

3. Brigantine - Great Bay

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a. Habitats

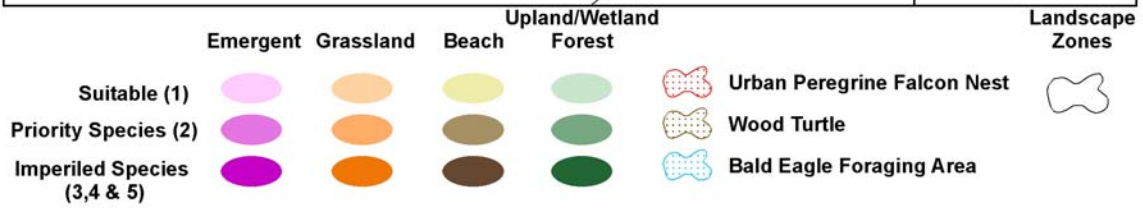
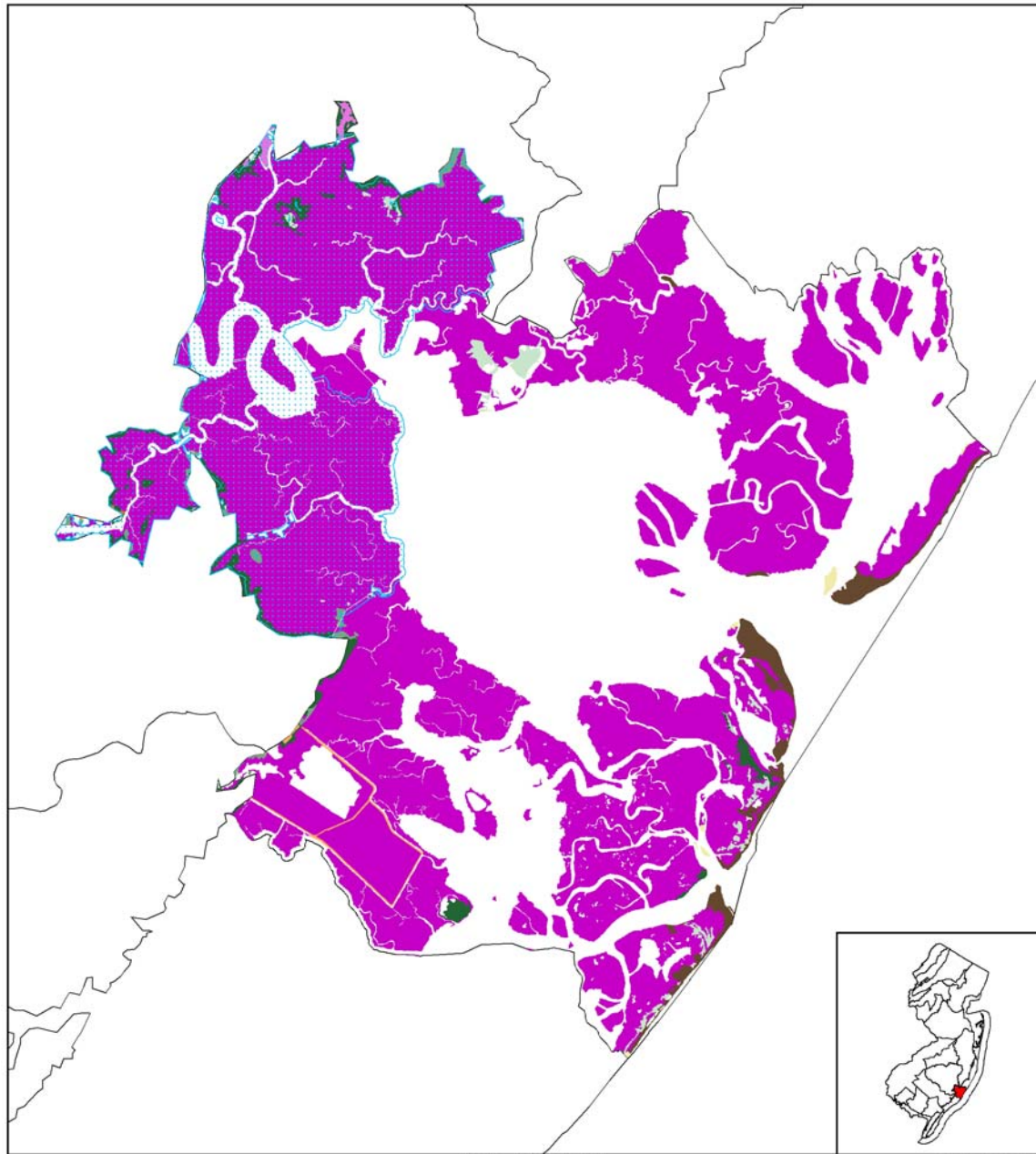
The Atlantic City skyline can be seen across salt meadows that extend south of Long Beach Island to the north of the Brigantine and Great Bay Conservation Priority Area (Figure 7). Squeezed between two heavily developed barrier islands, Absecon Wildlife Management Area (WMA), North Brigantine Natural Area, Edwin B. Forsythe National Wildlife Refuge (NWR), and Great Bay Boulevard WMA are important conservation opportunity areas that preserve the New Jersey coastal habitat, including barrier island beaches and dunes, inlets, tidal salt meadows, marshes, shallow coves, bays, and pristine maritime dune forest and scrub-shrub communities. This entire zone encompasses the only remaining large coastal area in the state that is largely untouched by development or other human alteration, and the Mullica River/Great Bay Watershed is one of the most pristine in the state. Therefore, this zone is one of the most critical for wildlife within the coastal region and state.

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 Brigantine – Great Bay zone supports eight federal endangered or threatened species, ten state endangered species, five state threatened species, and 44 species of special concern or regional priority. The federal or endangered species are the piping plover, and northeastern beach tiger beetle (reintroduction candidate), as well as sea turtle species that may enter the region's inlets and bays. In addition, summer populations of bats, potentially including the federal endangered Indiana bat, are suspected to occur in the zone. The bald eagle, 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. The black rail, black-crowned night-heron, osprey, red knot, and yellow-crowned night-heron are state threatened. Special concern wildlife include the American oystercatcher, common tern, Forster's tern, whimbrel, northern diamondback terrapin, and other coastal marsh birds, colonial waterbirds, migratory shorebirds, reptiles, and amphibians. 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. Other game species, most notably selected waterfowl species, have been assigned priority status.

Figure 7. Critical landscape habitats within the Brigantine - Great Bay conservation zone, as identified through the Landscape Map (v2).



Along the Atlantic Flyway, the Brigantine - Great Bay area is an important stopover for migrating colonial waterbirds, waterfowl, shorebirds, songbirds and raptors, and provides significant wintering habitat for a variety of waterfowl species. Undeveloped barrier beaches provide critical nesting habitat for the black skimmer, least tern, black ducks, and piping plover, and other beach nesting species. Bald eagles, ospreys, peregrine falcons, and coastal marsh birds nest and forage in the vast salt meadows. Northern diamondback terrapin can also be found in the salt meadows and tidal bays and creeks; and beaches in this zone, where no bulkhead or other impediments exist, provide them with extensive nesting habitat. 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 within Great Bay 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 Brigantine – Great Bay Zone

Table C23. Federal Endangered and Threatened Species*

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

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

**Potential presence.

R: Proposed reintroduction of species.

X: Species occurs within the identified habitat.

Table C24. State Endangered Species

Common Name	Water	Beach	Wetlands	Forests and Forested Wetlands
Birds				
American bittern			X	
Bald eagle			X	X
Black skimmer		X	X	
Least tern		X		
Northern harrier			X	X
Peregrine falcon			X	
Sedge wren			X	
Short-eared owl			X	X
Amphibians				
Cope’s gray treefrog			X	

X: Species occurs within the identified habitat.

Table C25. State Threatened Species

Common Name	Water	Beach	Wetlands	Forests and Forested Wetlands
Birds				
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 C26. Nongame Species of Conservation Concern

Common Name	Water	Beach	Wetlands	Forests and Forested Wetlands
Mammals				
Harbor porpoise	X			
Harbor seal ♦	X	X		
Marsh rice rat			X	
Southern bog lemming			X	X
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	
Whimbrel			X	
Willet		X	X	
Wilson's phalarope		X	X	
Reptiles				
Eastern box turtle				X
Northern diamondback terrapin		X	X	

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Nongame Species of Conservation Concern (continued)

Common Name	Water	Beach	Wetlands	Forests and Forested Wetlands
Amphibians				
Fowler's toad		X		
Fish				
Atlantic sturgeon	X			

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

X: Species occurs within the identified habitat.

Table C27. 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
Birds				
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 C28. Fish Species

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

Common Name	Water
Fish	
Hickory shad	X

X: Species occurs within the identified habitat.

Table C29. 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	Beach	Wetlands	Forests and Forested Wetlands
Mammals				
River otter	X		X	
Birds				
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

The Brigantine-Great Bay zone is the least impacted by habitat loss and habitat manipulation because much of the barrier island beach strand and coastal marsh is undeveloped, federally or state protected land. Furthermore, none of the beaches within the zone are part of beach replenishment projects. However, upland portions of the zone on the western edge of the back-bay, including scrub-shrub and forested habitat critical for migratory raptors, songbirds, and butterflies, continue to be under heavy pressure from residential and commercial development. Other habitat concerns include phragmites' intrusion or domination of salt marsh habitat and dredge disposal sites, which reduces the suitability of habitat for a variety of breeding or wintering species, including long-legged wading birds, marsh birds, and waterfowl. The impacts of aquaculture, particularly for hard clams (*Mercenaria mercenaria*) as well as hydraulic crab dredging, are largely unmeasured and poorly understood.

Boats and personal watercraft create disturbance at back-bay colonial waterbird colonies, osprey nests, and interfere with foraging throughout the region. Harbor seal "haul-out" areas in this zone are also subject to boat and personal watercraft disturbance.

Excessive predation by human subsidized species (e.g., red fox, crow, gull species, raccoon, striped skunk, free roaming "owned or feral cats), even in areas separated from residential development, 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.
- Enhance and/or restore critical beach and dune habitats identified by the Landscape Project for 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 Brigantine - Great Bay Zone.
- Prevent, stabilize and reverse declines of endangered, threatened, and rare species and special concern fishes.
- Continue to monitor and protect osprey and peregrine falcons.
- 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
Protect wildlife habitat through implementation of Landscape Project mapping	
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>)

Priority	Conservation Actions (continued)
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>
Enhance and/or restore critical beach habitat for wildlife species of conservation concern	
1°	Work with federal and state agencies to enhance and/or restore critical beach and dune habitats for beach nesting birds of conservation concern.
Protect critical coastal wetland habitat and waterways for wildlife species of conservation concern	
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. <i>(Conserve wildlife – rare wildlife; game species)</i>
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>

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°	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. Great Bay) and post them to minimize human disturbance. (<i>Protect habitat – humans</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>)
Protect critical forest and forested wetland habitat for wildlife species of conservation concern	
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.
Protect critical scrub-shrub habitat for wildlife species of conservation concern	
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.
Protect and enhance water quality	
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>)

Priority	Conservation Actions (continued)
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>
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>
Maintain natural biodiversity, community integrity and structure and ecosystem function by controlling invasive and overabundant species	
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 practice – 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)
Inventory, determine distribution, and monitor wildlife and fish	
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 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, bald eagle, osprey, northern diamondback terrapin, and other water-dependent coastal species. <i>(Conserve wildlife – rare wildlife; Protect aquatic wildlife - humans, development)</i>
2°	Survey and monitor bald eagle nest occupancy and reproductive success, and identify and monitor concentration and roosting areas to understand their role in population maintenance. <i>(Conserve wildlife – rare wildlife; Protect habitat – recreational vehicles, humans)</i>
Prevent, stabilize, and reverse declines of wildlife and fish populations	
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 conducting 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°	Work with USFWS to implement reintroduction of northeastern beach tiger beetle at Holgate Unit of Edwin B. Forsythe NWR. <i>(Conserve wildlife – rare wildlife)</i>

Priority	Conservation Actions (continued)
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>)
2°	Provide the NJ Division of Fish and Wildlife’s Bureau of Law Enforcement 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>)
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>)
Monitor and protect osprey and peregrine falcon	
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. (<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, such as the Edwin B. Forsythe NWR and Great Bay WMA. (<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>)
Protect beach nesting bird sites and foraging habitat	
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. (<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>)

Priority	Conservation Actions (continued)
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°	Reduce excessive predation on beach nesting birds by working with local municipalities and other landowners to develop policies and/or establish regulations that minimize the impacts of predators on native wildlife species, including bans on feeding of wildlife and bans on “managed” cat colonies near critical wildlife areas. (<i>Conserve wildlife – cats, subsidized predators</i>)
1°	Reduce fox predation on beach nesting birds at North Brigantine Natural Area either through integrated wildlife damage management or by encouraging trapping at the site during the legal hunting season. Work with USFWS and USDA-APHIS to reduce predation at Little Beach Island and the Holgate Unit of the Edwin B. Forsythe NWR, federally owned sites crucial to the recovery of piping plover in the state. (<i>Conserve wildlife – 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 regulations into beach nesting bird plans and agreements. Strengthen law enforcement of no pet restrictions (e.g., dog ordinances) 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>)
Reduce negative impacts on colonial nesting birds	
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 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 at 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>)
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>)

Priority	Conservation Actions (continued)
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>)
Assess large-scale habitat change every five years	
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.
Protect and enhance important and unique habitats	
1°	Acquire or facilitate acquisition of land adjacent to Edwin B. Forsythe NWR, Absecon WMA, and Great Bay WMA to fill critical gaps in public land holdings and/or to buffer existing holdings. (<i>Protect habitat – Landscape Project; Corridors – sprawl</i>)
1°	Identify specific areas of the Brigantine-Great Bay conservation zone where it would be appropriate to restrict human activities detrimental to wildlife or habitat through the establishment of a Marine Conservation Zone or equivalent regulatory restrictions. (<i>Protect habitat – Landscape Project, humans</i>)
2°	Identify species, such as colonial waterbirds, peregrine, and osprey that would benefit from habitat restoration at the “Fish Factory” site. Work with appropriate agencies to develop and implement a habitat restoration plan. (<i>Conserve wildlife – rare wildlife</i>)
Promote public education and awareness	
1°	Create viewing opportunities for beach nesting birds and shorebirds at North Brigantine Natural Area, 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, and schools 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>)
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 nonindigenous 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>)

Priority	Conservation Actions (continued)
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 and other wildlife species at North Brigantine Natural Area. <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 (NJ Audubon Society, local land trusts, The Nature Conservancy – NJ Chapter (TNC), NJ Conservation Foundation, etc.) 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, osprey, peregrine falcon, 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.
- Elicit public assistance for wildlife management projects at North Brigantine Natural Area from beach buggy and fishing organization (e.g., New Jersey Beach Buggy Association).

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

- Coordinate efforts to protect diamondback terrapin with The Wetlands Institute, especially in identifying areas of high road mortality and to insure that data collection addresses conservation needs.
- 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 the Tuckerton Seaport and Jacques Cousteau National Estuarine Research Reserve to coordinate conservation efforts and develop outreach opportunities.
- Work with conservation organization such as New Jersey Audubon Society, Atlantic Audubon Society, American Bird Conservancy, Cats Indoors!, etc. to develop advocacy for appropriate conservation and regulatory issues.
- 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 scientific comparisons of manipulated and natural beach systems that can be used to develop model to identify suitable beach nesting bird micro-habitats, which can be incorporated into beachfill 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 and colonial waterbirds.
- Work with Rutgers University Marine Field Station to develop research projects and help integrate aquatic and terrestrial resource needs of the estuary.

- Work with Drexel University on northern diamondback terrapin research and help frame projects to meet conservations needs.
- 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, USFWS - NJ Field Office, US Army Corps. of Engineers (USACE), USDA, non-profit organizations, Department of Community Affairs (DCA), and Office of Smart Growth to protect, enhance, and create habitats; and protect populations of coastal species.
 - Municipalities, NJ Department of Environmental Protections Division'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, on beach nesting birds and other critical wildlife.
 - DFW to work with the City of Brigantine and the Division of Parks and Forestry to implement management agreement for North Brigantine Natural Area in a way that best protects resources.
 - DFW to work with the City of Brigantine to modify existing beach management practices on municipal beaches at southern end of Brigantine Island to restore habitat for beachnesting birds.
 - DFW and USFWS staff to work to create habitat and implement best management practices for coastal marsh birds and migratory songbirds and raptors on federal refuge and state lands.
 - DFW to work with the USACE and state dredging programs to create and maintain habitat for nesting colonial waterbirds.
 - DFW to coordinate development and implementation of beachnesting bird management plans with USFWS, NJDEP, and local municipalities.
 - DFW to work with Edwin B. Forsythe National Wildlife Refuge (NWR) to meet conservation and management goals of the zone and to develop protocol for inventory of wildlife present on refuge lands.
 - DFW and conservation organizations to work with appropriate local, county, and state road departments to reduce road mortality to 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 terrapin 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 and increase presence at beach nesting bird breeding sites.

- 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 (NRCS) 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 waterbodies 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 (LURP) 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, conservation organizations, and park commissions to expand public outreach through on-site programs 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 plover, black skimmer, least tern, common tern, American oystercatcher (beach nesting population only), osprey (biennial), peregrine, 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, diamondback terrapin, 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.