

3. Central Piedmont Plains

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a. Habitats

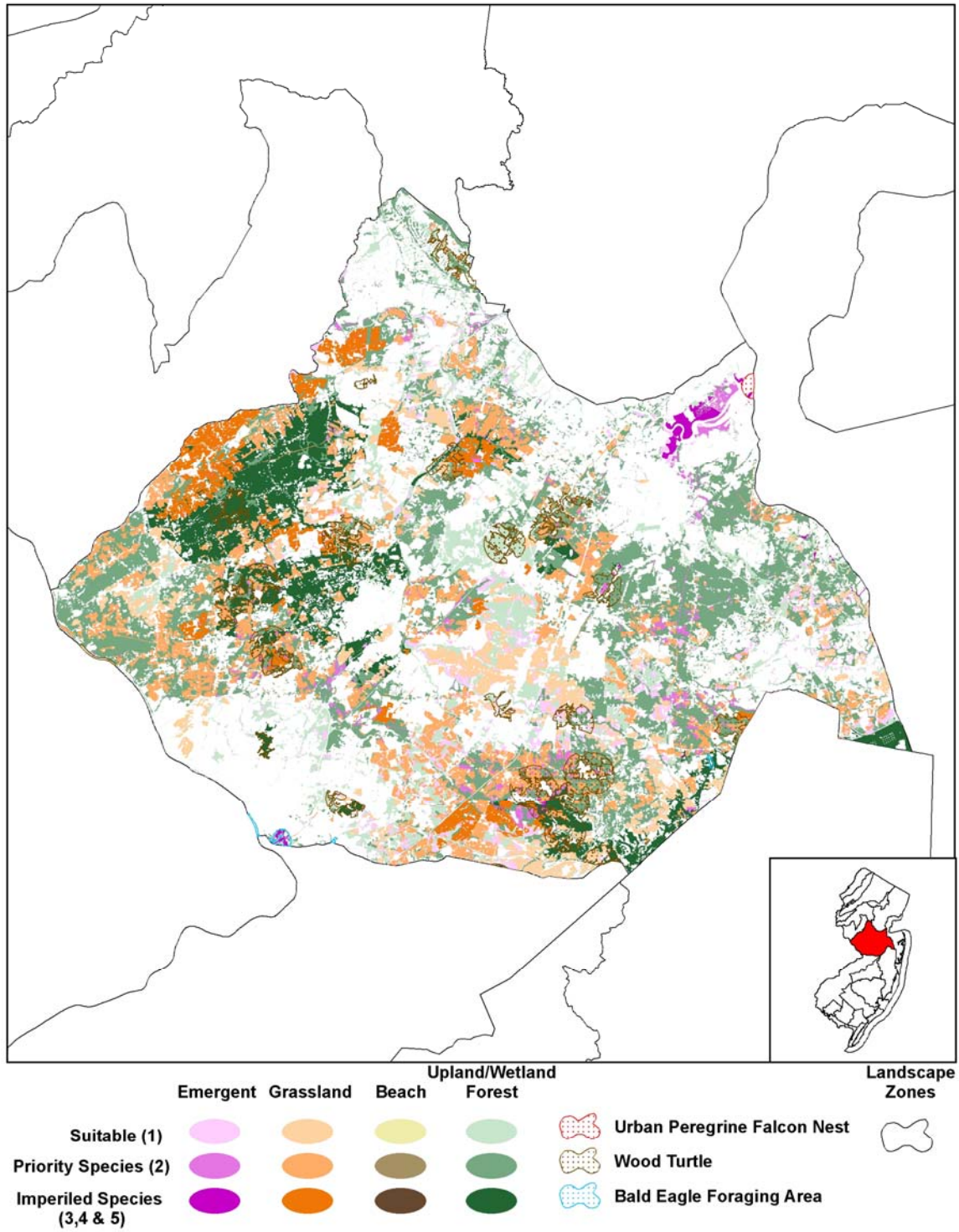
The second largest zone in the state, the Central Piedmont Plains zone (Figure 20) lies at the “waistline” of New Jersey, consisting of Mercer County, southern portions of Somerset and Middlesex counties and western Monmouth County (west of Highway 34). This region includes the Assunpink Wildlife Management Area (WMA), Delaware & Raritan Canal and Six Mile Run, Sourland Mountain Preserve, and Pigeon Swamp State Park and Forest.

Extensive farmed areas and grasslands, fragmented woodlands, tidal freshwater marshes, and housing developments characterize the Central Piedmont Plain, and about half of the entire area is considered suitable for wildlife of concern. Large agricultural/grassland complexes span this zone along the Mercer-Middlesex border south to Assunpink WMA and include cropland, pasture, and agricultural wetlands. The Sourland Mountain Preserve, Assunpink WMA, and Pigeon Swamp State Park and Forest contain sizeable deciduous forest tracts. The largest wetlands in this zone occur east of the Delaware & Raritan Canal State Park.

This zone is unique because it is a transition area between the hardwood forests of northern New Jersey and the deciduous-coniferous forests of the Pinelands. Preserving connectivity of terrestrial and riparian habitats is a primary goal here.

Forest patches (upland, wetland and riparian) totaling approximately 67,500 hectares (260.6 square miles) in the Central Piedmont Plains, range in size from 0.2 hectare (half an acre) to over 7,000 hectares (27 square miles) (Sourland Mountain Preserve), and are a high-priority habitat type in this landscape. Over 36,000 hectares (138.9 square miles) of early-succession habitat (grasslands, old fields, agriculture), with patch sizes ranging from half an acre to nearly 2,000 hectares (7.7 square miles) (East Amwell Township), provide habitat for all of New Jersey’s endangered and threatened grassland birds. Most of these areas are agricultural lands, but there are also 11 airports that provide grassland habitat for species of conservation concern. Approximately 8,500 hectares (32.8 square miles) of emergent wetlands exist in the Central Piedmont Plains. Most of these areas are small pockets of scattered wetlands, but larger expanses exist along the Raritan River estuary and in Assunpink WMA.

Figure 20. Critical landscape habitats within the Central Piedmont Plains conservation zone, as identified through the Landscape Map (v2).



b. Wildlife of Greatest Conservation Need

The Central Piedmont Plains supports one federal endangered and one federal threatened species, ten state endangered species, 17 state threatened species, 69 special concern and regional priority species, and seven additional harvested species of regional priority. In addition, summer populations of forest-dwelling bat species, potentially including the federal endangered Indiana bat, are known to occur in the Central Piedmont Plains.

The largest forests in the north (Sourland Mountain, forests in the Stony Brook-Millstone Watershed Management Area) support area-sensitive species including the barred owl, bobcat, Cooper's hawk, and a large variety of forest-interior songbirds and forest reptiles and amphibians (wood turtle, northern copperhead, and vernal pool species). Forests in the south also support the barred owl and pinelands species (Pine Barrens treefrog, timber rattlesnake). Forests in both the north and south provide suitable habitat for summer populations of Indiana and other forest-dwelling bat species. Riparian forests (upland and wetland) spanning the zone support a sizeable population of wood turtles and a variety of special concern reptiles and amphibians. The Delaware & Raritan Canal State Park is an important greenway providing breeding and stopover habitat for migratory songbirds.

The large complexes of grasslands within the agricultural matrix in this zone present great management opportunities and currently support area-sensitive grassland species (upland sandpiper, vesper, savannah and grasshopper sparrows, bobolink). Grassland-dependent invertebrates such as pink streak and scarlet bluet are also found in this zone. Many of these areas also provide breeding habitat for scrub-shrub birds, bog turtles, frosted elfin, and basking and nesting areas for wood turtles and eastern box turtles. American kestrels appear to have declined dramatically in this and other agricultural regions of the state, and large complexes of agricultural land provide opportunities to restore populations through a nest-box program.

The diverse wetland, lacustrine (lake), and riverine habitats support colonial waterbirds (green and great blue herons, and black-crowned night-heron), other freshwater wetland birds (pied-billed grebes, common loons), bog turtles, spotted turtles, carpenter frogs, Fowler's toads, Pine Barrens treefrogs, freshwater mussels, and silver-bordered fritillaries. Cliff swallows, chimney swifts, and concentrations of summer bats, including Indiana bats, can breed in highly urbanized areas and utilize man-made structures for nesting habitat. The following tables identify the species of greatest conservation need within this zone.

Wildlife Species and Associated Habitats of the Central Piedmont Plains

Table PP24. Federal Endangered and Threatened Species*

Common Name	Water	Wetlands	Grasslands	Forests and Forested Wetlands
Mammals				
Indiana bat				X**
Reptiles				
Bog turtle		X		X
Mussels				
Dwarf wedgemussel	X***			
Fish				
Shortnose sturgeon	X			

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

**Potential presence.

***Riverine habitat.

X: Species occurs within the identified habitat.

Table PP25. State Endangered Species

Common Name	Water	Wetlands	Grasslands	Forests and Forested Wetlands
Mammals				
Bobcat		X		X
Birds				
American bittern		X		X
Bald eagle		X		X
Northern harrier		X	X	
Peregrine falcon				X
Pied-billed grebe		X		
Red-shouldered hawk				X
Upland sandpiper			X	
Vesper sparrow			X	
Reptiles				
Timber rattlesnake				X
Amphibians				
Blue-spotted salamander		R		R

R: Proposed reintroduction of species

X: Species occurs within the identified habitat.

Table PP26. State Threatened Species

Common Name	Water	Wetlands	Grasslands	Forests and Forested Wetlands
Birds				
Barred Owl				X
Black-crowned night-heron		X		
Bobolink			X	
Cooper's hawk				X
Grasshopper sparrow			X	
Long-eared owl			X	X
Osprey		X		
Red-headed woodpecker				X
Savannah sparrow			X	
Reptiles				
Wood turtle				X
Amphibians				
Eastern mud salamander				X
Long-tailed salamander		X		X
Pine Barrens treefrog		X		X
Mussels				
Tidewater mucket	X			
Triangle Floater	X			
Yellow lampmussel	X			

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State Threatened Species (continued)

Common Name	Water	Wetlands	Grasslands	Forests and Forested Wetlands
Insects				
Frosted elfin		X	X	X
Silver-bordered fritillary		X	X	X

X: Species occurs within the identified habitat.

Table PP27. Nongame Species of Conservation Concern

Common Name	Water	Wetlands	Grasslands	Forests and Forested Wetlands
Mammals				
Eastern small-footed myotis				X**
Eastern red bat				X**
Hoary bat				X**
Marsh rice rat			X	
Silver-haired bat				X**
Southern bog lemming				X
Birds				
Acadian flycatcher				X
American golden-plover			X	
American kestrel			X	
Baltimore oriole				X
Black-and-white warbler				X
Black-billed cuckoo				X
Black-throated blue warbler				X
Black-throated green warbler				X
Blue-winged warbler		X		X
Broad-winged hawk				X
Brown thrasher				X
Canada warbler				X
Cerulean warbler				X
Chimney swift				X
Chuck-will's-widow				X
Cliff swallow		X	X	
Common nighthawk			X	X
Dickcissel			X	
Eastern kingbird			X	
Eastern meadowlark			X	
Eastern screech-owl				X
Eastern towhee				X
Eastern wood-pewee				X
Field sparrow			X	
Gray catbird				X
Great blue heron		X		X
Great crested flycatcher				X
Green heron		X		X
Hooded warbler				X
Horned lark			X	
Indigo bunting			X	X
Kentucky warbler				X
Least bittern		X		
Least flycatcher				X
Louisiana waterthrush				X
Marsh wren		X		
Northern flicker				X
Northern parula				X
Pine warbler				X
Prairie warbler				X
Prothonotary warbler				X
Rose-breasted grosbeak				X
Saltmarsh sharp-tailed sparrow		X		
Scarlet tanager				X
Seaside sparrow		X		
Sharp-shinned hawk				X

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Nongame Species of Conservation Concern (continued)

Common Name	Water	Wetlands	Grasslands	Forests and Forested Wetlands
Birds (continued)				
Spotted sandpiper		X		
Summer tanager				X
Veery				X
Whip-poor-will				X
Willet		X		
Willow flycatcher				X
Winter wren				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	X
Northern copperhead				X
Northern diamondback terrapin		X		
Spotted turtle		X		X
Amphibians				
Carpenter frog		X		X
Fowler's toad		X		X
Mussels				
Creeper	X			X
Insects				
Clubtail dragonfly, <i>Gomphus septima</i>	X			X
Scarlet bluet, <i>Enallagma pictum</i>	X	X	X	
Pink streak, <i>Faronta rubripennis</i>				X
Fish				
American brook lamprey*	X			
Atlantic sturgeon	X			
Bridle shiner	X			

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

**Potential presence.

X: Species occurs within the identified habitat.

Table PP28. Game Species of Regional Priority

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

Common Name	Water	Wetlands	Grasslands	Forests and Forested Wetlands
Birds				
American black duck	X	X		X
American woodcock				X
Canada goose (Atlantic population)	X	X		
Northern bobwhite			X	
Surf scoter	X			
Virginia rail		X		
Wood duck				X

X: Species occurs within the identified habitat.

Table PP29. Fish Species

Common Name	Water
Fish	
Hickory shad	X
Margined madtom	X
Shield darter	X

X: Species occurs within the identified habitat.

Table PP30. 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	Wetlands	Grasslands	Forests and Forested Wetlands
Mammals				
River otter	X	X		
Birds				
Ruffed grouse				X
Sora rail		X		

X: Species occurs within the identified habitat.

c. Threats to Wildlife and Habitats of the Central Piedmont Plains

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

While some forest, grassland, and wetland habitats are preserved in county, municipal, state, and federal lands, a large portion of these habitats are in danger of being lost to development pressures. Expanding development adjoins wetland habitat, removing upland buffers, and converts forests and farmlands into large homes with neatly trimmed lawns. Fragmentation of forest tracts, wetlands, and grasslands are also significant threats to wildlife. Many raptors and forest and grassland songbirds are area-sensitive and require areas of minimum size to establish territories and reproduce successfully. Fragmentation of habitat allows for many invasive plant species to become integrated into natural areas thereby degrading habitat suitability for many species. Additionally, fragmentation increases stress on the remaining trees, thereby increasing susceptibility of invasive pests (such as Asian longhorned beetle and gypsy moths). White-tailed deer thrive in fragmented non-urban areas and the resulting over-browse of the forest system in this landscape is severe and virtually eliminates forest regeneration. White-tailed deer also selectively browse giving invasive species that they avoid (barberry species, etc.) a stronghold in the forested understory.

Upland and wetland forest are high priority habitats in New Jersey because they are difficult to retain as mature, unbroken tracts and take many years to develop complex “old growth” structure. Most of the open fields in this zone are in the form of agriculture. Mechanized, row-crop agriculture renders agricultural lands unsuitable for most wildlife; mowing of cool-season grasses and along roadsides and utility rights-of-way during breeding season (mid-April through early July) increases mortality and reduces productivity of many species, including reptiles and amphibians, and small mammals, but especially birds and invertebrates.

Invasive plants, such as common reed or Phragmites (*Phragmites australis*) and purple loosestrife (*Lythrum salicaria*), can severely reduce habitat suitability of freshwater wetlands for marsh-nesting birds. Furthermore mallards, which thrive in areas with human habitation, compete with and displace American black ducks and have also been known to hybridize with them. American black ducks are not very prevalent within this zone, but do occur near Van Nest WMA and the Raritan River. In riparian areas, North American beavers can create wetland habitat suitable for many species by damming up streams, but may, in turn, alter riparian habitat downstream from the dam.

Other threats to species in the Central Piedmont Plains include pesticides, herbicides, and traffic noise. Additionally, the impact of free-ranging domestic and feral cats on wildlife is well documented and can severely impact and destroy important wildlife populations. Also see Section I-E “Threats to Wildlife and Habitats” (page 17) of this document.

d. Conservation Goals

- Identify, protect, enhance, and/or restore endangered, threatened, and special concern wildlife and fish populations and their habitats through full implementation of Landscape Project.
- Identify, protect, enhance, and/or restore suitable forest and wetland forest habitat for wildlife species of conservation concern, particularly for the barred owl, red-shouldered hawk, bobcat, timber rattlesnake, long-eared owl, forest passerines, and frosted elfin.
- Identify, protect, enhance, and/or restore suitable grasslands (areas with >75 % herbaceous and <25% woody vegetation) with interspersed scrub-shrub (areas with >25% woody vegetation <20 feet in height) for wildlife species of conservation concern, particularly for the upland sandpiper, vesper sparrow, grasshopper sparrow, bobolink, savannah sparrow, pink streak and scarlet bluet.
- Identify, protect, enhance, and/or restore suitable aquatic, wetland and riparian habitat and water quality for wildlife and fish species of conservation concern, particularly for the osprey, northern harrier, American bittern, pied-billed grebe, silver-bordered fritillary, and clubtail dragonfly.
- Inventory, determine distribution, and monitor all endangered, threatened, special concern wildlife and fish species in the Central Piedmont Plains.
- Prevent, stabilize, and reverse declines of forest raptors and songbirds, freshwater wetland birds, grassland and scrub-shrub birds, open field birds as well as priority reptiles, amphibians, mussels, butterflies, dragonflies, damselflies, and rare fish species.
- Assess large-scale habitat change every five years.
- Maintain ecological integrity of natural communities and regional biodiversity by controlling invasive species and overabundant wildlife.
- Protect and enhance important and unique natural communities.
- Prevent illegal collection of rare reptiles and amphibian (including bog and wood turtles, timber rattlesnake and pine snake).
- Protect and enhance bald eagle nesting, foraging and roosting habitat.
- Promote public education and awareness, wildlife and indigenous nongame fish conservation, and participation in habitat restoration efforts on private land.

e. Conservation Actions

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

Priority	Conservation Actions
Protect wildlife through implementation of Landscape Project mapping	
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>)
1°	Provide technical assistance and promote use of Landscape Project mapping in state land-use regulation, municipal planning, land acquisition priorities, and the development of management strategies for permanently protected lands. (<i>Protect habitat – Landscape Project</i>)
1°	Develop a GIS model of Indiana bat habitat to incorporate into the Biotics database. Identify appropriate protection strategies to maintain and enhance habitat (landowner incentives for protecting summer habitat, public education regarding importance of bat conservation, development of best management practices). (<i>Protect habitat – Landscape Project; Conserve wildlife – rare wildlife</i>)
2°	Use baseline data to develop management strategies for endangered, threatened and special concern wildlife on permanently protected natural lands. (<i>Conserve wildlife – rare wildlife</i>)
2°	Increase the number of acres of critical wildlife habitat by enhancing and restoring critical habitats through afforestation and revegetation where possible (forest and riparian habitats) and through active management (grasslands, wetlands, and scrub-shrub habitats). (<i>Protect habitat – Landscape Project; Enhance habitat – private lands</i>)
2°	Incorporate ENSP approved sightings data from nominated and approved Important Bird Areas into the Biotics database and Landscape Project mapping providing the sightings meet the ENSP Biotics and Landscape Project standards. (<i>Protect habitat – Landscape Project, migratory birds</i>)
2°	Study songbird migration and develop appropriate management strategies for important stopover areas including collaboration with surrounding private landowners. (<i>Protect habitat – migratory birds; Corridors – migratory birds</i>)

Priority	Conservation Actions (continued)
Protect suitable forest and wetland forest habitat for wildlife	
1°	<p>Increase the effective size and connectivity of 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 forest and target these areas for acquisition to maintain a system of large, connected tracts of forest within and between conservation zones. Where possible, enhance and restore forested habitat through afforestation and revegetation. (<i>Enhance habitat – private lands; Corridors – sprawl, migratory birds; Protect habitat – Landscape Project</i>)</p>
1°	<p>Increase the number of forests managed to contain a mix of seral (successional) stages to provide habitat for a wide range of forest-dwelling species (e.g., woodland raptors, timber rattlesnakes, bobcats, Indiana bats, cerulean warblers, Canada warblers, Kentucky warblers, wood thrush, northern parulas, ruffed grouse, and woodcock) within large contiguous tracts while maintaining suitability for area-sensitive species per the Forest Management Guidelines for Nongame Species in New Jersey.</p> <ul style="list-style-type: none"> • The primary goal being to maintain or manage for large and contiguous areas of mature and near-mature forests with large trees, $\geq 80\%$ canopy cover, and an uneven-age structure that is suitable for woodland nesting raptors (forest raptors). • Maintain and enhance floodplain and upland forests for forest-interior passerines (managing for mature bottomland forests with structural diversity and dense ground cover; mid-successional forests with dense understory; mature coniferous forests with $>75\%$ canopy closure). • Selected areas of second-growth forested wetlands of moderate wildlife value should be allowed to mature and managed to create future barred owl and red-shouldered hawk habitat. • Take action to minimize loss of older forest stands with large trees in large, contiguous tracts by protecting, maintaining, enhancing, and/or restoring habitat on public and private lands through programs such as fee purchases, conservation easements, landowner incentives, and/or forest management plans. <p>(<i>Silviculture – Land management; Protect habitat – Landscape Project, migratory birds, rare wildlife</i>)</p>

Priority	Conservation Actions (continued)
1°	<p>Use GIS measures, other remote sensing tools, and surveys to identify critical core forests (forest area >90 meters from the forest edge) and maintain information in the Biotics database. Preserve and protect core forests through regulations, land acquisition, and incentive programs for forest-interior passerines and bobcats (≥ 10 hectares or 24.7 acres of core forest), forest raptors (≥ 100 hectares or 247 acres of contiguous forest), Indiana bats (≥ 6.8 hectares or 17 acres of contiguous forest) per the Forest Management Guidelines for Nongame Species in New Jersey, and timber rattlesnakes (if unknown foraging habitat, a minimum of 1 ½ mile radius surrounding known den locations or 4,521 acres). Focus preservation efforts in forests that are at least 2,500 meters from major highways. Work to prevent activities that cause permanent breaks in the forest canopy and lead to fragmentation (roads, development). Identify adjacent habitats to core forests that can be preserved and/or managed to increase the total size of forest habitat. <i>(Protect habitat – Landscape Project; Silviculture – land management)</i></p>
1°	<p>Use GIS measures, other remote sensing tools, and surveys to identify and assess core forested wetland and riparian/floodplain habitat for forest raptors (red-shouldered hawk, barred owl, long-eared owl), forest-interior songbirds (Canada warbler, Kentucky warbler, scarlet tanager, wood thrush, northern parula), bobcats, and Indiana bats. Take action to minimize habitat loss by protecting, maintaining, enhancing and/or restoring habitat on public and private lands through programs such as fee purchases, conservation easements, landowner incentives, and/or forest management and stewardship plans. <i>(Silviculture – land management; Protect habitat – Landscape Project, development; Enhance habitat – private lands)</i></p>
1°	<p>Use GIS measures, other remote sensing tools, and surveys to select woodlots to maintain and manage for structural forest diversity, especially shrub and subcanopy understory for forest passerines (Kentucky warblers, Louisiana waterthrushes, wood thrushes), priority reptiles, amphibians, and invertebrate species. <i>(Silviculture – land management)</i></p>
2°	<p>Use GIS measures, other remote sensing tools, and surveys to identify, protect, and maintain coniferous and hemlock forests with >70% forest cover to protect and maintain them, through land acquisition, incentive programs, and public education, for priority bird species (black-throated green warbler, blue-headed vireo, northern parula), reptiles and amphibians. <i>(Protect habitat – Landscape Project)</i></p>
2°	<p>Increase the number of acres of floodplain forests maintained and enhanced for forest passerines. <i>(Protect habitat – Landscape Project; Enhance habitat – private lands)</i></p>
2°	<p>Use GIS measures and other remote sensing tools, surveys, incentive programs, and public education to select and manage woodlots to maintain dead trees, reduce understory, and thin tree stands for open-woodland species and cavity-nesters such as red-headed woodpeckers. <i>(Silviculture – land management)</i></p>

Priority	Conservation Actions (continued)
Protect suitable grassland and open-field habitat for wildlife	
1°	Use GIS measures, other remote sensing tools, and surveys to identify large expanses of grasslands and protect them (through land acquisition, incentive programs, and regulations) from development, succession, and mechanized agricultural practices. <i>(Protect habitat – Landscape Project, humans; Agriculture – land management)</i>
1°	Determine if differences exist in grassland dependent species diversity and abundance in the Northeast between warm season and cool season grass types. <i>(Agriculture – land management)</i>
1°	Research different management techniques to understand the appropriateness of prescribed burning, mowing, brush-hogging, and other methods for maintaining suitable habitat for northeastern grassland birds and grassland dependent invertebrates. <i>(Conserve wildlife – rare wildlife)</i>
1°	Use GIS measures, other remote sensing tools, and surveys to identify existing grasslands important for endangered, threatened and special concern species; increase the number of large existing grasslands enhanced to support a robust grassland bird community. <i>(Protect habitat – Landscape Project; Conserve wildlife – rare wildlife)</i>
1°	Use GIS measures, other remote sensing tools, and surveys to identify areas where scrub-shrub habitat can be created and/or maintained with little impact to forested, wetland, and grassland habitats to maintain populations of shrub-dependent butterflies and moths, reptiles, amphibians, and scrub-shrub birds such as the yellow-breasted chat, American woodcock, and northern bobwhite quail. <i>(Protect habitat – Landscape Project)</i>
1°	Increase the number of acres of grasslands and scrub-shrub habitats protected through innovative public and private partnerships. Promote existing landowner incentives for protecting and managing wildlife habitat and develop landowner cooperative agreements to protect significant bog turtle, frosted elfin, silver-bordered fritillary, grassland and scrub-shrub/open field birds, and special concern reptile populations. <i>(Enhance habitat – private lands; Conserve wildlife – rare wildlife)</i>
2°	Develop, implement and evaluate best management practices (BMPs), through wildlife and habitat surveys, for utility rights-of-way (ROWs) to reduce impacts of vegetation management practices on wildlife and enhance scrub-shrub habitats. <i>(Protect habitat – humans; Conserve wildlife – rare wildlife)</i>
2°	Maintain and enhance grassland habitats where they exist; do not expand or create grassland habitat at the expense of large forest that meet the needs of area-sensitive forest species. Acquire grassland habitat through direct purchase or easements; enlist private lands in preservation and management programs that offer long-term (no less than 5 years) stability of a matrix of grassland schemes including various stages of vegetative succession, where appropriate. <i>(Protect habitat – Landscape Project, development; Enhance habitat – private lands)</i>

Priority	Conservation Actions (continued)
2°	Use GIS measures, other remote sensing tools, and surveys to identify grassland habitat for grassland birds and American kestrels and increase the number of acres of grassland habitat enhanced for source populations of these species. (<i>Protect habitat – Landscape Project; Enhance habitat – private lands</i>)
2°	Work to consolidate adjacent grassland fields, through the elimination of hedgerows, fences, or tree lines, in areas where open land occupies a considerable amount of the surrounding landscape and grassland management can be identified as a reasonable management alternative. (<i>Agriculture – land management</i>)
Protect suitable aquatic/wetland/riparian habitat and water quality for wildlife and fish species of conservation concern	
1°	Increase the number of acres of freshwater emergent wetlands maintained and enhanced for viable populations of pied-billed grebe, American bittern, black-crowned night-heron, silver-bordered fritillary, clubtail dragonfly and bog turtle. (<i>Protect habitat – development, sprawl; Enhance habitat – private lands</i>)
1°	Restore and maintain bog turtle habitat by providing incentives to landowners for long-term management of wet meadows utilizing FWS Region 5 BMPs for bog turtles (prescribed grazing, targeted herbicide application, stem cutting and removal, or a combination of these). (<i>Enhance habitat – private lands; Conserve wildlife – rare wildlife</i>)
1°	Use GIS measures, other remote sensing tools, and surveys to identify and best management practices to maintain wetlands with snags of dead trees for red-headed woodpeckers and other cavity-nesters. (<i>Protect habitat – development, sprawl; Silviculture – land management</i>)
1°	Work with managers to increase the number of impoundments managed to benefit bitterns, rails, ducks and some invertebrates by providing suitable foraging habitat and encouraging dense stands of emergent vegetation for nesting. (<i>Protect habitat – humans</i>)
1°	Protect water quality and aquatic-dependent species by appropriately designating Category 1 waters. (<i>Protect habitat – rare wildlife, fish</i>)
1°	Identify threats to vernal pools through systematic monitoring and devise strategies to protect species dependent upon vernal pool habitat. (<i>Conserve wildlife – rare wildlife</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°	Preserve and enhance riparian habitats through regulations, land acquisition, and incentive programs to protect aquatic ecosystems for dwarf wedgemussels, tidewater muckets, and shortnose sturgeon. <i>(Protect habitat – mussels, fish; Enhance habitat – private lands)</i>
2°	Encourage stream bank restoration for freshwater mussels through public education, volunteer programs, and land managers. <i>(Protect habitat – mussels)</i>
2°	Perform QA/QC of the NJDEP - DFW, Bureau of Freshwater Fisheries' FishTrack Database and query the database to determine distributions of fishes identified as special concern by the Delphi process. <i>(Monitor wildlife – fish)</i>
2°	Identify and protect habitat by plotting distributions of special concern fish species, and integrate those data into the Biotics database. <i>(Protect habitat – Landscape Project, fish)</i>
Inventory and monitor endangered, threatened and special concern wildlife and fish	
1°	Use the Biotics database and Landscape Project to identify where species data and monitoring gaps exist. data gaps in species monitoring, distribution, and management. Design and implement coordinated surveys to acquire data in those areas. <i>(Monitor wildlife – long-term monitoring)</i>
1°	Through national, standardized survey protocols, utilizing citizen scientists, continue long-term monitoring and survey to collect baseline data (protected lands) of early successional birds (grassland and scrub-shrub), forest songbirds and raptors, reptiles and amphibians (Herptile Atlas and calling amphibian surveys), freshwater mussels and aquatic invertebrate populations (Integrated Aquatic Assessment), and incorporate new information into the Biotics database. <i>(Monitor wildlife – long-term monitoring)</i>
1°	Continue coordinated wildlife monitoring and management efforts among conservation groups and state agencies in New Jersey (Citizen Scientist Project, cooperative management efforts on state and permanently-protected conservation lands and adjacent private lands). <i>(Monitor wildlife – long-term monitoring)</i>
1°	Promote coordination of species monitoring and management efforts among conservation groups and state agencies in New Jersey by using standardized monitoring and data entry methods for birds and reptiles and amphibians.
1°	Repeat surveys for woodland raptors every four years. <i>(Monitor wildlife – long-term monitoring)</i>
1°	Conduct demographic studies (productivity, survival, dispersal) of priority species to provide information needed for determining causes of population declines and understanding metapopulation dynamics. <i>(Monitor wildlife – long-term monitoring)</i>
1°	Survey to collect baseline data and develop management strategies for endangered, threatened and special concern wildlife on permanently-protected public lands. Incorporate all data into the Biotics database. <i>(Monitor wildlife – long-term monitoring; Conserve wildlife – rare wildlife)</i>

Priority	Conservation Actions (continued)
1°	Survey suitable habitats to determine distribution of barn owls, American kestrels, northern copperheads, and other wildlife of greatest conservation need and establish baseline information for monitoring. <i>(Monitor wildlife – long-term monitoring; Conserve wildlife – rare wildlife)</i>
1°	Identify and research water quality parameters for bald eagle, wood turtle, spotted turtle, carpenter frog, Fowler’s toad, and other special concern amphibian populations. Assess impacts and incorporate into BMPs. <i>(Conserve wildlife – rare wildlife; Protect aquatic wildlife - humans, development)</i>
1°	Research and evaluate effectiveness of water quality management practices on wood and bog turtles, special concern amphibians, and aquatic invertebrates, particularly those practices associated with permitting or mitigation actions, and revise management actions where appropriate. <i>(Conserve wildlife – rare wildlife)</i>
1°	Determine population status and monitor trends of forest dwelling bat species in comparison to land use changes and alteration of habitat through long-term acoustical sampling and trapping/netting surveys. <i>(Monitor wildlife – long-term monitoring)</i>
1°	Continue volunteer-based summer bat concentration surveys to locate maternity sites and determine roost characteristics. Trap bats at summer concentration sites to identify bat species; apply colored, plastic bands to Indiana bats to aid in recognition during hibernation surveys. <i>(Monitor wildlife – long-term monitoring)</i>
1°	Conduct telemetry study during summer months to determine roost characteristics and habitat requirements for Indiana bat maternity colonies. <i>(Protect habitat – Landscape Project)</i>
2°	Continue ground surveys of all known great blue heron rookeries every 3-5 years. Improve census methods to capture population and reproductive success metrics at a finer scale. <i>(Monitor wildlife – long-term monitoring; Conserve wildlife – rare wildlife)</i>
2°	Establish a formal ground survey for inland colonies of colonial waterbirds, with a particular emphasis on black and yellow-crowned night herons. Once the survey is instituted, continue on a rotation of once every other year. <i>(Monitor wildlife – long-term monitoring; Conserve wildlife – rare wildlife)</i>
2°	Conduct searches for triangle floaters, frosted elfins, Henslow’s sparrows, long-tailed salamanders, eastern mud salamanders, queen snakes, silver-bordered fritillaries, clubtail dragonflies, scarlet bluets, and pink streaks. <i>(Monitor wildlife – long-term monitoring; Conserve wildlife – rare wildlife)</i>
2°	Conduct concentrated field sampling for listed or special concern fish species at areas indicated by FishTrack Database queries and incorporate data into Biotics database. <i>(Monitor wildlife – fish)</i>
2°	Conduct sampling to determine distribution, range, and habitat use of summer bats. <i>(Protect habitat - Landscape Project; Monitor wildlife – long-term monitoring)</i>

Priority	Conservation Actions (continued)
Prevent, stabilize, and reverse declines of wildlife and rare fish populations	
1°	Investigate causes of decline and landscape-scale habitat requirements of American kestrels; identify most effective methods to restore and enhance habitat and provide nest cavities (standing dead biomass and nest boxes). <i>(Enhance habitat – private lands; Conserve wildlife – rare wildlife)</i>
1°	Maintain and enhance reptile and amphibian populations by increasing law enforcement (hiring additional officers) and penalties for illegal collection for the pet trade (bog and wood turtles, timber rattlesnakes) and working with state, county, and local DOTs to install raised roads or multiple culverts to reduce road mortality (e.g., along known box turtle breeding locations near roads). <i>(Conserve wildlife – rare wildlife; Protect habitat – roads; Corridors – roads)</i>
1°	Secure bog turtle and wood turtle populations threatened by collection by identifying sources of funding for enforcement of endangered species laws and protection of wildlife from illegal collection. <i>(Protect wildlife – humans)</i>
1°	Collaborate with DOTs, NGOs, and volunteers to identify areas with known wildlife mortality issues including road crossings for breeding amphibians and roads with high incidences of road mortality (snakes, turtles, large mammals). <i>(Protect habitat – roads; Corridors – roads)</i>
2°	Develop and implement management actions to enhance populations of special concern and rare fish. <i>(Protect aquatic wildlife – humans)</i>
2°	Research effects of parasites and diseases on special concern fish species' populations. <i>(Monitor wildlife – fish)</i>
2°	DFW will collaborate with USDA to identify and prioritize, based upon species of greatest conservation need, areas where rapid response to an exotic pathogen introduction or incident is needed. <i>(Conserve wildlife – rare wildlife, invasives)</i>
2°	Work with DOTs and other appropriate federal, state, and local agencies to increase the number of sites where road crossing are improved to maintain and avoid disturbance to the natural streambeds and riparian habitat, to permit high volumes of water to flow freely, and to provide adequate travel corridors for terrestrial wildlife, while maintain stream flow for fish passage. Bridges that span rivers and streambeds and include floodplain habitat on either side of the span to provide travel corridors for terrestrial wildlife are preferred over culverts. <i>(Corridors – roads; Protect habitat – roads, fish)</i>
2°	Incorporate freshwater mussel survey results into the Biotics database and determine critical areas for listed species and assess impact of aquatic invasive species on freshwater mussels. <i>(Protect habitat – mussels)</i>
2°	Evaluate and assess the potential impacts of wind turbines to populations of bats. Carry out post-construction monitoring of both existing and future wind turbines to assess the actual impacts these structures have on bats. <i>(Protect habitat – humans; Conserve wildlife – rare wildlife)</i>

Priority	Conservation Actions (continued)
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>
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.
Maintain natural biodiversity, community integrity and structure and ecosystem function by controlling invasive and overabundant species	
1°	Identify areas where invasive, non-indigenous plants and animals are either already established or are becoming established through GIS, surveys, public participation, and creating a system for reporting and qualifying new locations of invasive species. Prioritize areas for control measures according to the potential level of impact on the ecosystem and species of conservation concern and the likelihood of success. <i>(Conserve wildlife – invasives)</i>
1°	Develop area-specific deer density or percent-reduction targets to reduce herd size to a sustainable level where forest regeneration is possible and to enhance forest health and biodiversity. <i>(Evaluate restoration – deer; Conserve wildlife – deer, rare wildlife)</i>
1°	The NJ Division of Fish and Wildlife, Bureau of Wildlife Management will consider forest health and biodiversity as one of the primary determinants in making deer management decisions regarding deer densities. Forest health and biodiversity will be determined by using long term monitoring of forest regeneration via a system of exclosures and vegetative sample plots (or other methods that will empirically and objectively measure the effect of deer herbivory) throughout New Jersey in order to evaluate habitat health in response to changing deer densities. DFW will recommend adjustments to existing Deer Management Zone deer densities goals and recommend changes to zone specific deer harvest and control strategies, as required in order to meet this objective. <i>(Evaluate restoration – deer; Conserve wildlife - deer)</i>
1°	Continue or develop, implement and evaluate methods for both aquatic and terrestrial invasive species removal programs in critical wildlife habitats. <i>(Conserve wildlife – invasives; Evaluate restoration – invasives)</i>
1°	Work with public and private landowners and managers to employ appropriate physical, chemical, or biological control measures, or a combination of these, to reduce invasive non-indigenous plants and animals in areas that are identified as providing critical habitat for endangered, threatened or priority wildlife species and are being threatened by invasive non-indigenous plants. <i>(Conserve wildlife – invasives)</i>

Priority	Conservation Actions (continued)
1°	Support projects, through funding and collaborative efforts, to eliminate aggressive invasive species found on private and public natural lands, especially in large grassland tracts, wet meadow, marsh, emergent wetland, and aquatic habitats. Assess effectiveness of management techniques of invasive species removal on private and public lands. Assess impacts of aquatic invasives on freshwater mussels and implement management strategies to eliminate aquatic invasive species in sensitive or important habitats containing listed freshwater mussels. <i>(Conserve wildlife – invasives; Evaluate restoration – invasives)</i>
2°	Work with land management agencies to monitor for the spread of invasive insect species that jeopardize forest health. The species of primary concern include the Asian longhorned beetle and gypsy moth. Collaborate on appropriate control options for these pests and use appropriate control methods to reduce tree damage and limit the spread of infestations. <i>(Conserve wildlife – invasives)</i>
2°	Request permission from private landowners (both those who allow hunting and do not allow hunting) interested in or currently enrolled in incentive programs to establish vegetation monitoring plots. This will allow greater surveillance of deer impacts on private lands, provide landowners direct information about the health of their land, and provide greater data input into the deer harvest formula. <i>(Evaluate restoration – deer)</i>
Protect and enhance important and unique habitats	
1°	Identify (through Landscape Project, radar studies, IBAs, and surveys), protect (through incentive programs and land acquisition), and enhance (through incentive programs and best management practices) critical migratory stopover habitats, including but not limited to the Sourland Mountains, Princeton Woods, and Assunpink WMA. <i>(Protect habitat – migratory birds; Corridors – migratory birds)</i>
2°	Federal, state, and local governments will work with the NJ DEP, Natural Heritage Program to cooperatively map significant natural communities in the Central Piedmont Plains. <i>(Protect habitat – Landscape Project)</i>
2°	Work with local governments and the NJ DEP’s Natural Heritage Program (NHP) to protect and enhance habitats and rare communities through incentive programs, land acquisition, the creation and use of BMPs, and increased law enforcement efforts to minimize disturbance. These communities include, but are not limited to the tidal freshwater swamp and sandy bluff natural community and rare plant species at the South River Marshes, the open farmlands at East Amwell Grasslands Macrosite, and the forest at Sourland Mountain Preserve. <i>(Protect habitat – development)</i>

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

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

f. Potential partnerships to Deliver Conservation

Private Landowners

- Protect and enhance habitat through innovative partnerships with private landowners.
 - Implement best management practices that protect nesting and foraging sites of forest passerine, freshwater wetland bird, raptor, and scrub-shrub/open field bird populations.
 - Utilize incentive programs that encourage the management of bog turtle, forest and grassland bird populations.
 - Through incentive programs, target private landowners surrounding public natural lands to manage land for mature forest in order to increase effective size and connectivity of forest patches
 - Encourage farmers to preserve farmland through conservation easements and TDRs (Transfer of Development Rights) through partnerships with NJ DEP’s Green Acres,

- the Nature Conservancy – NJ Chapter, NJ Farm Bureau, SADC, local land trust, and local municipalities for the conservation of bog turtle, forest and grassland bird populations.
- Develop/maintain cooperative relationships with private landowners with bog turtles and breeding freshwater wetland birds on their land.
 - Collaborate with private landholders to manage grassland and early-succession complexes for source populations of grassland birds, invertebrates, yellow-breasted chats, and American kestrels.
 - Develop and implement landowner incentives for providing, maintaining, and protecting summer bat habitat.
 - Work with landowners to inventory their properties for the presence and severity of invasive non-indigenous plant invasions. Work with them to develop effective control or eradication measures to protect critical wildlife habitats.
 - Work with landowners to maintain/enhance existing habitats where listed and special concern fish species occur.
 - 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 such as NJ Audubon Society, D&R Greenway, local land trusts, 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 in a systematic manner to achieve short and long term monitoring goals.
 - Collaborate with NJ Audubon Society, NJ Conservation Foundation, and other environmental, member-based organizations to recruit and train Citizen Scientists to monitor vegetative plots (exclosures) on state lands for evaluation of vegetative structure in response to deer densities.
 - Involve Citizen Scientists in conservation projects, such as stream bank restoration, and searching for undocumented freshwater wetland bird populations.
 - Involve Citizen Scientists in management and protection projects, such as protection and posting of bald eagle nesting areas.
 - Continue volunteer-based summer bat concentration surveys.
- Promote backyard habitat management for migratory raptors and passerines.
- Work with landowners to maintain/enhance existing habitats where listed special concern species occur.
- Educate landowners about the negative impact free-roaming housecats have on wildlife; discourage managed cat colonies and trap, neuter and release programs.

Wildlife Professionals

- Collaborate with researchers in New York, Pennsylvania, and West Virginia to develop best management practices and conservation plans for scrub-shrub birds and American kestrels.

- 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

- Partner with D&R Greenway, Stony Brook-Millstone Watershed, Sourland Mountain Preserve, NJ Audubon Society, NJ Conservation Foundation, The Nature Conservancy - NJ Chapter, and other conservation organizations to protect and enhance habitats.
 - Protect woodland raptor nesting and foraging sites.
 - Develop best management practices and conservation plans for grasslands and utility rights-of-way.
 - Protect and enhance riparian corridors and early-succession fields.
 - Encourage management of grassland and early-succession complexes for source populations of grassland birds, invertebrates, yellow-breasted chats, and American kestrels.
 - Protect and enhance critical habitat where listed or special concern wildlife and fish occur.
 - Conduct habitat surveys to determine geographic distribution and severity of invasions of invasive non-indigenous plants.
- Consult with conservation organizations to develop educational programs, particularly the Keep Cats Indoors campaign.
- Establish data-sharing partnerships to ensure species data from other organizations' surveys are incorporated into the Landscape Project and Office of Natural Lands Management's Natural Heritage Biotics database.
- Encourage the use of priority habitat maps to guide land acquisition by conservation organizations through programs such as NJ DEP's Green Acres, State Agricultural Development Committee (SADC), NJ Farm Bureau, and local land trusts.
- Continue participation in regional and national bat conservation efforts such as the Northeast Bat Working Group and the North American Bat Conservation Partnership.
- Conservation organizations should act as advocates for legislation and regulatory reform that address integrating deer management goals into farmland tax assessment laws, farmland preservation programs, and other farm conservation programs.
- Work with land trusts to develop and implement deer management plans that achieve desired deer densities on preserved lands.
- Collaborate with Ducks Unlimited on studies involving migration and wintering ecology of waterfowl and other birds.

Local Government, Other State and Federal Agencies

- Partner with local, state, and federal government agencies, including municipal and county planning boards, USDA's NRCS, USFWS - NJ Field Office, SADC, NJ Farm Bureau, and the DCA, Office of Smart Growth, to protect, enhance, and create habitats, and to protect NJ's native wildlife.
 - NJ Department of Environmental Protection's (DEP) Divisions of Fish and Wildlife (DFW) to protect woodland raptor nesting and foraging sites.

- DFW to develop a plan to prevent collection of bog and wood turtles, and timber rattlesnakes and pine snakes, and to protect sensitive sites (basking, gestation/ nesting, hibernacula) from disturbance.
- DFW to share site information and expertise with state and federal law enforcement to increase surveillance of bog turtle and wood turtle sites.
- DFW to determine groundwater recharge areas for bog turtle habitats with the DEP's Division of Water Quality (DWQ) and the NJ Geological Survey. Expand efforts with DWQ to minimize impacts on water quality in these areas.
- Work with DEP's Water Monitoring and Standards to recommend classification upgrades in water bodies where listed or special concern species occur.
- DFW to work with DEP's Division of Parks and Forestry (DPF) to enhance state forests for wildlife: uneven-age stand management, preserve standing and fallen dead biomass, manage for older-growth forests especially wetland forests and adjacent upland forest, avoid forestry practices in wetland forests.
- DFW and conservation organizations to encourage and provide site information to the NJ Department of Transportation to incorporate multiple culverts in road construction to widen stream flow for fish and wildlife passage and preserve natural streambeds and reduce road mortality by creating wildlife passages across roadways.
- DFW, National Park Service, conservation organizations, and DEP's Lands Use Regulation Program (LURP) to work to protect and appropriately classify wetlands for special concern invertebrate, reptile, and amphibian populations on state, federal, and private lands.
- DFW to lead in the development of specific conservation plans for special concern birds, reptiles, amphibians, and invertebrates on state lands.
- DFW and DPF to work with the USFWS, Department of Defense, and National Park Service to develop effective plans to eradicate invasive, non-indigenous plants on federal and state lands and aquatic systems that are threatening critical wildlife habitats.
- DFW to work with USDA through NRCS and the WHIP program to control purple loosestrife and other invasive plants in critical wildlife habitats.
- DFW and DEP's Bureau of Water Monitoring and Standards to work together to recommend classification upgrades in water bodies where listed or special concern species occur.
- DFW to partner with local, county and state authorities to establish best management practices in areas where listed or special concern fish and wildlife species occur.
- DFW to work with LURP to make recommendations on stream encroachment permit issues for areas where listed or special concern species occur.
- Expand efforts to create habitat and implement best management practices that protect nesting and foraging sites of cavity-nesters, forest passerines and raptors, and other forest dwelling species on state lands and with natural resource managers, county and municipal utility authorities and planners; and where grassland/ scrub-shrub habitats already exist, enhance and maintain habitats for grassland and scrub-shrub/open field birds.
- DFW, conservation organizations, and land stewards to encourage greater buffers for important riparian and floodplain areas for forest passerines, reptiles, amphibians, and

- invertebrates with the DEP's Division of Watershed Management. Partner with them to investigate water quality and threats of contaminants/pollution.
- DFW to work with state and county mosquito commissions to reduce the use of deleterious insecticides and biological controls at known amphibian breeding sites.
 - DFW will integrate results of research on vegetative structure in response to deer densities into deer management strategies within deer management zones.
 - DFW to work with land management agencies at the state, local, and federal levels to implement deer management plans and harvest quotas that achieve desired deer densities to maintain ecological integrity of natural communities.
 - DFW to work with USDA-NRCS to ensure that deer management goals are integrated into farm conservation plans that include measurable outcomes.
 - DFW and USDA-NRCS to collaborate with SADC and NJ Farm Bureau to implement deer management plans on farmland particularly in areas with high deer densities.
 - DFW to work with USFWS and other state and federal partners to implement North American Waterfowl Management Plan as appropriate.
 - DFW to work with land stewards, private landowners, and municipal, state and federal staff to establish best management practices in areas where listed or special concern species occur.
 - DFW to collaborate with public landholders to manage grassland and early-succession complexes for source populations of grassland birds, invertebrates, yellow-breasted chats, and American kestrels.
 - DFW to work with neighboring state fish and wildlife agencies to radio-track dispersing Indiana bats across state boundaries.
 - DFW to work with the DEP's Division of Watershed Management to upgrade stream classifications in areas with rare mussels.
 - DFW to identify areas where scrub-shrub macro-sites can be created and/or maintained for American woodcocks and northern bobwhite quail without negatively affecting endangered, threatened, or special concern species and their habitats.
 - DFW to make recommendations on stream encroachment permit issues for areas where listed or special concern species occur.
 - DFW, USFWS, and US Department of Agriculture to continue monitoring diseases that can potentially affect wild, native populations of special concern fish species.
 - DFW to continue working with fishing clubs and organizations, lake communities, hatcheries nationwide, and individuals permitted to stock fish in NJ's freshwater streams and lakes to ensure healthy stock is used to minimize the spread of disease and parasites to native fish species and to prevent the use or release of exotic species.
- DFW will lead the development of educational materials for public and private landowners about wildlife of greatest conservation need and associated habitats.
 - State agencies, local municipalities, and townships to work together to discourage managed cat colonies and trap, neuter, and release programs.
 - DEP to encourage the use of the Landscape Project's critical habitat mapping to guide habitat protection and land acquisition by federal, state, and local governments through programs such as DEP's Green Acres Program, State Agricultural Development Committee (SADC), Farmland Preservation, and local land trusts, and through mitigation.

- DEP to encourage the use of the Landscape Project's critical habitat mapping to guide land use planning and zoning decisions by planning agencies at the federal, state, and local level.

g. Monitoring Success

- Conduct habitat assessment and monitor habitat changes over time; monitor efficacy of habitat management and restoration efforts.
- Annually monitor abundance, productivity, distribution, and trends of bald eagle, bog turtle, and wood turtle populations; priority invertebrate species; colonial waterbird, forest passerine, freshwater wetland bird, grassland bird, raptor, and scrub-shrub/open field bird communities, particularly in areas beyond the reach of the Breeding Bird Survey.
- Determine distribution and expand efforts to track bobcat in the region.
- Continue the long-term monitoring of reptile and amphibian populations through the Herp Atlas Project, the Calling Amphibian Monitoring Program, the Vernal Pool Project, and the volunteer coverboard surveys.
- Conduct long-term monitoring of vegetative plots (exclosures) within state lands to assess vegetative success/ failure over time as deer densities change.
- Work with volunteers, private landowners and conservation groups to monitor the success of eradication/control projects that target invasive non-indigenous plants.
- Continue to monitor deer densities and deer harvest data.
- Develop and implement a simple but effective technique to monitor deer impacts on private land (something that landowners can actually use.).
- Develop indicator metrics for monitoring forest health and implement at the scale necessary to monitor effectiveness of deer management strategies.
- Continue monitoring diseases as outlined in the DFW's annual Fish Health Management Plan.
- Employ/implement adaptive management techniques for the goals and conservation actions established for species of greatest conservation need. Review effectiveness of research and management, and improve techniques as necessary.