

#### **4. Barnegat Bay - Little Egg Harbor**

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##### **a. Habitats**

The Barnegat Bay - Little Egg Harbor zone spans the eastern edge of southern Ocean County, including all of Long Beach Island, as well as Island Beach State Park directly to the north (Figure 8). The vegetated dune communities of Island Beach State Park extend almost eight miles, making this one of the few and largest sections of undeveloped barrier island in the state. In contrast, beaches in resort towns to the north and Long Beach Island to the south, where limited (or no) dune systems exist, provide limited habitat for coastal species. The zone includes a large portion of Barnegat Bay, the state's largest and longest coastal back-bay, and the extensive saline marshes of the Edwin B. Forsythe NWR and Manahawkin WMA. Across Little Egg Harbor and Barnegat Bay, there are tidal salt meadows and marshes, shallow inlets and coves, upland pitch pine forests, oak forests, and white cedar-red maple swamps.

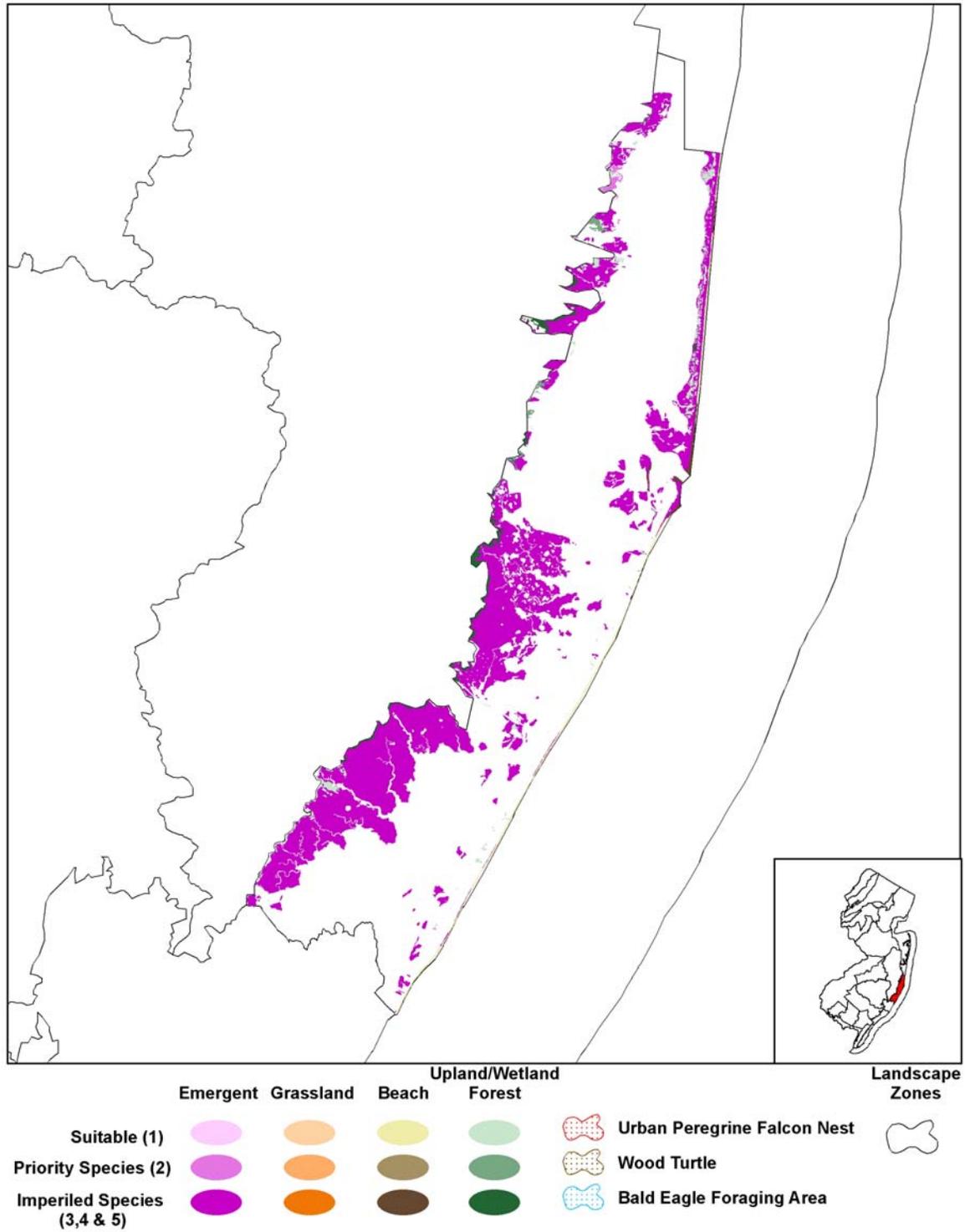
The conservation areas of opportunity in the Barnegat Bay - Little Egg Harbor zone are the Edwin B. Forsythe NWR (Barnegat Division), Manahawkin WMA, Island Beach State Park (including the Southern and Northern Natural Areas, and Sedge Islands WMA and Marine Conservation Zone). Beach habitat at the Barnegat Lighthouse State Park and the adjoining portion of the beach along the inlet jetty have historically provided important habitat for large numbers of beach nesting birds, and could so again if habitat restoration was implemented.

The beach/dune and coastal wetland/waterways habitats are the priority habitats in the coastal landscape region. Coastal wetlands and their associated waterways support the greatest diversity of species of conservation concern, whereas the beaches and dunes provide habitat for some of the state's most critically threatened species. These habitats are the most representative of the region and because of the intensive recreational usage within these habitats they should receive priority conservation status. Coastal scrub-shrub, including some vegetated dune communities, are of secondary priority within this region, although they still provide critical habitat for migratory birds, butterflies, and other species. Forest/forested wetlands are also of secondary importance and would receive the lowest priority within this region.

##### **b. Wildlife of Greatest Conservation Need**

The Barnegat Bay - Little Egg Harbor zone supports eleven federally endangered or threatened species, nine state endangered species, five state threatened species, and 42 species of special concern or regional priority. The federally endangered or threatened species are bald eagle, bog turtle, piping plover, northeastern beach tiger beetle (reintroduction candidate), roseate tern (historical), as well as sea turtle species that may enter the region's inlets and bays. In addition, summer or migratory populations of bats, potentially including the federally endangered Indiana bat, are suspected to occur in the zone. American bittern, black skimmer, least tern, northern harrier, peregrine falcon, pied-billed grebe, sedge wren, short-eared owl, and Cope's gray treefrog are state endangered. Black rail, black-crowned night-heron, osprey, red knot, and

**Figure 8.** Critical landscape habitats within the Barnegat Bay - Little Egg Harbor conservation zone, as identified through the Landscape Map (v2).



yellow-crowned night-heron are state threatened. Special concern wildlife include American oystercatcher, common terns, various species of herons and egrets, eastern box turtle, northern diamondback terrapin, and Fowler’s toad. Back-bay salt marshes and coastal sounds in this area are critical wintering areas for Atlantic brant and American black ducks in the Atlantic Flyway. Significant numbers of lesser and greater scaup winter in this area. Other game species, most notably selected waterfowl species, have been assigned priority status.

The protected dunes of Island Beach State Park, in particular the Southern Natural Area are nesting and foraging habitat for beach nesting birds and shorebirds, including American oystercatcher, black skimmer, least tern, and piping plover. This area could also provide habitat for the reintroduction of the northeastern beach tiger beetle. Marsh islands, including some dredge spoil sites provide significant nesting habitat for colonial waterbirds, black skimmer, and common tern. Tidal marshes are foraging habitat for coastal marsh birds and northern diamondback terrapin. Marsh habitat, in particular in the Sedge Island WMA provide critical nesting habitat for osprey and peregrine falcon, while the Eastern box turtle, Cope’s gray treefrog, and Fowler’s toad inhabit upland forests and wetlands. Marine mammals, sea turtles, and some species of anadromous fish utilize estuarine habitat, including inlets and bays. Harbor seals also use sandy beaches and sand bars just inside Barnegat Inlet as winter “haul-out” locations. The following tables identify the species of greatest conservation need within this zone.

Wildlife Species and Associated Habitats of the Barnegat Bay – Little Egg Harbor Zone

Table C30. Federal Endangered and Threatened Species\*

Common Name	Water	Beach	Wetlands	Forests and Forested Wetlands
<b>Mammals</b>				
Indiana bat				X**
<b>Birds</b>				
Piping plover		X		
Roseate tern		X	X	
<b>Reptiles</b>				
Bog turtle			X	
Green sea turtle ♦	X			
Hawksbill sea turtle ♦	X			
Kemp’s ridley sea turtle ♦	X			
Leatherback sea turtle ♦	X			
Loggerhead sea turtle ♦	X			
<b>Insects</b>				
Northeastern beach tiger beetle		R		

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

\*\*Potential presence.

♦ Sea turtles only present in water (inlets, bays, and estuaries).

R: Proposed reintroduction of species.

X: Species occurs within the identified habitat.

Table C31. State Endangered Species

Common Name	Water	Beach	Wetlands	Forests and Forested Wetlands
<b>Birds</b>				
American bittern			X	
Bald eagle			X	X
Black skimmer		X	X	
Least tern		X		
Northern harrier			X	X

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State Endangered Species (continued)

Common Name	Water	Beach	Wetlands	Forests and Forested Wetlands
<b>Birds</b>				
Peregrine falcon			X	
Pied-billed grebe			X	
Sedge wren			X	
Short-eared owl			X	X
<b>Amphibians</b>				
Cope's gray treefrog			X	

X: Species occurs within the identified habitat.

Table C32. State Threatened Species

Common Name	Water	Beach	Wetlands	Forests and Forested Wetlands
<b>Birds</b>				
Black rail			X	
Black-crowned night heron			X	X
Osprey		X	X	
Red knot		X	X	
Yellow-crowned night heron			X	X

X: Species occurs within the identified habitat.

Table C33. Nongame Species of Conservation Concern

Common Name	Water	Beach	Wetlands	Forests and Forested Wetlands
<b>Mammals</b>				
Harbor porpoise	X			
Harbor seal ♦	X	X		
Marsh rice rat			X	
Southern bog lemming			X	X
<b>Birds</b>				
American golden-plover			X	
American oystercatcher		X	X	
Black tern		X		
Caspian tern		X		
Cattle egret			X	
Chimney swift				X
Common barn owl				X
Common tern		X	X	
Forster's tern			X	
Glossy ibis			X	
Great blue heron				X
Great crested flycatcher				X
Great egret			X	
Greater yellowlegs			X	
Green heron			X	X
Gull-billed tern		X	X	
Horned lark		X		
Hudsonian godwit			X	
King rail			X	
Least bittern			X	
Little blue heron			X	
Marbled godwit			X	
Marsh wren			X	
Nelson's sharp-tailed sparrow			X	
Purple sandpiper		X		
Royal tern		X		
Ruddy turnstone		X	X	
Saltmarsh sharp-tailed sparrow			X	
Sanderling		X	X	
Seaside sparrow			X	
Semipalmated sandpiper		X	X	
Snowy egret			X	
Tricolored heron			X	

Nongame Species of Conservation Concern (continued)

Common Name	Water	Beach	Wetlands	Forests and Forested Wetlands
<b>Birds (continued)</b>				
Whimbrel			X	
Willet		X	X	
Wilson's phalarope		X	X	
<b>Reptiles</b>				
Eastern box turtle				X
Northern diamondback terrapin		X	X	
<b>Amphibians</b>				
Fowler's toad		X		
<b>Fish</b>				
Atlantic sturgeon	X			

♦ Harbor seal primarily present in water, but utilize beach as "haul-outs".

X: Species occurs within the identified habitat.

Table C34. Game Species of Regional Priority

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

Common Name	Water	Beach	Wetlands	Forests and Forested Wetlands
<b>Birds</b>				
American black duck	X		X	
Atlantic brant	X		X	
Black scoter	X			
Bufflehead	X		X	
Canada goose (Atlantic population)	X		X	
Canvasback	X		X	
Clapper rail			X	
Common eider *	X			
Greater scaup	X		X	
Harlequin duck*	X			
Lesser scaup	X		X	
Long-tailed duck	X			
Northern pintail	X		X	
Surf scoter	X			
Virginia rail			X	
White-winged scoter	X			

\*Species considered regional priority, however, NJ is south of the species' normal winter range and there is no natural habitat. A few occur along man-made rock jettys each winter, but this is insignificant to the overall population status.

X: Species occurs within the identified habitat.

Table C35. Fish Species

Note: Species identified within the table are nongame species within New Jersey, currently without state or regional status.

Common Name	Water
<b>Fish</b>	
Hickory shad	X

X: Species occurs within the identified habitat.

Table C36. 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 NJ DFW to be species of concern.

Common Name	Water	Beach	Wetlands	Forests and Forested Wetlands
<b>Mammals</b>				
River otter	X		X	
<b>Birds</b>				
Sora rail			X	

X: Species occurs within the identified habitat

**c. Threats to the Wildlife and Habitats**

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)

Narrow, steep beaches with little dune system, which are characteristic of Long Beach Island, the major barrier island in the zone, provide limited suitable nesting habitat for beach nesting birds. Intensive dune management, including overuse of dune fencing and unnecessary beach grass planting (i.e. where adequate storm protection already exists), exacerbates the poor quality of the habitat. A major beach replenishment project planned for the island could create more suitable habitat, but municipal management of the beach would have to be closely monitored to ensure that activities, such as mechanical beach raking, don't jeopardize nesting opportunities or nesting success and/or reduces available foraging habitat for piping plovers and migratory shorebirds. Intense off-road vehicle usage on Island Beach State Park severely degrades oceanfront beach habitat for beach nesting birds and northeastern beach tiger beetles. Development of remaining coastal scrub-shrub and forested habitat reduces habitat critical for migratory raptors, songbirds and butterflies. Stabilization and manipulation of the Barnegat Inlet (e.g., jetties, revetment, geotubes, ongoing dredging, etc.) reduces natural formation of habitat, creates impediments or reduction of foraging and nesting opportunities for some species (piping plovers, northern diamondback terrapin). Invasive plant species, such as phragmites, which dominate many dredge disposal sites and some coastal salt marshes, reduce the suitability of habitat for critical coastal species, including breeding long-legged wading birds, high marsh specialists, and waterfowl. The impacts of aquaculture, particularly for hard clams (*Mercenaria mercenaria*), as well as hydraulic crab dredging are largely unmeasured and poorly understood.

Heavy recreational use of all beaches on Long Beach Island (exception: Borough of Barnegat Light) limits nesting opportunities and potential success for beach nesting birds and also creates disturbance to a wide range of migrating shorebirds. Off-road vehicle use on the oceanfront portion of Island Beach State Park, particularly the southern end, creates on-going disturbance that strongly reduces the likelihood of beach nesting birds selecting the site to nest, and causes disturbance to migratory (foraging) shorebirds. Boats and personal watercraft create disturbance at back-bay colonial waterbird colonies and osprey nests, and interfere with foraging throughout the region.

Excessive predation, especially by human subsidized species (e.g., red fox, crow, gull species, raccoon, striped skunk, free-roaming "owned" or feral cats), severely impairs beach nesting bird and colonial waterbirds breeding success. 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 critical habitats identified by the Landscape Project, focusing primarily on habitat for beach dependent species such as piping plover,

least tern, black skimmer, and migratory shorebirds (e.g., red knots). The beach/dune habitat is one of two priority habitat types in this zone.

- Identify, protect, enhance, and/or restore suitable coastal wetlands and waterways for wildlife species of conservation concern such as waterfowl, colonial waterbirds (e.g., long-legged, wading birds), secretive marsh birds” (i.e. bitterns, rails), northern diamondback terrapin, and the harbor seal. The coastal wetland/waterways habitats are the second group of priority habitats in this zone.
- Identify, protect, enhance, and/or restore suitable forest and wetland forest habitat for wildlife species of conservation concern, particularly for raptors, forest-dwelling bats, and yellow- and black-crowned night herons. Forest/forested wetlands are also of secondary importance and would receive the lowest priority within this zone.
- Identify, protect, enhance, and/or restore suitable scrub-shrub habitat (areas with >25% woody vegetation <15 feet in height, including late successional back dune vegetative communities, often characterized by presence of bayberry) for wildlife species of conservation concern, particularly migratory songbirds, raptors, butterflies, and other species. Coastal scrub-shrub, including some vegetated dune communities, are of secondary priority in this zone.
- Protect and enhance water quality to preserve aquatic ecosystems, particularly for species of conservation concern that rely on high water quality.
- Maintain ecological integrity of natural communities and regional biodiversity by controlling invasive species and overabundant wildlife.
- Inventory, determine distribution, and monitor endangered, threatened, special concern, and regional priority wildlife and fish species in the Barnegat Bay – Little Egg Harbor Zone.
- Prevent, stabilize and reverse declines of endangered, threatened, and rare species and special concern fishes.
- Continue to monitor and protect osprey and peregrine falcon.
- Protect beach nesting bird sites and associated foraging habitats from human disturbance, predation, and other threats.
- Reduce the impacts of human disturbance, predation, and other threats on colonial nesting birds.
- Assess large-scale habitat change (every five to 10 years) focusing on beach erosion and loss of coastal marshes and coastal bay islands.
- Protect and enhance important and unique natural communities.
- Promote public education and awareness, wildlife conservation, and viewing opportunities.

**e. Conservation Actions**

The actions below are identified as primary (1° or priority) and secondary (2°). Prioritization was determined by the Atlantic Coastal Regional Landscape stakeholders during a meeting held on March 29, 2007 (see *Attachment H*). 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 habitat through implementation of Landscape Project mapping</b>	
1°	Use GIS measures, other remote sensing tools, and surveys to identify critical beach/dune, coastal scrub-shrub, forest, and wetland habitats and assess their condition for nesting, migrating, and wintering birds, and other coastal species. 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 habitat management plans. Maintain information and incorporate all new survey and mapping data into the Landscape Project and Biotics database. ( <i>Protect habitat – Landscape Project</i> )
1°	Identify and protect habitat for fish by plotting distributions of special concern fish species, and integrate those data into the Biotics database. ( <i>Monitor wildlife – fish; Protect habitat – Landscape Project</i> )
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> )
2°	Use GIS measures, other remote sensing tools, and surveys to identify areas where additional habitat-based regulatory measures or land acquisition would be appropriate to benefit wildlife species of conservation concern.
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°	Develop, implement, and evaluate best management practices to protect, enhance, and restore upland habitat to maintain the migration of raptor (with a main focus on osprey and peregrine falcon) and passerine populations (with a focus on scrub-shrub inhabitants) at viable levels. Develop an action plan for immediate implementation should habitat levels fall below the minimum necessary to sustain the migration. Actively manage state and other conservation lands to enhance autumn food availability, and promote backyard habitat management to make similar improvements on private lands. ( <i>Conserve wildlife – rare wildlife; Corridors – migratory birds; Protect habitat – migratory birds</i> )

Priority	Conservation Actions (continued)
<b>Protect critical beach habitat for wildlife species of conservation concern</b>	
1°	Work with the U.S. Army Corps of Engineers (USACE) and the NJDEP Office of Construction and Engineering (OCE) to integrate designs into beach nourishment projects that increase availability of and access to nesting and foraging habitat for beachnesting birds, in particular at beaches adjacent to Barnegat Inlet. ( <i>Conserve wildlife – rare wildlife</i> )
1°	Develop, implement, and evaluate best management practices (BMPs) for dune management policies, to incorporate into beach nesting bird management agreements, through collaborative efforts with the U.S. Department of Agriculture (USDA) – Natural Resources Conservation Services (NRCS), U.S. Fish and Wildlife Service (USFWS), USACE, and NJDEP LURP. ( <i>Other practices – land management; Protect habitat – humans; Conserve wildlife – rare wildlife</i> )
2°	Investigate the efficacy of experimental techniques (e.g., restoration, enhancement) to improve foraging habitat on nourished beaches for beachnesting birds. ( <i>Conserve wildlife – rare wildlife</i> )
2°	Restore or enhance nesting and foraging habitat for beach nesting birds, including piping plovers, least terns, black skimmers, common terns, and American oystercatchers on the south side of the Barnegat Inlet. Restoration efforts include reduction of mature dunes and dense beach vegetation to create more suitable nesting habitat and the creation of tidally-flushed ponds for improving foraging habitat. ( <i>Conserve wildlife – rare wildlife</i> )
<b>Protect critical coastal wetland habitat and waterways for wildlife species of conservation concern</b>	
1°	Work with NJDEP-OCE, USACE, and other appropriate agencies to coordinate beneficial placement of dredge materials for creation, enhancement, or maintenance of colonial waterbird nesting, in particular with regards to Intercoastal Waterway restoration projects. ( <i>Conserve wildlife – rare wildlife; Other practices – land management</i> )
1°	Investigate and improve current marsh management techniques to benefit critical wildlife species, in particular high marsh nesting birds and waterfowl.
2°	Develop, implement, and evaluate best management practices for making dredge spoil deposition sites attractive to breeding, migrating, and wintering wildlife. ( <i>Conserve wildlife – rare wildlife; Other practices – land management</i> )
2°	Identify and protect critical areas of submerged aquatic vegetation to benefit waterfowl, finfish, and shellfish species through surveys, GIS measures and other remote sensing tools, expert opinion, and historical records. Reestablish/restore historically important submerged aquatic vegetation beds to benefit waterfowl species. ( <i>Conserve wildlife – game species</i> )
2°	Protect overwintering colonies and/or “haul out” areas for harbor seals by using GIS measures, other remote sensing tools, and surveys to identify important “haul-out” areas (e.g. Barnegat Inlet) and post them to minimize human disturbance. ( <i>Protect habitat – humans</i> )

Priority	Conservation Actions (continued)
2°	Identify locations where undoing the effects of wetland ditching can benefit marsh species, especially high marsh or area-sensitive species, such as northern harriers. Implement restoration of these sites. ( <i>Conserve wildlife – rare wildlife; Other practices – land management</i> )
2°	Use GIS, other remote sensing tools, and surveys to identify critical habitats supporting local bald eagle nesting, summering and wintering populations and assess their condition. Take action to minimize habitat loss and maintain contiguous habitats by restoring, enhancing, and/or protecting woodland and riverine habitats and waterways on public and private lands through direct purchase or easements. Enlist private landowners in preservation programs, where appropriate, to maintain suitable habitats free of human disturbance during key periods. ( <i>Conserve wildlife – rare wildlife; Enhance habitat – private lands; Protect habitat – Landscape Project</i> )
<b>Protect critical forest and forested wetland habitat for wildlife species of conservation concern</b>	
1°	Use GIS measures, other remote sensing tools, and surveys to identify remaining forest parcels; protect and reduce incremental loss of these areas through either application of Coastal Zone Management (CZM) “critical wildlife habitat” designation or acquisition in order to benefit migratory songbirds, raptors, butterflies, and other species.
<b>Protect critical scrub-shrub habitat for wildlife species of conservation concern</b>	
1°	Use GIS measures, other remote sensing tools, and surveys to identify remaining parcels of scrub-shrub habitat; protect and reduce incremental loss of these areas through either application of Coastal Zone Management (CZM) “critical wildlife habitat” designation or acquisition in order to benefit migratory songbirds, raptors, butterflies, and other species.
<b>Protect and enhance water quality</b>	
1°	Prevent chemical contamination, siltation, eutrophication, and other forms of pollution/contamination to wetlands used by wildlife especially as breeding sites that could directly harm breeding species or their food supply (including birds, amphibians, and invertebrates). Evaluate protection efforts through regular monitoring of water quality. ( <i>Conserve wildlife – contaminants</i> )
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> )
2°	Protect water quality and aquatic-dependent species by appropriately designating Category 1 waters. Seek appropriate classifications for stream segments based on Index of Biotic Integrity (IBI) results that do not fulfill Category One requirements. ( <i>Protect habitat – rare wildlife, fish</i> )

Priority	Conservation Actions (continued)
2°	Protect water quality through the enforcement of Clean Vessel Act regulations. Boaters to observe pump-out and no discharge zone designations. <i>(Protect habitat – rare wildlife, fish)</i>
<b>Maintain natural biodiversity, community integrity and structure and ecosystem function by controlling invasive and overabundant species</b>	
1°	Enhance or restore habitats for colonial waterbirds through the elimination or reduction of phragmites from dredge material sites to allow for the natural succession of woody habitats to benefit nesting long-legged wading birds or the creation of sandy substrate for ground nesting colonial waterbirds at selected sites. Restoration efforts should focus on historic dredge material sites, so as to not further reduce the available locations for sediment deposit. If an active site is selected for restoration, efforts should be focused on areas that will not interfere with the sites’ capacity to accept sediment. “Jump-start” natural vegetation (using nursery stock and seedlings) where appropriate. <i>(Conserve wildlife – rare wildlife, invasives)</i>
1°	Develop, implement, and evaluate best management practices to address adverse effects of invasive plant and wildlife species (e.g. phragmites, mute swan) and over-abundant native wildlife (e.g. resident Canada geese, greater snow goose) on the quality of coastal wetland habitat. <i>(Conserve wildlife – invasives; Other practices – land management)</i>
2°	Assess impacts of gull populations (laughing gull, greater black-back gull, herring gull) on the breeding success of beach nesting birds, colonial waterbirds, and other species to determine if integrated wildlife damage management of gulls is necessary. <i>(Conserve wildlife –, subsidized predators)</i>
2°	Monitor encroachment of Japanese sedge in beach/dune habitat, assess impacts on habitat quality, implement control efforts (e.g., herbicide and physical removal of plants) where appropriate, and research additional control methods. <i>(Evaluate restoration – invasives)</i>
2°	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 level of potential impact on the ecosystem and species of conservation concern and the likelihood of success. <i>(Conserve wildlife – invasives)</i>
2°	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 species of conservation concern. <i>(Conserve wildlife – invasives)</i>

Priority	Conservation Actions (continued)
<b>Inventory, determine distribution, and monitor wildlife and fish</b>	
1°	Conduct surveys and review existing databases to better identify the migratory songbird species using coastal habitat and the distribution of the species. ( <i>Monitor wildlife – long-term monitoring; Conserve wildlife – rare wildlife; Protect habitat – migratory birds</i> )
1°	Conduct research to quantify the importance of shrub-scrub habitat for migratory songbirds. ( <i>Protect habitat – migratory birds</i> )
1°	Conduct surveys to determine distribution, population, and habitat use of coastal marsh birds, in particular high marsh specialists, such as Northern harrier, black rails and salt marsh sharp-tailed sparrow. ( <i>Monitor wildlife – long-term monitoring. Conserve wildlife – rare wildlife</i> )
1°	Research population distribution of northern diamondback terrapin to determine critical areas for protection. ( <i>Protect habitat – Landscape Project; Monitor wildlife – long-term monitoring</i> )
1°	Collaborate with DOTs, NGOs, and volunteers to identify key road-crossing areas of northern diamondback terrapin and work with appropriate government agencies to install turtle crossing signs and erect turtle barriers or provide safe passage, as appropriate, depending on the habitat and location. ( <i>Conserve wildlife – rare wildlife; Protect habitat – roads; Corridors - roads</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 and barrier island colonies of colonial waterbirds (not covered by aerial surveys), 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°	Continue the annual Mid-Winter Waterfowl Survey to monitor population trends. ( <i>Monitor wildlife – long-term monitoring; Protect habitat – migratory birds; Conserve wildlife – game species</i> )
2°	Continue the Atlantic Flyway Breeding Waterfowl Survey annually to monitor population trends. ( <i>Monitor wildlife – long-term monitoring; Conserve wildlife – game species</i> )
2°	Conduct baseline inventory of the marsh rice rat, southern bog lemming, and seals and develop long-term monitoring plans to determine each species' population trend. ( <i>Monitor wildlife – long-term monitoring, Conserve wildlife – rare wildlife</i> )
2°	Investigate home ranges of wintering Atlantic brant in relation to carrying capacity of back-bay habitat for Atlantic brant. ( <i>Conserve wildlife – game species</i> )

Priority	Conservation Actions (continued)
2°	Use GIS measures, other remote sensing tools, and surveys to identify important staging areas for red knots and other migratory shorebirds and determine and enforce the necessary restrictions on human activities to minimize disturbance at and destruction of these sites. Obtain necessary approvals from New Jersey Tidelands Council for management actions. <i>(Protect habitat – humans; Corridors – migratory birds)</i>
2°	Continue volunteer-based summer bat concentration surveys to locate maternity sites and determine roost characteristics. Trap and band 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; Conserve wildlife – rare wildlife)</i>
2°	Assess significance of coastal region as an important travel corridor and concentration site for migratory tree-roosting bats through comparative surveys of their distribution through radio-telemetry, acoustical monitoring, mist-netting, and field searches during the migratory season. <i>(Protect habitat – Landscape Project)</i>
2°	Identify and research water quality parameters for various species' populations including but not limited to long-legged colonial waterbirds, osprey, bald eagle, northern diamondback terrapin, and other water-dependent coastal species. <i>(Conserve wildlife – rare wildlife; Protect aquatic wildlife - humans, development)</i>
<b>Prevent, stabilize, and reverse declines of wildlife and fish populations</b>	
1°	Reduce deleterious effects of pesticides on coastal species and ecosystems by conducting investigations that assess the impacts of pesticides and biological controls on coastal species, in particular those species dependent on coastal marshes and wetlands. Evaluate and modify best management practices as appropriate. <i>(Other practices – land management)</i>
1°	Provide 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, with a map of critical sites to implement stringent enforcement of endangered species laws including harassment and human disturbance; update map as additional data become available. <i>(Protect habitat – humans)</i>
1°	Improve marsh management techniques to benefit critical wildlife species by conduct critical assessments of the effects of Open Marsh Water Management on wildlife species, in particular high marsh nesting birds and waterfowl. Evaluate and modify best management practices as appropriate. <i>(Conserve wildlife – rare wildlife, game species; Other practices – land management)</i>
1°	Develop, implement, and evaluate management actions to enhance populations of special concern and rare fish, and implement adaptive management strategies. <i>(Conserve wildlife – rare wildlife; Protect habitat - fish)</i>

Priority	Conservation Actions (continued)
1°	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°	Enhance northern diamondback terrapin populations by closing the harvest season until sustainable population levels are reached. Determine if protective regulations are sufficient, in conjunction with naturally occurring survivorship rates, to reduce mortality in northern diamondback terrapin populations. <i>(Conserve wildlife – rare wildlife)</i>
2°	Determine compliance with current crab trap regulations (e.g. turtle excluder devices) and increase enforcement if necessary. <i>(Conserve wildlife – rare wildlife)</i>
2°	Increase research efforts on the northern diamondback terrapin, including studies focusing on reproductive success, the effects of predators on productivity and developing sustainable population goals. <i>(Conserve wildlife – rare wildlife)</i>
2°	Investigate impacts of aquaculture on waterfowl and other wildlife. Determine relative effects of locations and aquaculture techniques. If possible, develop management actions or aquaculture techniques to minimize impacts. <i>(Aquaculture – land management; Conserve wildlife – game species)</i>
2°	Determine carrying capacity of coastal salt marshes for wintering American black ducks and Atlantic brant to inform decisions in setting Atlantic Flyway population objectives and to guide management actions. <i>(Conserve wildlife – game species)</i>
2°	Investigate crab dredging impacts on back-bay habitats and wildlife. Determine if any restrictions are necessary to protect wildlife or habitats. If needed, determine the nature of restrictions on dredging activities that will achieve protection. <i>(Protect habitat – humans)</i>
2°	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 importance of bat conservation, development of best management practices). <i>(Protect habitat – Landscape Project; 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>
2°	Conduct pilot study and/or collaborate with USFWS to identify locations at Island Beach State Park appropriate for reintroduction of northeastern beach tiger beetle and gauge likelihood of success of reintroduction efforts. <i>(Conserve wildlife – rare wildlife)</i>
2°	Investigate carrying capacity of back-bay habitats for wintering greater and lesser scaup. <i>(Conserve wildlife – game species)</i>

Priority	Conservation Actions (continued)
2°	Investigate the role of locally available contaminants in the ecology of greater and lesser scaup. ( <i>Conserve wildlife – contaminants; Conserve wildlife – game species</i> )
2°	Actively protect, monitor, and manage bald eagle nests and foraging areas, including posting signs in waterways to prevent disturbance by recreational activity, delineating and posting nests and significant roosting areas, building cooperation with private landowners, and working closely with law enforcement and volunteers to minimize disturbance at nest sites. ( <i>Conserve wildlife – rare wildlife; Protect habitat – recreational vehicles, humans</i> )
2°	Develop and implement proactive habitat conservation plans that will help meet and maintain the recovery goals for bald eagles. ( <i>Conserve wildlife – rare wildlife; Protect habitat – Landscape Project</i> )
<b>Monitor and protect osprey and peregrine falcon</b>	
1°	Continue monitoring all known pairs of peregrine falcon, including assessment of productivity and threats. Track other regularly observed peregrine falcons to determine new nesting pairs/sites. ( <i>Monitor wildlife – long-term monitoring, Conserve wildlife – rare wildlife</i> )
1°	Continue monitoring osprey, including coast wide survey of population and nesting success on biannual basis, and annual assessment of reproductive success at targeted locations, such as Sedge Islands WMA. ( <i>Monitor wildlife – long-term monitoring, Conserve wildlife – rare wildlife</i> )
1°	Maintain nesting opportunities through repair and replacement of existing man-made structures. Identify where additional nesting structures would be appropriate. ( <i>Conserve wildlife – rare wildlife</i> )
2°	Continue to monitor fish stocks, in particular menhaden, to determine the effects of reduced or changing prey base on the reproductive success of osprey. ( <i>Monitor wildlife – long-term monitoring</i> )
<b>Protect beach nesting bird sites and foraging habitat</b>	
1°	Continue intensive monitoring of populations and reproductive success of beach nesting birds, including piping plover, least tern, black skimmer, common tern and American oystercatcher, to determine population trends. ( <i>Monitor wildlife – long-term monitoring, Conserve wildlife – rare wildlife</i> )
1°	Continue surveys of wintering population of American oystercatchers to determine abundance, distribution, and population trends. ( <i>Monitor wildlife – long-term monitoring; Conserve wildlife – rare species</i> )
1°	Continue existing management practices that minimize impacts of human disturbance (e.g., fence, post, and patrol nesting sites). Obtain necessary approvals from New Jersey Tidelands Council for management actions. ( <i>Protect habitat – humans</i> )
1°	Protect beach nesting birds and minimize impacts on their reproductive success by incorporating limits on beach raking practices into beach nesting bird management agreements. ( <i>Protect habitat – Landscape Project; Conserve wildlife – rare wildlife</i> )

Priority	Conservation Actions (continued)
1°	Reduce and mitigate impacts of human activities on beach nesting birds through the implementation of beach management agreements with municipalities on Long Beach Island as island-wide replenishment occurs. Develop agreement with Borough of Barnegat Light regardless of status of replenishment project as piping plovers already nest on their beach. <i>(Conserve wildlife – rare wildlife; Protect habitat – Landscape Project)</i>
1°	Reduce predation on beach nesting birds through current management techniques (i.e. predator exclosures, electric fence), and implementation of integrated wildlife damage management at important nesting sites for beach nesting birds (e.g., Island Beach State Park). <i>(Conserve wildlife – cats, subsidized predators)</i>
1°	Reduce excessive predation on beach nesting birds by working with local municipalities to develop policies and/or establish regulations that minimize the impacts of predators (e.g., raccoons, gulls, red fox, feral and free-roaming cats) on beach nesting birds. <i>(Conserve wildlife – cats, subsidized predators)</i>
2°	Research and monitor comparative reproductive success of American oystercatcher and common terns on beach vs. marsh nesting habitat at selected sites, including identification of specific threats. <i>(Conserve wildlife – rare wildlife)</i>
2°	Incorporate enforcement of pet restriction (e.g., dog ordinances) regulations into beach nesting bird plans and agreements. Strengthen law enforcement of no pet restrictions by state and federal conservation officers and park rangers. <i>(Protect habitat – humans)</i>
2°	Increase regular presence of state conservation officers at beach nesting bird sites during the nesting season. <i>(Protect habitat – humans)</i>
<b>Reduce negative impacts on colonial nesting birds</b>	
1°	Increase frequency of coast wide aerial colonial waterbirds surveys to once every other year to better determine population trends and distribution. Continue critical investigation of aerial survey technique through selected “ground truthing” and literature and peer review in order to increase efficacy of survey, minimize surveyor bias and error, and increase accuracy of trend data. <i>(Monitor wildlife – long-term monitoring, Conserve wildlife – rare wildlife)</i>
1°	Reduce excessive predation on colonial nesting birds through implementation of integrated wildlife damage management at important nesting sites for colonial waterbirds. <i>(Conserve wildlife – cats, subsidized predators)</i>
1°	Reduce watercraft impacts on colonial waterbirds. Use GIS measures, other remote sensing tools, and surveys to identify important foraging areas and habitats and establish, post, and enforce buffers to restrict watercraft and pedestrian use around nesting areas. Elicit assistance from staff of Edwin B. Forsythe NWR to implement on refuge lands. Obtain necessary approvals from New Jersey Tidelands Council for management actions. <i>(Protect habitat – humans)</i>
2°	Investigate habitat selection of breeding colonial waterbirds, including use of phragmites. <i>(Protect habitat – Landscape Project)</i>

Priority	Conservation Actions (continued)
2°	Determine reproductive success of colonial waterbirds at targeted nesting colonies. Identify factors limiting success (e.g., predators and possible effects of contaminants). ( <i>Monitor wildlife – long-term monitoring, Conserve wildlife – rare wildlife, contaminants</i> )
2°	Conduct investigations to establish appropriate buffer sizes to minimize disturbance from watercraft and pedestrians at colonial bird nesting sites. ( <i>Protect habitat – humans</i> )
2°	Identify coastal marsh islands within Barnegat Bay where the lack of sufficient wrack mats limits nesting for black skimmer and common terns. Create “artificial” nesting mats through raking and redistribution of wrack material in years when needed. ( <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. Focus within this zone should be on beach erosion and loss of coastal marshes and coastal bay islands.
<b>Protect and enhance important and unique habitats</b>	
1°	Continue stringent protection of Sedge Islands WMA through enforcement of existing state regulated marine conservation zone designation. Assess effectiveness of current designation of and determine if additional measures or regulations are needed to insure adequate protection of its wildlife and habitat. Implement appropriate changes. ( <i>Protect habitat – Landscape Project</i> )
1°	Acquire or facilitate acquisition of land adjacent to the Edwin B. Forsythe NWR and Manahawkin WMA to fill critical gaps in public land holdings or buffer existing holdings. ( <i>Protect habitat – Landscape Project; Corridors – sprawl</i> )
1°	Pursue acquisition or landowner agreements/easements to protect remaining private marsh islands within the Barnegate-Little Egg Harbor conservation zone. ( <i>Protect habitat – Landscape Project</i> )
<b>Promote public education and awareness</b>	
1°	Create viewing opportunities for beach nesting birds at Barnegat Lighthouse State Park and Island Beach State Park, and for colonial water birds at selected appropriate locations. Develop and install interpretive signage at wildlife viewing locations. ( <i>Education – humans</i> )
1°	Develop and present educational programs to local environmental organizations, community groups, schools, and the general public to promote understanding of threats to beach nesting birds, colonial water birds, osprey, and for other coastal species as needed, and to increase environmental stewardship. ( <i>Education – humans</i> )

Priority	Conservation Actions (continued)
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 a major source of non-indigenous species that invade natural plant communities. <i>(Education – humans)</i>
1°	Develop targeted outreach brochures for pet owners to reduce negative impacts to beach nesters and migratory and breeding shorebirds from domestic dog activity and free-roaming cats. <i>(Education- humans)</i>
1°	Develop a brochure and/or poster which targets boat and jet-ski operators in order to help minimize their impact on wildlife. The outreach materials should include general information about what wildlife may be encountered, and the proper etiquette and appropriate practices for operating watercraft in the vicinity of wildlife and/or areas posted to protect wildlife. <i>(Education – humans)</i>
2°	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 and encourage opportunities for eco-tourism in the coastal zone including but not limited to the creation of viewing opportunities, interpretive trails, and other wildlife viewing experiences. <i>(Education – humans)</i>
2°	Work with New Jersey Division of Parks and Forestry (NJDPF) to develop and enhance outreach opportunities with regards to beach nesting birds at state parks and natural areas, such as Barnegat Lighthouse State Park and Island Beach State Park. <i>(Education – humans)</i>
2°	Develop brochures and posters to educate the public and increase awareness of New Jersey’s indigenous nongame fish species. <i>(Education – humans)</i>
2°	Develop an outreach brochure about northern diamondback terrapin biology, behavior, and threats, specifically targeting recreational (crab pot) crabbers that can be distributed when they are applying for their crabbing licenses. <i>(Education – humans)</i>
2°	Provide public education and outreach efforts focused on NJ’s Clean Marina Program and encourage marina owners, boaters, etc. to adopt voluntary practices aimed at preventing adverse impacts to water quality. <i>(Education – humans)</i>
2°	Engage landowners and NJ citizens in protection and survey efforts for endangered species by increasing enrollment in landowner incentives, backyard habitat management, and Citizen Science Program. <i>(Education – humans)</i>

**f. Potential Partnerships to Deliver Conservation**

Private Landowners

- Work with private landowners to maintain or create scrub-shrub habitat for migratory songbirds, raptors and butterflies through promotion of “backyard habitat” program.

- Encourage private owners of dredge material islands to create or enhance habitat suitable for colonial nesting birds through landowner incentive programs.
- Develop and implement landowner incentives for providing, maintaining, and protecting summer bat habitat.

#### Public

- Expand volunteer Citizen Scientist Program recruitment and activities.
  - Collaborate with conservation groups such as NJ Audubon Society, local land trusts, The Nature Conservancy – NJ Chapter, 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.
  - Recruit Citizen Scientists and conservation groups to assist with surveying and monitoring of wildlife, including colonial waterbirds, ospreys, peregrine falcons, and migratory shorebirds and songbirds.
  - Involve Citizen Scientists in management and protection projects, such as fencing beach nesting bird breeding sites, erection and placement of osprey nesting platforms, and other appropriate projects.

#### Wildlife Professionals

- Collaborate with researchers and wildlife managers from other Atlantic coast states to develop best management practices, conservation plans, and surveying protocol for colonial waterbirds, beach nesting birds, and other coastal species.
- 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.

#### Conservation Organizations

- Elicit assistance from New Jersey Audubon Society, in particular through coordinated Citizen Scientist Program, to assist in various bird surveys.
- Collaborate with Ducks Unlimited on studies involving migration and wintering ecology of waterfowl and other birds of conservation need.
- Work with conservation organization such as New Jersey Audubon Society, American Bird Conservancy, and Cats Indoors! to develop advocacy for appropriate conservation and regulatory issues.
- Work with the Tuckerton Seaport, Barnegat Bay Estuary Program, Save Barnegat Bay, and others to coordinate conservation efforts and develop outreach opportunities, in particular with regards to watershed and water quality issues in Barnegat Bay.
- Encourage the use of Landscape Project critical habitat mapping to guide land acquisition by conservation organizations through programs such as Green Acres and local land trusts.

#### Academic Institutions

- Collaborate with Richard Stockton College's Coastal Research Center to develop comparisons of manipulated and natural beach systems that can be used to develop a scientific model to identify suitable beach nesting bird micro-habitats, which can be incorporated into beach fill project designs.

- Work with Richard Stockton College to develop appropriate projects for internship program.
- Work with Rutgers University to develop appropriate graduate level research projects in the coastal area, in particular focusing on beach nesting birds, colonial waterbirds, and American oystercatcher.
- Work with Rutgers University Center for Remote Sensing and Spatial Analysis to develop predictive modeling and GIS mapping of areas that will be potentially impacted by sea-level rise.
- Collaborate with other US and Canadian universities on migration and wintering ecology of waterfowl and other birds of conservation need.

#### Local Government, Other State and Federal Agencies

- Partner with local, state, and federal government agencies, including municipal and county planning boards, NRCS, USFWS - NJ Field Office, US Army Corps. of Engineers (USACE), and USDA, non-profit organizations, and the Department of Community Affairs (DCA), Office of Smart Growth to protect, enhance, and create habitats, and to protect populations of coastal species.
  - Municipalities, NJ Department of Environmental Protection's (DEP) of Fish and Wildlife (DFW) and Parks and Forestry (DPF), the State Wildlife Control Unit, USDA-APHIS-Wildlife Services, and local animal control officers to work together to reduce the effects of predators, especially red fox and feral cats, on beach nesting birds and other critical wildlife.
  - DFW and conservation organizations to develop stronger partnerships with municipal environmental commissions to gain support for local conservation efforts, in particular involving beach nesting birds.
  - DFW to create habitat and implement best management practices for coastal marsh birds and migratory songbirds and raptors on Wildlife Management Areas.
  - DFW to work with the U.S. Army Corps of Engineers (USACE) and state dredging programs to create and maintain habitat for nesting colonial waterbirds.
  - DFW to coordinate development and implementation of beach nesting bird management plans with USFWS, NJDPF and local municipalities.
  - DFW to work with the USFWS and the USACE, to ensure that beachfill and beach renourishment projects include a beach nesting bird component.
  - DFW, USFWS, USACE, NJ-OCE, DEP's Land Use Regulation Program (LURP), and USDA-Natural Resources Conservation Service (NRCS) to work together to develop dune management policies and techniques that benefit beach nesting birds, while still providing adequate storm protection.
  - Where feasible, continue to shift some responsibilities for management of beach nesting birds to individual municipalities and other agencies (e.g., NJDPF at Island Beach State Park).
  - DFW and conservation organizations to work with appropriate local, county, and state road departments to reduce road mortality to northern diamondback terrapins, in particular in areas identified as having high density populations or high incidence of mortality.
  - DFW to continue protection measures for northern diamondback terrapins by requiring excluders on commercial crab traps in small creeks and lagoons.

- DFW and local municipalities to limit public access and disturbance to colonial waterbird breeding colonies, increase presence at beach nesting bird breeding sites, and continue to strongly enforce Sedge Islands Marine Conservation Zone.
- DFW to work with state and county mosquito commissions to assess the impacts of insecticides and biological controls on critical wildlife, and improve best management practices for marsh management.
- DFW to work with neighboring state fish and wildlife agencies to radio-track dispersing Indiana bats across state boundaries.
- DFW to work with USFWS and other state and federal partners to implement North American Waterfowl Management Plan as appropriate.
- DFW to work with federal and state agencies, including USFWS, USCG, National Oceanic and Atmospheric Administration, NJ Bureau of Emergency Response, and NJ Office of Natural Resources Restoration to plan for and assist with emergency oil spill response.
- DFW and DPF to work with the USFWS to develop effective plans to eradicate invasive non-indigenous plants on federal and state lands that are threatening critical wildlife habitats.
- DFW to work with USDA through NRCS and the WHIP program to control purple loosestrife, Japanese sedge 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 the Land Use Regulation Program to make recommendations on stream encroachment permit issues for areas where listed or special concern species occur.
- DFW, conservation organizations, and land stewards to work with NJ Coastal Heritage Trail to develop more wildlife focused trail destinations or viewing areas, and to elevate the importance of eco-tourism.
- DFW to work with NJDEP-OEC, USACE, and other appropriate agencies to develop and implement best management practices for making dredge spoil deposition sites attractive to breeding, migrating and wintering wildlife.
- DFW to lead in the development of educational materials for the public and private landowners about wildlife of greatest conservation need, their habitats, the potential harmful effects of disturbance on beach nesting and coastal marsh birds, and the importance of the Atlantic Flyway and its associated migratory stopover sites.
- DFW to work with Ocean County Park System to develop outreach programs and wildlife viewing opportunities.
- DFW and conservation organizations to expand public outreach through on-site programs, programs at the Lighthouse Camp, and colonial waterbird viewing opportunities.
- 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, local land trusts, and through mitigation.
- DEP to encourage the use of Landscape Project critical habitat mapping to guide land use planning and zoning decisions by planning agencies at the federal, state, and local level.

**g. Monitoring Success**

- Conduct habitat assessment and monitor habitat changes over time.
- Monitor efficacy of habitat management, habitat restoration, and invasive species control projects.
- Continue to annually monitor abundance, productivity, distribution, and trends of breeding piping plovers, black skimmers, least terns, common terns, American oystercatchers (beach nesting population only), osprey (biennial), peregrine falcons, colonial waterbirds (biennial), as well as wintering waterfowl and migratory shorebird communities. Conduct threat assessment including factors relating to nest failure and brood loss.
- Collect baseline data (distribution and abundance) for other coastal species, such as marsh birds, migratory songbirds and raptors, northern diamondback terrapins, and coastal mammals including bats.
- Conduct Delphi Process every three to four years to update status of coastal species.
- 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.