of the NJ's 30 most aggressive invasive plants can be found at the following web site:
  www.state.nj.us/dep/parksandforests/natural/heritage/InvasiveReport.pdf

- Develop list of natural processes altered by human presence or activity, (e.g., fire suppression), identify impacted sites on public land and target for pilot work, develop collaborative management techniques to safely restore natural processes using experts and land managers, and evaluate and document results in adaptive management framework.
- Develop dedicated funding to identify and map infestations.
- Develop prioritization framework, based on expert guidance, to evaluate of the aggressiveness of the infestations, ecological importance of the community or habitat, control methods and the likelihood of success.
- Develop funding for an interstate web-based mapping application (e.g., Google Earth) where states can input and/or track new infestations of exotic freshwater fish species, mollusks, aggressive pathogens, and insects.

c. Potential Partnerships to Deliver Conservation

- DFW will coordinate with experts from universities, conservation organizations, government, and the private sector to provide an overall framework and basis for establishing priorities concerning control of terrestrial and aquatic invasive species and to develop strategies to control infestations on protected lands.
- Department of Environmental Protection's (DEP) Division of Fish and Wildlife (DFW) will work with NJ Sea Grant to inform the public about the threat of a zebra mussel infestation and train people to monitor for them.
- DFW will work with state and county agencies (DEP's Division of Parks and Forestry and Office of Natural Lands Management-Natural Heritage Program, county parks and natural areas) and bordering states' agencies to document and communicate exotic terrestrial and aquatic species occurrences.
- DFW will work with the DEP's Office of Natural Land Management-Natural Heritage Program (NHP) to identify and prioritize management strategies of protected lands impacted by invasive species.
- DFW and conservation organizations will work with water watch groups, river keeper organizations, etc. to identify and report exotic aquatic species occurrences and illegal carp stocking.
- DFW and conservation organizations will partner with the US Fish and Wildlife Service to prevent exotic species introductions and minimize their impacts.
- DFW will investigate reports of illegal carp stocking.

d. Monitoring Success

- Evaluate control efforts by incorporating the collection of necessary information into routine activities and develop funding for dedicated monitoring.

e. Information Gaps

- Encourage research on the long-term impacts of invasive species (e.g., changes in soil pH caused by Japanese barberry), effectiveness of control methods and re-colonization rates of restoration sites.

Suburban Sprawl and Large-acre zoning

a. Conservation Goals

- ***Priority:*** Identify and protect breeding, migration, and wintering habitats and landscapes essential for long-term viability of wildlife and fish populations of species of conservation concern. *(Protect habitat - sprawl)*
- ***Priority:*** Maintain connectivity of habitats at the landscape scale. *(Corridors - sprawl)*
- Encourage creation and enhancement of wildlife habitat on private lands. *(Enhance habitat – private lands)*

b. Conservation Strategies

The approach to ameliorate the effects of continued development in New Jersey will require a large-scale and long-term perspective and will rely mainly on the planning community with major support and technical assistance from the conservation community.

- ***Priority:*** NJ Division of Fish and Wildlife (DFW) will lead in the training of municipal and county planners to use the Landscape Map to identify critical wildlife habitats for sensitive species and natural systems within their borders.
- ***Priority:*** DEP will encourage New Jersey counties and/or municipalities to develop Regional Habitat Conservation Plans within the next 5 years as part of their smart growth plan by collaborating in the development of planning documents and zoning ordinances that consider the larger landscape region. Various methods to achieve this include clustering development and in-fill development to maximize infrastructure, avoiding large-acre zoning, and minimizing fragmentation of habitat.
- ***Priority:*** Mitigate impacts of development, particularly when adjacent to open space, through non-regulatory measures, (e.g., create and restore habitat on private lands through landowner incentive programs, backyard habitat initiatives, keeping cats indoors).
- ***Priority:*** Counties and municipalities should collaborate in developing master planning documents and ordinances that implement Habitat Conservation Plans.
- ***Priority:*** Develop smart-growth plans at the municipal and county level whereby development is clustered and in-fill development maximizes infrastructure efficiency and cost savings while minimizing loss of habitat with priority on counties not already included in other regional planning areas such as the Pinelands or Highlands. Create incentives to encourage inter-municipal planning.
- ***Priority:*** DEP will create a staff internally to provide technical support to New Jersey counties and/or municipalities to develop wildlife conservation planning integrated with watershed planning and land use regulations, within the next 10 years, to benefit wildlife, habitat, and the quality of life for New Jersey citizens. Prioritize in areas outside of regional planning areas of the Highlands and Pinelands.
- Enact legislation amending New Jersey's Freshwater Wetlands Protection Act to provide larger, more ecologically sound wetlands buffers based upon findings in recent peer-reviewed scientific literature.

c. Potential Partnerships to Deliver Conservation

- Government and non-government natural resource agencies to work with municipal and county planners to: develop Habitat Conservation Plans; incorporate wildlife needs while providing citizens green space; and develop smart growth plans that minimize habitat destruction.

d. Monitoring Success

- Continue land cover trend analyses, every five years or fewer, the New Jersey DEP's Bureau of Geographic Information and Analysis in collaboration with the Rutgers University Center for Remote Sensing and Spatial Analysis. Trend analyses conducted for the period of 1986-1995 predicted total build-out in New Jersey in approximately 32 years. With this analysis as a baseline, land cover change monitoring could be used to evaluate success of changes in land-use planning.
- Evaluate possible measures of success, including increases in habitat area via reduction and mitigation of habitat fragmentation; increases in cluster, in-fill and urban development; increases in habitat connectivity; and reductions in the rate of loss of natural lands from large-acre or "sprawl" development.

e. Information Gaps

- Encourage municipalities to acquire GIS capability and proficiency. Promote the use of the Landscape Project in planning efforts by offering technical training to municipal planning authorities.

Motorized Recreation Vehicles

Reducing illegal off-road vehicle (ORV) use and heavy personal watercraft use in sensitive wildlife habitats will require concerted education and law-enforcement efforts and the establishment of legal riding areas. Because of the funds and effort required, law enforcement should focus on areas that are most used by motorized vehicles and most sensitive for terrestrial and water-dependent wildlife.

a. Conservation Goals

- ***Priority:*** Conduct long-term monitoring to evaluate protection and restoration efforts of both wildlife and their habitats. *(Evaluate restoration - recreational vehicles)*
- ***Priority:*** Identify and actively protect public natural lands and waters with rare wildlife from ORV and personal watercraft use. *(Protect habitat – recreational vehicles)*
- Restore and maintain wildlife populations through the collaborative protection of species and habitats from disturbance and habitat degradation by motorized recreation vehicles. *(Conserve wildlife - recreational vehicles)*

b. Conservation Strategies

- ***Priority:*** Identify areas where off-road vehicle (ORV) or personal watercraft (PWC) use occurs in critical wildlife habitats and direct law enforcement to concentrate on those areas to enforce seasonal restrictions and posted/restricted areas. Obtain funding for additional officers to assist with enforcement.
- ***Priority:*** Investigate the impacts that personal watercraft and off-road vehicles have on those species whose breeding, roosting, haul-out, and migratory stopover areas' requirements make them vulnerable to injury, mortality, or disturbance. Use Natural Resource Damage Assessment (NRDA) and economic methods to quantify benefits and losses relative to these resources and ORV/PWC damages.
- ***Priority:*** Collaborate with off-road organizations and state and non-government agencies to address the problem of unlawful use of public and private natural lands by off-road vehicles. Develop and disseminate educational materials to all riders via registration, public areas and

public service announcements, and investigate mentoring programs by off-road organizations.

- ***Priority:*** Identify appropriate areas for establishing off-road vehicle use in accordance with local and/or regional Habitat Conservation Plans to minimize impact to important wildlife habitat. Concurrently, increase the legal and financial penalties for illegal off-road vehicle use.
- ***Priority:*** Enact legislation to require registration of all all-terrain vehicles (ATVs) at time of purchase and annually thereafter.
- Exclude personal watercraft from important shorebird roosting, breeding, and foraging areas through designation of "conservation zones" (e.g., northern Barnegat Bay), and alternatively "no landing" zones (e.g., Stone Harbor Point and Champagne Island).

c. Potential Partnerships to Deliver Conservation

- DFW and conservation organizations will work with private landowners that have rare wildlife and significant vegetative communities on their properties to minimize the impact of off-road vehicles (all terrain vehicles, tractors, trucks, dirt bikes, etc.).
- DFW will work with NJ Audubon Society to develop methods to minimize the impact of personal watercraft on avian species.
- DFW will share site information and expertise with state and federal law enforcement to protect sensitive areas and monitor illegal use of off-road recreation vehicles.

d. Monitoring Success

- Staff and law enforcement personnel to qualitatively monitor ORV use and improvement of habitat condition on state lands. A sample of the most critical and heavily used sites may be monitored for recovery of habitat and wildlife diversity.
- Conduct survey of ORV users through recreation associations to determine their level of satisfaction and use of designated ORV areas.

e. Information Gaps

- Investigate the potential of collaborating with ORV user groups to develop outreach materials on environmental impacts of ORV use on natural lands.
- Siting ORV parks continues to be a difficult problem because communities and those involved in low-impact recreation often do not want high-noise, high-impact recreation activities adjacent to homes, parks, golf courses, etc. This relegates ORV parks to remote areas that are most critical for wildlife. Scenarios for siting ORV parks must be investigated to develop the least disruptive and destructive areas for residents, low-impact users and wildlife.

Subsidized Predators

Reducing the impacts on native wildlife of subsidized predators such as raccoons (*Procyon lotor*), red fox (*Vulpes vulpes*), American crow (*Corvus brachyrhynchos*) and free-roaming "owned" and feral cats will require the concerted effort and collaboration of many government and non-government agencies, but must commence with an aggressive and thoughtful public outreach campaign. Such a campaign should be developed via the collaboration of wildlife biologists, the veterinary community, environmental educators and representatives from local and county animal shelters and advocacy groups.

a. Conservation Goals

- ***Priority:*** Reduce the adverse impacts of subsidized predator populations such as raccoons, red fox, American crow, and free-roaming and feral cats on critical wildlife, natural communities, and habitat quality. *(Conserve Wildlife –subsidized predators)*
- Identify and restore more natural predator-prey relationships through the management of subsidized predators and restoration of natural predators. *(Restore habitat - subsidized predators)*

b. Conservation Strategies

- ***Priority:*** Educate the public about the negative impacts of free-roaming cats ("owned" and feral) on New Jersey's native wildlife and encourage responsible cat ownership and care through public service announcements, brochures, public presentations, etc.
- ***Priority:*** Develop and support research to provide better information on the impacts of feral and free-roaming cats on native wildlife populations.
- ***Priority:*** Collaborate with animal rights/welfare groups, local municipalities and conservation organizations to develop and implement model ordinances, policies and guidance documents to address the impacts of predators, including feral and free roaming cats, on native wildlife species, including:
    - A model ordinance for municipalities that elect to implement or allow trap, neuter, and release (TNR) programs to attempt to reduce feral cat populations.
    - A guidance document/protocol for minimizing the impacts TNR on native wildlife.
    - A model ordinance for regulating feeding of wildlife.
    - A model pet-licensing ordinance.
    - Mapping of colonies to evaluate impact on species of conservation concern.
- ***Priority:*** Identify areas where predation is significantly diminishing reproductive success of wildlife species of conservation concern and apply appropriate integrated predation management techniques.
- Provide educational materials at all public and non-government organization natural land areas.
- Distribute Cats Indoors brochures and available informational material on the hazards of feeding wildlife to all county, state, and local nature/environmental centers and all NGO nature/environmental centers/environmental centers.
- Develop and support research to improve management practices (e.g., predator exclosures and electric fences) that reduce predation on native wildlife.

c. Potential Partnerships to Deliver Conservation

- Government and non-government wildlife biologists, the veterinary community, environmental educators, and animal welfare organizations, local animal control agents, and local and county animal shelters should collaborate on educational materials regarding the negative impact of feral and free-roaming cats on native wildlife and methods for pet owners to minimize those impacts.
- DFW and NJ Audubon Society will continue to work with American Bird Conservancy's "Cats Indoors" program to develop outreach materials, press releases, and partnerships with local conservation organizations.

- DFW will work with and encourage conservation organizations to include educational materials regarding free-ranging house cats and feral cats within their constituency newsletters (e.g., Conserve Wildlife Foundation, NJ Audubon Society, The Nature Conservancy-NJ Chapter).

d. Monitoring Success

- Establish long-term monitoring efforts where concentrations of vulnerable wildlife exist and where active control or management of feral cats is being conducted.

e. Information Gaps

- Pursue a comprehensive peer-reviewed paper compiling results of current research worldwide on the impact of cats to native wildlife.
- Develop and distribute recommendations for control and management of feral and free roaming cats that are sensitive to both animal welfare concerns and effectively protect native wildlife populations.
- Launch a public outreach campaign, possibly through the creation of a thoughtful documentary about cats and wildlife that could be shown on public television stations nationwide.
- Develop a better understanding of the effectiveness of TNR programs in effecting reductions in feral cat populations.

Oil Spills

a. Conservation Goals

- ***Priority:*** Identify and protect breeding, migration, and wintering habitats and landscapes essential for long-term viability of wildlife and fish populations of species of conservation concern. *(Protect habitat – oil)*
- Assess, reduce and mitigate the impacts of oil spills on critical habitat. *(Protect habitat – oil)*

b. Conservation Strategies

- Use the Landscape Map as the basis for emergency response planning by prioritizing sensitive habitats according to location and seasonality of spills. Insert the prioritized mapping into maps used by Office of Emergency Response and the U.S. Fish and Wildlife Service.
- Develop specific plans for the highest priority species (Delaware Bay migratory shorebirds, piping plovers, and wintering waterfowl) and most vulnerable habitats (e.g., shorelines of Delaware River and Bay). These specific plans should be simple and be included in the mapping noted above, as biologist input during a spill event will provide the greater detail needed. Update species plans and mapping annually or as needed with printouts from Biotics to reflect the most current species distribution information.
- Hold annual meetings with staff from DEP Office of Emergency Response to incorporate updated information and mapping on priority wildlife areas, and review response actions in previous years' spill events. Review criteria to evaluate the effectiveness of New Jersey's response to oil spills with respect to rare wildlife and sensitive habitats, including area of impact, timeliness and effectiveness of cleanup, and number/species affected.
- Develop methodology to identify all long- and short-term impacts of oil spills on critical habitat and rare species populations in spill areas.

- On a case-by-case basis, determine the possible mitigation strategies and their potential to mitigate for loss and degradation of critical habitats. Make recommendations to the Office of Natural Resource Damages for restoration.
- Evaluate and reduce threats to marine mammals and sea turtles posed by catastropic oil spills, contaminants, and persistent marine debris.
- Ensure marine mammals and sea turtles adequately/appropriately considered in the state's spill response plan.

c. Potential Partnerships to Deliver Conservation

- State and county emergency response planners, local officials, state, federal and non-government biologists and geographic information system (GIS) experts should develop mapping for oil-spill response that prioritizes sites.
- State and federal members, including the Department of Interior (USFWS), US Coast Guard, Department of Commerce (NOAA) and NJDEP Office of Natural Resource Restoration, in addition to a dedicated team comprised of non-government organizations including Tri-State Bird Rescue and Research, Inc., will work to develop the evaluation methodology of New Jersey's response to oil spills. This evaluation method should assess the extent of the areas affected, the timeliness and effectiveness of the response and impacts to wildlife and habitat.

d. Monitoring Success

- Continue to improve the emergency response and clean-up process by reviewing information compiled from spill events and evaluating monitoring criteria.
- Develop a long-term monitoring plan in which wildlife and habitats are surveyed at least one year after a spill to assess whether the ecosystem is still experiencing impacts.

e. Information Gaps

- Long- and short-term impacts to benthic (bottom-dwelling aquatic) communities.
- Long- and short-term impacts on wildlife productivity due to the bioaccumulation of contaminants in food resources.

Contaminants (point and non-point sources)

a. Conservation Goals

- ***Priority:*** Restore and maintain wildlife and fish populations and critical habitats by eliminating or reducing exposure to point and nonpoint source contamination. *(Conserve wildlife – contaminants)*
- ***Priority:*** Conduct long-term monitoring to evaluate population viability and protection and restoration efforts of both wildlife and their habitats. *(Evaluate restoration – contaminants)*

b. Conservation Strategies

- ***Priority:*** Reduce contaminants of concern (e.g., PCBs, DDT, mercury, petroleum products) to "No Adverse Effects" levels in areas where they are currently significantly affecting wildlife populations, such as the lower Delaware River, NY-NJ Harbor, and portions of the Atlantic coast.
- ***Priority:*** Analyze tissues of raptors and waterbirds on a regular basis using 1) failed eggs, 2) nestling blood, 3) adults found dead, and 4) living adults, where appropriate, to assess contaminant levels and determine causes of mortality and nest failures. Analyze tissues of

actual or typical prey items in nest areas to assess the level of contaminants and determine the threat within the food web; repeated measures may be used to indicate trend of contaminants in local prey.

- ***Priority:*** Following the Meadowlands model, where contaminants are impacting wildlife populations and/or restoration efforts, develop a working group of experts to, 1) identify data gaps, 2) design study methodologies to measure existing ecosystem effects on wildlife (food chain studies), and 3) evaluate post restoration/clean-up effects on wildlife populations.

c. Potential Partnerships to Deliver Conservation

- DFW will continue to work collaboratively with the DEP's Divisions of Science, Research and Technology and Watershed Management to monitor water quality and aquatic communities (fish and invertebrates).
- DFW will continue to work collaboratively with Tri-State Bird Rescue and Research, Inc., US Fish and Wildlife Service, and DEP programs to monitor bald eagles for contaminants.
- DFW to work collaboratively with research and management agencies and universities to investigate the role of contaminants as limiting factors to population growth for wildlife of concern.
- DFW's Herptile Atlas and vernal pool volunteers will be enlisted to report deformities in amphibians.
- DFW will continue to monitor and manage bald eagle nest sites through volunteers.
- DFW will continue cooperative work with the DEP to determine the relative threats of known pollution locations and sources, maintaining raptors and amphibians as key indicators of contaminant levels in the state.
- DFW will work with State and federal members, including the Department of Interior (USFWS), US Coast Guard, Department of Commerce (NOAA) and NJDEP Office of Natural Resource Restoration and Site Remediation Programs to build restoration in to hazardous site clean ups and remedies.

d. Monitoring Success

- Reports on contaminants in wildlife will continue to be produced by the DFW.

e. Information Gaps

- Long- and short-term impacts to benthic (bottom-dwelling aquatic) communities.
- Long- and short-term impacts on wildlife productivity due to the bioaccumulation of contaminants in food resources.

Direct Human Impacts on Native Wildlife and Ecosystem Health

a. Conservation Goals

- ***Priority:*** Identify, protect, and minimize human disturbance at sensitive locations (nests, hibernacula, breeding pools, critical concentration or feeding areas, etc.). *(Protect habitat - humans)*
- Eliminate illegal collection of reptiles and amphibians within New Jersey and the release of unwanted exotic species into New Jersey's natural environment. *(Protect wildlife - humans)*
- Minimize impacts of controlled water releases on fishes, freshwater mussels, dragonflies, damselflies, and other aquatic organisms. *(Protect aquatic wildlife - humans)*
- Minimize impacts of illegal draw-downs by enforcing existing regulations.

- Minimize impacts of water intake systems on aquatic organisms.
- Minimize acoustic effects to anadromous freshwater fishes and marine mammals and turtles.
- Promote public awareness and conservation. *(Education – humans)*
- Minimize impacts of snag removal and stream cleaning on aquatic species. *(Protect habitat–humans)*
- Identify and restore unique ecosystem processes. *(Restore habitat - humans)*

b. Conservation Strategies

- ***Priority:*** Create funding that will allow a minimum of one conservation officer for each landscape region dedicated to increase protection of sensitive habitats at risk of frequent human disturbance, collection/poaching, and at protective barriers such as gates restricting entry to bat hibernacula.
- ***Priority:*** Design and implement protective measures to minimize deleterious impacts of direct human disturbance at osprey and colonial waterbird nest sites, shorebirds along Delaware Bay, rare reptile and amphibian denning, nesting/breeding, and gestation sites, as well as bat hibernacula.
- ***Priority:*** Investigate impacts of controlled water releases on aquatic organisms (e.g., freshwater mussels) through current and future research.
- ***Priority:*** Review all stream encroachment and other permit applications within the Division of Fish and Wildlife and apply restrictions on acoustic intrusions and other activities with deleterious effects on aquatic wildlife.
- Collect rare species' location data and release occurrence data updates semiannually to departmental environmental review staff and other DEP staff as appropriate, and periodically update the Landscape Map with the new occurrence data.
- Develop funding to support a portion of the salary of one conservation officer to investigate reports of illegal draw-downs and enforce existing regulations.
- Review such data as biological assessments from power plants and provide recommendations to minimize impingement/entrainment impacts to wildlife.
- Develop statewide outreach programs to educate citizens about New Jersey’s ecosystems, natural communities, and state laws and restrictions.
- Develop responsible ecotourism opportunities to foster appreciation for New Jersey’s biological diversity and greater understanding of the economic benefits of wildlife.

c. Potential Partnerships to Deliver Conservation

- DFW, conservation organizations and environmental educators will develop and implement statewide outreach programs to increase conservation awareness about New Jersey’s natural history, native wildlife and state laws and restrictions. Encourage the establishment of environmental programs such as Project Wild throughout New Jersey’s schools.
- DFW will work with state and federal law enforcement to develop and implement a plan to increase protection at sensitive areas (nests, hibernacula, breeding sites, etc.).
- DFW and conservation organizations will collaborate on survey and monitoring techniques of reptile and amphibian populations.
- DFW will work with rock-climbing organizations to educate their constituents and to minimize disturbance at sensitive areas (gestation and basking sites, nest sites, etc.).

- DFW, conservation organizations, and land trusts will collaborate with citizen resource groups (bird watching, hunt clubs, bird-dog training groups) to monitor and protect preserved lands from unlawful ORV use, illegal collection of reptiles and amphibians, vandalism to critical sites (nests, hibernacula), and illegal dumping.
- DFW will develop a plan to improve the efficiency of receiving and responding to public reports of illegal or unsafe activities/ events. Increase fines where appropriate.
- DFW will work with USFWS to develop a plan to monitor the taking of non-target species by commercial fisheries and determine if alternative methods can be used that will minimize the impact on rare fish.
- DFW will investigate incidents of illegal draw-downs and enforce existing regulations.
- Work with the National Marine Fisheries Service (NMFS) and the USFWS on water intake system impacts.
- DEP will work with water watch groups, river keeper associations, and other organizations to report illegal draw-downs.
- DFW will collaborate on environmental reviews to ensure that seasonal restrictions are applied during migration periods.
- Work with the US Army Corps of Engineers, Delaware River Keeper, Delaware River Basin Commission, US Coast Guard, bridge authorities and other groups on issues related to acoustic effects in waterways.

d. Monitoring Success

- Monitor short- and long-term effects of commercial fisheries' practices on populations offish and bird species of conservation concern.
- Monitor reptile and amphibian populations through volunteer programs (Herptile Atlas, vernal pool project, etc.).
- Continue to monitor wintering bat populations at known hibernacula and monitor human disturbance at potential hibernacula that currently are not protected.
- Continue Mid-Winter Waterfowl Surveys.

e. Information Gaps

- Gather information to determine cumulative impacts on reptile and amphibian populations from direct human activity (e.g., collection, wanton killing, destruction of critical habitat, and illegal draw-down of waterways).

Development

a. Conservation Goals

- ***Priority:*** Identify and protect breeding, migration, and wintering habitats and landscapes essential for long-term viability of wildlife and fish populations of species of conservation concern. *(Protect habitat – development)*
- ***Priority:*** Maintain connectivity of habitats at the landscape scale.
- ***Priority:*** Conduct long-term monitoring to evaluate population viability through statewide surveys and atlases, and the effectiveness of protection and restoration efforts of both wildlife and their habitats. *(Evaluate restoration - development)*
- Restore and maintain wildlife populations through collaborative protection of species and habitats. *(Conserve wildlife - development)*

- Minimize impacts of dredging, channelization and dam construction on aquatic species. *(Protect habitat – development))*
- Minimize impacts of snag removal and stream cleaning on aquatic species.
- Restore historic anadromous fish spawning habitat to what it was before dam installation to increase population size. *(Restore aquatic habitat – development)*
- Minimize acoustic effects to anadromous freshwater fishes and marine mammals and turtles.

b. Conservation Strategies

- ***Priority:*** Increase the effective size and connectivity of public lands through the Landowner Incentive Program and targeted land acquisition.
- ***Priority:*** Work with Division of Land Use Regulation to strengthen and enforce existing regulations to prevent illegal stream cleaning or snag removal activities.
- ***Priority:*** Require that all lands purchased with Green Acres funds develop management plans consistent with the NJ Wildlife Action Plan.
- ***Priority:*** Identify and prioritize, for Green Acres, the habitat corridors for acquisition or other preservation to decrease isolation of public natural lands.
- ***Priority:*** Measure the enrollment acreage and effectiveness of backyard habitat management.
- ***Priority:*** Develop GIS measures to evaluate the effectiveness of habitat conservation programs including acquisition, restoration, and connectivity.
- ***Priority:*** Track the acreage and management of land enrolled in habitat enhancement programs administered by NJ Habitat Incentive Team (NJHIT); monitor each site and evaluate the effectiveness of the management technique.
- ***Priority:*** Where appropriate, install and monitor fish ladders to assist passage of anadromous fish in areas with dams; prioritize by waterways with fish species of conservation concern.
- Increase the number landowners enrolled in habitat enhancement programs, and the total number of private acres managed for rare wildlife, by expanding the NJHIT. An increase in the size of this team should result in an overall increase in the number of acres that can be placed into a state or federal enhancement program.
- Secure and increase the amount of state funding dedicated to the Division of Fish and Wildlife's Environmental Review Office to provide more thorough and timely reviews of stream cleaning and stream encroachment permit applications.
- Enact legislation amending New Jersey's Freshwater Wetlands Protection Act to provide larger, more ecologically sound wetlands buffers based upon findings in recent peer-reviewed scientific literature.

c. Potential Partnerships to Deliver Conservation

- DFW and the Division of Parks and Forestry (DPF) will work with government and non-government organizations that currently have habitat programs in place to decrease isolation of public natural lands by development.
- Federal, state, and non-government organizations to identify focus sites and educate the public about backyard habitat programs that benefit New Jersey's native wildlife and plant communities.
- DFW is collaborating with the US Department of Agriculture's Natural Resources Conservation Service (NRCS), conservation organizations (NJ Audubon Society, The Nature

Conservancy – NJ Chapter, Ducks Unlimited, Ruffed Grouse Society, Pheasants Forever, Trout Unlimited, Turkey Federation, Quail Unlimited), and the USFWS NJ Field Office to develop a more simplified program for landowners interested in habitat enhancement programs.

- DEP will partner with river keeper associations, water watch groups, etc., so that they will report illegal snag removal or stream cleaning activities.
- DEP will work with the US Army Corps of Engineers, US Fish and Wildlife Service and other groups on issues related to dredging and channelization when appropriate.

d. Monitoring Success

- Conduct large-scale monitoring via land cover change analyses every five years to monitor change in extent, connectivity and fragmentation of habitats statewide. Link this analysis with large-scale monitoring activities for birds, reptiles and amphibians to develop trends for species and habitats.
- Continue to monitor rare reptile and amphibian populations within isolated habitats for presence, genetic isolation and its effects on populations and breeding success.

e. Information Gaps

- Gather information to determine the cumulative impacts of collisions with man-made structures on populations of rare bird species.

Road Mortality of Wildlife

a. Conservation Goals

- ***Priority:*** Identify and protect breeding, migration, and wintering habitats and landscapes essential for long-term viability of wildlife and fish populations of species of conservation concern. *(Protect habitat - roads) and (Corridors – roads)*
- ***Priority:*** Conduct long-term monitoring to evaluate population viability and protection and restoration efforts of both wildlife and their habitat. *(Evaluate restoration - roads)*

b. Conservation Strategies

- Create a "Dead on Road" feature label within Biotics for all species tracked in this database. This will help to map and identify areas where wildlife is repeatedly killed along the roadway and will help focus remediation efforts.
- Quantify the use of existing road culverts and stream underpasses by wildlife using standard survey techniques (camera traps, box traps, etc.). Use data from this study to determine how these underpasses might be redesigned to increase their suitable as wildlife passageways.
- Increase the number of DOT projects that are reviewed for impacts to road-vulnerable threatened and endangered species.
- Work with DOT and municipalities to incorporate amphibian migration corridors into local and county plans for development and protection and to increase the number of amphibian migration routes that are monitored (and potentially closed to traffic) during mass migration events in spring.

c. Potential Partnerships to Deliver Conservation

- Government and non-government agencies and engineers from the NJ Department of Transportation can work together to develop methods to minimize or eliminate road mortality at specific sites.
- DFW will work with local and county planners and road departments to consider and incorporate known amphibian migration corridors into perspective Habitat Conservation Plans and Smart Growth plans.

d. Monitoring Success

- Develop funding to conduct seasonal surveys in areas identified as high mortality sites. Collaborative development and implementation of solutions to reduce acute, seasonal mortality at some of these sites presents an opportunity to carry out before-and-after surveys to assess efficacy of solutions.

e. Information Gaps

- Gather information, conduct research and evaluate the effectiveness of under- and over-road passages for wildlife.

High Deer Densities

The best approach for this problem is to encourage private and public landowners including private conservation lands to allow hunting on their properties. These efforts should be accompanied by a public outreach effort stressing the need for deer hunting for effective deer management that includes public presentations by biologists from organizations such as NJ Division of Fish and Wildlife, NJ Audubon Society, and the NJ Conservation Foundation. The joint credibility of these biologists can encourage non-hunting landowners to allow hunting access by educating them about the damage caused by overabundant deer populations.

a. Conservation Goals

- ***Priority:*** Conduct long-term monitoring to evaluate population viability, protection and restoration efforts of both wildlife and their habitat. *(Evaluate restoration - deer)*
- ***Priority:*** Identify, maintain, and restore natural vegetative communities through sustainable, area-specific deer densities. *(Restore habitat - deer)*
- Restore and maintain wildlife populations through collaborative protection of species and habitats. *(Conserve wildlife - deer)*

b. Conservation Strategies

- ***Priority:*** Conduct forest health surveys and use forest health indices as a main factor in developing deer management goals with priority areas being contiguous forest blocks on public and private lands within Skylands, Delaware Bay, Piedmont Plains, and Pinelands Landscape Regions.
- ***Priority:*** Expand the DFW community-based deer mgmt program to work with private landowners and public land stewards to achieve deer densities compatible with the NJ Wildlife Action Plan's habitat management goals.
- ***Priority:*** Amend regulation or legislation to implement programs that support increased hunter access and hunting opportunities like reduction of safety zone for bow hunting,

Sunday bow hunting, and providing economic incentives for hunters to spend more time in the field.

- ***Priority:*** Develop and implement, through regulation or legislation, programs that require anyone receiving preferential tax treatment based on land-management practices to achieve deer management goals, including harvest quotas, to qualify for farm tax assessment or farmland preservation programs.
- ***Priority:*** Institute measures to require addressing deer management for any property that receives state or federal funding. The land or agricultural management plans must include harvest quotas and mechanisms to ensure implementation.
- ***Priority:*** Fully fund the Hunters Helping the Hungry venison donation program, which allows hunters to donate venison to food kitchens. Many hunters are reluctant to harvest deer that would be wasted because they have no need of or an outlet for the venison. Full funding of this program will expand the program and help provide an incentive for hunters to continue harvesting deer and therefore help meet harvest quotas.
- Evaluate current and ongoing research studies and develop and conduct research studies directed at evaluating the efficacy or of contraceptive approaches to managing deer populations.

c. Potential Partnerships to Deliver Conservation

- DFW will continue to work with the Fish and Game Council to include Game Code provisions that increase deer hunter access and hunting opportunities building on the success of the deer management strategy in areas with good hunter access.
- In the context of landowner incentive programs such as LIP and Forestry Stewardship, DFW will work with landowners to develop and implement deer management plans that achieve desired deer densities.
- Conservation organizations should act as advocates for legislation and regulatory reform that address integrating deer management goals into farmland tax assessment laws, farmland preservation programs and other farm conservation programs.
- DFW will work with land trusts to develop and implement deer management plans that achieve desired deer densities on preserved lands.
- DFW and DEP's Division of Parks and Forestry (DPF) will partner with Rutgers University and other academic institutions to conduct studies necessary to better understand the impacts of deer on biodiversity, forest health and ecosystem processes, and to develop habitat-specific or landscape-specific deer density targets.
- DFW will work with the USDA's NRCS to ensure that deer management goals are integrated into farm conservation plans that include measurable outcomes.
- DFW will work with land management agencies at the state, local, and federal levels to implement deer management plans that achieve desired deer densities on lands that they oversee.

d. Monitoring Success

- Monitor forest health and regeneration as an index of success of deer management efforts.
- Continue to monitor deer harvest and deer densities.

e. Information Gaps

- Evaluate effectiveness of contraception methods to control deer populations through review of current literature and assessment of feasibility for use in New Jersey.

Unsustainable Land Management Practices on both Private and Conserved Lands and Waters

a. Conservation Goals

- ***Priority:*** Encourage farmers, foresters, and land stewards of private, local, state, and federal lands to develop habitat management plans that enhance habitats for species of conservation concern and maintain or improve the ecological integrity of the natural community. *(Silviculture – land management)*
- Minimize impacts of agricultural practices on aquatic waterways, ground-nesting birds, reptiles and amphibians. *(Agriculture – land management)*
- Investigate impacts of aquaculture on critical habitats and wildlife and develop BMPs to minimize negative impacts. *(Aquaculture – land management)*
- Minimize impacts of other potentially deleterious land management practices, such as dune stabilization, stream cleaning, shoreline stabilization, etc., on critical habitats and wildlife. *(Other practices – land management)*

b. Conservation Strategies

- ***Priority:*** Increase staff in the NJ Habitat Incentive Team (NJHIT) to educate and provide technical assistance to private landowners enrolling in Landowner Incentive Programs (LIP).
- ***Priority:*** Increase number of landowners through NJHIT that conduct delayed mowing of hayfields and fallow fields until after most ground nesting birds have fledged at least one brood; leave a minimum of 20% of grass fields standing during winter for cover; and/or plant and maintain native warm season grasses.
- ***Priority:*** Develop BMPs or management prescriptions for species of conservation concern to reduce negative impacts of various land management practices such as forestry, agriculture, dune stabilization, stream stabilization, aquaculture, DOT mowing, etc.
- ***Priority:*** Dedicate staff in DFW to provide technical assistance to develop site-based management plans with forestry or wildlife production goals using GIS and principles of landscape ecology as the foundation.
- ***Priority:*** Increase the number of Category 1 streams justified by E&T species data.
- Minimize impacts of fertilizers, pesticides, livestock, etc., on waterways by maintaining adequate buffers and, when feasible, enhancing riparian areas through stream bank restoration efforts.
- Enact legislation amending New Jersey's Freshwater Wetlands Protection Act to provide larger, more ecologically sound wetlands buffers based upon findings in recent peer-reviewed scientific literature.

c. Potential Partnerships to Deliver Conservation

- DFW will work with DEP's Bureau of Water Monitoring and Standards to upgrade stream classifications to Category One in segments with endangered or threatened aquatic species present.
- DFW will work with landowners to minimize impacts on waterways by maintaining adequate buffers and enhancing riparian areas through stream bank restoration efforts.

- DFW will work with farmers, state and private foresters and land stewards of private, local, state, and federal lands to implement best management practices that will benefit New Jersey's rare wildlife and natural communities (altered mowing, raising mower blades, controlled or "spot" pesticide application, sustainable forestry practices, etc.)

d. Monitoring Success

- Track the amount of acreage that is enrolled in the various federal and state programs that encourage best management practices.
- Track invasive species removal and re-growth.

e. Information Gaps

- Acquire historic and current data from the Division of Parks and Forests regarding the location, date, and type of silvicultural or other management practice conducted on public lands.
- Identify areas impacted by invasive species.

2. Endangered, Threatened, and Rare Wildlife

New Jersey's nongame wildlife list (as identified under Endangered and Nongame Species Conservation Act (Act), N.J.S.A. 23:2A-1 et. seq; N.J.A.C. 7:25-4.17) currently does not include arthropods, mollusks or fish unless they have been listed as federal or state endangered or threatened. The Division of Fish and Wildlife's Endangered and Nongame Species Program (ENSP) believes that there are species of special concern within these suites that are in need of protection and management assistance and have included them among the species listed within the Plan. The ENSP intends to address this disparity within the Act and include fish and arthropods on the nongame list in the near future.

Part I of the State Wildlife Action Plan focuses wildlife and habitat conservation goals on New Jersey's endangered, threatened and rare wildlife. Species of state concern have been identified within the wildlife tables W2 – W6 in Appendix I and include federal endangered and threatened species, state endangered, threatened, and species of special concern, and species of regional priority.

a. Conservation Goals

- ***Priority:*** Restore populations of endangered and threatened wildlife to stable levels that allow their delisting through population management, protection of critical habitat, and habitat restoration and enhancement. *(Conserve wildlife – rare wildlife)*
- Pursue habitat restoration and enhancement to benefit wildlife species. *(Enhance habitat – rare wildlife)*
- Identify summer distribution, habitat use, and migratory corridors for inter- and intrastate migratory wildlife species of conservation concern (birds, bats, marine mammals, fish) and develop and implement strategies to protect these areas. *(Protect habitat – rare wildlife)*
- Identify critical wildlife habitat to protect or buffer to accommodate sea-level change. *(Protect habitat – rare wildlife)*

b. Conservation Strategies

- ***Priority:*** Reevaluate the status of listed and non-listed nongame wildlife every five years using the Delphi review process.
- ***Priority:*** Develop and implement recovery plans for species of greatest priority based on reliable assessment and monitoring of population levels and the identification of limiting factors. Species recovery plans should establish clear and specific strategies for reducing threats and improving habitat conditions and lead to recovery and maintenance of populations at viable levels that complement complete, viable, functioning ecosystems.
- ***Priority:*** Conduct surveys to identify migratory corridors for bats, marine mammals, anadromous fish, Lepidoptera, and Odonata.
- Develop a list of priority sites/regions for promoting habitat conservation (through such practices as acquisition, conservation easements and landowner incentives) in areas that are needed to meet the habitat requirements of wildlife at restored and viable population levels.
- Develop a monitoring program to determine the success of habitat creation and restoration projects and develop improvements to current restoration technologies.
- Reduce state regulatory impediments to improving beach, dune, and coastal wetland habitats for beach nesting birds.
- Work with Rutgers University's Center for Remote Sensing and Spatial Analysis to develop predictive modeling and GIS mapping to identify areas along the coast that need protection and/or buffering in the event of significant sea-level rise.
- Initiate and/or work with other agencies or organizations to research the effects of offshore energy projects (wind turbines) on avian species and marine mammals.
- Enact legislation amending New Jersey’s Freshwater Wetlands Protection Act to provide larger, more ecologically sound wetlands buffers based upon findings in recent peer-reviewed scientific literature.

c. Potential Partnerships to Deliver Conservation

- DFW will coordinate with species experts from universities, conservation organizations, government and private sectors to participate in the Delphi process to review and classify species status.
- DFW will develop new species information in partnership with the US Fish and Wildlife Service, universities, conservation organizations such as NJ Audubon Society, NJ Conservation Foundation and The Nature Conservancy-NJ Chapter, regional wildlife planning groups, and private consultants to track wildlife trends. Develop species recovery goals and plans with assistance from these groups and individuals.
- DFW will maintain a corps of Citizen Scientist volunteers who collect data on species presence and abundance, contributing to wildlife trend information and data that supports the Landscape Project’s critical habitat designations.
- DFW will identify significant habitats for endangered and threatened wildlife on public and conservation lands and coordinate with land managers to enhance habitats.
- DFW will identify significant habitats on private lands (particularly those adjacent to public and conservation lands) and work with landowners to promote management beneficial to rare wildlife.
- DFW will work with regional biologists to develop the research initiative to identify migratory corridors for migrating bats.

- DFW will work with researchers along the east coast to identify migratory routes for marine mammals and develop plans to protect these critical corridors.

d. Monitoring Success
- Regularly review the population status of native nongame wildlife to evaluate trends and re-evaluate official status designations.
- Regularly review species recovery and habitat goals predicted to support recovered populations.

e. Information Gaps
- Pursue information on species occurring in the state whose statuses are designated as "unknown."
- Pursue research necessary to establish recovery goals relative to population, productivity and habitat requirements.

3. The Landscape Project

For additional information regarding the Landscape Project, see Attachment A or visit our web site: www.njfishandwildlife.com/ensp/landscape/lp_report.pdf

a. Conservation Goals
- ***Priority:*** Identify and protect breeding, migration, and wintering habitats and landscapes essential for long-term viability of wildlife and fish populations of species of conservation concern. *(Protect habitat – Landscape Project)*

b. Conservation Strategies
- ***Priority:*** Increase the number of data sources to populate the Biotics database and work to improve data quality and decrease the time necessary to review and input the data.
- ***Priority:*** Refine existing Landscape Project species occurrence areas through research and, where lacking, develop new species occurrence areas as data on species requirements become available. Develop, review, and improve species-habitat associations as new land use/land cover data become available.
- ***Priority:*** Use geographic information systems (GIS) to create map products that guide land management, habitat conservation, restoration, land acquisition and land planning at all levels of government and non-government organizations.
- Dedicate staff in DFW and/or NRCS to provide technical assistance to develop site-based management plans with forestry or wildlife production goals using the Landscape Project and principles of landscape ecology as foundation.
- Recommend that partners at National Wildlife Refuges, military bases, and other public lands integrate the Wildlife Action Plan strategies and actions into their existing site plans as they come up for renewal and revision.
- Refine Landscape Project mapping for use at municipal, county and regional levels for use in habitat conservation planning (e.g., regional HCPs).

c. Potential Partnerships to Deliver Conservation

- DFW will continue coordinating with landscape ecology experts to review and adapt the methodology applied in the Landscape Project habitat mapping and species modeling.
- DFW will maintain a corps of Citizen Scientist volunteers who collect data on species presence and abundance, contributing to wildlife trend information and data that supports the Landscape Project's critical habitat designations.
- DFW will coordinate with state experts, the National Bird Monitoring Committee, Partners In Flight, and other regional and national efforts to integrate new and existing data into national and regional planning.
- DFW will identify significant habitats on public and conservation lands and coordinate with land managers to enhance habitats. DFW will identify significant habitats on adjacent private lands and work with landowners to promote management beneficial to rare wildlife.
- DFW will continue to work with Department of Environmental Protection (DEP) agencies to apply the Landscape Project to guide regulatory protection of habitats.
- DFW will work with conservation organizations, the Association of NJ Environmental Commissions, county and local governments, and private citizens to apply Landscape Project planning statewide.

d. Monitoring Success

- Track habitat protection and loss relative to Landscape Project designations.
- Track the populations and distribution of rare species and adapt the Landscape Project's conservation strategies as needed.
- Collect data on habitat parameters to identify trends and adapt management techniques as necessary to reach rare wildlife population and habitat goals.

e. Information Gaps

- Continue to improve accuracy of base map land use/land cover.
- Pursue rare species information for habitat parcels that have the rank of 1 (meets minimum area requirement but has no known species occurrences) in Landscape Project mapping.
- Educate private citizens and conservation and government organizations about reporting occurrences of rare species.

4. Migratory Stopover and Important Bird Areas Planning

a. Conservation Goals

- ***Priority:*** Identify, monitor, and conserve key migratory corridors and stopover locations for migratory birds. *(Corridors – migratory birds)*
- Conserve sites critical to breeding and wintering birds. *(Protect habitat – migratory birds)*

b. Conservation Strategies

- ***Priority:*** Conduct surveys of migrating passerines and raptors at major stopover areas, primarily the Cape May Peninsula, every five years.
- ***Priority:*** Annually monitor shorebird populations along the Delaware Bayshore stopover.

- ***Priority:*** Prioritize land acquisition, conservation easements, private landowner incentive programs, and mitigation funding, and develop management plans to conserve stopover habitat.
- ***Priority:*** Identify a network of locations that will help sustain migratory bird populations by producing a set of recommendations for the conservation of Important Bird Areas (IBA) statewide.
- ***Priority:*** Conduct baseline surveys of other stopover areas such as Sandy Hook, Island Beach, and inland habitats important to migrating birds.
- ***Priority:*** Conduct studies and create models to identify migratory bird routes and assess the potential risks to avifauna from wind turbines, tall buildings, radio towers and other "human-made" tall structures.
- Identify critical habitat for migratory birds using parameters of proximity to Atlantic and Delaware Bay coasts and patch size (in areas away from the coast), among others. Circulate the resulting map of critical habitat for migratory birds to land protection agencies to add priority to land preservation efforts. Use CAFRA regulations to provide some habitat protection and to mitigate for habitat losses.
- Raise public awareness about the value of habitat for birds and other wildlife using backyard wildlife habitat programs, migration events, and feeder and nestbox programs.
- Continue to conduct the annual Mid-Winter Waterfowl Survey and the Atlantic Flyway Breeding Waterfowl Survey using standardized methods.

c. Potential Partnerships to Deliver Conservation

- DFW will work with public land managers, NJ Conservation Foundation (NJCF), The Nature Conservancy-NJ Chapter (TNC), other landowning conservation organizations and private landowners to create and enhance habitats for migratory birds.
- DFW will engage NJ Audubon Society (NJAS), National Audubon chapters in NJ, NJCF, TNC, and Citizen Scientists to act as advocates and monitors on behalf of local IBAs.
- DFW will continue collaboration with state wildlife agencies, the International Wader Studies Group, the Royal Ontario Museum, the US Fish and Wildlife Service, and the Canadian Wildlife Service to carry out shorebird research and surveys on the Delaware Bay, Arctic breeding grounds, and South American wintering grounds.
- DFW will continue collaboration with state wildlife agencies, Partners in Flight, and other regional and national organizations to protect and enhance stopover habitat vital to regional and global bird populations.
- DFW will collaborate with the US Fish and Wildlife Service and the Atlantic Flyway Council to conduct the Mid-Winter Waterfowl and Breeding Waterfowl Surveys.
- DFW will collaborate with the US Fish and Wildlife Service, Atlantic Coast Joint Venture, and universities to identify key staging areas for waterfowl.

d. Monitoring Success

- Compare new survey results to previous surveys to assess trends in abundance, distribution, and habitat use.

5. Freshwater Riparian and Aquatic Species

Currently, the ENSP has developed critical wildlife habitat mapping that identifies important upland, wetland and grassland areas statewide. The next phase of the Landscape Project is the Riparian Landscape Project, which will develop the riparian component of critical habitat mapping to protect species that are not well represented in existing habitat layers. The Bureau of Freshwater Fisheries current work on stream classifications through an integrated biotic index they are performing will provide valuable data for developing the riparian mapping. Freshwater mussels, nongame fishes and Odonata (dragonflies and damselflies) are obligate aquatic species ("that breed exclusively in aquatic habitat (and occur in New Jersey's rivers, streams, lakes and ponds. Water quality degradation, habitat loss and/or alteration and loss of essential riparian areas threaten species within these groups.

a. Conservation Goals

- Pursue habitat restoration and enhancement to benefit wildlife species. *(Enhance habitat – riparian species)*

Freshwater Mussels

a. Conservation Goals

- Protect freshwater mussel species through long-term monitoring, stream classification upgrades and the development of management plans. *(Protect habitat – mussels)*

b. Conservation Strategies

- Conduct statewide surveys using timed searches for listed and priority freshwater mussel species in all previously unsurveyed historic locations and suitable habitats with documented host fishes.
- Monitor populations of listed and priority species and develop a freshwater mussel management strategy that would include stream bank restoration, increased water quality protection, and possible relocation efforts into previously occupied, suitable areas.
- Incorporate occurrence information into the Biotics database and develop models for listed species to be used in the Landscape Project's aquatics coverage.
- Recommend to the Bureau of Water Monitoring and Standards stream segments that warrant Category One status based on listed freshwater mussel species present. C1 recommendations will be provided to BWMS on an annual basis.
- Produce freshwater field guide that includes species profiles, color plates, a key to New Jersey species, and range maps. The field guide will be used as a training tool for volunteers working on a freshwater mussel atlas. The guide will also be distributed to water watch groups, state agencies, academic institutions, environmental commissions, and other interested parties.
- Enact legislation amending New Jersey's Freshwater Wetlands Protection Act to provide larger, more ecologically sound wetlands buffers based upon findings in recent peer-reviewed scientific literature.

c. Potential Partnerships to Deliver Conservation

- DFW will work with the DEP's Bureau of Water Monitoring and Standards to recommend stream classification upgrades in areas where listed mussels occur.

- DFW will work with adjacent states to incorporate New Jersey data with existing neighboring states' data and provide contiguous range maps of critical habitats across state boundaries.
- DFW will work with private landowners, government agencies and non-government organizations (NGOs) and conservation organizations to protect riparian areas through stream bank restoration efforts and land management practices.
- DFW will work with the US Fish and Wildlife Service to protect and restore dwarf wedgemussel populations.

d. Monitoring Success

- Regularly review the population status of priority freshwater mussel species to evaluate trends and re-evaluate official status designations.

Nongame Fish Species

a. Conservation Goals

- Determine species status for unregulated fishes using the Delphi Status Review and revise New Jersey nongame wildlife lists (Act, N.J.S.A. 23:2A-1 et. seq; N.J.A.C. 7:25-4.17) through state rulemaking process to include endangered and threatened species. *(Status – fish)*
- Protect listed freshwater species through identification of critical areas, stream classification upgrades, and/or development of management plans with the NJ Department of Environmental Protection, Division of Fish and Wildlife's Bureau of Freshwater Fisheries (BFF) that include long-term monitoring. *(Protect habitat – fish)*
- Incorporate occurrence information into the Riparian Landscape Project, develop species models and identify critical areas. *(Monitor wildlife - fish)*

b. Conservation Strategies

- Recommend to the Bureau of Water Monitoring and Standards stream segments that warrant Category One status based on listed fish species present. C1 recommendations will be provided to BWMS on an annual basis once species are listed through the Delphi Process.
- Determine species status of nongame fish every five years through Delphi Status Review.
- DFW will conduct/support shortnose sturgeon research in the Delaware River, including studies to locate nursery areas for early life stages, population analysis, and acoustic tracking to determine areas of the river utilized by the population.
- DFW will develop management plans for Endangered and Threatened nongame fish species when status is established through the Delphi Review and state rulemaking process.

c. Potential Partnerships to Deliver Conservation

- DFW will work with DEP's Bureau of Water Monitoring and Standards to recommend stream classification upgrades in areas where listed fish occur.
- DFW will enlist the assistance of species experts to assess species status for regulatory and recovery purposes.

d. Monitoring Success

- Regularly review the population abundance, productivity and distribution of priority species to evaluate trends and re-evaluate official status designations and monitor recovery efforts.

Odonata (Dragonflies and Damselflies)

a. Conservation Goals

- Protect listed Odonata through long-term monitoring, stream classification upgrades, and development of management plans. *(Enhance habitat – odonata)*

b. Conservation Strategies

- Complete the listing process for Odonata based on results of the Delphi Status Review and Endangered and Nongame Species Advisory Committee recommendations.
- Increase funding for baseline Odonata surveys, with a focus on rare species within this taxonomic group.
- Develop species models for rare Odonata and incorporate occurrence information into the Riparian Landscape Project.
- Begin mapping stream segments with endangered or threatened Odonata species present and seek Category One upgrades for these segments.
- Enact legislation amending New Jersey's Freshwater Wetlands Protection Act to provide larger, more ecologically sound wetlands buffers based upon findings in recent peer-reviewed scientific literature.

c. Potential Partnerships to Deliver Conservation

- DFW will work with DEP's Bureau of Water Monitoring and Standards to recommend stream classification upgrades in areas where the larval stage of listed Odonata occur.
- DFW will work with private landowners, government agencies and non-government organizations such as NJ Audubon Society (NJAS), NJ Conservation Foundation (NJCF), and The Nature Conservancy-NJ Chapter (TNC) to protect riparian areas through stream bank restoration efforts and land management practices.

d. Monitoring Success

- Regularly review the population status of priority Odonata species to evaluate trends and re-evaluate official status designations.

6. Game Species of Regional Priority and Concern

The Division of Fish and Wildlife's Bureau of Wildlife Management is responsible for the development and maintenance of a productive, diversified wildlife resource and the habitat on which that resource depends. This mandate is accomplished through a variety of scientifically sound management and research programs and provides wildlife related recreational opportunities for the citizens of New Jersey. In this Plan, game species of regional priority and game species of concern have been identified within wildlife Table W7 and Table W9, respectively, in Appendix I.

a. Conservation Goals

- Restore declining populations of game species to viable levels. *(Conserve wildlife – game species)*
- Maintain sustainable populations of all current game species of conservation concern in New Jersey. *(Conserve wildlife – game species)*
- Pursue habitat restoration and enhancement to benefit wildlife species. *(Enhance habitat – game species)*

b. Conservation Strategies

- Establish population level goals for game species and maintain at desired levels through monitoring population vital rates, identify limiting factors, and adapting management to achieve those goals.
- Establish population level goals and maintain them at levels that complement viable functioning ecosystems.
- Establish population level goals for river otter and maintain at desired levels through monitoring population vital rates, identification of limiting factors, and adaptive management.
- Identify and map critical river otter habitat and promote habitat conservation in these areas through such practices as habitat acquisition, landowner incentives and conservation easements.
- Develop research to investigate the use of such variables as water quality, fish and Odonata occurrences and other habitat attributes as correlates to river otter occurrence.

c. Potential Partnerships to Deliver Conservation

- Develop best management practices (BMP) for game species habitats in partnership with the US Fish and Wildlife Service, US Department of Agriculture-Natural Resources Conservation Service, universities, conservation organizations (e.g., Ducks Unlimited, Ruffed Grouse Society, NJ Audubon Society), state and county mosquito commissions, regional wildlife planning groups, and private consultants. Ensure that BMPs reflect a holistic approach that accounts for the needs of all wildlife sharing the same habitat and maintains ecological and community integrity.
- Maintain a corps of Wildlife Conservation Corps volunteers that assist in game species monitoring programs.
- Identify significant habitats for game wildlife of conservation need on public and conservation lands and coordinate with land managers to enhance habitats that maintain ecological integrity.
- Identify significant habitats on private lands (particularly those adjacent to public and conservation lands) and work with landowners to promote management beneficial to regional priority game species without negatively affecting endangered, threatened, or special concern species and their habitats.
- Work with DEP's Bureau of Water Monitoring and Standards to recommend stream classification upgrades in areas where river otters occur.
- Identify significant habitats for river otters on public and conservation lands and coordinate with land managers to enhance habitats.

- Work with fur-trapping organizations to obtain otter carcasses for population monitoring purposes.

d. Monitoring Success

- Regularly review the population status and trends of game species and adjust hunting and trapping regulations as necessary.
- Evaluate how populations of game species of conservation concern respond to habitat management programs and incorporate findings into future habitat management decisions.

e. Information Gaps

- Evaluate and improve monitoring programs for enigmatic (elusive) game species.

7. Long-term Population Monitoring

a. Conservation Goals

- ***Priority:*** Conduct long-term monitoring to evaluate population viability through statewide surveys and atlases and to determine the effectiveness of protection and restoration efforts of both wildlife and their habitats. *(Monitor wildlife – long-term monitoring)*
- Review and analyze management efforts focused on the restoration of unique ecosystem processes. *(Evaluate restoration – long-term monitoring)*

b. Conservation Strategies.

- ***Priority:*** Maintain monitoring programs that collect data on species, suites of species, and habitats statewide, including but not limited to the following:
    - Breeding Bird Atlas
    - Breeding Bird Survey
    - Delaware Bay Migratory Shorebird Survey
    - Bald Eagle Midwinter Survey
    - Herptile Atlas
    - Calling Amphibian Monitoring Program
    - Fish Monitoring-Streams and Ponds
    - Freshwater Mussel Atlas
    - Mid-Winter Waterfowl Survey
    - Atlantic Flyway Breeding Waterfowl Survey
    - DFW Bobwhite Call-Count Survey
    - Woodcock Call-Count Survey
    - DFW Beaver-Otter Survey
    - Migratory Game Bird Banding Programs
    - Colonial Waterbird Survey
    - Beach Nesting Bird Survey
    - Site-specific Fish Monitoring Programs
- ***Priority:*** Complete and implement the Coordinated Bird Monitoring Plan to increase the efficiency and effectiveness of regional and national bird surveys.

c. Potential Partnerships to Deliver Conservation

- DFW will work with national coordinators at the US Geological Survey (USGS) to maintain adequate Breeding Bird Survey (BBS) and Calling Amphibian Monitoring Program (CAMP) survey routes in New Jersey to track trends.
- DFW will continue to work with NJ Audubon Society to support and improve the BBS.
- DFW and research-based conservation organizations will train volunteers to be knowledgeable in species identification, survey methodologies and data recording.
- DFW will work with universities, local naturalists and other state agencies to incorporate all available data into centralized databases (primarily Biotics).
- DFW will continue partnership with NJAS and the Citizen Scientist Program to recruit skilled volunteers and carry out bird surveys.
- DFW will develop a plan with the USGS-Bird Banding Lab for monitoring bird populations using bird banding on a broad scale.
- DFW will work with adjacent states to incorporate New Jersey data with existing neighboring states' data and provide contiguous range maps of critical habitats across state boundaries.
- DFW will continue to work with other wildlife agencies, Partners in Flight, and other organizations to coordinate and collaborate on the monitoring of birds at a regional and, eventually, continental scale.
- Work with the USFWS, USGS, and Atlantic Flyway Council to complete surveys and banding for migratory game birds of conservation concern.

d. Monitoring Success

- Evaluate trends of long-term monitoring for suitable species and suites of species and evaluate the power of methodologies to achieve certainty levels. Apply databases to Landscape Project mapping to evaluate trends in distribution relative to habitat trends.

8. Adaptive Management Practices

a. Conservation Goals

- Apply best management practices (BMP) for wildlife and habitat resources in the state, monitor effectiveness and modify BMPs as necessary.
- Maintain Landscape Map database and species based models; improve models as more data become available.
- Monitor research and data evaluation techniques and modify as needed.

b. Conservation Strategies.

- Evaluate and modify, when appropriate, monitoring and management strategies for species of greatest conservation need on private and protected lands, and share effectiveness of management strategies with conservation partners at a maximum of four-year intervals.
- Evaluate the effectiveness of management strategies used in landowner incentive programs through monitoring species response to management annually for the duration of the agreement and modify management as necessary.
- Review species based models as information is available, determine efficacy within Landscape Map and revise as appropriate.

- Develop on-line reporting mechanism for public land managers to share successes and failures with others and revise habitat management strategies accordingly.

c. Potential Partnerships to Deliver Conservation

- DFW will work with federal, state, and local agencies, NJ Audubon Society, the NJ Conservation Foundation, the Nature Conservancy-NJ Chapter, other conservation non-governmental organizations (NGOs), and local and private land stewards to incorporate adaptive management practices on lands managed for species of greatest conservation need.
- DFW and research-based conservation organizations will work to analyze and improve on-going habitat and wildlife management strategies on protected lands.
- DFW will apply adaptive management to habitat restoration and management projects on private land.
- DFW will work with research-based conservation organizations, and federal and state researchers to assess and modify current research and management objectives for species of greatest conservation need.

d. Monitoring Success

- Continue to assess research and management techniques and maintain information-sharing relationship with appropriate researchers within the state and region.
- Employ adaptive management techniques to evaluate Wildlife Action Plan implementation.

9. Review of Wildlife Action Plan

The NJ Department of Environmental Protection, Division of Fish and Wildlife (DFW) developed the Wildlife Action Plan with assistance from numerous organizations (Appendix V) and public input. Participation in the development of the Plan by large, member-based organizations such as NJ Audubon Society, the Nature Conservancy-NJ Chapter, and Ducks Unlimited, representing their constituencies throughout NJ, provided an additional approach to incorporating the needs and concerns of NJ's citizens. In addition, many natural resource management-focus and planning organizations, such as watershed groups, riverkeepers, Pinelands Commission, the National Park Service, and many others, helped coordinate goals and strategies to ensure that the Plan includes the needs of various organizations focused on more localized conservation efforts. Through a series of meetings, the Wildlife Action Plan has emerged as a truly inclusive and comprehensive strategy focused on the long-term viability of NJ's rare wildlife and ecological communities.

a. Conservation Goals

- ***Priority:*** Ensure that conservation activities of federal, state, county, municipal, and private (non-government organizations and utility companies) lands affecting species of conservation concern are consistent with the Plan. *(Management – Plan)*
- Wildlife Action Plan is an on-going, dynamic document, to be reviewed every five years. *(Evaluate progress – Plan)*

b. Conservation Strategies

- ***Priority:*** The most current version of the Plan will be linked to the most current version of the Landscape Project mapping and will be continually available for review and interactive use on the DFW Web site with an open invitation to submit comments.
- ***Priority:*** Every five years, the Division of Fish and Wildlife's Endangered and Nongame Species Program will initiate review of the Plan beginning with Division and Department biologists in a process that includes DEP staff, the Endangered and Nongame Species Advisory Committee (ENSAC), and a wildlife summit in which adaptive management will be built into the revision.
- ***Priority:*** Dedicate one meeting per year to reviewing the progress and soliciting input on the Plan, participants to include representatives of the ENSAC, the Fish and Game Council, and the Marine Fisheries Council.
- ***Priority:*** DFW will work with federal, state, county, municipal, and private land managers to incorporate the goals and strategies of the NJ Wildlife Action Plan into current management plans by the first formal review in 2011.
- Updated lists of species of conservation concern, referencing the state lists of endangered, threatened and special concern wildlife, and those species recognized as high priority by regional conservation plans will be incorporated into Plan revisions and clearly identified through a maintained "Plan revisions list."

c. Potential Partnerships to Deliver Conservation

- DFW will host a Wildlife Summit every five years with statewide conservation and environmental organizations, federal, state, and local governments, and environmentally based academia to review successes and failures of Plan and develop additional conservation goals.

d. Monitoring Success

- The level of participation in the regular Summit events, in which all partners will have opportunities to evaluate and revise the Plan, may measure success of the Plan review process.