2. Kittatinny Valley (or Great Valley)

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

a. Habitats

The Kittatinny Valley lies in Sussex and Warren counties, between the Kittatinny Ridge and the northern extent of the Highlands Mountain ridges (Figure 29). This broad valley, in the Ridge and Valley physiographic province, contains fertile soils and has a long history of agricultural activity. The grassland habitat in the valley includes natural grasslands, croplands, pastures, old farm fields, hedgerows, and brush lots. The headwaters and associated freshwater wetlands of the Paulins Kill, Pequest, and Wallkill rivers are in the Kittatinny Valley. Old farm ponds, limestone fens, wet meadows, and swamps dot the landscape. Although grasslands and open habitats dominate much of the Kittatinny Valley, scattered, large parcels of forest remain interspersed throughout. The upland forest and forested wetland habitat includes stands of deciduous hardwood forest, scrublands and scrub-shrub wetlands, vernal pools, and red maple and hardwood swamps.

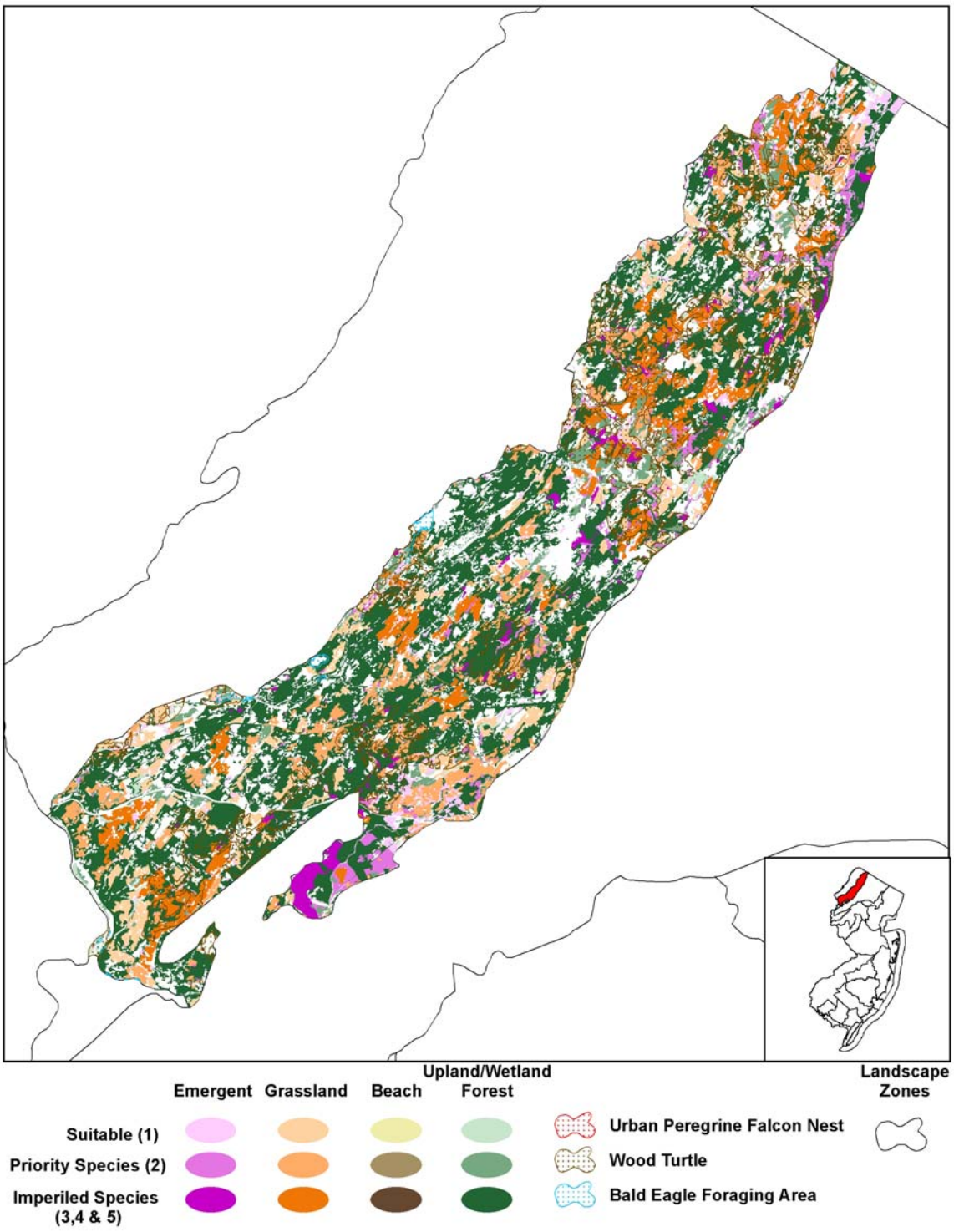
Conservation areas of opportunity in the Kittatinny Valley include Sussex Swamp Preserve, Kittatinny Valley and Swartswood state parks, Paulins Kill River, Whittingham, Columbia Lake, Beaver Brook and Musconetcong WMA's, Wallkill River NWR, and White Lake and Limestone Ridge natural areas.

b. Wildlife of Greatest Conservation Need

Kittatinny Valley habitats support five federal endangered or threatened, 14 state endangered, 16 state threatened, and 77 special concern and regional priority wildlife species, in addition to five game species of regional priority and three nongame fish species currently without state or regional status. The dwarf wedgemussel is federally endangered and the bog turtle is federally threatened. The state endangered species are the American bittern, northern goshawk, northern harrier, red-shouldered hawk, sedge wren, vesper sparrow, and blue-spotted salamander. The state threatened species are the barred owl, black-crowned night heron, bobolink, Cooper's hawk, grasshopper sparrow, long-eared owl, red-headed woodpecker, savannah sparrow, wood turtle, long-tailed salamander, eastern lampmussel, triangle floater, and silver-bordered fritillary. Special concern wildlife in the Kittatinny Valley are colonial waterbirds, forest passerines, freshwater wetland birds, grassland birds, scrub-shrub birds, reptiles, amphibians, and mollusks.

Migratory colonial waterbirds, songbirds, raptors, freshwater wetland birds, and waterfowl are funneled through the Kittatinny Valley to take refuge in the forest and wetland habitats. Forests, forested wetlands, and vernal pools also provide important habitat to a diverse group of reptiles and amphibians, including eastern box turtles, spotted turtles, wood turtles, blue-spotted salamanders, Fowler's toads, Jefferson salamanders, long-tailed salamanders, marbled salamanders, and northern spring salamanders. Due to the proximity of known hibernacula, the forests of this zone likely provide summer foraging and roosting habitat for Indiana bats. Bog turtles are found in the fens and wet meadows associated with pastures. The valley's grasslands

Figure 29. Critical landscape habitats within the Kittatinny Valley (or Great Valley) conservation zone, as identified through the Landscape Map (v2).



are critical to grassland birds and to foraging raptors. Dwarf wedgemussels persist in the Pequest River, their only known habitat in New Jersey. There are also eastern lampmussels, triangle floaters, and creepers in the valley's rivers and streams. One of the state's only two known Mitchell's satyr wetland habitats is in the Kittatinny Valley. The following tables identify the species of greatest conservation need within this zone.

Wildlife Species and Associated Habitats of the Kittatinny Valley

Table S16. Federal Endangered and Threatened Species*

Common Name	Water	Wetlands	Grasslands	Forests and Forested Wetlands
Mammals				
Indiana bat		X		X**
Reptiles				
Bog turtle		X	X	X
Amphibians				
Dwarf wedgemussel	X***			
Insects				
American burying beetle♦			X	
Mitchell's satyr♦		X		X

*All Federal Endangered and Threatened species have an Endangered status on the NJ List of Endangered Wildlife
**Potential presence.
** *Riverine habitat, within Landscape Map, these species are identified within the "Emergent Wetlands" layer
♦Only historic records exist. Species believed to be extirpated.
X: Species occurs within the identified habitat.

Table S17. State Endangered Species

Common Name	Water	Wetlands	Grasslands	Forests and Forested Wetlands
Mammals				
Bobcat				X
Birds				
American bittern		X		
Bald eagle		X		X
Northern harrier		X	X	
Pied-billed grebe		X		
Red-shouldered hawk				X
Sedge wren		X		
Short-eared owl		X		
Upland sandpiper			X	
Vesper sparrow			X	
Reptiles				
Timber rattlesnake				X
Amphibians				
Blue-spotted salamander				X
Mollusks				
Green floater	X**			
Insects				
Appalachian grizzled skipper ♦			X	

** Riverine habitat, within Landscape Map, these species are identified within the "Emergent Wetlands" layer.
♦Only historic records exist. Species believed to be extirpated.
X: Species occurs within the identified habitat.

Table S18. 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

State Threatened Species (continued)

Common Name	Water	Wetlands	Grasslands	Forests and Forested Wetlands
Birds (continued)				
Grasshopper sparrow			X	
Long-eared owl			X	X
Osprey		X		
Red-headed woodpecker				X
Savannah sparrow			X	
Reptiles				
Wood turtle			X	X
Amphibians				
Long-tailed salamander		X		X
Mollusks				
Eastern lampmussel	X**			
Tidewater mucket	X**			
Triangle floater	X**			
Yellow lampmussel	X**			
Insects				
Silver-bordered fritillary				X

**Riverine habitat, within Landscape Map, these species are identified within the "Emergent Wetlands" layer.
X: Species occurs within the identified habitat.

Table S19. Nongame Species of Conservation Concern

Common Name	Water	Wetlands	Grasslands	Forests and Forested Wetlands
Mammals				
Eastern small-footed bat				X**
Eastern red bat				X**
Hoary bat				X**
Silver-haired bat				X**
Long-tailed (Rock) shrew				X
Southern bog lemming				X
Birds				
Acadian flycatcher				X
American golden-plover				
American kestrel			X	
Baltimore oriole				X
Black-and-white warbler				X
Black-billed cuckoo				X
Black-throated green warbler				X
Blue-winged warbler				X
Brown thrasher				X
Canada warbler				X
Cerulean warbler				X
Chimney swift			X	
Chuck-will's-widow				X
Cliff swallow		X	X	
Common barn owl		X	X	
Common nighthawk			X	
Eastern kingbird			X	
Eastern meadowlark			X	
Eastern screech-owl			X	X
Eastern towhee				X
Eastern wood-pewee				X
Field sparrow			X	
Golden-winged warbler				X
Gray catbird				X
Gray-cheeked thrush				X
Great blue heron		X		X
Great crested flycatcher				X
Green heron		X		
Hooded warbler			X	
Horned lark				

Nongame Species of Conservation Concern (continued)

Common Name	Water	Wetlands	Grasslands	Forests and Forested Wetlands
Birds (continued)				
Indigo bunting			X	
Kentucky warbler				
King rail		X		
Least bittern		X		
Least flycatcher				X
Louisiana waterthrush				X
Northern flicker				X
Northern parula				X
Pine warbler				X
Prairie warbler				X
Purple finch				X
Rose-breasted grosbeak				X
Scarlet tanager				X
Veery				X
Whip-poor-will				X
Willow flycatcher				X
Wood thrush				X
Worm-eating warbler				X
Yellow-bellied sapsucker				X
Yellow-billed cuckoo				X
Yellow-breasted chat				X
Yellow-throated vireo				X
Yellow-throated warbler				X
Reptiles				
Eastern box turtle		X	X	X
Eastern hognose snake			X	
Eastern ribbon snake		X	X	
Northern copperhead				X
Spotted turtle		X		
Amphibians				
Fowler's toad				X
Jefferson salamander				X
Marbled salamander				X
Northern spring salamander		X		X
Mollusks				
Creeper	X***			
Insects				
A noctuid moth (*Cucullia alfarata*)			X	
New England bluet	X	X		
Northern metalmark		X		X
Pitcher plant borer moth		X		
Schweitzer's buckmoth				X
Fish				
American brook lamprey*	X			
Bridle shiner	X			

*Species is also recognized as target species of ecoregional concern by the Nature Conservancy-NJ Chapter
**Potential presence.
***Riverine habitat, within Landscape Map, these species are identified within the "Emergent Wetlands" layer.
X: Species occurs within the identified habitat.

Table S20. 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		
American woodcock		X		X
Canada goose (Atlantic population)	X	X		
Wood duck	X	X		X
Virginia rail		X		
Fish				
Brook trout*	X			

*Species is an excellent indicator of water quality.
X: Species occurs within the identified habitat.

Table S21. Fish Species
Note: Species identified within the table are nongame species within New Jersey, currently without state or regional status.

Common Name	Water
Fish	
Cutlips minnow	X
Margined madtom	X
Slimy sculpin	X

X: Species occurs within the identified habitat.

Table S22. 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		X
Birds				
Ruffed grouse				X
Sora rail		X		
Fish				
Brown trout*	X			
Rainbow trout*	X			

*Species are not native to New Jersey. Established breeding populations exist due to stocking for recreational use.
X: Species occurs within the identified habitat.

c. Threats to the Wildlife and Habitats of the Kittatinny Valley

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

Habitat loss, degradation, and fragmentation are a concern for wildlife in the Kittatinny Valley. The fragmentation and alteration of grasslands due to development, agricultural practices, and the reversion of fields and scrub-shrub habitats to forest threaten habitat specialist grassland birds and scrub-shrub/open field birds. Deleterious invasive plants and groundwater degradation have altered the fens and wet meadows inhabited by bog turtles. Efforts must be made to protect unique habitats and plant and animal communities such as White Lake Natural Area and Whittingham Natural Area. Beaver, although generally considered beneficial, may be of local concern when their dams flood bog turtle habitat. Road mortality and illegal collection threaten

bog and wood turtles, and over-collection has seriously reduced or possibly extirpated Mitchell's satyr populations. Dam construction and water quality degradation threaten riverine habitats that support mussel, nongame fish and native trout populations. Development continues to fragment the existing large forest parcels inhabited by area-sensitive species of raptors and passerines. New Jersey's burgeoning white-tailed deer population poses a significant threat to forest health and forest regeneration. Deer damage coupled with anthropogenic factors has severely impacted much of New Jersey's remaining public and private natural lands. 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, maintain, enhance, and restore critical wetland habitats as identified by Landscape Project for pied-billed grebes, American bitterns, sedge wrens, colonial waterbirds, bog turtles, blue-spotted salamanders, long-tailed salamanders, vernal pool breeders, special concern reptiles and amphibians, Mitchell's satyrs, rare damselflies and dragonflies, and silver-bordered fritillaries. Maintain connectivity between habitats to insure the long-term viability of these species.
- Identify, protect, enhance, and/or restore important riverine habitats and water quality to preserve aquatic ecosystems for dwarf wedgemussels, special concern mollusks, wood turtles, special concern reptiles and amphibians, nongame fishes, native, wild trout populations and rare damselflies and dragonflies.
- Identify, protect, maintain, enhance, and restore large contiguous tracts of critical grassland habitat (areas with >75 % herbaceous and <25% woody vegetation) as identified by the Landscape Project for upland sandpipers, vespers, grasshoppers and savannah sparrows, bobolinks, special concern grassland birds, wintering raptors and special concern butterflies and moths.
- Identify, protect, maintain, enhance, and restore large contiguous tracts of forest and forested wetlands as identified by the Landscape Project for the long-term viability of forest-dwelling, area-sensitive and interior-nesting wildlife. These include such species or suites as Indiana and other forest-dwelling bats, bobcats, red-shouldered hawks, barred owls, interior forest passerines, cavity nesting birds and timber rattlesnakes. Maintain connectivity of these habitats to ensure the long-term viability of area-sensitive species.
- Identify, protect, maintain, enhance, and restore important scrub-shrub communities (areas with >25% woody vegetation <20 feet in height).
- Inventory, determine distribution, and monitor wildlife (including nongame fish species) of greatest conservation need in the Kittatinny Valley zone.
- Prevent, stabilize, and reverse declines of primarily grassland, scrub-shrub, and wetland/ riverine species including grassland passerines and raptors, special concern dragonflies, damselflies, butterflies and moths, rare and special concern reptiles and amphibians, colonial waterbirds, special concern fish species, and forest-interior species such as woodland raptors, bobcats, and forest-dwelling bats including the federal endangered Indiana bat.
- Protect and enhance bald eagle nesting, foraging and roosting habitat.
- Protect and enhance important and unique natural communities.

- Assess large-scale habitat change (every five to 10 years).
- Maintain the ecological integrity of natural communities and regional biodiversity by controlling invasive species and overabundant wildlife.
- Preserve the ecological quality and integrity of vernal pool communities.
- Prevent illegal collection of rare reptiles including bog and wood turtles.
- Protect, enhance, and restore coldwater fish habitat and ecosystems.
- Conserve and enhance native, wild trout populations at optimal levels.
- Promote public education and awareness, wildlife conservation, and viewing opportunities.

e. Conservation Actions

The actions below are identified as primary (1° or priority) and secondary (2°). Prioritization was determined by the Skylands Regional Landscape stakeholders during a meeting held on January 10, 2007 (see *Attachment G*). 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	
2º	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. *(Protect habitat – Landscape Project)*
2º	Support programs, provide guidance and work with public and private landowners and managers to eliminate or control harmful, invasive, exotic vegetation in areas where it is presenting a threat to species of conservation concern. *(Conserve wildlife – invasives)*
2º	Identify, prioritize, and reclaim degraded rare species habitats by working with land management agencies to determine the appropriate actions needed to restore habitat values for the documented species. Appropriate actions might include the control of harmful, invasive, vegetation, restoring natural stream flows, re-vegetation with native plants or restoring habitat structure. *(Evaluate restoration – invasives)*
2º	Enhance targeted habitats for cavity-nesters, forest passerines, freshwater wetland birds, grassland birds, scrub-shrub birds and woodland raptors through the use of best management practices. *(Agriculture – land management; Silviculture – land management; Enhance habitat – private lands; Protect habitat – rare wildlife; Other practices – land management)*

Priority	Conservation Actions
Protect critical wetland habitats identified in the Landscape Project	
1º	Increase the effective size and connectivity of wetlands on permanently protected public lands and surrounding private lands through incentive programs and targeted land acquisition through local land use policy and planning. Use GIS measures, other remote sensing tools, and surveys to identify important corridors that connect wetland habitats and target these areas for acquisition or work with public and private landowners to enhance and restore the corridors. *(Enhance habitat – private lands; Corridors – sprawl, migratory birds; Protect habitat – Landscape Project)*
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; Enhance habitat –private lands)*
2º	Reduce the impacts of mute swan herbivory to native vegetation in wetlands and managed impoundments. Mute swan populations should be reduced to the population objectives identified for New Jersey in the Atlantic Flyway Mute Swan Management Plan. *(Conserve wildlife – invasives)*
Protect critical riverine habitats for aquatic/ wetland/riparian species.	
1º	Protect water quality and aquatic-dependent species by appropriately designating Category 1 waters. *(Protect habitat – rare wildlife, fish, mussels)*
2º	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. *(Monitor wildlife – fish)*
2º	Identify and protect habitat for fish by plotting distributions of special concern fish species, and integrate those data into the Biotics database. *(Protect habitat – Landscape Project, fish)*
2º	Prevent runoff and sedimentation by maintaining riparian areas through stream bank restoration efforts. *(Conserve Wildlife – contaminants, development; Protect habitat – humans, sprawl, development, mussels, fish; Restore habitat – humans; Enhance habitat – riparian species, Odonata, private lands; Agriculture – land management; Silviculture – land management)*

Priority	Conservation Actions (continued)
Protect critical grassland habitats identified in the Landscape Project	
1º	Use GIS measures, other remote sensing tools, and surveys to identify critical core grassland habitats (areas with >75 % herbaceous and <25% woody vegetation), assess their condition for nesting grassland birds, and maintain information. Identify protection (e.g., landowner incentives, farmland preservation, and acquisition) and management (timing restrictions for mowing, conversion to warm-season grasses) strategies to maintain and enhance large existing core areas of grassland in perpetuity. Focus on habitat patches that can be managed to enhance the total size of suitable grassland habitat. *(Conserve wildlife – rare wildlife; Enhance habitat – private lands; Agriculture – land management Protect habitat – sprawl, Landscape Project, development)*
1º	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. *(Agriculture – land management)*
1º	Increase the effective size and connectivity of grasslands 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 grasslands and scrub-shrub habitats and target these areas for acquisition to maintain a system of large, connected tracts of grasslands within and between conservation zones. Where possible, enhance and restore grassland habitat through revegetation and management practices such as prescribed burns and appropriate mowing strategies. Work with the NJ DEP, Green Acres Program and the Dept. of Agriculture to identify parcels for acquisition or purchase of development rights. Target 2,000 hectare (7.7 sq. mi.) regions. *(Enhance habitat – private lands; Corridors – sprawl, migratory birds; Protect habitat – Landscape Project)*
1º	Encourage landowners to delay mowing to allow grassland-dependent species to breed through public education and incentive programs. Increase the number of acres converted from existing hay and/or row crops to warm season grass fields, where appropriate, using landowner incentive programs. Evaluate effectiveness of delayed mowing between warm season grass fields and cool season hay fields for grassland-dependent species including birds, invertebrates, reptiles, and amphibians. *(Protect habitat – humans; Enhance habitat –private lands)*
1º	Identify (through GIS and other remote sensing tools and surveys) and enhance grassland habitat for source populations of grassland birds and American kestrels. *(Protect habitat – Landscape Project; Enhance habitat – private lands)*
2º	Work with Bureau of Land Management to identify appropriate sites on public lands to maintain and enhance grasslands. Establish mowing schedules, control exotic, invasive vegetation, and establish stands of native warm season grasses on 30 - 50 acres per year within the Landscape region. *(Conserve wildlife – rare wildlife; Protect habitat – Landscape Project, migratory birds)*

Priority	Conservation Actions (continued)
2º	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. *(Conserve wildlife – rare wildlife)*
2º	Develop best management practices to guide public and private land managers in maintaining and enhancing grassland and other early succession habitats (scrublands and shrublands). *(Agriculture – land management; Other practices – land management)*
Protect critical forest and forested wetland habitats identified in the Landscape Project	
1º	Increase the effective size and connectivity of forests 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 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. *(Enhance habitat – private lands; Corridors – sprawl, migratory birds; Protect habitat – Landscape Project)*
1º	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, cerulean warblers, 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. • 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 ridge-top forests for forest-interior passerines (managing for mature forests with 65-85% canopy closure and structural diversity). • Selected areas of second-growth forested wetlands of moderate wildlife value should be allowed to mature to create future barred owl and red-shouldered hawk habitat. • Canopy of 10-50% should be maintained at known timber rattlesnake dens and basking areas, and a canopy of >50% in foraging areas (these limits are generally naturally-occurring due to rocky and talus substrates). • Take action to minimize loss of older growth 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)*

Priority	Conservation Actions (continued)
1º	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). *(Protect habitat – Landscape Project; Conserve wildlife – rare wildlife)*
2º	Use GIS measures, other remote-sensing tools, and surveys to identify critical habitats and assess their condition for bald eagle nesting and wintering populations. Develop specific protection strategies to address the threats (e.g., working with the National Park Service to limit recreational opportunities in areas near eagle nests, closing sections of river shoreline to foot traffic and seasonal trail closures). *(Protect habitat – humans, Landscape Project)*
Protect important scrub-shrub communities	
1º	Work with public and private land managers to maintain and enhance scrub-shrub habitats where appropriate. *(Conserve wildlife – development; Silviculture – land management)*
1º	Use GIS measures, other remote sensing tools, and surveys to identify critical scrub-shrub habitats, assess their condition for nesting birds (golden-winged warbler and woodcock), and maintain information. Identify protection (e.g., landowner incentives, farmland preservation, and acquisition) and management (timing restrictions for management, cooperative agreements with utility companies for maintenance of rights-of-ways) strategies to create interspersed scrub-shrub habitat in a grassland matrix. *(Conserve wildlife – rare wildlife; Enhance habitat – private lands; Agriculture – land management Protect habitat – sprawl, Landscape Project, development)*
2º	Use GIS measures, other remote sensing tools, and surveys to identify scrub-shrub areas within or adjacent to large forest parcels that have the potential to provide habitat for early succession/scrub-shrub species such as the golden-winged warbler, woodcock and ruffed grouse while protecting the integrity of the forest for area-sensitive species. Manage areas within large forest parcels to provide and maintain scrub-shrub habitats. *(Silviculture – land management; Conserve wildlife – game species)*
2º	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 habitat. *(Protect habitat – humans; Conserve wildlife – rare wildlife)*
2º	Maintain existing grassland and scrub-shrub habitats and work to establish new grasslands or scrub-shrub habitats along utility-line rights-of-way. *(Conserve wildlife – development; Silviculture – land management)*
Inventory and monitor endangered, threatened, and special concern wildlife and fish	
1º	Use the Biotics database and Landscape Project to identify where species data and monitoring gaps exist. Design and implement coordinated surveys to acquire data in those areas.

Priority	Conservation Actions (continued)
1º	Systematically survey the Kittatinny Valley Zone for all endangered and threatened species and selected species of special concern to develop baseline data and track population and habitat trends. Incorporate species occurrence data into the Biotics database. *(Monitor wildlife – long-term monitoring; Protect habitat – Landscape Project)*
1º	Research and evaluate effectiveness of water quality management practices on spotted turtles, Fowler's toads, Jefferson salamanders, marbled salamanders, northern spring salamanders, dwarf wedgemussels, eastern lampmussels, triangle floaters, freshwater wetland birds, bog turtles, nongame fish, native trout, and aquatic invertebrates, particularly those practices associated with permitting and mitigation actions, and revise management actions where appropriate. *(Conserve wildlife – rare wildlife)*
1º	Identify and research water quality parameters for spotted turtles, Fowler's toads, Jefferson salamanders, marbled salamanders, northern spring salamanders, dwarf wedgemussels, eastern lampmussels, triangle floaters, freshwater wetland birds, bog turtles, nongame fish, native trout, and aquatic invertebrates. Assess impacts and incorporate into BMPs. *(Conserve wildlife – rare wildlife; Protect aquatic wildlife - humans, development)*
1º	Incorporate freshwater mussel survey results into the Biotics database and determine critical areas for listed species. *(Protect habitat – Landscape Project)*
1º	Use GIS, other remote sensing tools, and surveys to identify critical habitats for dwarf wedgemussels and other special concern mollusks, wood turtles, longtail salamanders, special concern reptiles and amphibians, nongame fishes, silver-bordered fritillaries, and special concern damselflies and dragonflies and assess their condition for maintaining populations. Work with the Bureau of Freshwater fisheries to identify critical nongame fish and native trout habitat. Use the new data to refine species occurrence areas and integrate into the Biotics database. *(Protect habitat – mussels, Landscape Project, fish; Conserve wildlife – rare wildlife)*
1º	Use GIS measures, other remote-sensing tools, and surveys to determine home range territories and habitat use for bobcats, and to identify important travel corridors. Use the new data to refine species occurrence areas and integrate into the Biotics database. *(Protect habitat – Landscape Project)*
1º	Conduct systematic surveys for woodland raptors every four years to monitor population and habitat trends. *(Monitor wildlife – long-term monitoring)*
1º	Determine population status and monitor trends of species of conservation concern in comparison to land use changes and alteration of habitat through long-term sampling and surveys. *(Monitor wildlife – long-term monitoring)*
1º	Conduct concentrated field sampling for listed or special concern species at areas indicated by Fish Track Database queries and incorporate data into Biotics database. *(Protect habitat – fish; Monitor wildlife – fish)*

Priority	Conservation Actions (continued)
1º	Survey abandoned mines, caves, and railroad tunnels and determine their suitability as winter roost sites for Indiana bats and other wintering bat species; sites where bats are observed will be incorporated into the Biotics database. Recruit private and public land managers to protect active hibernacula from human disturbance. *(Monitor wildlife – long-term monitoring; Conserve wildlife - development)*
1º	Conduct sampling to determine distribution, range, and habitat use of summer bats. *(Protect habitat - Landscape Project; Monitor wildlife – long-term monitoring)*
1º	Conduct telemetry studies during spring emergence from hibernacula to determine dispersal distances, roost characteristics, and travel corridors of Indiana bats. *(Protect habitat – Landscape Project)*
1º	Conduct telemetry studies during summer months to determine roost characteristics and habitat requirements for Indiana bat maternity colonies. *(Protect habitat – Landscape Project)*
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)*
2º	Continue to monitor reproductive success of eagles and protect nesting areas from human disturbance. *(Monitor wildlife – long-term monitoring)*
2º	Develop and conduct nighttime surveys to inventory nightjars (whip-poor-wills, chuck-will's-widows, common nighthawks) and eastern screech-owls. *(Monitor wildlife – long-term monitoring)*
2º	Conduct the annual Mid-Winter Waterfowl Survey to monitor population trends. *(Monitor wildlife – long-term monitoring)*
2º	Conduct the Atlantic Flyway Breeding Waterfowl Survey annually to monitor population trends. *(Monitor wildlife – long-term monitoring)*
2º	Conduct surveys in suitable, previously un-surveyed areas to determine if listed or special concern freshwater mussel species are present. Repeat surveys every four years to monitor populations. *(Protect habitat – mussels; Monitor wildlife – long-term monitoring)*
2º	Trap Indiana bats during spring emergence from hibernacula and apply colored plastic bands to aid in recovery efforts during summer concentration surveys. *(Monitor wildlife – long-term monitoring)*

Priority	Conservation Actions (continued)
2º	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. *(Monitor wildlife – long-term monitoring)*
Prevent, stabilize, and reverse declines of wildlife and rare freshwater fish species	
1º	Use GIS measures, other remote-sensing tools, and surveys to identify, and best management practices to maintain, enhance, and/or protect critical habitats for dwarf wedgemussels, brook floaters, creepers, and longtail salamanders and assess their condition for maintaining populations. *(Enhance habitat –private lands) (Protect habitat – humans)*
1º	Research the intensity and characteristics of threats to wildlife species of conservation concern and their habitats, including the causes and effects of habitat loss, degradation, and alteration, edge, disturbance, predation, disease, food availability, contaminants, water quality, competition by invasive plants and animals, and hybridization. *(Protect habitat – sprawl, recreational vehicles, humans; Conserve wildlife – contaminants, invasives, rare wildlife, subsidized predator; Evaluate restoration – roads)*
1º	DEP to work with partners in conservation to establish a policy to control damage to native wildlife populations resulting from feral and free-ranging domestic cats on public lands. *(Conserve wildlife–cats, subsidized predators)*
1º	Develop and implement management actions to enhance populations of special concern and rare fish. *(Protect habitat – fish)*
1º	Maintain and enhance reptile and amphibian populations, particularly those that are endangered because of illegal collection for the pet trade (bog and wood turtles) and those populations most susceptible to road mortality (known box turtle breeding locations near roads and amphibian breeding migration corridors). *(Conserve wildlife – rare wildlife; Protect habitat – roads; Corridors – roads)*
1º	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). *(Protect habitat – roads; Corridors - roads)*
1º	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 pro*vid*e travel corridors for terrestrial wildlife are preferred over culverts. *(Corridors – roads, sprawl; Protect habitat – roads, fish, mussels)*

Priority	Conservation Actions (continued)
1º	Use GIS measures, other remote-sensing tools, and surveys to identify critical wetland habitats and assess their suitability for bog turtles and/or other wetland dependent species. Maintain, enhance, and restore populations through habitat protection, management, and maintaining appropriate water levels and buffers, as appropriate, such as innovative public and private partnerships, incentive programs, and cooperative agreements to protect and manage habitat. Additional actions can include fencing and grazing, maintaining protective buffers, eliminating invasive, non-native vegetation and controlling water levels in impoundments. *(Protect habitat – Landscape Project; Conserve Wildlife – rare wildlife; Enhance habitat – private lands)*
1º	Research the habitat requirements for species of conservation concern (e.g., forest passerines and raptors, bobcats, and Indiana bats) and implement planned silviculture to enhance forests for these species and species suites. *(Protect habitat – Landscape Project; Silviculture – land management; Conserve wildlife – rare wildlife)*
1º	DEP to work with partners in conservation to establish a policy to control damage to native wildlife populations resulting from feral and free-ranging domestic cats on public lands. *(Conserve wildlife – cats, subsidized predators)*
1º	Assess specific threats to dwarf wedgemussel, triangle floater and Eastern lampmussels, nongame fishes, native trout, wood turtles, longtail salamanders, and other target species. Work with public and private landowners to protect, maintain, enhance, and restore habitat, as appropriate, through acquisition of, restoration of, and incentive programs focused on riparian habitats to maintain water quality and reduce siltation. *(Protect habitat – mussels, fish, sprawl; Enhance habitat – private lands)*
1º	Decrease or eliminate human disturbance and vandalism at bat hibernacula through increased patrols by the DFW, Bureau of Law Enforcement. *(Protect habitat - humans)*
1º	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). *(Conserve wildlife – rare wildlife)*
2º	Use GIS measures, other remote-sensing tools, and surveys to identify critical habitats and assess their condition for breeding, migratory, and wintering waterfowl populations. Maintain, protect, enhance, and restore these sites, as appropriate, through acquisition, incentive programs, and best management practices. *(Protect habitat – sprawl, development, Conserve wildlife – game species)*
2º	Trap and relocate beaver when their dams threaten bog turtle and/or rare plant populations. *(Protect habitat – Landscape Project)*
2º	Use GIS measures, other remote-sensing tools, and surveys to identify critical habitat for silver-bordered fritillaries and manage for the proliferation of host vegetation and to retard succession where appropriate. *(Protect habitat – Landscape Project)*

Priority	Conservation Actions (continued)
2º	Investigate causes of decline and landscape-scale habitat requirements of American kestrels and barn owls; identify the most effective methods to restore and enhance habitat and provide nest cavities (standing dead biomass and nest boxes). *(Enhance habitat – private lands; Conserve wildlife – rare wildlife)*
2º	Identify groundwater recharge areas for blue-spotted salamander breeding sites and incorporate the sites into the Biotics database. *(Conserve wildlife – rare wildlife)*
2º	Develop research proposal to investigate the impact of land use patterns on woodland raptors and rare reptiles and amphibians. *(Protect habitat – sprawl; Corridors - sprawl)*
2º	Prevent declines in wildlife populations by utilizing the Delphi process to determine species that may warrant "special concern status" among taxa that has not undergone Delphi review (e.g., fish, moths). *(Monitor wildlife – fish; Conserve wildlife – rare wildlife)*
2º	Assess the need for stabilization and gating of important bat hibernacula to ensure structural soundness and prevent human disturbance. Install data loggers in important hibernacula to monitor internal conditions and to evaluate the impacts of the gating structures on those conditions. *(Protect habitat – humans)*
2º	Identify and implement appropriate protection strategies to maintain and enhance Indiana bat and other bat species' wintering habitat (e.g., working with recreational groups to limit cave and mine access to summer months, landowner incentives for protecting winter habitat). *(Protect habitat – humans)*
2º	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. *(Protect habitat – humans; Conserve wildlife – rare wildlife)*
Protect and enhance important and unique habitats	
1º	Federal, state, and local agencies will work with the NJ DEP, Natural Heritage Program to cooperatively map significant natural communities in White Lake and the Johnsonburg Preserve. *(Protect habitat – Landscape Project)*
1º	Federal and state agencies,, non-government organizations, and private landowners to protect and manage critical bog turtle sites on public and private lands within the Wallkill River National Wildlife Refuge and the Wallkill River, Paulinskill, and Pequest watersheds through best management practices, incentive programs, and land acquisition. *(Protect habitat – Landscape Project, humans; Enhance habitat – private lands)*
1º	Work with local governments and NJ DEP's Natural Heritage Program (NHP) to protect and enhance the unique natural communities that support endangered species and species of conservation concern at White Lake, Johnsonburg and Blair Creek preserves, Lake Owassa's Bear Swamp, Crooked Swamp, and Glover's Pond Natural Heritage Priority Site. *(Protect habitat – humans, development, sprawl; Enhance habitat – private lands)*

Priority	Conservation Actions (continued)
2º	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 within the Wallkill River National Wildlife Refuge and Wallkill River Watershed. *(Protect habitat – migratory birds; Corridors – migratory birds)*
2º	Work with local governments and NJ DEP's Natural Heritage Program (NHP) to continue to support the protection of the large wetland complex of the Wallkill River National Wildlife Refuge, Wallkill River Watershed, White Lake, Johnsonburg and Blair Creek preserves, Lake Owassa's Bear Swamp, Crooked Swamp, and Glover's Pond and enhance endangered plant and unique natural communities, through incentive programs, best management practices, and increased law enforcement to minimize disturbance at these sites. *(Protect habitat - humans, development, sprawl)*
Protect and enhance bald eagle habitat	
2º	Use GIS measures, other remote-sensing tools, and surveys to identify critical habitats and assess their condition for bald eagle nesting and wintering populations. Develop specific protection strategies to address the threats (e.g., working with the National Park Service to limit recreational opportunities in areas near eagle nests, closing sections of river shoreline to foot traffic and seasonal trail closures). *(Protect habitat – humans, Landscape Project)*
2º	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. *(Conserve wildlife – rare wildlife; Protect habitat – recreational vehicles, humans)*
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.
Maintain the ecological integrity of natural communities and regional biodiversity by controlling invasive species and overabundant wildlife	
1º	Develop area-specific deer density or percent-reduction targets to reduce herd size to a sustainable level where regeneration of native vegetative communities is possible. *(Evaluate restoration – deer; Conserve wildlife – deer, rare wildlife)*

Priority	Conservation Actions (continued)
1º	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. *(Evaluate restoration – deer; Conserve wildlife - deer)*
1º	Identify areas where invasive, non-indigenous plants and animals are either already established or are becoming established through GIS, surveys, public participation, and through the creation of 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. *(Conserve wildlife – invasives)*
1º	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. *(Conserve wildlife – invasives)*
2º	Work with land management agencies to survey and monitor for the spread of invasive insect species that jeopardize forest health. The species of primary concern include the hemlock woolly adelgid, gypsy moth, Asian long-horned beetle, and emerald ash borer. Research control options for these pests and use appropriate control methods to reduce tree damage and limit the spread of infestations. *(Conserve wildlife – invasives)*
2º	Where appropriate, continue to develop and expand incentives for harvesting antlerless deer (e.g., "earn-a-buck"). *(Conserve wildlife – deer)*
Preserve integrity of vernal pool communities	
1º	Locate potential vernal pools through aerial imagery and surveys, conduct species surveys, and integrate certified vernal pools into the DEP regulations database and Landscape Project. *(Protect habitat – Landscape Project)*
1º	Work with public agencies and private landowners to protect vernal pools and maintain optimal biological buffers (beyond regulatory requirements) to preserve the integrity of vernal pools and the surrounding upland habitat for vernal pool dependent amphibians. Stabilize wetland buffers and streambanks by encouraging plantings of native vegetation through public education, volunteer programs, and land managers to stabilize pool buffers and prevent erosion. *(Protect habitat – sprawl; Enhance habitat –private lands)*

Priority	Conservation Actions (continued)
Prevent illegal collection of rare reptiles	
1º	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 and NWR officers, National Park Service law enforcement, US Army 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). *(Protect wildlife – humans, recreational vehicles)*
2º	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), persecution (timber rattlesnake), and human disturbance (off-road-vehicles). *(Protect wildlife – humans)*
Protect, enhance, and restore coldwater fish habitat and ecosystems	
1º	Use GIS measures, other remote sensing tools, and surveys to identify critical habitats for freshwater nongame fish and native, wild trout and assess their condition for maintaining populations. *(Protect habitat – fish)*
1º	Develop and implement habitat improvement and restoration programs for coldwater fish species' habitats and ecosystems. *(Protect habitat – fish)*
2º	Assess the impacts of changing water quality to native, wild, summer trout populations. *(Monitor wildlife– fish)*
Conserve and enhance native, wild trout populations at optimal levels	
1º	Systematically monitor native, wild trout populations to revise management strategies when appropriate, aid in the identification of resource problems and issues, and demonstrate agency commitment to the management of aquatic resources. *(Monitor wildlife – fish)*
1º	Develop population management strategies to assure the protection of NJ's wild coldwater fisheries. *(Protect habitat – humans)*
2º	Work with fisheries biologists and managers to evaluate current management practices that may negatively impact native, wild trout populations and revise management practices where appropriate to reverse declines or increase populations. *(Protect habitat – humans)*
2º	Protect native, wild trout populations by increasing the enforcement of established fishing regulations. *(Protect aquatic wildlife – humans)*
Promote public education and viewing opportunities	
1º	Develop brochures and posters about management practices for the public and for private landowners with significant bog turtle, wood turtle, cavity-nester, freshwater wetland bird, grassland bird, forest passerine, woodland raptor, and scrub-shrub/open field bird populations. *(Education – humans)*

Priority	Conservation Actions (continued)
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; Conserve wildlife – invasives)*
1º	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)*
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 to evaluate impacts and success (i.e., reduction of cats over time) of existing managed cat colonies.
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)*
2º	Develop a field guide to NJ's freshwater mussel species to assist in promoting public education and increase awareness of New Jersey's native freshwater mussel fauna. *(Education – humans)*
2º	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 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, local, and non-governmental organization partners. *(Education – humans)*
2º	Educate homeowners, through newsletters, press releases, brochures, presentations, etc., about habitat requirements of chimney swifts and discourage use of chimney caps where possible (e.g., abandoned and unused chimneys) and prudent (for human and animal safety). *(Education – humans)*
2º	Develop brochures and posters to educate the public and increase awareness of New Jersey's indigenous nongame and coldwater fish species. *(Education – humans)*

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 cavity-nesters, forest passerines, freshwater wetland birds, grassland birds, raptors, and scrub-shrub/open field birds.
    - Utilize incentive programs that encourage the management of grassland and scrub-shrub communities and bog turtle habitats and to protect water quality and riparian habitat in areas where rare mussels occur.
    - Encourage farmers to preserve farmland through conservation easements through partnerships with Green Acres, the Nature Conservancy, Land Trust, and local municipalities for the conservation of grassland and scrub-shrub communities and bog turtle habitats.
    - Develop and implement landowner incentives for providing, maintaining, and protecting summer and winter bat habitat.
    - Develop/maintain cooperative relationships with private landowners with bog turtles on their land.
    - Work with landowners to maintain/enhance riparian areas through stream bank restoration and planting native vegetation for dwarf wedgemussels, eastern lampmussels and triangle floaters, wood turtles, nongame fish, and rare damselflies and dragonflies.
    - Work with landowners to protect water quality by minimizing use of fertilizers and pesticides for dwarf wedgemussels, eastern lampmussels and triangle floater, wood turtles, nongame fish, native trout, and rare damselflies and dragonflies.
    - 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.
    - 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 (TNC), NJ Conservation Foundation, and other environmental, member-based organizations to recruit and train Citizen Scientists to locate, survey, and monitor wildlife habitats and populations in a systematic manner to achieve short- and long-term monitoring goals.
    - Collaborate with NJ Audubon Society, NJ Conservation Foundation, and other environmental, member-based organizations to recruit and train Citizen Scientists to monitor vegetative plots (exclosures) on state lands for evaluation of vegetative structure in response to deer densities.
    - Recruit North American Butterfly Association volunteers to conduct surveys for moth and butterfly species
    - Involve Citizen Scientists in conservation projects, such as stream bank restoration.
    - Continue volunteer-based summer bat concentration surveys.

Wildlife Professionals

- Collaborate with researchers in New York, Pennsylvania, and West Virginia to develop best management practices and conservation plans for scrub-shrub/open field birds.
- Collaborate with the National Native Mussel Conservation Committee and other experts to develop best management practices for areas with listed and special concern species.
- Work with American Museum of Natural History to maintain existing NY/NJ freshwater mussel web site.
- 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 NJ Audubon Society, The Nature Conservancy – NJ Chapter, NJ Conservation Foundation, and conservation organizations to maintain and enhance habitats.
    - Protect cavity-nester and woodland raptor nesting and foraging sites.
    - Protect and enhance riparian habitats.
    - Initiate and support eradication efforts for invasive plant species.
- Consult with conservation organizations to develop educational programs.
- Encourage the use of the Landscape Project's critical habitat mapping to guide land acquisition by conservation organizations through programs such as Green Acres, State Agricultural Development Committee (SADC) Farmland Preservation, and local land trusts.
- Continue participation in regional and national bat conservation efforts such as the Northeast Bat Working Group and the North American Bat Conservation Partnership.
- Conduct habitat surveys to determine geographic distribution and severity of invasions of invasive non-indigenous plants.

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, and USDA, and the DCA, Office of Smart Growth to protect, enhance, and create habitats; and protect NJ's native wildlife.
    - NJ Department of Environmental Protection's (DEP) Division of Fish and Wildlife (DFW) to protect cavity-nester and raptor nesting and foraging sites.
    - DFW to develop a plan to protect sensitive bog turtle and wood turtle sites 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 and conservation organizations to work with the DEP's Land Use Regulation Program (LURP) to protect and appropriately classify wetlands for special concern reptile and amphibian populations.
    - DFW to work with the DEP's Division of Watershed Management to upgrade stream classifications in areas with rare mussels, nongame fishes and native and/or wild trout populations.
    - Expand efforts to create habitat and implement best management practices that protect nesting and foraging sites of cavity-nesters, forest passerines, raptors, and

other forest-dwelling species, and freshwater wetland birds 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. Protect important and unique communities of plants and animals such as White Lake and Big Spring Natural Areas.

- DFW to encourage greater buffers for important riparian and floodplain areas for forest passerines, reptiles, amphibians, freshwater mussels, and invertebrates with DEP's Division of Watershed Management and Land Use Regulation Program. Partner with them to investigate water quality and threats of contaminants/pollution and to make recommendations on stream encroachment permit issues for areas with listed mussels and rare fish species.
- DFW to develop specific conservation plans for special concern reptiles and amphibians on state lands.
- DFW to work with state and county mosquito commissions to prevent the use of insecticides and biological controls at known amphibian breeding sites.
- DFW will integrate results of 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 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 in 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 to work with the DEP's Office of Natural Lands Management, Natural Heritage Program (NHP) to develop mapping of significant vegetative communities 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 to determine groundwater recharge areas for bog turtle habitats, breeding sites for blue-spotted salamander and long-tailed salamander, and vernal pools with the DEP's Division of Water Quality (DWQ) and the NJ Geological Survey. Expand efforts with DWQ to minimize impacts on water quality and conduct hydrological monitoring in these areas.
- DFW to work with neighboring state fish and wildlife agencies to radio-track dispersing Indiana bats across state boundaries.
- DFW to work with USFWS and other state and federal partners to implement North American Waterfowl Management Plan as appropriate.
- DFW to work with USFWS and other state and federal partners to implement American Woodcock Management Plan as appropriate.
- DFW and DEP's 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, freshwater mussels, and wildlife species occur.

  - DFW to work with the LURP to make recommendations on stream encroachment permit issues for areas where listed or special concern species occur.
- DFW to lead in the development of educational materials for the public and private landowners about wildlife of greatest conservation need and associated habitats.
- DFW, conservation organizations, and park commissions to expand public outreach through wildlife viewing opportunities.
- DEP to encourage the use of the Landscape Project's critical habitat mapping to guide habitat protection and land acquisition by federal, state, and local governments through programs such as DEP's Green Acres Program, State Agricultural Development Committee (SADC), Farmland Preservation, local land trusts, and through mitigation.
- DEP to encourage the use of the Landscape Project's critical habitat mapping to guide land use planning and zoning decisions by planning agencies at the federal, state, and local level.

g. Monitoring Success

- Conduct habitat assessment and monitor habitat changes over time; monitor efficacy of habitat management and restoration efforts.
- Periodically monitor abundance, productivity, distribution, and trends of bog turtles, wood turtles, blue-spotted salamanders, long-tailed salamanders, forest-dwelling bats, cavity-nesters, colonial waterbirds, forest passerines (2-4 years), freshwater wetland birds (2-4 years), and grassland bird, raptor, and scrub-shrub/open field bird communities (2-4 years), particularly in areas beyond the reach of the Breeding Bird Survey.
- 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.
- Monitor extant sites with dwarf wedgemussels, eastern lampmussels, and triangle floaters.
- 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.
- Monitor populations of breeding, migratory and wintering waterfowl of conservation concern.
- 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.