

F. Priority Conservation Zones, Assessments, and Strategies within the Skylands

1. Upper Delaware River Valley and Kittatinny Ridge

- 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

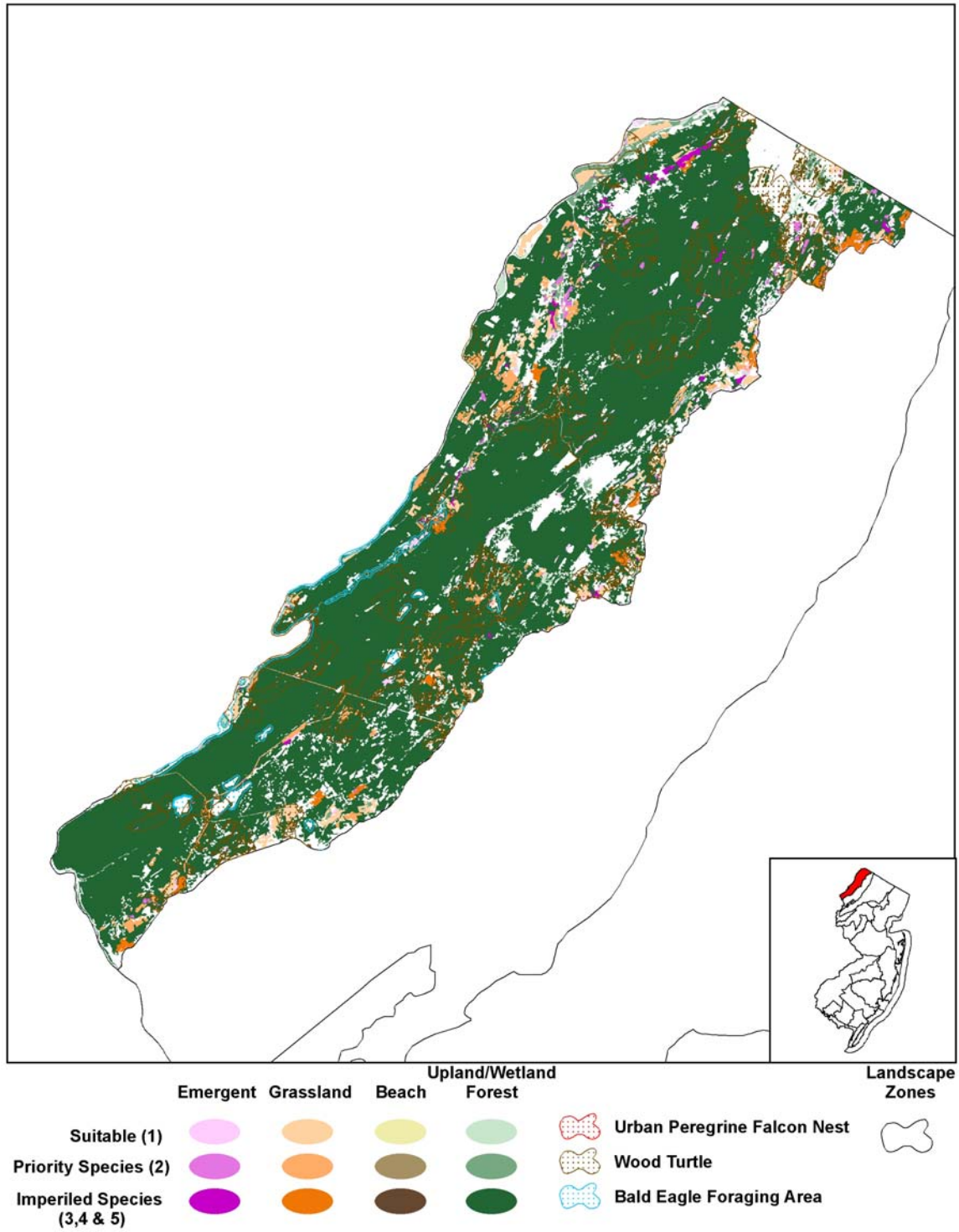
The Upper Delaware River Valley and Kittatinny Ridge encompass the area in New Jersey southwest to northeast along the Delaware River upstream from U.S. Interstate 80 and west from the Kittatinny Valley in the Ridge and Valley physiographic province (Figure 28). Much of this Priority Conservation Zone is preserved as public land. It includes the Big Flat Brook Watershed, the Little Flat Brook Watershed, and the Kittatinny Ridge. Opportunities exist for conservation at the Mashipacong Preserve, Hainesville Wildlife Management Area (WMA), Flat Brook WMA, Roy WMA, Delaware Water Gap National Recreation Area (DWGNRA), Worthington State Forest, Stokes State Forest, and High Point State Park.

Much of the wildlife habitat in this region of the state is a contiguous, maturing mixed hardwood oak-dominated forest. Ridge-tops are covered with pitch pine-scrub oak communities. The Kittatinny Ridge is an important migration corridor for raptors and passerines. Hemlock stands inhabit the ravines created by small streams that flow from the ridge. The forest continues up to the Wild and Scenic Delaware River, with floodplain forest patches of sycamore, silver maple, river birch, and American elm along its banks. The river is an important migration corridor for waterfowl, ospreys, and other birds. Wetland habitats in the Priority Conservation Zone include glacial lakes, beaver-dammed ponds and lakes, artificial farm ponds, wet meadows with thick hummocks, fens, seeps, and vernal pools. Abandoned beaver meadows have become densely covered scrub-shrub habitat, with thickets of alders, willow, and buttonbush. The paucity of pastureland, cropland, old fields, and utility corridors in this zone provide limited habitat for grassland wildlife. A limited amount of early succession (grassland and scrub-shrub) habitat exists and is being maintained within the DWGNRA along the Delaware River on the western side of the Kittatinny Ridge.

b. Wildlife of Greatest Conservation Need

The Upper Delaware Valley and Kittatinny Ridge support four federal endangered and threatened, 14 state endangered, 12 state threatened, and 66 special concern and regional priority wildlife species, in addition to five game species of regional priority and five nongame fish species currently without state or regional status. The federal listed species include the endangered dwarf wedgemussel, the threatened bald eagle, and the threatened bog turtle. The state endangered species include the bobcat, American bittern, northern goshawk, red-shouldered hawk, timber rattlesnake, and brook floater. The state threatened species include the barred owl, bobolink, Cooper's hawk, red-headed woodpecker, savannah sparrow, wood turtle, long-tailed salamander, and silver-bordered fritillary. Special concern wildlife include cavity-nesters,

Figure 28. Critical landscape habitats within the Upper Delaware River Valley and Kittatinny Ridge conservation zone, as identified through the Landscape Map (v2).



colonial waterbirds, interior forest passerines, freshwater wetland birds, grassland birds, raptors, and scrub-shrub/open field birds, reptiles, amphibians, mollusks, and rare damselflies and dragonflies.

The contiguous forest of the ridges in this region is critical habitat for forest-dwelling bats, bobcats, cavity-nesters, migratory raptors and passerines, and forest-nesting passerines. Due to the proximity of known hibernacula, the forests of this zone likely provide summer foraging and roosting habitat for Indiana bats. The forests provide summer foraging habitat for timber rattlesnakes while rocky outcroppings within the forest provide basking and gestating habitat. Eastern box turtles and northern copperheads are also forest-dwelling wildlife inhabiting this zone. The forested wetlands support wood turtles, Fowler’s toads, Jefferson salamanders, long-tailed salamanders, marbled salamanders, northern spring salamanders, and silver-bordered fritillaries. The Delaware River’s floodplain forest is habitat for bald eagles, colonial waterbirds, and scrub-shrub birds, and provides critical stopover habitat for migrating birds. The diverse wetlands support bog and spotted turtles, colonial waterbirds, freshwater wetland birds, scrub-shrub/open field birds, bald eagles, special concern amphibians, and rare damselflies and dragonflies. The clear mountain streams support some of the state’s most robust wood turtle and native trout populations. Tables S9 – S15 identify the species of greatest conservation need within this zone.

Wildlife Species and Associated Habitats of Upper Delaware River Valley and Kittatinny Ridge

Table S9. Federal Endangered and Threatened Species*

| Common Name | Water | Wetlands | Grasslands | Forests and Forested Wetlands |
|---------------------------|-------|----------|------------|-------------------------------|
| Mammals | | | | |
| Indiana bat | | | | X** |
| Reptiles | | | | |
| Bog turtle | | X | | X |
| Mollusks | | | | |
| Dwarf wedgemussel | X*** | | | |
| Insects | | | | |
| American burying beetle ♦ | | | 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 S10. State Endangered Species

| Common Name | Water | Wetlands | Grasslands | Forests and Forested Wetlands |
|----------------------|-------|----------|------------|-------------------------------|
| Mammals | | | | |
| Allegheny woodrat*** | | | | X |
| Bobcat | | X | | X |
| Birds | | | | |
| American bittern | | X | | |
| Bald eagle | | X | | X |
| Northern goshawk | | | | X |
| Northern harrier | | | X | |
| Pied-billed grebe | | X | | |
| Peregrine falcon | | X | | X |
| Red-shouldered hawk | | | | X |
| Vesper sparrow | | | X | |

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State Endangered Species (continued)

| Common Name | Water | Wetlands | Grasslands | Forests and Forested Wetlands |
|------------------------------|-------|----------|------------|-------------------------------|
| Reptiles | | | | |
| Timber Rattlesnake | | | | X |
| Mollusks | | | | |
| Brook floater | X** | | | |
| 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 within this zone.

X: Species occurs within the identified habitat.

Table S11. 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 | X |
| Amphibians | | | | |
| Long-tailed salamander | | X | | X |
| Mollusks | | | | |
| Tidewater mucket | X** | | | |
| Yellow lampmussel | X** | | | |
| Insects | | | | |
| Silver-bordered fritillary | | X | | X |

**Riverine habitat, within Landscape Map, these species are identified within the “Emergent Wetlands” layer

X: Species occurs within the identified habitat.

Table S12. Nongame Species of Conservation Concern

| Common Name | Water | Wetlands | Grasslands | Forest and Forested Wetlands |
|------------------------------------|-------|----------|------------|------------------------------|
| Mammals | | | | |
| Eastern small-footed bat | | | | X** |
| Eastern red bat | | | | X** |
| Silver-haired bat | | | | X** |
| Hoary bat | | | | X** |
| Long-tailed (Rock) shrew | | | | X |
| Southern bog lemming | | X | X | X |
| Birds | | | | |
| Acadian flycatcher | | | | X |
| American golden-plover | | X | | |
| American kestrel | | | X | |
| Baltimore oriole | | | | X |
| Black-and-white warbler | | | | X |
| Black-billed cuckoo | | | | X |
| Blackburnian warbler | | | | X |
| Black-throated blue warbler | | | | X |
| Black-throated green warbler | | | | X |
| Blue-headed vireo (Solitary vireo) | | | | X |
| Blue-winged warbler | | | | X |
| Broad-winged hawk | | | | X |
| Brown thrasher | | | | X |

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Nongame Species of Conservation Concern (continued)

| Common Name | Water | Wetlands | Grasslands | Forest and Forested Wetlands |
|----------------------------|-------|----------|------------|------------------------------|
| Birds (continued) | | | | |
| Canada warbler | | | | X |
| Cerulean warbler | | | | |
| Chimney swift | | X | X | X |
| Chuck-will's-widow | | | | X |
| Cliff swallow | | X | X | |
| Common nighthawk | | X | X | X |
| Eastern kingbird | | | X | |
| Eastern meadowlark | | | X | |
| Eastern towhee | | | | X |
| Eastern wood-pewee | | | | X |
| Field sparrow | | | X | |
| Golden-winged warbler | | | | X |
| Gray catbird | | | X | X |
| Gray-cheeked thrush | | | | X |
| Great blue heron | | X | | X |
| Great crested flycatcher | | | | X |
| Green heron | | X | | |
| Hooded warbler | | | | X |
| Horned lark | | | X | |
| Indigo bunting | | | X | |
| Kentucky warbler | | | | 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 |
| Sharp-shinned hawk | | | | X |
| Spotted Sandpiper | | X | | |
| Veery | | | | X |
| Whip-poor-will | | | | X |
| Willow flycatcher | | | | X |
| Winter wren | | | | 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 |
| Northern copperhead | | | | X |
| Eastern hognose snake | | | | X |
| Eastern ribbon snake | | X | X | |
| Spotted turtle | | X | | |
| Amphibians | | | | |
| Fowler's toad | | | | X |
| Jefferson salamander | | | | X |
| Marbled salamander | | | | X |
| Northern spring salamander | | X | | X |
| Mollusks | | | | |
| Creeper | X*** | | | |
| Insects | | | | |
| Northern metalmark | | X | | X |
| Extra-striped snaketail | X | | | X |
| New England bluet | | X | | X |
| Clubtail dragonfly | X | | | X |

Nongame Species of Conservation Concern (continued)

| Common Name | Water | Wetlands | Grasslands | Forest and Forested Wetlands |
|-------------------------|-------|----------|------------|------------------------------|
| 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 S13. 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 | 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 S14. 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 |
| Northern hogsucker | X |
| Shield darter | X |
| Slimy sculpin | X |

X: Species occurs within the identified habitat.

Table S15. 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 | 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 Upper Delaware River Valley and Kittatinny Ridge

For complete literature review on the impacts of habitat loss and fragmentation, please see New Jersey's Landscape Project Report, Attachment A or visit our website:

www.njfishandwildlife.com/ensp/landscape/lp_report.pdf

The Upper Delaware River Valley and Kittatinny Ridge Zone remains one of the most rural areas in the state, with a large portion in public ownership. The greatest threats to wildlife include habitat fragmentation, degradation, and loss due to unsustainable and unscientific silviculture practices, and development that is occurring on privately owned land. Forest passerines, raptors and bobcats require large, contiguous forest stands. Cavity-nesters require large standing hollow trees for nesting. Disturbance and encroachment from recreational activities on public lands and waters can affect nesting bald eagles and other raptors, and timber rattlesnakes. A limited amount of grassland and scrub-shrub bird habitat occurs primarily along the Delaware River in the northwest portion of this zone that is threatened by changing agricultural practices, development, and reversion of fields to forest. Increased development often results in declining water quality, added pressure on groundwater resources, and the introduction of invasive plants. Inadequate wetland protection through the regulatory process affects bog turtles, amphibians, colonial waterbirds, and freshwater wetland birds. Declining water quality, invasive species, and dam construction impact mussel, and nongame fish and wild trout populations. The bioaccumulation of contaminants threatens bald eagles and other raptors. 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 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 as the primary goal for this zone. Included in this group are such species or suites as the bobcat, Indiana and other forest-dwelling bats, the barred owl, red-shouldered hawk, northern goshawk, interior forest passerines, cavity nesting birds, the timber rattlesnake, and wood turtle.
- Identify, protect, maintain, enhance, and restore critical wetland habitats as identified by the Landscape Project for freshwater wetland birds, bog turtles, long-tailed salamanders, vernal pool breeders, special concern reptiles and amphibians, rare damselflies and dragonflies, and silver-bordered fritillaries.
- Identify, protect, maintain, enhance, and restore critical riverine habitat and water quality to preserve aquatic ecosystems, particularly for dwarf wedgemussels and other special concern mollusks, wood turtles, nongame fish, and rare damselflies and dragonflies that rely on high water quality.
- Identify, protect, maintain, enhance, and restore important grassland (areas with >75 % herbaceous and <25% woody vegetation) and scrub-shrub habitats (areas with >25% woody vegetation <20 feet in height) as identified by the Landscape Project for grassland birds and scrub-shrub/open field birds. Due to the relative scarcity of grassland habitat,

this is a secondary priority for this zone. Grassland habitat should not be created at the expense of forest habitat in this zone.

- Inventory, determine distribution, and monitor fish and wildlife of greatest conservation need in the Upper Delaware River Valley and Kittatinny Ridge zone.
- Prevent, stabilize, and reverse declines of interior-forest species (primarily) including passerines and raptors, timber rattlesnakes, bobcats, forest-dwelling bats, special concern reptiles and amphibians, riparian and aquatic species such as rare freshwater mussels, freshwater wetland birds, special concern fish species, grassland and scrub-shrub wildlife populations of birds, rare dragonflies and damselflies, and butterfly and moth species of conservation concern.
- 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.
- Identify and protect hibernation sites for Indiana bat and other winter resident bat species within New Jersey.
- 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 | |
| 2° | Refine existing Landscape Project species occurrence areas through research and, where lacking, develop new species occurrence areas as data on species requirements become available. Develop, review and improve species-habitat associations as new land use/land cover data become available. (<i>Protect habitat – Landscape Project</i>) |
| 2° | 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. (<i>Conserve wildlife – invasives</i>) |
| 2° | 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. (<i>Evaluate restoration – invasives</i>) |

| Priority | Conservation Actions (continued) |
|---|---|
| 2° | <p>Enhance targeted habitats for cavity-nesters, forest passerines, freshwater wetland birds and woodland raptors through the use of best management practices. <i>(Agriculture – land management; Silviculture – land management; Enhance habitat – private lands; Protect habitat – rare wildlife; Other practices – land management)</i></p> |
| <p>Protect critical forest and forested wetland habitats identified in the Landscape Project</p> | |
| 1° | <p>Use GIS measures, other remote-sensing tools, and surveys to identify critical high quality core forests (forest area >90 meters from the forest edge) and maintain species information in the Biotics database. Preserve and protect core forests through:</p> <ul style="list-style-type: none"> • Regulations, land acquisition, and incentive programs for forest-dependent breeding species: forest-interior passerines and bobcats (≥ 10 hectares or 24.7 acres of core forest), forest raptors (≥ 100 hectares or 247 acres of contiguous forest), timber rattlesnakes (if unknown foraging habitat, a minimum of 1 ½ mile radius surrounding known den locations or 4,521 acres), and Indiana bats (≥ 6.8 hectares or 17 acres of contiguous forest) per the Forest Management Guidelines for Species of Conservation Concern in New Jersey. • Preservation efforts focused on area- and disturbance-sensitive breeding species in core forests located at least 2,500 meters from major highways. • Prevention of activities that cause permanent breaks in the forest canopy and lead to fragmentation (roads, development). • Identification of habitats adjacent to core forests that can be preserved and/or managed to increase the total size of forest habitat. • Collaboration with land managers, forest stewards, and private landowners to develop and implement best management practices <p><i>(Protect habitat – Landscape Project; Silviculture – land management)</i></p> |
| 1° | <p>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. <i>(Enhance habitat – private lands; Corridors – sprawl, migratory birds; Protect habitat – Landscape Project)</i></p> |

| Priority | Conservation Actions (continued) |
|----------|--|
| 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, 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.</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 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 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. <p><i>(Silviculture – Land management; Protect habitat – Landscape Project, migratory birds, rare wildlife)</i></p> |
| 1° | <p>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></p> |
| 2° | <p>Use GIS measures, other remote-sensing tools, and surveys to identify forested stopover areas important for migrant forest raptors, passerines and bats during spring and fall migration. Use appropriate measures (e.g. regulations, land acquisition, incentive programs) to protect habitat and develop conservation forestry plans. <i>(Protect habitat – Landscape Project, migratory birds)</i></p> |

| Priority | Conservation Actions (continued) |
|--|--|
| Protect critical wetland habitats identified in the Landscape Project | |
| 1° | Use GIS measures, other remote sensing tools, and surveys to identify and assess core forested wetland and riparian/floodplain habitat for forest-dependent breeding species: forest raptors (red-shouldered hawk, northern goshawk, long-eared owl, and barred owl), forest-interior songbirds (cerulean warbler, Louisiana waterthrush, Canada warbler, and winter wren), bobcats, and Indiana bats. Take action to minimize habitat loss by restoring, enhancing and/or protecting 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> |
| 1° | 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. <i>(Enhance habitat – private lands; Corridors – sprawl, migratory birds; Protect habitat – Landscape Project)</i> |
| 1° | 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. <i>(Protect habitat – Landscape Project)</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, sprawl; Enhance habitat –private lands)</i> |
| 2° | Identify threats to vernal pools through systematic monitoring and devise strategies to protect vernal pool dependent species. <i>(Conserve wildlife – rare wildlife)</i> |
| 2° | 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> |
| 2° | 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. <i>(Conserve wildlife – invasives)</i> |

| Priority | Conservation Actions (continued) |
|--|--|
| Protect critical riverine habitats for aquatic/ wetland/riparian species. | |
| 1° | Protect water quality and aquatic-dependent species by appropriately designating Category 1 waters. <i>(Protect habitat – rare wildlife, fish, mussels)</i> |
| 2° | Prevent runoff and sedimentation by maintaining riparian areas through stream bank restoration efforts. <i>(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)</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 for fish by plotting distributions of special concern fish species, and integrate those data into the Biotics database. <i>(Protect habitat – Landscape Project, fish)</i> |
| Protect critical grassland and scrub-shrub habitats identified in the Landscape Project | |
| 1° | Use GIS measures, other remote sensing tools, and surveys to identify critical core grassland habitats, 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. <i>(Conserve wildlife – rare wildlife; Enhance habitat – private lands; Agriculture – land management Protect habitat – sprawl, Landscape Project, development)</i> |
| 1° | 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), butterflies, moths, odonates, and other scrub-shrub species 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. <i>(Conserve wildlife – rare wildlife; Enhance habitat – private lands; Agriculture – land management Protect habitat – sprawl, Landscape Project, development)</i> |
| 1° | Encourage landowners to delay mowing to allow grassland-dependent species to successfully 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. <i>(Protect habitat – humans; Enhance habitat –private lands)</i> |

| Priority | Conservation Actions (continued) |
|---|---|
| 1° | <p>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 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. Grassland habitats are limited within this zone and the primary area of opportunity for maintaining and managing these habitats is along the Delaware River within the Delaware Water Gap NRA. <i>(Enhance habitat – private lands; Corridors – sprawl, migratory birds; Protect habitat – Landscape Project)</i></p> |
| 2° | <p>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></p> |
| 2° | <p>Develop best management practices to guide public and private land managers in maintaining and enhancing grassland and other early succession habitats (scrublands and shrublands). <i>(Agriculture – land management; Other practices – land management)</i></p> |
| 2° | <p>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. <i>(Protect habitat – humans; Conserve wildlife – rare wildlife)</i></p> |
| Inventory, determine distribution, and monitor fish and wildlife | |
| 1° | <p>Research and evaluate effectiveness of water quality management practices on spotted turtles, Fowler’s toads, Jefferson salamanders, marbled salamanders, northern spring salamanders, dwarf wedgemussels, brook floaters, creepers, freshwater wetland birds, bog turtles, wild coldwater fisheries, and aquatic invertebrates, particularly those practices associated with permitting or mitigation actions, and revise management actions where appropriate. <i>(Conserve wildlife – rare wildlife)</i></p> |
| 1° | <p>Identify and research water quality parameters for spotted turtles, Fowler’s toads, Jefferson salamanders, marbled salamanders, northern spring salamanders, dwarf wedgemussels, brook floaters, creepers, freshwater wetland birds, bog turtles, wild coldwater fisheries, and aquatic invertebrates. Assess impacts and incorporate into BMPs. <i>(Conserve wildlife – rare wildlife; Protect aquatic wildlife - humans, development)</i></p> |

| Priority | Conservation Actions (continued) |
|----------|---|
| 1° | 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. |
| 1° | Systematically survey the Delaware River Valley and Kittatinny Ridge Zone for all endangered and threatened species and selected species of special concern to track population and habitat trend data (e.g., woodland raptors to be surveyed every four years.) (<i>Monitor wildlife – long-term monitoring</i>) |
| 1° | Determine population status and monitor trends of selected species of conservation concern in comparison to land use changes and alteration of habitat through long-term sampling and surveys. (<i>Monitor wildlife – long-term monitoring</i>) |
| 1° | Conduct concentrated field sampling for listed or special concern fish species in areas indicated by Fish Track database queries and incorporate data into the Biotics database. (<i>Protect habitat – fish; Monitor wildlife – fish</i>) |
| 1° | 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. (<i>Protect habitat – mussels; Monitor wildlife – long-term monitoring</i>) |
| 1° | Incorporate freshwater mussel survey results into the Biotics database and determine critical areas for listed species. (<i>Protect habitat – Landscape Project</i>) |
| 1° | Use GIS measures, other remote-sensing tools, and surveys to determine home range and habitat use for bobcats and wood turtles. Use the new data to refine species occurrence areas and integrate into the Biotics database. (<i>Protect habitat – Landscape Project</i>) |
| 1° | Conduct sampling to determine distribution, range, and habitat use of summer bats. (<i>Protect habitat - Landscape Project; Monitor wildlife – long-term monitoring</i>) |
| 1° | Conduct telemetry study during spring emergence from hibernacula to determine dispersal distances, roost characteristics, and travel corridors of Indiana bats. (<i>Protect habitat – Landscape Project</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° | Trap Indiana bats during spring emergence from hibernacula and apply colored plastic bands to aid in recovery efforts during summer concentration surveys. (<i>Monitor wildlife – long-term monitoring</i>) |

| Priority | Conservation Actions (continued) |
|--|--|
| 2° | 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> |
| 2° | Continue to monitor reproductive success of eagles and protect nesting areas from human disturbance. |
| 2° | Develop and conduct nighttime surveys to inventory nightjars (whip-poor-wills, chuck-will’s-widows, and common nighthawks), northern saw-whet owls, and eastern screech-owls. <i>(Monitor wildlife – long-term monitoring)</i> |
| 2° | Conduct the annual Mid-Winter Waterfowl Survey to monitor population trends. <i>(Monitor wildlife – long-term monitoring)</i> |
| 2° | Conduct the Atlantic Flyway Breeding Waterfowl Survey annually to monitor population trends. <i>(Monitor wildlife – long-term monitoring)</i> |
| Prevent, stabilize, and reverse declines of terrestrial wildlife, rare freshwater mussels, and rare freshwater fish species | |
| 1° | 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, and creepers, longtail salamanders, and wood turtles, and assess their condition for maintaining populations. <i>(Protect habitat – mussels)</i> |
| 1° | Assess specific threats to dwarf wedgemussel, brook floater and creeper, longtail salamanders, and wood turtle populations. 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. <i>(Protect habitat – mussels, fish, sprawl; Enhance habitat – private lands)</i> |
| 1° | Locate critical hibernating, gestating, and basking habitats for timber rattlesnakes along the Kittatinny Ridge through GIS measures, other remote-sensing tools, and surveys. Develop protection strategies to minimize human disturbance and illegal collecting at these sites. Work with public land managers to minimize recreational activities in critical areas. Enlist assistance from state and federal law enforcement personnel to monitor vulnerable areas. <i>(Protect habitat – Landscape Project; Protect wildlife - humans)</i> |
| 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 and NWR officers, National Park Service law enforcement, 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, recreational vehicles)</i> |

| Priority | Conservation Actions (continued) |
|----------|--|
| 1° | 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. <i>(Protect habitat – Landscape Project; Conserve Wildlife – rare wildlife; Enhance habitat – private lands)</i> |
| 1° | 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. <i>(Protect habitat – sprawl, recreational vehicles, humans; Conserve wildlife – contaminants, invasives, rare wildlife, subsidized predator; Evaluate restoration – roads)</i> |
| 1° | Protect species of greatest conservation need from exotic pathogen introduction or incident through rapid response; DFW to give priority attention to these species in planning or implementing a response. <i>(Conserve wildlife – rare wildlife, invasives)</i> |
| 1° | Work with public and private landowners and managers with significant bog turtle, timber rattlesnake, wood turtle, longtail salamander, cavity-nester, freshwater wetland bird, grassland bird, woodland raptor, and interior-forest bird and scrub-shrub/open field bird populations to enhance targeted wildlife habitat through the implementation of best management practices and incentive programs. <i>(Protect habitat – rare wildlife; Conserve wildlife – rare wildlife; Agriculture – land management; Silviculture – land management)</i> |
| 1° | Develop and implement habitat conservation goals that will meet the recovery needs of endangered and threatened wildlife populations that depend on forest habitats. These include guidelines for forest silviculture on public and private lands to enhance forest maturity and canopy, and replanting to reduce fragmentation. <i>(Conserve wildlife – rare wildlife; Protect habitat – Landscape Project; Silviculture – land management; Enhance habitat – private lands)</i> |
| 1° | Protect timber rattlesnakes, bog and wood turtles, and special concern reptiles and amphibian populations from illegal collection through law enforcement and public education. <i>(Protect wildlife - humans)</i> |
| 1° | Maintain and enhance reptile and amphibian populations, particularly those that are endangered because of illegal collection for the pet trade (bog and wood turtles, timber rattlesnakes) and those populations most susceptible to road mortality (known box turtle breeding locations near roads and amphibian breeding migration corridors). <i>(Conserve wildlife – rare wildlife; Protect habitat – roads; Corridors – roads)</i> |

| Priority | Conservation Actions (continued) |
|----------|---|
| 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> |
| 1° | 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. <i>(Conserve wildlife – cats, subsidized predators)</i> |
| 1° | Research the habitat requirements for species of conservation concern (e.g., forest passerines and woodland raptors, timber rattlesnakes, bobcats, and Indiana bats, where appropriate) and implement planned silviculture practices to enhance forests for these species and species suites. <i>(Protect habitat – Landscape Project; Silviculture – land management; Conserve wildlife – rare wildlife)</i> |
| 1° | Develop and implement management actions to enhance populations of special concern and rare fish. <i>(Protect habitat – fish)</i> |
| 1° | Develop Indiana bat recovery plan in accordance with federal guidelines and strategies set forth in the USFWS Indiana Bat Recovery Plan (U.S. Fish and Wildlife Service, 1999). <i>(Conserve wildlife – rare wildlife)</i> |
| 2° | 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> |
| 2° | 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. <i>(Protect habitat – sprawl, development, Conserve wildlife – game species)</i> |
| 2° | 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. <i>(Protect habitat – Landscape Project, rare wildlife)</i> |
| 2° | Protect wildlife species of conservation concern, especially slow moving terrestrial species (e.g., reptiles, amphibians) and sensitive forest nesters (e.g., red-shouldered hawks, barred owls) by prohibiting off-road vehicles from all public and private conservation lands except where authorized by the governing agency by working with law enforcement agencies and implementing other means as they are developed. <i>(Protect habitat – recreational vehicles; Conserve wildlife - recreational vehicles)</i> |
| 2° | Develop research proposal to investigate the impact of land use patterns on woodland raptors and rare reptiles and amphibians. <i>(Protect habitat – sprawl; Corridors - sprawl)</i> |

| Priority | Conservation Actions (continued) |
|---|--|
| 2° | Research effects of parasites and diseases on special concern fish species' populations. (<i>Monitor wildlife – fish</i>) |
| 2° | 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). (<i>Monitor wildlife – fish; Conserve wildlife – rare wildlife</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 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). (<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>) |
| Protect and enhance important and unique habitats | |
| 1° | Federal, state, and local governments will work with the NJ DEP, Natural Heritage Program to cooperatively map significant natural communities in the Delaware Water Gap National Recreation Area, Stokes State Forest, High Point State Park, Worthington State Forest, and adjacent wildlife management areas. (<i>Protect habitat – Landscape Project</i>) |
| 1° | Federal and state agencies to maintain habitat suitable for area-sensitive species within the Delaware Water Gap National Recreation Area, Stokes State Forest, High Point State Park, Worthington State Forest, and adjacent wildlife management areas. (<i>Protect habitat - migratory birds, recreational vehicles, humans</i>) |
| 2° | 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 Delaware Water Gap National Recreation Area, Stokes State Forest, High Point State Park, Worthington State Forest, and adjacent wildlife management areas. (<i>Protect habitat – migratory birds; Corridors – migratory birds</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. |

| Priority | Conservation Actions (continued) |
|---|--|
| Maintain the ecological integrity of natural communities and regional biodiversity by controlling invasive species and overabundant wildlife | |
| 1° | 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. <i>(Conserve wildlife – 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, 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> |
| 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° | 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. <i>(Evaluate restoration – deer; Conserve wildlife – deer, rare wildlife)</i> |
| 2° | Work with land management agencies to monitor 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. <i>(Conserve wildlife – invasives)</i> |
| Identify and protect important hibernacula for wintering bats | |
| 1° | Survey abandoned mines, caves, and railroad tunnels and determine their suitability as winter roost sites; 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. <i>(Monitor wildlife – long-term monitoring; Conserve wildlife - development)</i> |

| Priority | Conservation Actions (continued) |
|--|--|
| 1° | Decrease or eliminate human disturbance and vandalism at hibernacula through increased patrols by the DFW, Bureau of Law Enforcement. <i>(Protect habitat - humans)</i> |
| 2° | 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. <i>(Protect habitat – humans)</i> |
| 2° | 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). <i>(Protect habitat – humans)</i> |
| Protect, enhance, and restore coldwater fish habitat and ecosystems | |
| 1° | 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. <i>(Protect habitat – fish)</i> |
| 1° | Develop and implement habitat improvement and restoration programs for coldwater fish species’ habitats and ecosystems. <i>(Protect habitat – fish)</i> |
| 2° | Assess the impacts of changing water quality to native, wild, summer trout populations. <i>(Monitor wildlife– fish)</i> |
| Conserve and enhance native, wild trout populations at optimal levels | |
| 1° | 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. <i>(Monitor wildlife – fish)</i> |
| 1° | Develop population management strategies to assure the protection of NJ’s wild coldwater fisheries. <i>(Protect habitat – humans)</i> |
| 2° | 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. <i>(Protect habitat – humans)</i> |
| 2° | Protect native, wild trout populations by increasing the enforcement of established fishing regulations. <i>(Protect aquatic wildlife – 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> |

| Priority | Conservation Actions (continued) |
|----------|--|
| 1° | Educate homeowners, through newsletters, press releases, brochures, presentations, etc., on the proper eviction of house-dwelling bat populations and importance of providing alternative roosting structures for maternity colonies. <i>(Education – humans)</i> |
| 1° | 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. <i>(Education – humans; Conserve wildlife – cats, subsidized predators)</i> |
| 1° | 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. <i>(Education – humans; Conserve wildlife – rare wildlife)</i> |
| 2° | Develop and maintain educational brochures and posters, and viewing and recreational 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. <i>(Education – humans)</i> |
| 2° | 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. <i>(Education – humans)</i> |
| 2° | Develop brochures and posters regarding the most aggressive, invasive non-indigenous plants to educate 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° | 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). <i>(Education – humans)</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> |

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 bald eagles, 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, emergent wetland 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, emergent wetland 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, brook floaters, creepers, 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, brook floaters, creepers, wood turtles, nongame fish, coldwater fish 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), and NJ Conservation Foundation and other environmental, member-based organizations to recruit and train Citizen Scientists to locate, survey, and monitor wildlife habitats and populations in a systematic manner to achieve short- and long-term monitoring goals.
 - 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 Lepidoptera 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 bald eagle, 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 Natural Resources Conservation Service (NRCS), US Fish and Wildlife Service (USFWS) - NJ Field Office, and US Department of Agriculture (USDA), Natural Heritage Program (NHP) and the Department of Community Affairs (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) Division of Fish and Wildlife (DFW) to protect bald eagle, cavity-nester, and raptor nesting and foraging sites.
 - DFW to develop a plan to protect sensitive bald eagle, bog turtle, timber rattlesnake, and wood turtle sites from disturbance.
 - DFW to share site information and expertise with state and federal law enforcement to increase surveillance of bald eagle, bog turtle, timber rattlesnake, and wood turtle sites.
 - DFW to work with the DEP's Land Use Regulation Program (LURP) to protect sensitive areas around timber rattlesnake hibernacula.
 - DFW and conservation organizations to work with the LURP to protect and appropriately classify wetlands and vernal pools for special concern reptile and amphibian populations.
 - Expand efforts to create habitat and implement best management practices that protect nesting and foraging sites of bald eagles, 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 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 work with the DEP's Division of Watershed Management to upgrade stream classifications in areas with rare mussels and wild trout populations.
- 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 DEP only.
- DFW to interact with other state agencies on operational, regulatory and land-use issues to ensure adequate consideration is given to protect coldwater fish resources.
- DFW to determine groundwater recharge areas for bog turtle habitats and long-tailed salamander breeding sites 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, 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.
- Determine distribution, occurrence, and monitor bobcats.
- Routinely monitor abundance, productivity, distribution, and trends of bald eagles (annually), bog turtles, timber rattlesnakes, wood turtles, 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.
- Monitor contaminant levels that may impact bald eagle populations.
- Sponsor "Hawk Watches" for raptor monitoring during the fall migration.
- Monitor extant populations of dwarf wedgemussels, brook floaters and creepers.
- 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.
- 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.