5. Cape May Peninsula

a. Habitats
b. Wildlife of Greatest Conservation Need
c. Threats to Wildlife and Habitats
d. Conservation Goals
e. Conservation Actions
f. Potential Partnerships to Deliver Conservation
g. Monitoring success

a. Habitats

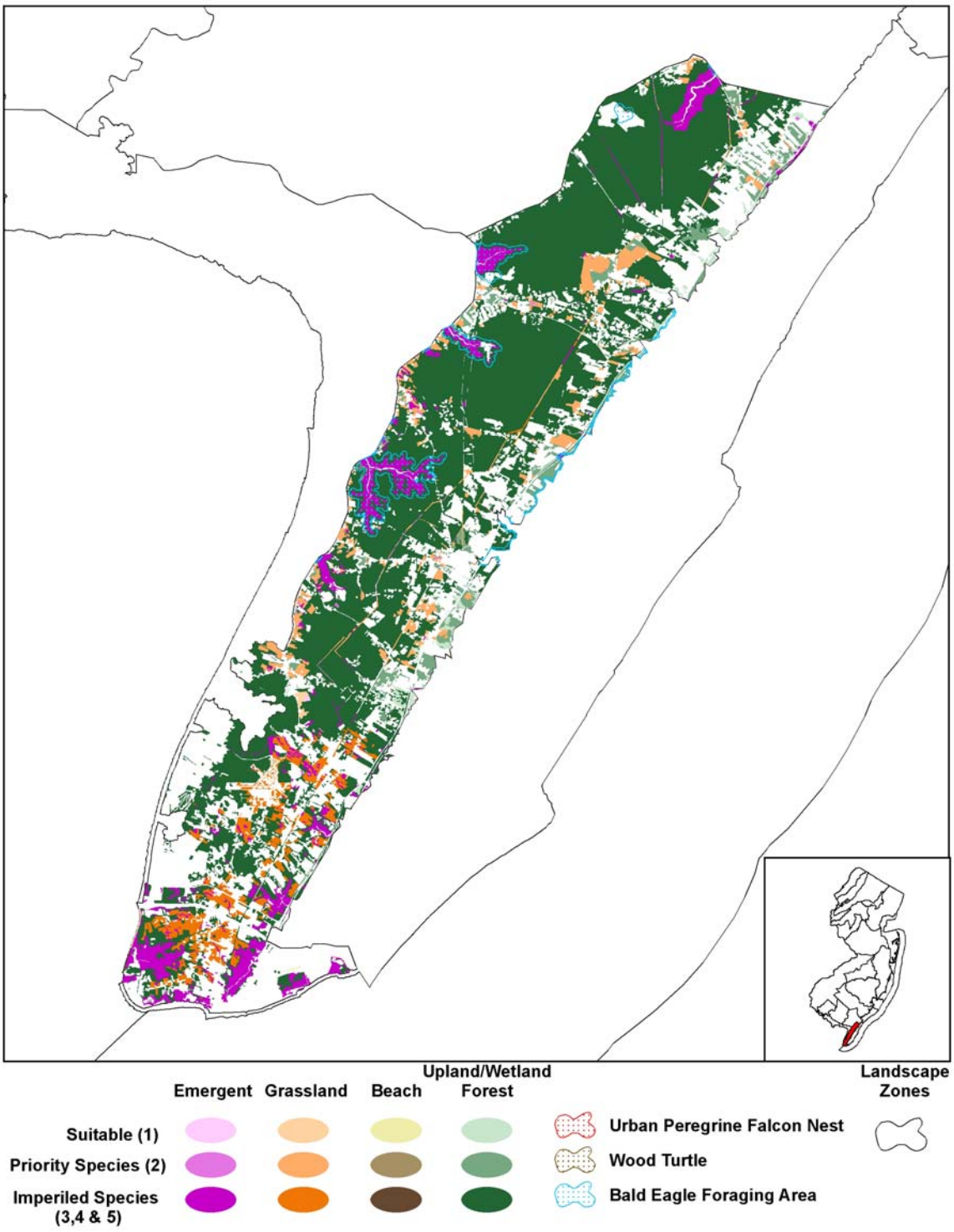
The Cape May Peninsula zone includes inland Cape May County (excluding the Coastal Landscape region to the east and the Delaware Bay shoreline to the west), spanning from the southern tip of Cape May to portions of Dennis and Upper townships to the north (Figure 16). Due to its geography, the peninsula's habitats comprise a nationally-important area of the Atlantic Flyway in the way migratory birds are funneled toward the Delaware Bay. It also holds populations of rare wildlife that are limited to this far southern reach of the state. Habitats range from the beaches of the Cape May Point area to native dune forests at Higbee Beach, mixed upland forest, and the wetland forest of Beaver Swamp and Cape May NWR. A corridor of upland and wetland forest persists in the center of the peninsula. Patches of fields persist on the peninsula adjacent to both forest and marsh.

Important conservation areas include Higbee Beach WMA, parts of Cape May Point State Park and Cape May Meadows Preserve, Beaver Swamp WMA, Cape May NWR-Great Cedar Swamp Division, and Lizard Tail Swamp preserve. Some lands are also held by the water supply authority in Middle Township, including part of the valuable Fishing Creek headwaters. The county park system includes the Fishing Creek freshwater marsh in Lower and Middle townships, and upland forests in Middle and Upper townships.

b. Wildlife of Greatest Conservation Need

The nationally-important migration of raptors, songbirds, and American woodcock through the peninsula represent some of the zone's most notable wildlife. In addition, species inhabiting the peninsula include the state endangered bald eagle, red-shouldered hawk, northern harrier, peregrine falcon, Cope's gray treefrog, and eastern tiger salamander. State threatened species include the barred owl, black-crowned night-heron, bobolink, Cooper's hawk, osprey, red knot, red-headed woodpecker, northern pine snake, Pine Barrens treefrog, and frosted elfin. Special concern wildlife include forest raptors and passerines, freshwater wetland birds, foraging coastal and freshwater marsh birds, grassland birds (primarily on the grounds of Cape May Airport), migratory shorebirds, eastern box turtle, eastern king snake, carpenter frog, Fowler's toad and marbled salamander. In addition, summer populations of forest-dwelling bat species, potentially including the federal endangered Indiana bat, occur on the Cape May Peninsula. Maintaining the priority wildlife habitats, particularly those for migratory and forest birds, will adequately protect habitats for most of the rare wildlife populations; however, special attention is needed to maintain and recover the eastern tiger salamander and Cope's gray treefrog. Tables DB36 – DB42 identify the species of greatest conservation need within this zone.

Figure 16. Critical landscape habitats within the Cape May Peninsula conservation zone, as identified through the Landscape Map (v2).



Wildlife Species and Associated Habitats of the Cape May Peninsula

Table DB36. Federal Endangered Species*

Common Name	Water	Beach	Wetlands	Grasslands	Forests and Forested Wetlands
Currently no federal listed species are located in this conservation zone					

*All Federal Endangered and Threatened species have an Endangered status on the NJ List of Endangered Wildlife
X: Species occurs within the identified habitat.

Table DB37. State Endangered Species

Common Name	Water	Beach	Wetlands	Grasslands	Forests and Forested Wetlands
Birds					
Bald eagle		X			X
Loggerhead shrike				R	
Northern harrier			X	X	
Peregrine falcon			X		
Pied-billed grebe			X		
Red-shouldered hawk					X
Amphibians					
Cope's gray treefrog			X		X
Eastern tiger salamander			X		X

R: Proposed reintroduction of species.
X: Species occurs within the identified habitat.

Table DB38. State Threatened Species

Common Name	Water	Beach	Wetlands	Grasslands	Forests and Forested Wetlands
Birds					
Barred owl					X
Black-crowned night heron			X		
Bobolink				X	
Cooper's hawk					X
Osprey			X		
Red knot		X			
Red-headed woodpecker					X
Yellow-crowned night heron			X		X
Reptiles					
Northern pine snake					X
Amphibians					
Pine Barrens treefrog					X
Insects					
Frosted elfin				X	X

X: Species occurs within the identified habitat.

Table DB39. Nongame Species of Conservation Concern

Common Name	Water	Beach	Wetlands	Grasslands	Forests and Forested Wetlands
Mammals					
Eastern red bat					X*
Eastern small-footed myotis					X*
Hoary bat					X*
Silver-haired bat					X*
Eastern red bat					X*
Birds					
Acadian flycatcher					X
American kestrel				X	
American oystercatcher			X		

Nongame Species of Conservation Concern (continued)

Common Name	Water	Beach	Wetlands	Grasslands	Forests and Forested Wetlands
Birds (continued)					
Baltimore oriole					X
Blackburnian warbler					X
Black-and-white warbler					X
Black-billed cuckoo					X
Black-throated green warbler					X
Blue-winged warbler					X
Broad-winged hawk					X
Brown thrasher					X
Cattle egret			X	X	
Chimney swift				X	
Chuck-will's-widow					X
Common barn owl				X	
Common tern			X		
Eastern kingbird				X	X
Eastern meadowlark				X	
Eastern screech-owl					X
Eastern towhee					X
Eastern wood-peewee					X
Field sparrow				X	
Forster's tern			X		
Glossy ibis			X		
Gray catbird				X	X
Great blue heron			X		
Great crested flycatcher					X
Great egret		X	X		
Green heron			X		
Hooded warbler					X
Horned lark			X		
Indigo bunting				X	
Kentucky warbler					X
King rail			X		
Least bittern			X		
Least tern		X	X		
Louisiana waterthrush					X
Marsh wren			X		
Northern flicker					X
Northern parula					X
Pine warbler					X
Prairie warbler					X
Prothonotary warbler					X
Saltmarsh sharp-tailed sparrow			X		
Scarlet tanager					X
Seaside sparrow			X		
Sharp-shinned hawk					X
Snowy egret			X		
Tricolored heron			X		
Whip-poor-will					X
Willow flycatcher					X
Wood thrush					X
Worm-eating warbler					X
Yellow-billed cuckoo					X
Yellow-breasted chat					X
Yellow-throated vireo					X
Yellow-throated warbler					X
Reptiles					
Eastern box turtle					X
Eastern king snake					X
Spotted turtle			X		
Amphibians					
Carpenter frog			X		X
Fowlers toad			X		X

Nongame Species of Conservation Concern (continued)

Common Name	Water	Beach	Wetlands	Grasslands	Forests and Forested Wetlands
Amphibians (continued)					
Marbled salamander			X		X
Insects					
A noctuid moth, *Cucullia alfarata*				X	
Maritime sunflower borer, *Papaipema maritima*			X	X	
Precious underwing, *Catocala pretiosa pretiosa*					X
Rare skipper, *Problema bulenta*					X
Fish					
Atlantic sturgeon	X				

*Potential presence.
X: Species occurs within the identified habitat.

Table DB40. Game Species of Regional Priority
Note: Species identified within the table have seasonal harvests within New Jersey.

Common Name	Water	Beach	Wetlands	Grasslands	Forests and Forested Wetlands
Birds					
American black duck	X		X		
American woodcock			X		X
Black scoter	X				
Bufflehead	X		X		
Canada Goose (Atlantic population)	X		X		
Clapper rail			X		
Long-tailed duck	X				
Northern bobwhite				X	X
Northern pintail	X		X		
Surf scoter	X				
Virginia rail			X		
White-winged scoter	X				
Wood duck			X		

X: Species occurs within the identified habitat.

Table DB41. 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 DB42. 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	Grasslands	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 of the Cape May Peninsula

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

Wildlife and their associated habitats within Cape May Peninsula are under severe pressure from development: 40 percent of wildlife habitat was lost between 1975 and 1995 due to development as this area's resorts continue to grow rapidly. Additional losses occur due to fragmentation associated with development, degrading habitat for migratory raptors, forest passerines, and nearly all forest and field-dependent birds. Development also destroys and degrades wetland habitats, leading to water quality declines, the proliferation of deleterious invasive plants, and pressure on groundwater resources that impact eastern tiger salamander and Cope's gray treefrog populations. Encroachment from development and recreational activities negatively impact nesting and foraging bald eagles and ospreys. Cavity-nesters are threatened by loss of large trees and competition from invasive birds, while scrub-shrub birds are threatened by competition and loss of suitable habitats to intensive land uses. 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.
- Protect, enhance, and restore forest and field habitats to provide feeding, resting and roosting resources for migratory raptors, passerines, American woodcock, and butterflies and moths. The habitat matrix to be maintained is dominated by forest (upland and wetland) but includes fields in various stages of succession and agricultural use.
- Protect and enhance critical wetland habitats as identified by the Landscape Project: wetlands in the lower peninsula for migratory shorebird populations; coastal marsh birds, and colonial waterbirds; and forested wetlands for freshwater wetland birds, Cope's gray treefrog, eastern tiger salamander, and special concern amphibian populations.
- Inventory and monitor, and determine distribution and habitat requirements, of the autumn-migration birds, forest-dependent resident birds, and listed and special concern amphibians and reptiles of the peninsula, and of rare fish species.
- Prevent, stabilize, and reverse declines of coastal marsh birds, colonial waterbirds, freshwater wetland birds, scrub-shrub birds, listed and special concern amphibians, listed butterfly and moth species, and endangered, threatened, and special concern fish species such as the Atlantic sturgeon and hickory shad.
- Monitor, maintain, and enhance populations of breeding, migratory and wintering waterfowl of conservation concern.
- Maintain ecological integrity of natural communities and regional biodiversity by controlling invasive species and overabundant wildlife.
- Protect and enhance important and unique natural communities.
- Assess large-scale habitat change (every five to 10 years).
- Promote public education and awareness of wildlife conservation.

e. Conservation Actions

The actions below are identified as primary (1° or priority) and secondary (2°). Prioritization was determined by the Delaware Bay Regional Landscape stakeholders during a meeting held on September 12, 2007 (see *Attachment J*). 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	
1º	Develop, implement, and evaluate best management practices and guidelines to maintain, enhance, and/or restore habitat on public and private lands with significant habitats for resident and migratory forest raptors and passerines, as well as other listed species. *(Conserve wildlife – rare wildlife)*
1º	Revise existing Landscape Project species occurrence areas through research and, where lacking, develop new species occurrence areas as data on species habitat requirements become available. Develop, review, and improve species-habitat associations as new land use/land cover data become available. *(Protect habitat – Landscape Project)*
1º	Identify, prioritize, and reclaim degraded rare species habitats by working with land management agencies to determine the appropriate actions needed to restore habitat value for the documented species. Appropriate actions might include the control of harmful, invasive, vegetation, restoring natural stream flows, revegetation with native plants or restoring habitat structure. *(Evaluate restoration – invasives)*
2º	Increase the effective size and connectivity of critical habitats supporting species of conservation concern on permanently protected public lands and surrounding private lands through incentive programs and targeted land acquisition. Use GIS measures, other remote sensing tools, and surveys to identify important corridors that connect large, contiguous tracts of critical habitats and target these areas for acquisition to maintain a system of large, connected tracts within and between conservation zones. Where possible, enhance and restore habitats through revegetation and management practices as appropriate (e.g., grasslands, prescribed burns and appropriate mowing strategies with little or no impact to forested and wetland dependent species of greatest conservation need; forests, appropriate silviculture practices). Work with the NJ DEP, Green Acres Program and the Dept. of Agriculture to identify parcels for acquisition or purchase of development rights. Acquire habitat through direct purchase or easements and enlist private lands in preservation and management programs that offer long-term stability. *(Enhance habitat – private lands; Corridors – sprawl, migratory birds; Protect habitat – Landscape Project; Agriculture – land management)*
2º	Use GIS, other remote sensing tools, and surveys to identify and map significant natural vegetative communities that may host wildlife species of conservation need, particularly on public lands and lands that serve as wildlife corridors. *(Conserve wildlife – rare wildlife)*

Priority	Conservation Actions (continued)
2º	Protect habitats through innovative public and private partnerships. Promote existing landowner incentives for protecting and managing upland fields and forests and wetland forests for resident and migratory birds, and vernal pools, wetlands, and surrounding uplands that support tiger salamander and gray treefrog sites and metapopulations. Develop landowner cooperative agreements to protect significant freshwater wetland bird sites and vernal pools where they occur. *(Protect habitat – migratory birds, Landscape Project; Conserve wildlife – rare wildlife; Enhance habitat – private lands)*
Protect critical habitats for migratory wildlife (birds, bats, and Lepidoptera)	
1º	Increase the area of forest managed to contain a mix of seral (successional) stages to provide habitat for a wide range of forest-dwelling and scrub-shrub/ open-field species (e.g., woodland raptors, pine snakes, black-throated green warbler, and woodcock, butterflies, moths, yellow-breasted chat, blue-winged warbler, brown thrasher). • These forest types to include but are not limited to: an uneven-age structure; mature forests with 65-95% canopy closure and structural diversity; scrub-oak communities; and regenerating stands of forests (e.g., Atlantic white cedar). • All areas of second-growth forested wetlands of moderate wildlife value should be allowed to mature to create optimal habitat for barred owl and red-shouldered hawk. • Take action to minimize loss of older forest stands with large trees in large, contiguous tracts by protecting, maintaining, enhancing, and/or restoring habitat on public and private lands through programs such as fee purchases, conservation easements, landowner incentives, and/or forest management and stewardship plans. *(Silviculture – Land management; Protect habitat – Landscape Project, migratory birds, rare wildlife)*
1º	Develop, implement, and evaluate best management practices to protect, enhance, and restore upland habitat to maintain the migration of raptor and passerine populations 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. *(Conserve wildlife – rare wildlife; Corridors – migratory birds; Protect habitat – migratory birds)*
1º	Use GIS, other remote sensing tools, and surveys to identify critical habitats for bald eagles (resident and migratory), and critical stopover habitats for migratory birds, bats, and Lepidopteran species, assess their condition, and maintain information. Identify habitat requirements and monitor trends in habitat change to develop protection strategies and best management practices (e.g., regulations, land acquisition, incentive programs) to maintain the migration at viable levels for species populations. *(Protect habitat – migratory birds; Landscape Project)*

Priority	Conservation Actions (continued)
2º	Identify best management practices for scrub-shrub and field birds, and implement them on conservation lands in the peninsula. *(Conserve wildlife – rare wildlife; Corridors – migratory birds; Protect habitat – migratory birds)*
2º	Develop, implement, and evaluate best management practices for powerlines and other rights-of-way for the conservation of rare butterflies and moths. *(Conserve wildlife – rare wildlife)*
Protect critical wetland habitats as identified by the Landscape Project	
1º	Maintain and enhance upland and floodplain forests on private and public lands for forest birds by promoting contiguous forests and discouraging fragmentation. *(Conserve wildlife – rare wildlife; Corridors – migratory birds; Protect habitat – migratory birds)*
1º	Develop, implement, and evaluate best management practices to protect, enhance, and restore freshwater wetland habitats to maintain the migration of raptor and passerine populations at viable levels. Actively manage state and other conservation lands to enhance contiguous wetlands and wetland networks for forest birds and Lepidopteran species, and discourage the loss of wetland habitats through filling, nutrient loading, or contamination. *(Protect habitat – Landscape Project, migratory birds; Corridors – migratory birds)*
1º	Develop, implement, and evaluate best management practices and guidelines to maintain, enhance, and/or restore marsh habitat (e.g., mosquito control, rights-of-way management) and freshwater wetland habitat (e.g., mitigation wetlands). *(Conserve wildlife – rare wildlife)*
1º	Develop, implement, and evaluate best management practices to enhance and/or restore aquatic and adjacent riparian habitats supporting populations of special concern and rare fish such as by removing obstructions to fish passage in rivers and streams. *(Protect habitat – fish; Monitor wildlife - fish)*
1º	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. Restablish/restore historically important submerged aquatic vegetation beds in Delaware Bay tributaries to benefit waterfowl and waterbirds. *(Conserve wildlife – game species)*
1º	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. *(Protect habitat – Landscape Project, sprawl, rare wildlife, fish; Enhance habitat – private lands)*
1º	Protect water quality and aquatic-dependent species by appropriately designating Category One waters. *(Protect habitat – rare wildlife, fish)*

Priority	Conservation Actions (continued)
1º	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. *(Conserve wildlife – contaminants)*
2º	Investigate and improve current marsh management techniques to benefit critical wildlife species, in particular high marsh nesting birds and waterfowl, and include in marsh BMPs and species dependent on mudflats and impoundments. *(Conserve wildlife – rare wildlife, game species)*
2º	Identify threats to vernal pools through systematic monitoring and devise strategies to protect vernal pool dependent species. *(Conserve wildlife – rare wildlife)*
Inventory, determine distribution, and monitor rare fish and wildlife	
1º	Identify and protect habitat for fish by plotting distributions of special concern fish species, and integrate those data into the Biotics database. *(Monitor wildlife – fish; Protect habitat – Landscape Project)*
1º	Regularly survey (e.g., 5 years) suitable habitats to determine distribution and trend of migratory raptors and passerines and evaluate their habitat use patterns. *(Monitor wildlife – long-term monitoring)*
1º	Regularly survey suitable habitats for E. tiger salamander and S. (Cope's) gray treefrog to monitor population size, trends, productivity, and suitability of habitats. *(Conserve wildlife – rare wildlife)*
1º	Monitor American woodcock populations through surveys conducted every five years; review available survey data in the peninsula, assess habitat use and habitat condition to determine species status and management needs. *(Conserve wildlife – game species)*
1º	Conduct concentrated field sampling for listed or special concern fish species at areas indicated by FishTrack Database. *(Status – fish)*
1º	Identify and research water quality parameters for eastern tiger salamander, Cope's gray treefrog, and other vernal pool amphibian populations. Investigate the effects of chemical mosquito control on amphibian, dragonfly, and damselfly populations. *(Conserve wildlife – rare wildlife; Protect aquatic wildlife - humans, development)*
2º	Develop and conduct nighttime surveys to inventory nightjars (whip-poor-wills, chuck-will's-widows, common nighthawks), northern saw-whet owls, and Eastern screech-owls. *(Conserve wildlife – rare wildlife; Monitor wildlife – long-term monitoring)*
2º	Conduct sampling (e.g., mist netting) to determine distribution, range, migratory pathways, and habitat use of summer bats. Long-term sampling of forest dwelling bat species should be conducted to determine population trends and species response to changes in habitats. *(Protect habitat - Landscape Project; Monitor wildlife – long-term monitoring*

Priority	Conservation Actions (continued)
2º	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. *(Monitor wildlife – long-term monitoring; Conserve wildlife – rare wildlife)*
2º	Establish a formal ground survey for inland colonies of colonial waterbirds, with a particular emphasis on black and yellow-crowned night herons. Once the survey is instituted, continue on a rotation of once every other year. *(Monitor wildlife – long-term monitoring; Conserve wildlife – rare wildlife)*
Prevent, stabilize, and reverse declines of populations of colonial waterbirds, freshwater wetland birds, scrub-shrub birds, Lepidoteran (butterflies and moths) species, and rare fish species	
1º	Research the intensity and characteristics of threats to wildlife species of conservation concern and their habitat, including causes and effects of habitat loss, degradation, and alteration, edge, disturbance, impacts of roads, predation, competition by invasive plants and animals, disease, contaminants, food availability, hybridization, and how water quality degradation and contaminants affect rare species. *(Protect habitat – sprawl, recreational vehicles, humans; Conserve wildlife – contaminants, invasives, rare wildlife, subsidized predator; Evaluate restoration – roads)*
1º	Develop and implement proactive habitat conservation goals that will meet and maintain the recovery needs of all endangered and threatened wildlife and fish populations, particularly for the landbird migration through the peninsula that also addresses forest-interior bird nesting requirements. These include guidelines for forest silviculture on public and private lands to enhance forest maturity and canopy, and replanting to reduce fragmentation. *(Protect habitat – Landscape Project; Silviculture – land management; Enhance habitat – private lands; Conserve wildlife – rare wildlife)*
1º	Develop, implement, and evaluate proactive habitat conservation goals that will meet and maintain the recovery needs of the eastern tiger salamander, Cope's gray treefrog (consistent with the plan for Northeast Amphibian and Reptile Conservation), and freshwater wetland birds (consistent with the North American Waterbird Conservation Plan).
1º	Research the habitat requirements to maintain both migratory and resident forest birds in the peninsula in a quantified way, and develop, implement, and evaluate planning and management strategies to maintain or reach those levels. *(Conserve wildlife – rare wildlife; Protect habitat – migratory birds)*
1º	Research the terrestrial habitat requirements for Cope's gray treefrog and eastern tiger salamander, and recommend appropriate management and regulations based on the results. Investigate habitat requirements to sustain meta-populations. *(Conserve wildlife – rare wildlife; Protect habitat – Landscape Project)*

Priority	Conservation Actions (continued)
1º	Protect wildlife species of conservation concern, especially slow moving terrestrial-bound species (e.g. reptiles, amphibians) and sensitive forest nesters (e.g. red-shouldered hawks, barred owls) by prohibiting off-road vehicles from all public and private conservation lands except where authorized by the governing agency by working with law enforcement agencies and implementing other means as they are developed. *(Protect habitat – recreational vehicles; Conserve wildlife - recreational vehicles)*
2º	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. *(Conserve wildlife – rare wildlife; Protect habitat – recreational vehicles, humans)*
2º	Evaluate the impacts of roads on endangered and threatened species and other nongame wildlife. Research, develop, and implement methods to reduce roadside mortality of wildlife (e.g., implementing wildlife underpasses, road closures). *(Corridors – roads, sprawl; Protect habitat – roads, fish, mussels)*
Monitor, maintain, and enhance populations of breeding, migrating and wintering waterfowl of conservation concern	
1º	Use GIS, other remote sensing tools, and surveys to identify critical aquatic and wetland habitats and assess their condition for migratory and wintering waterfowl, finfish, and shellfish populations of conservation concern. Take action to minimize habitat loss by restoring, enhancing, and/or protecting habitat on public and private lands through protection strategies (e.g., acquisition, landowner incentives) and to maintain/ enhance existing waterfowl habitat where such management complements rare species management. *(Conserve wildlife – game species)*
2º	Conduct the annual Mid-Winter Waterfowl Survey to monitor population trends. *(Conserve wildlife – game species; Monitor wildlife – long-term monitoring)*
2º	Conduct the Atlantic Flyway Breeding Waterfowl Survey annually to monitor population trends. *(Conserve wildlife – game species; Monitor wildlife – long-term monitoring)*
2º	Determine carrying capacity of area marshes for wintering American black ducks to inform decisions in setting Atlantic Flyway population objectives and to guide management actions. *(Conserve wildlife – game species)*

Priority	Conservation Actions (continued)
Maintain natural biodiversity, community integrity and structure and ecosystem function by controlling invasive and overabundant species	
1º	Identify areas where invasive, non-indigenous plants and animals are either already established or are becoming established through GIS, other remote sensing tools, surveys, public participation, and creating a system for reporting and qualifying new locations of invasive species. Prioritize areas in need of control projects according to the potential level of impact on the ecosystem and species of conservation concern and the likelihood of success. *(Conserve wildlife – invasives; Evaluate restoration – invasives)*
1º	Work with appropriate government agencies to survey and monitor the spread of invasive insect species that jeopardize forest health. The species of primary concern include the southern pine beetle, orange-striped oakworm, gypsy moth, and oak lace bug. Take appropriate control methods to reduce tree damage and limit the spread of infestations, provided such methods avoid excessive direct or indirect harm to non-target species. *(Conserve wildlife – invasives)*
1º	Use appropriate measures to control the spread of phragmites (common reed) and restore native wetland vegetation to areas like Pond Creek. *(Restore aquatic habitat – development)*
1º	Work with public and private landowners and managers and regulatory agencies to employ physical, chemical, or biological control measures, or a combination of these, to reduce invasive, non-indigenous plants in areas that are identified as providing critical habitat for endangered, threatened or priority wildlife species that are being threatened such plants. *(Conserve wildlife – invasives)*
1º	Develop, implement, and evaluate management strategies to reduce the impacts of mute swan herbivory on native vegetation in impoundments and marshes of the Cohansey River supporting species of conservation concern. *(Conserve wildlife – invasives)*
2º	The NJ Division of Fish and Wildlife, Bureau of Wildlife Management will consider forest health and biodiversity as one of the primary determinants in making deer management decisions regarding deer densities. Forest health and biodiversity will be determined by using long term monitoring of forest regeneration via a system of exclosures and vegetative sample plots (or other methods that will empirically and objectively measure the effect of deer herbivory) throughout New Jersey in order to evaluate habitat health in response to changing deer densities. DFW will recommend adjustments to existing Deer Management Zone deer densities goals and recommend changes to zone specific deer harvest and control strategies, as required in order to meet this objective. *(Conserve wildlife – deer; Evaluate restoration - deer)*
2º	Develop area-specific deer density or percent-reduction targets to reduce herd size to a sustainable level where forest regeneration of native vegetative communities is possible and to enhance forest health and biodiversity. *(Evaluate restoration – deer; Conserve wildlife – deer, rare wildlife)*

Priority	Conservation Actions (continued)
2º	The NJ Division of Fish and Wildlife, Bureau of Wildlife Management will consider forest health and biodiversity as one of the primary determinants in making deer management decisions regarding deer densities. Forest health and biodiversity will be determined by using long term monitoring of forest regeneration via a system of exclosures and vegetative sample plots (or other methods that will empirically and objectively measure the effect of deer herbivory) throughout New Jersey in order to evaluate habitat health in response to changing deer densities. DFW will recommend adjustments to existing Deer Management Zone deer densities goals and recommend changes to zone specific deer harvest and control strategies, as required in order to meet this objective. *(Conserve wildlife – deer; Evaluate restoration - deer)*
2º	Where appropriate, continue to develop and expand incentives for harvesting antlerless deer. *(Conserve wildlife - deer)*
Protect and enhance important and unique habitats	
1º	Recognize, protect and enhance all undeveloped habitats in the southern 30 km of the peninsula for long term protection of migrations (with priority for larger and contiguous patches). Contiguous habitats in the 30 km as well as the marsh-forest edge along both the Atlantic and Delaware Bay coastlines are unique and essential for the international migrations. *(Protect habitat – migratory birds; Corridors – migratory birds; Conserve wildlife – rare wildlife)*
1º	Recognize and enhance protection of other significant wildlife habitats including the drainages of Fishing Creek, Dias Creek, Bidwell Creek, Dennis Creek and Cedar Swamp Creek, which include the larger wetland forest tracts of the peninsula. *(Protect habitat – migratory birds; Corridors – migratory birds; Conserve wildlife – rare wildlife)*
1º	Recognize and enhance protection of the significant wildlife habitats of Higbee Beach Wildlife Management Area, Cape May Point State Park, and Cape May Meadows, as unique and essential habitats for migratory fauna. *(Protect habitat – migratory birds; Corridors – migratory birds; Conserve wildlife – rare wildlife)*
2º	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. *(Corridors – migratory birds; Protect habitat – migratory birds, Landscape Project)*
Assess large-scale habitat change every five years	
1º	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.

Priority	Conservation Actions (continued)
Promote public education and awareness and wildlife conservation	
1º	Develop, maintain, and enhance opportunities for ecotourism on the Cape May Peninsula in a manner consistent with wildlife and habitat enhancement including but not limited to the creations of interpretive trails, the creation of viewing areas, and wildlife-related recreational opportunities that do not negatively impact species of conservation concern and their habitats. *(Education – humans)*
1º	Preventing establishment of non-indigenous species is the simplest and most cost-effective means of stopping invasions. Encourage native plant use in landscaping through public awareness and discouraging sales of non-native ornamental plants which are often a major source of non-indigenous species that invade natural plant communities. *(Education – humans)*
1º	Educate public about the importance of keeping cats indoors through newsletters, press releases, brochures, presentations, web pages, etc. Work to develop a statewide policy for local communities to discourage managed cat colonies and trap, neuter and release programs; encourage academic research that examines the full range of impacts of feral cat colonies on local wildlife populations and of feral cat colony management (including TNR) on local wildlife populations and local feral cat populations. *(Education – humans)*
1º	Engage landowners and NJ citizens in protection and survey efforts for endangered species by increasing enrollment in landowner incentives, forest stewardship, backyard habitat management, and Citizen Science Program. *(Education – humans; Conserve wildlife – rare wildlife)*
1º	Develop brochures and posters regarding the most aggressive, invasive non-indigenous plants to educate and involve the public in detecting problem areas early while they are still manageable. Early recognition of the establishment of new populations is the key to successful control. *(Education – humans; Conserve wildlife – invasives)*
2º	Develop and maintain education 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. *(Education – humans)*
2º	Develop brochures and posters to educate the public and increase awareness of New Jersey's indigenous nongame fish species. *(Education – humans)*
2º	Educate the public about the importance of the habitats within this zone to the Atlantic coast bird, bat, and Lepidopteran species' migration through newsletters, press releases, brochures, presentations, and web pages. *(Education – humans)*
2º	Educate homeowners, through newsletters, press releases, brochures, presentations, etc., on the proper eviction of house-dwelling bat populations and the importance of providing alternative roosting structures for maternity colonies. *(Education – humans)*

Priority	Conservation Actions (continued)
2º	Preventing establishment of non-indigenous species is the simplest and most cost-effective means of stopping invasions. Encourage native plant use in landscaping through public awareness and discouraging sales of non-native ornamental plants which are often a major source of non-indigenous species that invade natural plant communities. *(Education – humans; Conserve wildlife – invasives)*

f. Potential Partnerships to Deliver Conservation

Private Landowners

- Protect and enhance habitat through innovative partnerships with private landowners.
    - Implement best management practices that protect and enhance forest and field habitats for migratory landbirds and forest nesting birds. Publish management guidelines for private landowners.
    - Utilize incentive programs that encourage the management of fields, scrub-shrub and forest patches.
    - Through incentive programs, target private landowners surrounding public natural lands to manage land for forests in order to increase effective size and connectivity of forest patches.
    - Encourage farmers to preserve farmland through conservation easements through partnerships with Green Acres, The Nature Conservancy, Natural Lands Trust, and local municipalities for the conservation of fields, scrub-shrub and forest patches.
    - Work with landowners to maintain/enhance existing habitats where listed special concern fish species occur.
    - In the context of landowner incentive programs such as LIP and Forestry Stewardship, work with landowners to develop and implement deer management plans that achieve desired deer densities.

Public

- Expand volunteer Citizen Scientist recruitment and activities.
    - Collaborate with conservation groups (NJ Audubon Society, The Nature Conservancy-NJ Chapter, NJ Conservation Foundation) and other environmental, member-based organizations to recruit and train Citizen Scientists to locate, survey, and monitor wildlife habitats and populations.
    - Involve Citizen Scientists in management projects, such as posting refuges to prevent disturbance.
- Promote backyard habitat management for migratory raptors and passerines, concentrating on the most southern 20 km (12.4 miles) of the peninsula.

Wildlife Professionals

- Identify conservation actions in other states with significant migration stopovers and corridors that might be applied to the Cape May Peninsula. Work on a mid-Atlantic and Atlantic Flyway regional basis for conservation of habitats.

Academic Institutions

- Partner with Rutgers and other academic institutions to conduct studies necessary to better understand the impacts of deer on biodiversity, forest health, and ecosystem processes and to develop habitat-specific or landscape-specific deer density targets.

Conservation Organizations

- Partner with watershed and conservation organizations such as NJ Audubon Society (NJAS) NJ Conservation Foundation (NJCF) and The Nature Conservancy (TNC) to protect and enhance habitats for rare species.
    - Enhance habitat for eastern tiger salamander, Cope's gray treefrog, and forest birds in suitable areas (e.g., Lizard Tail Swamp).
- Work with conservation organizations such as NJ Audubon Society to develop educational programs and provide training in backyard habitat management.
- Work with organizations such as NJ Audubon Society to promote wildlife festivals in the region.
- Encourage the use of the Landscape Project's critical habitat mapping to guide land acquisition by conservation organizations through programs such as Green Acres, NJCF, TNC, State Agricultural Development Committee Farmland Preservation, and local land trusts.
- Conservation organizations should act as advocates for legislation and regulatory reform that address integrating deer management goals into farmland tax assessment laws, farmland preservation programs, and other conservation programs.
- Work with land trusts to develop and implement deer management plans that achieve desired deer densities on preserved lands.

Local Government, Other State and Federal Agencies

- Partner with local, state, and federal government agencies, including municipal and county planning boards, USDA-NRCS, USFWS, and the DCA, Office of Smart Growth to protect, enhance, and create habitats, and to protect NJ's native wildlife.
    - NJ Department of Environmental Protection (DEP) Division of Fish and Wildlife (DFW) and USFWS to work together at Cape May NWR and WMAs to enhance refuge habitat for forest interior nesters and migratory landbirds.
    - DFW will work with the DEP's Land Use Regulation Program (LURP) and other DEP programs to protect habitats critical to the landbird migration and to adapt regulatory protection as necessary.
    - DFW and DPF to work with the DEP's Office of Natural Lands Management, Natural Heritage Program (NHP) to develop mapping of significant natural vegetative communities, particularly on public lands and lands that serve as wildlife corridors, to be incorporated as a layer within the Landscape Map. Sensitive information would be a separate layer for use within the NJ Department of Environmental Protection only.
    - DFW and DPF to collaborate on forest management guidelines to achieve forest management goals for listed and rare wildlife, on both public and private lands.
    - DFW will lead law enforcement efforts to limit public access and disturbance to bald eagle nesting areas.
    - DFW will lead investigation of marine conservation zone planning as a tool to protect coastal marsh bird nesting and foraging areas.

- DFW and conservation organizations to work with LURP to protect vernal pools and appropriately classify wetlands for listed and rare amphibians.
- Expand efforts to create habitat and implement best management practices for forest-interior and migratory birds, and coastal marsh birds on Wildlife Management Areas and with natural resource managers, county and municipal utility authorities, and planners. Develop and implement BMPs for scrub-shrub birds in areas of existing fields on Higbee Beach and Dennis Creek WMAs.
- DFW will create vernal pools on state lands where they may serve to increase existing habitat for eastern tiger salamander and Cope's gray treefrog.
- DFW to lead in the development of specific conservation plans for special concern reptiles and amphibians on state lands.
- DFW to work with state and county mosquito commissions to measure the effects of, and prevent declines due to, the use of insecticides and biological controls at known amphibian breeding sites.
- 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 LURP to make recommendations on stream encroachment permit issues for areas where listed or special concern species occur.
- DFW to work with USFWS and other state, federal, and non-governmental partners to implement North American Waterfowl Management Plan as appropriate.
- DFW to work with USFWS and other state and federal partners to implement the American Woodcock Management Plan as appropriate, seeking areas where such management complements rare species management.
- DFW to work with USDA-NRCS to ensure that deer management goals are integrated into farm conservation plans that include measurable outcomes.
- DFW to work with land management agencies at the state, local, and federal levels to implement deer management plans and harvest quotas that achieve desired deer densities to maintain ecological integrity of natural communities.
- DFW to work with 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 to determine groundwater recharge areas for Cope's gray treefrog and E. tiger salamander breeding pools with the Division of Water Quality (DWQ) and the NJ Geological Survey. Expand efforts with DWQ to minimize impacts on water levels and quality, and conduct hydrological monitoring in these areas.

- DFW to lead in the development of educational materials for the public and private landowners about the Cape May fall migration, essential habitats, and the potential harmful effects of disturbance on nesting and resting birds.
- DFW, conservation organizations, and park commissions to expand public outreach through on-site programs, wildlife viewing opportunities, and wildlife festivals.
- DEP to encourage the use of the Landscape Project's critical habitat mapping to guide habitat protection and land acquisition by federal, state, and local governments through programs such as DEP's Green Acres Program, State Agricultural Development Committee Farmland Preservation, local land trusts, and through mitigation.
- Support the completion of land acquisition in the US Fish and Wildlife Service's Cape May National Wildlife Refuge acquisition boundary, and expansion of that boundary (per Cape May NWR Comprehensive Conservation Plan, 2004).
- DEP to encourage the use of the Landscape Project's critical habitat mapping to guide land use planning and zoning decisions by planning agencies at federal, state, and local levels.

g. Monitoring Success

- Assess habitat quantity and monitor habitat changes over time; measure bird use of different habitats, including managed and unmanaged sites to monitor efficacy of habitat management and restoration efforts.
- Regularly monitor abundance, distribution, and trends of migrating landbirds, forest-interior birds (barred owls, red-shouldered hawks, Cooper's hawks), ospreys, tidal and freshwater marsh birds, colonial waterbirds, and migratory shorebirds. Monitor productivity of forest-nesting birds via an index to be developed.
- Regularly monitor the resident bald eagle population and habitat use.
- Monitor weight gains of red knot and migratory shorebird populations during the stopover period. Monitor red knot habitat use relative to habitat type and horseshoe crab egg density.
- Monitor nesting density and productivity of red knots at Arctic breeding grounds.
- Monitor population trends of red knots at wintering grounds in Bahia Lomas, Chile, and Argentina.
- Monitor species abundance of migratory raptors at key locations to determine trends in migration counts.
- Monitor populations of breeding, migratory and wintering waterfowl of conservation concern.
- Continue the long-term monitoring of reptile and amphibian populations through the Herp Atlas Project, the Calling Amphibian Monitoring Program, and the vernal pool project, focusing on special concern reptiles, Eastern tiger salamander, Cope's gray treefrog, and vernal pool obligate and facultative species, species that depend wholly or significantly on vernal pools for breeding. Measure population fluctuations at both managed and unmanaged sites.
- Develop indicator metrics for monitoring forest health and implement at the scale necessary to monitor effectiveness of deer management strategies.
- 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.