

## **2. Raritan Bay and North Atlantic Coast**

- a. Habitats*
- b. Wildlife of Greatest Conservation Need*
- c. Threats to Wildlife and Associated Habitats*
- d. Conservation Goals*
- e. Conservation Actions*
- f. Partnerships to Deliver Conservation*
- g. Monitoring Success*

### **a. Habitats**

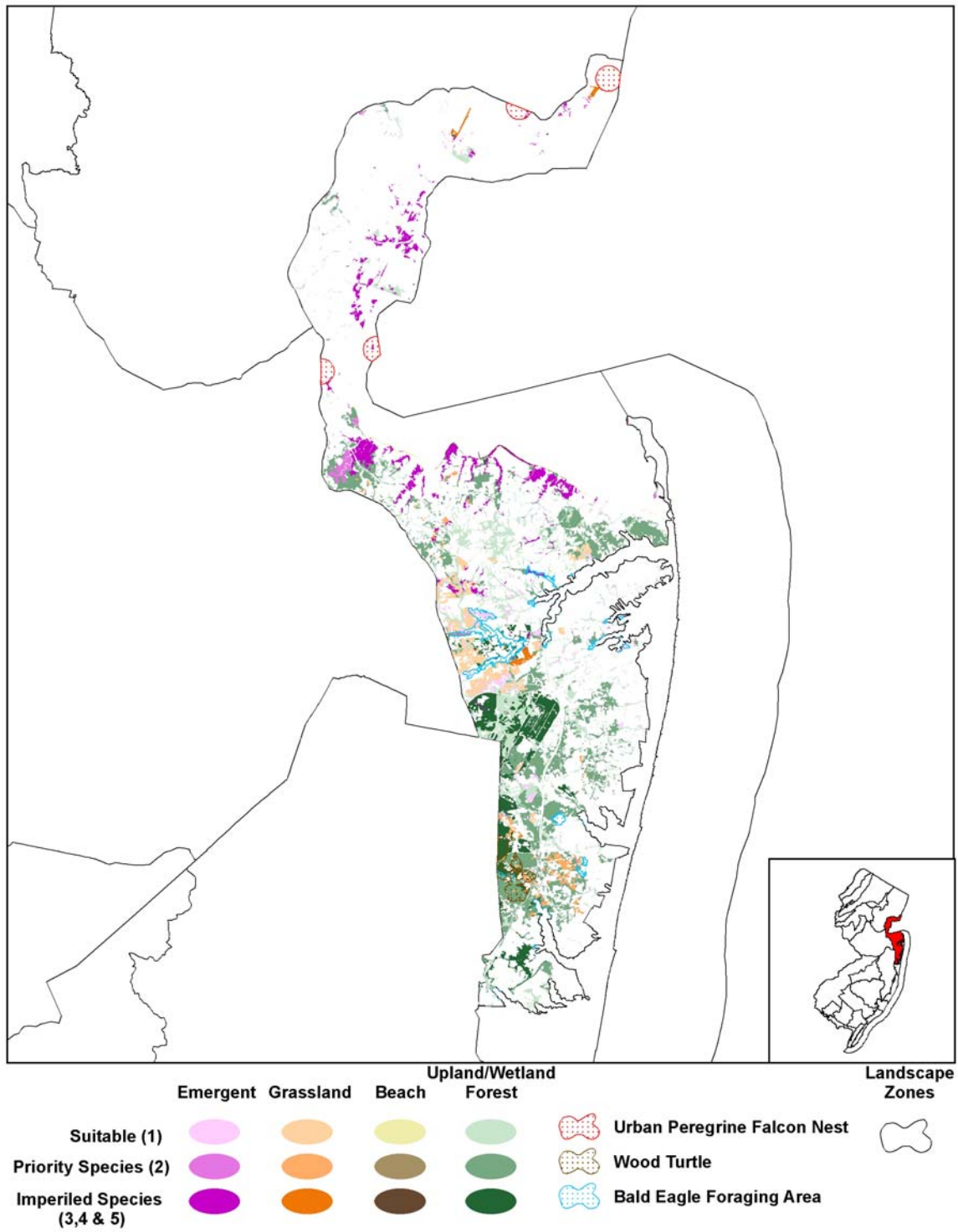
The Raritan Bay zone is located along the coastal areas of Essex, Hudson, Union, Middlesex, and Monmouth Counties (Figure 19). This zone contains parts of Allaire, Cheesequake, and Liberty State Parks, Manasquan River WMA, and Earl Naval Base.

Though largely developed, the Raritan Bay zone is extraordinary because of its extensive network of freshwater streams, ponds, major rivers, and their estuaries (Hudson, Raritan, Manasquan, Shark, Shrewsbury and Navesink) that drain into the Raritan Bay and Atlantic Ocean. Approximately 2,600 hectares or 10 square miles of open wetlands are in the Raritan Bay zone, with the largest wetland patches occurring west of Sandy Hook along the northern coastline of the Raritan Bay and Cheesequake State Park.

Nearly 20,000 hectares (77.2 square miles) of forested habitat (upland and wetland) with patch sizes ranging from less than 0.2 hectares (half an acre) to just under 2,000 hectares (4,942 acres) (Earl Naval Base), dot the landscape of the Raritan Bay. However, less than one fourth of the forest patches here are large enough to support wildlife of conservation concern without the detrimental effects of fragmentation. The southern portion of this zone contains large tracts of upland and wetland forest in Allaire State Park, Earl Naval Base, and various watershed management areas. Approximately 2,800 hectares or 10.8 square miles of open-field habitat (grasslands, pastures, and/or agriculture), with patch sizes ranging from 0.2 hectares (half an acre) to approximately 162 hectares (400 acres), are clustered in the Monmouth County portion of the Raritan Bay. Despite the expanse of open habitat in this area, less than half of the patches meet the minimum size requirement for area-sensitive grassland birds (10 hectares, 24.7 acres), let alone the more than 200 hectares (> 494 acres) needed to support a viable population of breeding upland sandpipers. Allaire, Newark, and Hop Brook Farm airports contain large patches of grasslands. Other areas with significant areas of open-field habitat include Colts Neck, Holmdel, and Wall Township in Monmouth County.

In summary, the priority habitats in this zone from north to south are: 1) estuaries and associated coastal wetlands, 2) riparian areas and associated forest/emergent wetlands, 3) large contiguous upland and wetland forests, 4) grasslands and early-succession habitats, which should be maintained and enhanced where they exist.

**Figure 19.** Critical landscape habitats within the Raritan Bay and North Atlantic Coast conservation zone, as identified through the Landscape Map (v2).



**b. Wildlife of Greatest Conservation Need**

The Raritan Bay provides habitat for one federal threatened species, eight state endangered species, eleven state threatened species, 71 special concern and regional priority species, and 17 additional harvested regional priority species.

Large expanses of marsh and riparian areas retain significant open water, emergent, forested, and coastal wetlands that provide extensive foraging habitats throughout the zone for least terns, colonial waterbirds, ospreys, freshwater wetland birds, spotted turtles, and Fowler’s toads. Raritan Bay winters one of the largest concentrations of greater and lesser scaup in the Atlantic Flyway. Peregrine falcons breed on bridge structures in the northern reach of this zone and Monmouth County riparian forests and open water support breeding bald eagles and forest songbirds. Large forest tracts border the Pinelands Landscape and support forest-interior raptors (red-shouldered hawks, barred owls, Cooper’s hawks) and forest-interior songbirds (black-throated green warblers, scarlet tanagers) These forest tracts are also vital for Pine Barrens treefrogs, wood turtles and other reptiles and amphibians, as migratory stopover for songbirds, and as foraging, roosting and breeding habitat for forest-dwelling bats. Early-succession habitat, is composed of two distinct habitat types, grassland and scrub-shrub, provide habitat for grassland and scrub-shrub birds, including upland sandpipers and savannah sparrows, breeding and nectaring areas for invertebrates (Lepidoptera), and nesting and basking sites for turtles. Cliff swallows, chimney swifts, and concentrations of summer bats can breed in highly urbanized areas and utilize man-made structures for breeding habitat. The following tables identify the species of greatest conservation need within this zone.

Wildlife Species and Associated Habitats of the Raritan Bay and North Atlantic Coast

Table PP17. Federal Endangered and Threatened Species\*

| Common Name               | Water | Beach and Dunes | Wetlands | Grasslands | Forests and Forested Wetlands |
|---------------------------|-------|-----------------|----------|------------|-------------------------------|
| <b>Mammals</b>            |       |                 |          |            |                               |
| Indiana bat               |       |                 |          |            | X**                           |
| <b>Reptiles</b>           |       |                 |          |            |                               |
| Bog turtle                |       |                 | X        | X          | X                             |
| <b>Insects</b>            |       |                 |          |            |                               |
| American burying beetle ♦ |       |                 | X        | X          |                               |

\*All Federal Endangered and Threatened species have an Endangered status on the NJ List of Endangered Wildlife

\*\*Potential presence.

♦ Only historic records exist. Species believed to be extirpated.

X: Species occurs within the identified habitat.

Table PP18. State Endangered Species

| Common Name         | Water | Beach and Dunes | Wetlands | Grasslands | Forests and Forested Wetlands |
|---------------------|-------|-----------------|----------|------------|-------------------------------|
| <b>Birds</b>        |       |                 |          |            |                               |
| Bald eagle          |       |                 | X        |            | X                             |
| Black skimmer       |       | X               | X        |            |                               |
| Henslow's sparrow   |       |                 | R        | R          |                               |
| Least tern          |       | X               | X        |            |                               |
| Northern harrier    |       |                 | X        | X          |                               |
| Peregrine falcon    |       |                 | X        |            |                               |
| Pied-billed grebe   | X     |                 | X        |            |                               |
| Red-shouldered hawk |       |                 |          |            | X                             |
| Upland sandpiper    |       |                 |          | X          |                               |

R: Proposed reintroduction of species

X: Species occurs within the identified habitat.

Table PP19. State Threatened Species

| Common Name                | Water | Beach and Dunes | Wetlands | Grasslands | Forests and Forested Wetlands |
|----------------------------|-------|-----------------|----------|------------|-------------------------------|
| <b>Birds</b>               |       |                 |          |            |                               |
| Barred owl                 |       |                 |          |            | X                             |
| Black-crowned night-heron  |       | X               | X        |            |                               |
| Cooper's hawk              |       |                 |          |            | X                             |
| Grasshopper sparrow        |       |                 |          | X          |                               |
| Osprey                     |       | X               | X        |            |                               |
| Savannah sparrow           |       |                 |          | X          |                               |
| Yellow-crowned night-heron |       | X               | X        |            |                               |
| <b>Reptiles</b>            |       |                 |          |            |                               |
| Northern pine snake        |       |                 |          | X          | X                             |
| Wood turtle                |       |                 | X        | X          | X                             |
| <b>Amphibians</b>          |       |                 |          |            |                               |
| Pine Barrens treefrog      |       |                 | X        |            | X                             |
| <b>Invertebrates</b>       |       |                 |          |            |                               |
| Checkered white            |       |                 | X        | X          | X                             |

X: Species occurs within the identified habitat.

Table PP20. Nongame Species of Conservation Concern

| Common Name                  | Water | Beach and Dunes | Wetlands | Grasslands | Forests and Forested Wetlands |
|------------------------------|-------|-----------------|----------|------------|-------------------------------|
| <b>Mammals</b>               |       |                 |          |            |                               |
| Eastern small-footed myotis  |       |                 |          |            | X**                           |
| Eastern red bat              |       |                 |          |            | X**                           |
| Hoary bat                    |       |                 |          |            | X**                           |
| Marsh rice rat               |       |                 |          | X          |                               |
| Silver-haired bat            |       |                 |          |            | X**                           |
| Southern bog lemming         |       |                 |          |            | X                             |
| <b>Birds</b>                 |       |                 |          |            |                               |
| Acadian flycatcher           |       |                 |          |            | X                             |
| American kestrel             |       |                 |          | X          |                               |
| American oystercatcher       |       | X               |          |            |                               |
| Baltimore oriole             |       |                 |          |            | X                             |
| Black-and-white warbler      |       |                 |          |            | X                             |
| Black-billed cuckoo          |       |                 |          |            | X                             |
| Black-throated green warbler |       |                 |          |            | X                             |
| Blue-headed vireo            |       |                 |          |            | X                             |
| Blue-winged warbler          |       |                 | X        |            | X                             |
| Broad-winged hawk            |       |                 |          |            | X                             |
| Brown thrasher               |       |                 |          |            | X                             |
| Canada warbler               |       |                 |          |            | X                             |
| Chimney swift                |       |                 |          |            | X                             |
| Common barn owl              |       |                 |          | X          |                               |

NJ Wildlife Action Plan: 01/23/08

Nongame Species of Conservation Concern (continued)

| Common Name                                 | Water | Beach and Dunes | Wetlands | Grasslands | Forests and Forested Wetlands |
|---|-------|-----------------|----------|------------|-------------------------------|
| <b>Birds (continued)</b>                    |       |                 |          |            |                               |
| Common nighthawk                            |       | X               |          | X          | X                             |
| Common tern                                 |       | X               |          |            |                               |
| Eastern kingbird                            |       |                 |          | X          |                               |
| Eastern meadowlark                          |       |                 |          | X          |                               |
| Eastern screech-owl                         |       |                 |          |            | X                             |
| Eastern towhee                              |       |                 |          |            | X                             |
| Eastern wood-pewee                          |       |                 |          |            | X                             |
| Field sparrow                               |       |                 |          | X          |                               |
| Forster's tern                              |       | X               | X        |            |                               |
| Glossy ibis                                 |       |                 | X        |            |                               |
| Gray catbird                                |       |                 |          |            | X                             |
| Great blue heron                            |       |                 | X        |            |                               |
| Great crested flycatcher                    |       |                 |          |            | X                             |
| Great egret                                 |       |                 | X        |            |                               |
| Green heron                                 |       |                 | X        |            |                               |
| Hooded warbler                              |       |                 |          |            | X                             |
| Horned grebe                                |       |                 | X        |            |                               |
| Horned lark                                 |       | X               |          | X          |                               |
| Indigo bunting                              |       |                 |          | X          | X                             |
| Kentucky warbler                            |       |                 |          |            | X                             |
| Least bittern                               |       |                 | X        |            |                               |
| Least flycatcher                            |       |                 |          |            | X                             |
| Little blue heron                           |       |                 | X        |            |                               |
| Louisiana waterthrush                       |       |                 |          |            | X                             |
| Marsh wren                                  |       |                 | X        |            |                               |
| Northern flicker                            |       |                 |          |            | X                             |
| Northern parula                             |       |                 |          |            | X                             |
| Northern gannet                             |       | X               |          |            |                               |
| Pine warbler                                |       |                 |          |            | X                             |
| Prairie warbler                             |       |                 |          |            | X                             |
| Purple finch                                |       |                 |          |            | X                             |
| Red-throated loon                           |       | X               | X        |            |                               |
| Rose-breasted grosbeak                      |       |                 |          |            | X                             |
| Saltmarsh sharp-tailed sparrow              |       |                 | X        |            |                               |
| Scarlet tanager                             |       |                 |          |            | X                             |
| Seaside sparrow                             |       |                 | X        |            |                               |
| Spotted sandpiper                           |       |                 | X        |            |                               |
| Summer tanager                              |       |                 |          |            | X                             |
| Veery                                       |       |                 |          |            | X                             |
| Whip-poor-will                              |       |                 |          |            | X                             |
| Willet                                      |       | X               | X        |            |                               |
| Willow Flycatcher                           |       |                 |          |            | X                             |
| Wood thrush                                 |       |                 |          |            | X                             |
| Worm-eating warbler                         |       |                 |          |            | X                             |
| Yellow-billed cuckoo                        |       |                 |          |            | X                             |
| Yellow-breasted chat                        |       |                 |          |            | X                             |
| Yellow-throated vireo                       |       |                 |          |            | X                             |
| Yellow-throated warbler                     |       |                 |          |            | X                             |
| <b>Reptiles</b>                             |       |                 |          |            |                               |
| Eastern box turtle                          |       |                 |          | X          | X                             |
| Northern copperhead                         |       |                 |          |            | X                             |
| Northern diamondback terrapin               |       |                 | X        |            | X                             |
| Spotted turtle                              |       |                 | X        | X          | X                             |
| <b>Amphibians</b>                           |       |                 |          |            |                               |
| Fowler's toad                               |       |                 |          | X          | X                             |
| Northern spring salamander                  |       |                 |          | X          | X                             |
| <b>Insects</b>                              |       |                 |          |            |                               |
| A noctuid moth,<br><i>Chytonix sensilis</i> |       |                 |          |            | X                             |

Nongame Species of Conservation Concern (continued)

| Common Name             | Water | Beach and Dunes | Wetlands | Grasslands | Forests and Forested Wetlands |
|-------------------------|-------|-----------------|----------|------------|-------------------------------|
| <b>Fish</b>             |       |                 |          |            |                               |
| American brook lamprey* | X     |                 |          |            | X                             |

\*Species is also recognized as target species of ecoregional concern by the Nature Conservancy - NJ Chapter

\*\*Potential presence.

X: Species occurs within the identified habitat.

Table PP21. Game Species of Regional Priority

Note: Species identified within the table have seasonal harvests within New Jersey.

| Common Name                        | Water | Beaches and Dunes | Wetlands | Grasslands | Forests and Forested Wetlands |
|------------------------------------|-------|-------------------|----------|------------|-------------------------------|
| <b>Birds</b>                       |       |                   |          |            |                               |
| American black duck                | X     |                   | X        |            | X                             |
| American woodcock                  |       |                   |          |            | X                             |
| Atlantic brant                     | X     |                   |          |            |                               |
| Black scoter                       | X     |                   |          |            |                               |
| Bufflehead                         | X     |                   |          |            |                               |
| Canada goose (Atlantic population) | X     |                   | X        |            |                               |
| Canvas back                        | X     |                   |          |            |                               |
| Clapper rail                       |       |                   | X        |            |                               |
| Greater scaup                      | X     |                   |          |            |                               |
| Harlequin duck*                    | X     |                   | X        |            |                               |
| Lesser scaup                       | X     |                   |          |            |                               |
| Long-tailed duck                   | X     |                   |          |            |                               |
| Northern bobwhite                  |       |                   |          | X          |                               |
| Northern pintail                   | X     |                   |          |            |                               |
| Virginia rail                      |       |                   | X        |            |                               |
| White-winged scoter                | X     |                   |          |            |                               |
| Wood duck                          |       |                   |          |            | X                             |

\*Species considered regional priority, but New Jersey is not significant in the population's survival.

X: Species occurs within the identified habitat.

Table PP22. Fish Species

| Common Name   | Water |
|---------------|-------|
| <b>Fish</b>   |       |
| Shield darter | X     |

X: Species occurs within the identified habitat.

Table PP23. Game Species

Note: Species identified within the table have seasonal harvests within New Jersey and currently are not identified as regional priority species, but they are considered by NJDFW to be species of concern.

| Common Name    | Water | Beaches and Dunes | Wetlands | Grasslands | Forests and Forested Wetlands |
|----------------|-------|-------------------|----------|------------|-------------------------------|
| <b>Mammals</b> |       |                   |          |            |                               |
| River otter    | X     |                   | X        |            |                               |
| <b>Birds</b>   |       |                   |          |            |                               |
| Ruffed grouse  |       |                   |          |            | X                             |
| Sora rail      |       |                   | X        |            |                               |

X: Species occurs within the identified habitat.

**c. Threats to the Wildlife and Habitats of the Raritan Bay and North Atlantic Coast**

For complete literature review on the impacts of habitat loss and fragmentation, please see New Jersey's Landscape Project Report, Attachment A or visit our website:

[www.njfishandwildlife.com/ensp/landscape/lp\\_report.pdf](http://www.njfishandwildlife.com/ensp/landscape/lp_report.pdf)

Although most of the large patches of suitable habitat are owned by municipal, county, state, and federal entities, this zone is fairly well developed. Habitat loss and fragmentation and human disturbance are the greatest threats in this zone.

Major waterways in this zone are situated in the New York metropolitan area and support some of the largest petro-chemical facilities in the U.S. As such, this zone faces spill and contaminants related threats that could be potentially catastrophic. This zone receives heavy recreational use of rivers and coastal waters by boats and personal watercraft, which can interfere with the breeding and foraging of bald eagles and colonial waterbirds. Loss and fragmentation of habitats and isolation of protected natural lands by development and roads are significant threats to wildlife in this zone. Roads and development destroy and degrade habitat and act as barriers to wildlife movements. Fragmentation of habitat allows for many invasive plant species to become integrated into natural areas, thereby degrading habitat suitability for many species. Additionally, fragmentation increases stress on the remaining trees thereby, increasing susceptibility of invasive pests (such as Asian longhorned beetle and gypsy moths). White-tailed deer thrive in fragmented non-urban areas and the resulting over-browse of the forest system in this landscape is severe and virtually eliminates forest regeneration. White-tailed deer also selectively browse giving invasive species that they avoid (barberry species, etc) a stronghold in our forested understory. Although more prevalent in the coastal region, predatory laughing gulls, herring gulls, and great black-backed gulls may impact breeding populations of birds, reptiles, and amphibians in this zone.

Stream encroachment is the leading cause of degradation of riparian ecosystems including habitat loss, increased water temperatures and runoff of contaminants. Invasive plants, such as common reed or Phragmites (*Phragmites australis*) and purple loosestrife (*Lythrum salicaria*), severely reduce suitability of wetlands for marsh-nesting birds. The sinuous network of riparian corridors in southern portion of this zone provides the only egress for wildlife to disperse through developed regions. Mute swans degrade wetlands throughout the area by grazing submerged aquatic vegetation. Furthermore mallards, which thrive in areas with human habitation, compete with and displace American black ducks and have also been known to hybridize with them, particularly in the northern part of this zone. In riparian areas, North American beavers can create wetland habitat suitable for many species by damming up streams, but may, in turn, alter riparian habitat downstream from the dam.

Many forest and grassland species are area sensitive and their populations decline as habitat size decreases. Mowing/brush-hogging of fields, roadsides and utility rights-of-way during breeding season (mid-April through early July) increases mortality and reduces productivity of many species, including birds, reptiles and amphibians, invertebrates, and small mammals. Additionally, the impact of free-ranging domestic and feral cats on wildlife is well documented and can severely impact and destroy important urban wildlife populations. Also see Section I-E “Threats to Wildlife and Habitats” (page 17) of this document.

**d. Conservation Goals**

- Identify, protect, enhance, and/or restore endangered, threatened, and special concern wildlife and fish populations and their habitats through full implementation of Landscape Project.
- Identify, protect, enhance and/or restore suitable aquatic, wetland, and riparian habitat and water quality for bald eagle, ospreys, least terns, pied-billed grebes, northern harriers, night-herons, special concern fish species and other aquatic and wetland species of conservation concern.
- Identify, protect, enhance and/or restore large tracts of suitable forest and forested wetland habitat for area-sensitive forest species of conservation concern, particularly for red-shouldered hawks, barred owls, and forest passerines.
- Identify, protect, enhance and/or restore suitable open-field/grassland (areas with >75 % herbaceous and <25% woody vegetation) habitat for area-sensitive grassland species such as upland sandpipers, savannah sparrows, and grasshopper sparrows, and American burying beetles.
- Inventory, determine distribution, and monitor all endangered, threatened, special concern species in the Raritan Bay and North Atlantic Coast zone.
- Prevent, stabilize, and reverse declines of wildlife populations of reptiles and amphibians, birds, and butterfly and moth species of conservation concern and rare fish species.
- Assess large-scale habitat change (every five to 10 years).
- Maintain ecological integrity of natural communities and regional biodiversity by controlling invasive species and overabundant wildlife.
- Protect and enhance important and unique natural communities.
- Prevent illegal collection of rare reptiles and amphibian (including bog and wood turtles).
- Protect and enhance bald eagle nesting, foraging and roosting habitat.
- Promote public education and awareness, wildlife and indigenous nongame fish conservation, and participation in habitat restoration efforts on private land.

**e. Conservation Actions**

The actions below are identified as primary (1° or priority) and secondary (2°). Prioritization was determined by the Piedmont Plains Regional Landscape stakeholders during a meeting held on September 7, 2006 (see *Attachment F*). These actions, with a focus on the priority actions, should be incorporated in planning and project development in conjunction with the priority state-level objectives (goals) and strategies (actions).

| Priority  | Conservation Actions   |
|---|--|
| <b>Protect wildlife through implementation of Landscape Project mapping</b> |  |
| 1°  | 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. ( <i>Protect habitat – Landscape Project</i> ) |



| Priority   | Conservation Actions (continued)   |
|--|--|
| 1°   | Provide technical assistance and promote use of Landscape Project mapping in state land-use regulation, municipal planning, land acquisition priorities, and development of management strategies for permanently protected lands. ( <i>Protect habitat – Landscape Project</i> )  |
| 1°   | Develop a GIS model of Indiana bat habitat to incorporate into the Biotics database. Identify appropriate protection strategies to maintain and enhance habitat (landowner incentives for protecting summer habitat, public education regarding the importance of bat conservation, development of best management practices). ( <i>Protect habitat – Landscape Project; Conserve wildlife – rare wildlife</i> ) |
| 2°   | Incorporate ENSP approved sightings data from nominated and approved Important Bird Areas into the Biotics database and Landscape Project mapping providing the sightings meet the ENSP Biotics and Landscape Project standards. ( <i>Protect habitat – Landscape Project, migratory birds</i> )   |
| 2°   | Study songbird migration and develop appropriate management strategies for important stopover areas including collaboration with surrounding private landowners. ( <i>Protect habitat – migratory birds</i> )  |
| <b>Protect suitable aquatic/wetland/riparian habitat and water quality for wildlife and fish species of conservation concern</b> |  |
| 1°   | Increase the number of acres of coastal and riparian emergent wetlands maintained and enhanced for breeding and foraging osprey, colonial waterbirds and marsh-nesting birds (yellow- and black-crowned night-herons, northern harriers, pied-billed grebes, rails). ( <i>Protect habitat – development; Conserve wildlife – rare wildlife</i> )   |
| 1°   | Use GIS measures, other remote sensing tools, and surveys to identify and best management practices to maintain wetlands with standing dead trees for red-headed woodpecker and other cavity-nesters. ( <i>Protect habitat – Landscape Project; Silviculture – land management</i> )   |
| 1°   | Preserve and protect occupied and potential habitat for black rails and sedge wren by restricting human activity at nesting sites and preserving surrounding wetlands through regulations, land acquisition, and incentive programs. ( <i>Protect habitat – development, humans; Enhance habitat – private lands</i> )   |
| 1°   | Protect all large (> 4.9 hectares, 12.1 acres) freshwater wetlands from development, draining, pollutants from runoff and other forms of habitat loss and degradation through regulations, land acquisition, and incentive programs. ( <i>Protect habitat – development, humans</i> )  |
| 1°   | Protect water quality and aquatic-dependent species by appropriately designating Category 1 waters. ( <i>Protect habitat – rare wildlife, fish</i> )   |

| Priority | Conservation Actions (continued)   |
|----------|--|
| 1°       | Maintain optimal biological buffers (beyond regulatory requirements) around wetlands, riparian and floodplain areas and minimize destruction per the NJ DEP Wetland Buffer Guidelines for Species of Conservation Concern in New Jersey (in prep). Stabilize wetland buffers and streambanks by encouraging plantings of native vegetation through public education, volunteer programs, and land managers to stabilize wetland buffers and stream banks and prevent erosion. <i>(Protect habitat – Landscape Project; Enhance habitat –private lands)</i> |
| 1°       | Protect marshes from chemical contamination, siltation, eutrophication, and other forms of pollution/contamination that could directly harm wetland dependent species or their food supply. Evaluate protection efforts through regular monitoring of water quality. <i>(Conserve wildlife – contaminants)</i>   |
| 2°       | Increase the number of acres of forested riparian areas and larger forest tracts maintained and enhanced for breeding bald eagles, forest raptors, songbirds, reptiles and amphibians, and terrestrial and aquatic invertebrates. <i>(Protect habitat – development; Conserve wildlife – rare wildlife)</i>  |
| 2°       | Increase the number of acres of riparian buffer areas maintained and enhanced through stream bank stabilization, erosion control, native plantings, and fencing for songbirds, raptors, long-legged wading birds, riparian reptiles and amphibians, and invertebrates. <i>(Protect habitat –development; Conserve wildlife – rare wildlife)</i>  |
| 2°       | Locate potential vernal pools through aerial imagery and surveys, conduct species surveys, and integrate certified vernal pools into the DEP regulations database and Landscape Project <i>(Protect habitat – Landscape Project)</i>   |
| 2°       | Perform QA/QC of the NJDEP - DFW, Bureau of Freshwater Fisheries' FishTrack Database and query the database to determine distributions of fishes identified as special concern by the Delphi process. <i>(Monitor wildlife – fish)</i>   |
| 2°       | Work with local agencies and stakeholders to develop and implement proactive habitat management/conservation plans for colonial waterbirds that focus on habitat protection and restoration and population recovery. <i>(Protect habitat – development; Conserve wildlife – development)</i>   |
| 2°       | Identify and protect habitat for fish by plotting distributions of special concern fish species, and integrate those data into the Biotics database. <i>(Protect habitat – Landscape Project, fish)</i>  |

| Priority   | Conservation Actions (continued)   |
|--|--|
| <b>Protect suitable forest and forested wetland habitat for wildlife species of conservation concern</b> |  |
| 1°   | Use GIS measures, other remote sensing tools, and surveys to identify and assess core forested wetland and riparian/floodplain habitat for forest raptors (red-shouldered hawk, barred owl), if applicable, and forest-interior songbirds (scarlet tanager, wood thrush, northern parula, pine warbler, veery). Take action to minimize habitat loss by protecting, maintaining, enhancing and/or restoring habitat on public and private lands through programs such as fee purchases, conservation easements, landowner incentives, and/or forest management and stewardship plans. <i>(Silviculture – land management; Protect habitat – Landscape Project, development; Enhance habitat – private lands)</i>   |
| 1°   | Use GIS measures, other remote sensing tools, and surveys to identify critical core forests (forest area >90 meters from the forest edge) and maintain information in the Landscape Project and Biotics database. Preserve and protect core forests through regulations, land acquisition, and incentive programs for forest-interior passerines (≥ 10 hectares or 24.7 acres of core forest) and forest raptors (≥ 100 hectares or 247 acres of contiguous forest), if applicable, per the Forest Management Guidelines for Nongame Species in New Jersey. Focus preservation efforts in forests that are at least 2,500 meters from major highways. Work to prevent activities that cause permanent breaks in the forest canopy and lead to fragmentation (roads, development). Identify adjacent habitats to core forests that can be preserved and/or managed to increase the total size of forest habitat. <i>(Protect habitat – Landscape Project; Silviculture – land management)</i> |
| 1°   | Use GIS measures and other remote sensing tools, surveys, incentive programs, and public education to select and manage woodlots to maintain dead trees, reduce understory, and thin tree stands for open-woodland species and cavity-nesters such as nightjars and red-headed woodpeckers, respectively. <i>(Silviculture – land management; Conserve wildlife – rare wildlife)</i>   |
| 1°   | Increase the effective size and connectivity of forested habitats and habitat corridors through incentive programs and targeted land acquisition. Use GIS measures, other remote sensing tools, and surveys to identify important corridors that connect large, contiguous tracts of forest; target these areas for enhancement/acquisition to maintain a system of large, connected tracts of forest within and between conservation zones. Revegetate and increase size of stream corridors in developed regions to create a network of corridors that allow wildlife passage through the landscape. <i>(Enhance habitat – private lands; Corridors – sprawl, migratory birds; Protect habitat – Landscape Project)</i>  |

| Priority  | Conservation Actions (continued)   |
|---|--|
| 1°  | <p>Increase the number of forests managed to contain a mix of seral (successional) stages to provide habitat for a wide range of forest-dwelling species (e.g., woodland raptors, timber rattlesnakes, bobcats, Indiana bats, wood thrush, northern parulas, scarlet tanagers, and pine warblers) within large contiguous tracts while maintaining suitability for area-sensitive species per the Forest Management Guidelines for Nongame Species in New Jersey.</p> <ul style="list-style-type: none"> <li>• The primary goal being to maintain or manage for large and contiguous areas of mature and near-mature forests with large trees, <math>\geq 80\%</math> canopy cover, and an uneven-age structure that is suitable for woodland nesting raptors (forest raptors).</li> <li>• Maintain and enhance floodplain and upland forests for forest-interior passerines (managing for mature deciduous or mixed forests with 65-85% canopy closure and structural diversity; managing pine or mixed-pine forests with sparse understory).</li> <li>• Selected areas of second-growth forested wetlands of moderate wildlife value should be allowed to mature and managed to create future barred owl and red-shouldered hawk habitat.</li> <li>• Take action to minimize loss of older forest stands with large trees in large, contiguous tracts by protecting, maintaining, enhancing, and/or restoring habitat on public and private lands through programs such as fee purchases, conservation easements, landowner incentives, and/or forest management plans.</li> </ul> <p><i>(Silviculture – Land management; Protect habitat – Landscape Project, migratory birds, rare wildlife)</i></p> |
| 2°  | <p>Use GIS measures, other remote sensing tools, and surveys to identify coniferous and hemlock forests with <math>&gt;70\%</math> forest cover to protect and maintain them, through land acquisition, incentive programs, and public education, for priority bird species (black-throated green warbler, northern parula), reptiles and amphibians.</p> <p><i>(Protect habitat – Landscape Project)</i></p>  |
| <p><b>Protect suitable grassland habitat for wildlife species of conservation concern</b></p> |  |
| 1°  | <p>Use GIS measures, other remote sensing tools, and surveys to identify existing grasslands important for endangered, threatened, and special concern species; increase the number of acres of large grasslands enhanced to support a robust grassland community. <i>(Protect habitat – Landscape Project; Enhance habitat – private lands)</i></p>   |
| 1°  | <p>Use GIS measures, other remote sensing tools, and surveys to identify areas where scrub-shrub habitat can be created and/or maintained for populations of butterflies and moths, reptiles, amphibians, and scrub-shrub birds such as American woodcock and northern bobwhite quail. <i>(Protect habitat – Landscape Project)</i></p>  |

| Priority  | Conservation Actions (continued)  |
|---|---|
| 2°  | Collaborate with municipal landfill operations to promote planting and management of capped landfills for grassland-dependent species and evaluate effectiveness of management through surveys. <i>(Education – humans)</i>   |
| 2°  | Maintain and enhance grassland habitats where they exist; do not expand or create grassland habitat at the expense of large forest that meet the needs of area-sensitive forest species. Acquire grassland habitat through direct purchase or easements; enlist private lands in preservation and management programs that offer long-term (no less than 5 years) stability of a matrix of grassland schemes including various stages of vegetative succession, where appropriate. <i>(Protect habitat – Landscape Project, development; Enhance habitat – private lands)</i> |
| 2°  | Develop, implement and evaluate best management practices (BMPs) through wildlife and habitat surveys on utility rights-of-way (ROWs) to reduce impacts of vegetation management practices on wildlife and enhance scrub-shrub habitat. <i>(Protect habitat – humans; Conserve wildlife – rare wildlife)</i>  |
| <b>Inventory and monitor endangered, threatened and special concern wildlife and fish</b> |   |
| 1°  | Use the Biotics database and Landscape Project to identify where species data and monitoring gaps exist. Design and implement coordinated surveys to acquire data in those areas. <i>(Monitor wildlife – long-term monitoring)</i>  |
| 1°  | Through national, standardized survey protocols, using citizen scientists, continue long-term monitoring and survey to collect baseline data (protected lands) of raptors, songbirds, reptiles, amphibians, colonial waterbirds, and aquatic invertebrate populations, and incorporate new information into the Biotics database. <i>(Monitor wildlife – long-term monitoring)</i>  |
| 1°  | Promote coordination of species monitoring and management efforts among conservation groups and state agencies in New Jersey by using standardized monitoring and data entry methods for birds and reptiles and amphibians. <i>(Monitor wildlife – long-term monitoring)</i>  |
| 1°  | Identify and research water quality parameters for bald eagle, wood turtle, and special concern amphibian populations. Assess impacts and incorporate into BMPs. <i>(Conserve wildlife – rare wildlife; Protect aquatic wildlife - humans, development)</i>   |
| 1°  | Research and evaluate effectiveness of water quality management practices on wood and bog turtles, special concern amphibians, and aquatic invertebrates, particularly those practices associated with permitting and mitigation actions, and revise management actions where appropriate. <i>(Conserve wildlife – rare wildlife)</i>   |
| 1°  | Determine population status and monitor trends of forest dwelling bat species in comparison to land use changes and alteration of habitat through long-term acoustical sampling and trapping/netting surveys. <i>(Monitor wildlife – long-term monitoring)</i>  |
| 1°  | Continue volunteer-based summer bat concentration surveys to locate maternity sites and determine roost characteristics. Trap bats at summer concentration sites to identify bat species; apply colored, plastic bands to Indiana bats to aid in recognition during hibernation surveys. <i>(Monitor wildlife – long-term monitoring)</i>   |

| Priority  | Conservation Actions (continued)   |
|---|--|
| 1°  | Conduct telemetry study during summer months to determine roost characteristics and habitat requirements for Indiana bat maternity colonies. <i>(Protect habitat – Landscape Project)</i>  |
| 2°  | Continue ground surveys of all known great blue heron rookeries every 3-5 years. Improve census methods to capture population and reproductive success metrics at a finer scale. <i>(Monitor wildlife – long-term monitoring; Conserve wildlife – rare wildlife)</i>   |
| 2°  | Establish a formal ground survey for inland colonies of colonial waterbirds, with a particular emphasis on black and yellow-crowned night herons. Once the survey is instituted, continue on a rotation of once every other year. <i>(Monitor wildlife – long-term monitoring; Conserve wildlife – rare wildlife)</i>  |
| 2°  | Conduct surveys to find more information about the species and management requirements of rails and other secretive marsh nesting species. <i>(Conserve wildlife – rare wildlife)</i>  |
| 2°  | Systematically survey the Raritan Bay zone, particularly airports, Liberty, Cheesequake, and Allaire state parks, Earl Naval Base, Manasquan River WMA, Colts Neck, Wall, Middletown, and Tinton Falls for American burying beetle, songbirds, raptors, colonial waterbirds, grassland/open-field butterflies and moths, and wetland butterflies and moths. <i>(Monitor wildlife – long-term monitoring)</i> |
| 2°  | Use GIS measures, other remote sensing tools, and surveys to identify suitable habitat for northern spring salamanders, northern copperheads, and checkered whites and survey these areas to update the species occurrence data in the Biotics database. <i>(Monitor wildlife – long-term monitoring; Conserve wildlife – rare wildlife)</i>   |
| 2°  | Research survey methods and develop a plan for the survey and long-term monitoring of colonial waterbird populations on the Raritan Bay coast and songbird populations throughout the zone. <i>(Monitor wildlife – long-term monitoring; Conserve wildlife – rare wildlife)</i>  |
| 2°  | Conduct concentrated field sampling for listed or special concern fish species at areas indicated by FishTrack Database queries and incorporate data into Biotics database. <i>(Protect habitat – fish; Monitor wildlife – fish)</i>   |
| 2°  | Survey all salt marshes for breeding seaside and saltmarsh sharp-tailed sparrows. <i>(Monitor wildlife – long-term monitoring; Conserve wildlife – rare wildlife)</i>  |
| 2°  | Conduct sampling to determine distribution, range, and habitat use of summer bats. <i>(Protect habitat - Landscape Project; Monitor wildlife – long-term monitoring)</i>   |
| <b>Prevent and reverse declines of wildlife and rare fish populations</b> |  |
| 1°  | Work with managers to increase the number of impoundments managed to benefit bitterns, rails, ducks and some invertebrates by providing suitable foraging habitat and encouraging dense stands of emergent vegetation for nesting. <i>(Protect habitat – humans)</i>   |

| Priority | Conservation Actions (continued)   |
|----------|--|
| 1°       | Protect all remaining habitat for saltmarsh sharp-tailed sparrows (high marsh with buffer, stable water levels) through legislation, land acquisition, and incentive programs. Use GIS measures, other remote sensing tools, and data from surveys to identify areas for restoration of snowy egret, saltmarsh sharp-tailed sparrow, seaside sparrow, and rail populations. <i>(Protect habitat – Landscape Project)</i>   |
| 2°       | Actively protect, monitor, and manage bald eagle nests and foraging areas, including posting signs in waterways to prevent disturbance by recreational water-users and cooperation with private landowners. <i>(Protect habitat – humans; Conserve wildlife – rare wildlife)</i>   |
| 2°       | Conduct literature reviews and research to determine habitat needs, limiting factors, and contaminant burdens in wintering greater and lesser scaup and sea ducks of conservation concern. <i>(Conserve wildlife – game species)</i>   |
| 2°       | Continue to monitor reproductive success of peregrine falcons and northern harriers and protect nesting areas from human disturbance through enforcement and volunteer efforts. <i>(Protect habitat – humans; Conserve wildlife – rare wildlife)</i>   |
| 2°       | Conduct research to assess the potential impacts of coastal and offshore wind turbines on breeding, migrating, and wintering bird and bat populations. Conduct studies and create models to identify migratory routes of and assess the potential impacts of wind turbines, tall buildings, radio towers and other "human-made" tall structures to populations of breeding and migratory birds and bats. Carry out post-construction monitoring of both existing and future wind turbines to assess the actual impacts these structures have on bats. <i>(Protect habitat - humans)</i>  |
| 2°       | Develop and implement management actions to enhance populations of special concern and rare fish. <i>(Protect aquatic wildlife-humans)</i>   |
| 2°       | Study how land use practices such as ditching, impounding, dredging, open marsh water management, burning, and marsh restoration impact species in this suite and assess/revise management actions where appropriate. <i>(Protect habitat – humans; Conserve wildlife – rare wildlife)</i>   |
| 2°       | Research effects of parasites and diseases on special concern fish species' populations. <i>(Monitor wildlife – fish)</i>  |
| 2°       | Work with DOTs and other appropriate federal, state, and local agencies to increase the number of sites where road crossing are improved to maintain and avoid disturbance to the natural streambeds and riparian habitat, to permit high volumes of water to flow freely, and to provide adequate travel corridors for terrestrial wildlife, while maintain stream flow for fish passage. Bridges that span rivers and streambeds and include floodplain habitat on either side of the span to provide travel corridors for terrestrial wildlife are preferred over culverts. <i>(Corridors – roads; Protect habitat – roads, fish)</i> |
| 2°       | DFW will collaborate with USDA to identify and prioritize, based upon species of greatest conservation need, areas where rapid response to an exotic pathogen introduction or incident is needed. . <i>(Conserve wildlife – invasives, rare wildlife)</i>  |

| Priority  | Conservation Actions (continued)  |
|---|---|
| 2°  | Evaluate and assess the potential impacts of wind turbines to populations of bats. Carry out post-construction monitoring of both existing and future wind turbines to assess the actual impacts these structures have on bats. ( <i>Protect habitat – humans; Conserve wildlife – rare wildlife</i> )  |
| 2°  | Develop Indiana bat recovery plan in accordance with federal guidelines and strategies set forth in the USFWS Indiana Bat Recovery Plan (U.S. Fish and Wildlife Service, 1999). ( <i>Conserve wildlife – rare wildlife</i> )  |
| <b>Assess large-scale habitat change every five years</b>   |   |
| 1°  | Collaborate with NJ DEP's Bureau of Geographic Information and Analysis and Rutgers Center for Remote Sensing and Spatial Analysis to develop methods to update DEP's land use/land cover data every five years and perform critical habitat change analysis to assess trend in habitat loss and conversion.  |
| <b>Maintain natural biodiversity, community integrity and structure and ecosystem function by controlling invasive and overabundant species</b> |   |
| 1°  | Identify areas where invasive, non-indigenous plants and animals are either already established or are becoming established through GIS, surveys, public participation, and creating a system for reporting and qualifying new locations of invasive species. Prioritize areas for control measures according to the potential level of impact on the ecosystem and species of conservation concern and the likelihood of success. ( <i>Conserve wildlife – invasives</i> ) |
| 1°  | Work with public and private landowners and managers to employ appropriate physical, chemical, or biological control measures, or a combination of these, to reduce invasive non-indigenous plants and animals in areas that are identified as providing critical habitat for endangered, threatened or priority wildlife species and are being threatened by invasive non-indigenous plants. ( <i>Conserve wildlife – invasives</i> )                                      |
| 1°  | Continue or develop, implement and evaluate methods for both aquatic and terrestrial invasive species removal programs in critical wildlife habitats. ( <i>Conserve wildlife – invasives; Evaluate restoration – invasives</i> )  |
| 1°  | Develop area-specific deer density or percent-reduction targets to reduce herd size to a sustainable level where forest regeneration is possible and to enhance forest health and biodiversity. ( <i>Evaluate restoration – deer; Conserve wildlife – deer, rare wildlife</i> )   |



| Priority  | Conservation Actions (continued)  |
|---|---|
| 1°  | <p>The NJ Division of Fish and Wildlife, Bureau of Wildlife Management will consider forest health and biodiversity as one of the primary determinants in making deer management decisions regarding deer densities. Forest health and biodiversity will be determined by using long term monitoring of forest regeneration via a system of exclosures and vegetative sample plots (or other methods that will empirically and objectively measure the effect of deer herbivory) throughout New Jersey in order to evaluate habitat health in response to changing deer densities. DFW will recommend adjustments to existing Deer Management Zone deer densities goals and recommend changes to zone specific deer harvest and control strategies, as required in order to meet this objective. <i>(Conserve wildlife – deer; Evaluate restoration – deer)</i></p> |
| 2°  | <p>Work with land management agencies to monitor for the spread of invasive insect species that jeopardize forest health. The species of primary concern include the Asian longhorned beetle and gypsy moth. Collaborate on appropriate control options for these pests and use appropriate control methods to reduce tree damage and limit the spread of infestations. <i>(Conserve wildlife – invasives)</i></p>  |
| 2°  | <p>Request permission from private landowners (both those who allow hunting and do not allow hunting) interested in or currently enrolled in incentive programs to establish vegetation monitoring plots. This will allow greater surveillance of deer impacts on private lands, provide landowners direct information about the health of their land, and provide greater data input into the deer harvest formula. <i>(Evaluate restoration – deer)</i></p>   |
| <p><b>Protect and enhance important and unique habitats</b></p> |   |
| 1°  | <p>Identify (through Landscape Project, radar studies, IBAs, and surveys), protect (through incentive programs and land acquisition), and enhance (through incentive programs and best management practices) critical migratory stopover habitats, including but not limited to areas near the Atlantic Highlands (Holmdel, Middletown Hazlet), Manasquan Naval Depot (Colts Neck, Tinton Falls), and Tom’s River (Brick, Wall). <i>(Protect habitat – migratory birds; Corridors – migratory birds)</i></p>  |
| 2°  | <p>Federal, state, and local governments will work with the NJ DEP, Natural Heritage Program to cooperatively map significant natural communities in the Raritan Bay and North Atlantic Coast. <i>(Protect habitat – Landscape Project)</i></p>   |
| 2°  | <p>Work with local governments and NJ DEP’s Natural Heritage Program (NHP) to protect and enhance habitats, including but not limited to the pine barren upland/wetland complex and rare plant species at Shark River Station, through incentive programs, land acquisition, the creation and use of BMPs, and increased law enforcement efforts to minimize disturbance. <i>(Protect habitat – development)</i></p>  |

| Priority  | Conservation Actions (continued)   |
|---|--|
| <b>Prevent illegal collection of reptiles and amphibians</b>            |  |
| 1°  | Recruit and provide training for local law enforcement personnel that are willing to assist in the enforcement of endangered species laws. Develop a partnership between local law enforcement, USFWS Special Agents, US Army and US Navy Natural Resources Managers, the NJ Division of Fish and Wildlife’s Bureau of Law Enforcement, and the Division of Parks and Forestry Bureau of Law Enforcement to enforce protection of native wildlife from illegal collection (including bog and wood turtles, northern pine snakes), persecution (northern pine snakes), and human disturbance (off-road-vehicles). ( <i>Protect wildlife – humans, recreational vehicles</i> ) |
| 2°  | ENSP biologists will be responsible for notifying the NJ Division of Fish and Wildlife’s Bureau of Law Enforcement and the Division of Parks and Forestry Bureau of Law Enforcement and managers, where and when appropriate, of critical sites (nesting, basking, gestation, dens) to implement stringent enforcement of endangered species laws, including protection of wildlife from illegal collection (including bog and wood turtles, corn and pine snakes), persecution (snakes), and human disturbance (off-road-vehicles). ( <i>Protect wildlife – humans, recreational vehicles</i> )   |
| <b>Protect and enhance bald eagle habitat</b>                           |  |
| 2°  | Use GIS measures, other remote-sensing tools, and surveys to identify critical habitats and assess their condition for bald eagle nesting and wintering populations. Develop specific protection strategies to address the threats (e.g., working with the National Park Service to limit recreational opportunities in areas near eagle nests, closing sections of river shoreline to foot traffic and seasonal trail closures). ( <i>Protect habitat – humans, Landscape Project</i> )   |
| 2°  | Actively protect, monitor, and manage bald eagle nests and foraging areas, including posting signs in waterways to prevent disturbance by recreational activity and cooperation with private landowners. ( <i>Conserve wildlife – rare wildlife; Protect habitat – recreational vehicles, humans</i> )   |
| <b>Promote public education and awareness and wildlife conservation</b> |  |
| 1°  | Engage landowners in protection efforts for endangered species by increasing enrollment in programs like the Citizen Science Program. ( <i>Education – humans; Conserve wildlife – rare wildlife</i> )   |
| 1°  | Collaborate with partners to develop innovative outreach educational programs to protect important habitats. Promote incentive programs to increase enrollment and encourage agricultural landowners to actively manage for grassland dependent species. ( <i>Education – humans; Agriculture – land management</i> )  |
| 1°  | Preventing establishment of non-indigenous species is the simplest and most cost-effective means of stopping invasions. Encourage native plant use in landscaping through public awareness and discouraging sales of non-native ornamental plants which are often a major source of non-indigenous species that invade natural plant communities. ( <i>Education – humans; Conserve wildlife – invasives</i> )   |

| Priority | Conservation Actions (continued)   |
|----------|--|
| 1°       | Educate public about the importance of keeping cats indoors through public service announcements, brochures, presentations, web pages, etc. Work to develop a statewide policy for local communities to discourage managed cat colonies and trap, neuter and release programs; encourage academic research to evaluate impacts and success (i.e., reduction of cats over time) of existing managed cat colonies. <i>(Education – humans; Conserve wildlife – cats, subsidized predators)</i> |
| 1°       | Educate public on threats to wildlife by creating brochures and posters and develop management guidelines for private landowners with significant bald eagle, wood turtle, freshwater wetland bird, grassland bird, woodland raptor, or scrub-shrub/open field bird populations. <i>(Conserve wildlife – rare wildlife; Education – humans)</i>  |
| 1°       | Develop and maintain educational brochures and posters and viewing opportunities for the public consistent with species recovery goals to enhance public awareness of wildlife conservation and environmental issues by cooperating with federal, state, and local government, and non-governmental organization partners. <i>(Education – humans)</i>   |
| 2°       | Develop brochures and posters regarding the most aggressive, invasive non-indigenous plants to educate and involve the public in detecting problem areas early while they are still manageable. Early recognition of the establishment of new populations is key to the successful control. <i>(Education – humans; Conserve wildlife – invasives)</i>   |
| 2°       | Develop brochures and posters to educate the public and increase awareness of New Jersey’s indigenous nongame and coldwater fish species. <i>(Education – humans)</i>  |
| 2°       | Educate homeowners, through newsletters, press releases, brochures, presentations, etc., on the proper eviction of house-dwelling bat populations and the importance of providing alternative roosting structures for maternity colonies. <i>(Education – humans)</i>  |

**f. Potential Partnerships to Deliver Conservation**

Private Landowners

- Protect and enhance habitat through innovative partnerships with private landowners.
  - Implement best management practices that protect nesting and foraging sites of bald eagle, forest passerine, freshwater wetland bird, raptor, and scrub-shrub/grassland bird populations.
  - Collaborate with conservation groups to utilize existing wildlife incentive programs to aid private landowners in habitat restoration.
  - Utilize incentive programs that encourage the management of bog turtle, other priority species and grassland dependent species populations.
  - Target private landowners surrounding public natural lands to manage land for mature forest in order to increase effective size and connectivity of forest patches.

- Encourage farmers to preserve farmland through conservation easements or Transfer of Development Rights (TDRs) through partnerships with NJ DEP's Green Acres Program, The Nature Conservancy – NJ Chapter, SADC, NJ Farm Bureau, local land trusts, and local municipalities for the conservation of bog turtle, forest and grassland bird populations.
- Develop/maintain cooperative relationships with private landowners with bog turtles and breeding bald eagles and freshwater wetland birds on their land.
- Develop/maintain cooperative relationships with Newark, Allaire, and Hop Brook Farm airports to encourage the management of grasslands for species of conservation concern.
- Encourage landowners to allow afforestation of riparian zones through incentive programs
- Develop and implement landowner incentives for providing, maintaining, and protecting summer bat habitat.
- Work with landowners to inventory their properties for the presence and severity of invasive non-indigenous plant invasions. Work with them to develop effective control or eradication measures to protect critical wildlife habitats.
- Work with landowners to maintain/enhance existing habitats where listed and special concern fish species occur.

#### Public

- Expand volunteer Citizen Scientist recruitment and activities.
  - Collaborate with conservation groups such as NJ Audubon Society, D&R Greenway, local land trusts, The Nature Conservancy – NJ Chapter, Conserve Wildlife Foundation, and NJ Conservation Foundation, and other environmental, member-based organizations to recruit and train Citizen Scientists to locate, survey, and monitor wildlife habitats and populations in a systematic manner to achieve short- and long-term monitoring goals.
  - Collaborate with NJ Audubon Society, NJ Conservation Foundation, and other environmental, member-based organizations to recruit and train Citizen Scientists to monitor vegetative plots (exclosures) on state lands for evaluation of vegetative structure in response to deer densities.
  - Recruit North American Butterfly Association volunteers to conduct surveys for Lepidoptera species.
  - Involve Citizen Scientists in management projects and protection projects, such as protection and posting of bald eagle nesting areas.
  - Continue volunteer-based summer bat concentration surveys.
- Collaborate with NJ Audubon Society, NY/NJ Baykeeper, Raritan Riverkeeper, State Parks, and other conservation organizations to educate public on the impacts of free-ranging domestic cats and feral cats and other threats on wildlife species of conservation concern.
- Collaborate with Ducks Unlimited on studies involving migration and wintering ecology of waterfowl and other birds.
- Promote backyard habitat management for invertebrates, reptiles, amphibians, migratory raptors and passerines.
- Work with landowners to maintain/enhance existing habitats where listed special concern species occur.

### Conservation Organizations

- Partner with NY/NJ Baykeeper, Raritan Riverkeeper, NJ Conservation Foundation, NJ Audubon Society, The Nature Conservancy – NJ Chapter, and other conservation organizations to protect and enhance habitats.
  - Develop a long-term coordinated monitoring and data-sharing project for colonial waterbirds and songbirds.
  - Protect bald eagles, ospreys, peregrine falcons, and woodland raptor nesting and foraging sites.
  - Protect emergent wetlands and open water for American bitterns, pied-billed grebes, sedge wrens, colonial waterbirds, and other marsh birds of concern
  - Initiate and support eradication efforts for invasive plant species
  - Create wildlife viewing opportunities.
  - Protect and enhance critical habitat where listed or special concern wildlife and fish occur.
  - Conduct habitat surveys to determine geographic distribution and severity of invasions of invasive non-indigenous plants.
- Develop effective and coordinated monitoring and data-sharing methods with conservation groups to fill data gaps and enable new species data to be incorporated into Landscape Project and the Biotics database.
- Collaborate with NJ Audubon Society on designating Important Bird Areas and fill gaps in baseline data.
- Collaborate with Ducks Unlimited on studies involving migration and wintering ecology of waterfowl and other birds.
- Encourage the use of priority habitat maps to guide land acquisition by conservation organizations through programs such as Green Acres, State Agricultural Development Committee (SADC), Farm Bureau for Farmland Preservation, and local land trusts.
- Continue participation in regional and national bat conservation efforts such as the Northeast Bat Working Group and the North American Bat Conservation Partnership.

### Wildlife Professionals

- Consult with animal control officers and extermination companies to implement proper removal of bats from houses and educate them on the importance of providing alternative roosting structures.

### Local Government, Other State and Federal Agencies

- Partner with local, state, and federal government agencies, including municipal and county planning boards, USDA's Natural Resource Conservation Service (NRCS), USFWS - NJ Field Office, and the DCA, Office of Smart Growth to protect, enhance, and create habitats, and to protect NJ's native wildlife.
  - NJ Department of Environmental Protection's (DEP) Division of Fish and Wildlife (DFW) to work with the DEP's Land Use Regulation Program to protect and appropriately classify wetlands for spotted turtles.
  - DFW, conservation organizations, and land stewards to encourage greater buffers for important riparian and floodplain areas for forest passerines, reptiles, amphibians, and invertebrates with Division of Watershed Management and Division of Fish and

Wildlife. Partner with them to investigate water quality and threats of contaminants/pollution.

- DFW to work with the DEP's Division of Parks and Forestry (NJDPF) to enhance state forests for wildlife: uneven-age stand management, preserve standing and fallen dead biomass, manage for older-growth forests especially wetland forests and adjacent upland forest.
- DFW to share site information and expertise with state and federal law enforcement to increase surveillance at sensitive bald eagle and bog turtle sites.
- Work with DEP's Water Monitoring and Standards to recommend classification upgrades in water bodies where listed or special concern species occur.
- DFW to work with neighboring state fish and wildlife agencies to radio-track dispersing Indiana bats across state boundaries.
- DFW to work with state and county mosquito commissions to reduce the use of deleterious insecticides and biological controls at known amphibian breeding sites.
- DFW to coordinate with the Department of Transportation to reduce road mortality to reptiles and amphibians and large mammals by creating wildlife under- and overpasses on new roads and road upgrades.
- DFW to lead in the development of specific conservation plans for special concern birds, reptiles and amphibians, and invertebrates on state lands.
- Expand efforts to create habitat and implement best management practices that protect nesting and foraging sites of cavity-nesters, forest passerines and raptors, and other forest dwelling species on state lands and with natural resource managers, county and municipal utility authorities and planners; and where grassland/ scrub-shrub habitats already exist, enhance and maintain habitats for grassland and scrub-shrub/open field birds.
- DFW will integrate results of research on vegetative structure in response to deer densities into deer management strategies within deer management zones.
- DFW to work with land management agencies at the state, local, and federal levels to implement deer management plans and harvest quotas that achieve desired deer densities to maintain ecological integrity of natural communities.
- DFW to work with USFWS and other state and federal partners to implement North American Waterfowl Management Plan as appropriate.
- DFW to work with land stewards, private landowners, and municipal, state and federal staff to establish best management practices in areas where listed or special concern species occur.
- DFW to identify areas where scrub-shrub macro-sites can be created and/or maintained for American woodcocks and northern bobwhite quail without negatively affecting endangered, threatened, or special concern species and their habitats.
- DFW and DEP's Division of Parks and Forestry (DPF) to work with the USFWS and National Park Service to develop effective plans to eradicate invasive, non-indigenous plants on federal and state lands and aquatic systems that are threatening critical wildlife habitats.
- DFW to work with USDA through NRCS and the WHIP program to control purple loosestrife and other invasive plants in critical wildlife habitats.

- DFW and DEP's Bureau of Water Monitoring and Standards to work together to recommend classification upgrades in water bodies where listed or special concern species occur.
- DFW to partner with local, county and state authorities to establish best management practices in areas where listed or special concern fish and wildlife species occur.
- DFW to work with DEP's Land Use Regulation Program to make recommendations on stream encroachment permit issues for areas where listed or special concern species occur.
- Develop effective and coordinated monitoring and data-sharing methods with Allaire, Cheesequake, and Liberty state parks, Earl Naval Base, DFW, and watershed management areas to fill data gaps and enable new species data to be incorporated into Landscape Project and the Biotics database.
- DFW to make recommendations on stream encroachment permit issues for areas where listed or special concern species occur.
- DFW, USFWS, and US Department of Agriculture to continue monitoring diseases that can potentially affect wild, native populations of special concern fish species.
- DFW to continue working with fishing clubs and organizations, lake communities, hatcheries nationwide, and individuals permitted to stock fish in NJ's freshwater streams and lakes to ensure healthy stock is used to minimize the spread of disease and parasites to native fish species and to prevent the use or release of exotic species.
- DFW, conservation organizations, and park commissions to expand public outreach through on-site programs and colonial waterbird viewing opportunities.
- DFW to lead in the development of educational materials for public and private landowners about wildlife of greatest conservation need and associated habitats.
- DEP to encourage the use of the Landscape Project's critical habitat mapping to guide habitat protection and land acquisition by federal, state, and local governments through programs such as DEP's Green Acres Program, State Agricultural Development Committee (SADC), Farmland Preservation, local land trusts, and through mitigation.
- DEP to encourage the use of the Landscape Project's critical habitat mapping to guide land use planning and zoning decisions by planning agencies at the federal, state, and local level.

**g. Monitoring Success**

- Incorporate standardized monitoring protocols, measures of success, and timeline for monitoring activities into mitigation projects and habitat conservation plans.
- Conduct habitat assessment and monitor habitat changes over time; monitor efficacy of habitat management and restoration efforts on private and public land.
- Annually monitor abundance, productivity, distribution, and trends of ospreys (biannually), bald eagles and colonial waterbirds.
- Continue the long-term monitoring of reptile and amphibian populations through the Herp Atlas Project, the Calling Amphibian Monitoring Program, the Vernal Pool Project, and the volunteer coverboard surveys.
- Work with volunteers, private landowners and conservation groups to monitor the success of eradication/control projects that target invasive non-indigenous plants.
- Conduct long-term monitoring of vegetative plots (exclosures) within state lands to assess vegetative success/ failure of deer management strategies over time as deer densities change.

- Continue monitoring diseases as outlined in the DFW's annual Fish Health Management Plan.
- Employ/implement adaptive management techniques for the goals and conservation actions established for species of greatest conservation need. Review effectiveness of research and management, and improve techniques as necessary.