
APPENDIX C: ENDANGERED SPECIES

Contents:

C-1. List of Rare Species of Hunterdon County

C-2. Rare Species Reporting Form

The following fact sheets are authored by the NJDEP Endangered and Nongame Species Program. These rare species have been reported within Holland Township. Fact sheets were not available for all species.

C-3. Fact Sheet: Bald Eagle File Name: appendix_C_baldeagle.pdf

C-4. Fact Sheet: Bobolink File Name: appendix_C_bobolink.pdf

C-5. Fact Sheet: Bog Turtle File Name: appendix_C_bogturtle.pdf

C-6. Fact Sheet: Cooper's hawk File Name: appendix_C_coopershawk.pdf

C-7. Fact Sheet: Mussels File Name: appendix_C_mussels.pdf

C-8. Fact Sheet: Vesper Sparrow File Name: appendix_C_vespersparrow.pdf

C-9. Fact Sheet: Wood Turtle File Name: appendix_C_woodturtle.pdf

HUNTERDON COUNTY
RARE SPECIES AND NATURAL COMMUNITIES
PRESENTLY RECORDED IN THE NEW JERSEY NATURAL HERITAGE DATABASE

NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS	GRANK	SRANK
*** Vertebrates					
ACCIPITER COOPERII	COOPER'S HAWK		T/T	G5	S3B,S4N
AMMODRAMUS HENSLOWII	HENSLOW'S SPARROW		E	G4	S1B
AMMODRAMUS SAVANNARUM	GRASSHOPPER SPARROW		T/S	G5	S2B
ASIO OTUS	LONG-EARED OWL		T/T	G5	S2B,S2N
BARTRAMIA LONGICAUDA	UPLAND SANDPIPER		E	G5	S1B
BUTEO LINEATUS	RED-SHOULDERED HAWK		E/T	G5	S1B,S2N
CIRCUS CYANEUS	NORTHERN HARRIER		E/U	G5	S1B,S3N
CISTOTHORUS PLATENSIS	SEDGE WREN		E	G5	S1B
CLEMMYS INSCULPTA	WOOD TURTLE		T	G4	S3
CLEMMYS MUHLENBERGII	BOG TURTLE	LT	E	G3	S2
CROTALUS HORRIDUS HORRIDUS	TIMBER RATTLESNAKE		E	G4T4	S2
DOLICHONYX ORYZIVORUS	BOBOLINK		T/T	G5	S2B
EURYCEA LONGICAUDA LONGICAUDA	LONGTAIL SALAMANDER		T	G5T5	S2
HALIAEETUS LEUCOCEPHALUS	BALD EAGLE	LT	E	G4	S1B,S2N
LYNX RUFUS	BOBCAT		E	G5	S3
MELANERPES ERYTHROCEPHALUS	RED-HEADED WOODPECKER		T/T	G5	S2B,S2N
PASSERCULUS SANDWICHENSIS	SAVANNAH SPARROW		T/T	G5	S2B,S4N
PETROCHELIDON PYRRHONOTA	CLIFF SWALLOW		S/S	G5	S2B
POECEETES GRAMINEUS	VESPER SPARROW		E	G5	S1B,S2N
STRIX VARIA	BARRED OWL		T/T	G5	S3B
*** Ecosystems					
CAVE AQUATIC COMMUNITY	CAVE AQUATIC COMMUNITY			G4?	S2
CAVE TERRESTRIAL COMMUNITY	CAVE TERRESTRIAL COMMUNITY			G4?	S3
SHALE CLIFF/ROCK OUTCROP COMMUNITY	SHALE CLIFF/ROCK OUTCROP COMMUNITY			G3	S2?
*** Invertebrates					
ALASMIDONTA UNDULATA	TRIANGLE FLOATER			G4	S3
CICINDELA MARGINIPENNIS	COBBLESTONE TIGER BEETLE			G2G3	S1

NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS	GRANK	SRANK
ENALLAGMA BASIDENS	DOUBLE-STRIPED BLUET			G5	S3
LAMPILIS CARIOSA	YELLOW LAMPMUSSEL			G3G4	S1
LEPTODEA OCHRACEA	TIDEWATER MUCKET			G4	S1
POLYGONIA PROGNE	GRAY COMMA			G5	SH
PTICHODIS BISTRIGATA	SOUTHERN PTICHODIS			G3	S1S3
*** Other types					
BAT HIBERNACULUM	BAT HIBERNACULUM			G?	S2
*** Vascular plants					
ADLUMIA FUNGOSA	CLIMBING FUMITORY			G4	S2
AGASTACHE NEPETOIDES	YELLOW GIANT-HYSSOP			G5	S2
AGASTACHE SCROPHULARIIFOLIA	PURPLE GIANT-HYSSOP			G4	S2
AGRIMONIA MICROCARPA	SMALL-FRUIT GROOVEBURR			G5	S2
ARISTOLOCHIA SERPENTARIA	VIRGINIA SNAKEROOT			G4	S3
ASIMINA TRILOBA	PAWPAW		E	G5	S1
ASPLENIUM PINNATIFIDUM	LOBED SPLEENWORT		E	G4	S1
ASTER PRAEALTUS	WILLOW-LEAF ASTER		E	G5T5?	S1
BOTRYCHIUM ONEIDENSE	BLUNT-LOBE GRAPE FERN			G4Q	S2
CACALIA ATRIPLICIFOLIA	PALE INDIAN PLANTAIN		E	G4G5	S1
CARDAMINE ANGUSTATA	SLENDER TOOTHWORT			G5	S3
CAREX AMPHIBOLA VAR AMPHIBOLA	NARROW-LEAF SEDGE		E	G5T4Q	S1
CAREX BUSHII	BUSH'S SEDGE		E	G4	S1
CAREX DEWEYANA	DEWEY'S SEDGE		E	G5T5	S1
CAREX FRANKII	FRANK'S SEDGE			G5	S3
CAREX HITCHCOCKIANA	HITCHCOCK'S SEDGE			G5	S2
CAREX JAMESII	JAMES' SEDGE		E	G5	S1
CAREX LEPTONERVIA	FINE-NERVE SEDGE		E	G4	S1
CAREX MEADII	MEAD'S SEDGE			G4G5	SX.1
CAREX OLIGOCARPA	FEW-FRUIT SEDGE		E	G4	S1
CAREX PALLESCENS	PALE SEDGE			G5	S2
CAREX WILLDENOWII VAR WILLDENOWII	WILLDENOW'S SEDGE			G5T5	S2
CASTILLEJA COCCINEA	SCARLET INDIAN-PAINTBRUSH			G5	S2
CERCIS CANADENSIS	REDBUD		E	G5T5	S1
CHEILANTHES LANOSA	HAIRY LIPFERN			G5	S2
CHENOPODIUM SIMPLEX	MAPLE-LEAF GOOSEFOOT			G5	S2

NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS	GRANK	SRANK
CRATAEGUS CALPODENDRON	PEAR HAWTHORN		E	G5	S1
CRATAEGUS DODGEI	DODGE'S HAWTHORN			G4	S2
CRATAEGUS HOLMESIANA	HOLMES' HAWTHORN			G5	S1
CRATAEGUS SUCCULENTA	FLESHY HAWTHORN		E	G5	S1
CUSCUTA CEPHALANTHI	BUTTONBUSH DODDER		E	G5	S1
CYNOGLOSSUM VIRGINIANUM VAR VIRGINIANUM	WILD COMFREY			G5T5	S2
CYSTOPTERIS PROTRUSA	LOWLAND FRAGILE FERN			G5	S2
DESMODIUM HUMIFUSUM	TRAILING TICK-TREFOIL		E	G1G2Q	SH
DICENTRA CANADENSIS	SQUIRREL-CORN		E	G5	S1
DOELLINGERIA INFIRMA	CORNEL-LEAF ASTER			G5	S2
DRABA REPTANS	CAROLINA WHITLOW-GRASS		E	G5	SH
ELLISIA NYCTELEA	AUNT LUCY		E	G5	S1
ERAGROSTIS FRANKII	FRANK'S LOVE GRASS			G5	S2
HYBANTHUS CONCOLOR	GREEN VIOLET		E	G5	S1
HYDROPHYLLUM CANADENSE	BROAD-LEAF WATERLEAF		E	G5	S1
HYPERICUM PYRAMIDATUM	GREAT ST. JOHN'S-WORT			G4	S3
ISOTRIA MEDEOLOIDES	SMALL WHORLED POGONIA		E	G2	S1
JEFFERSONIA DIPHYLLOA	TWINLEAF		E	G5	S1
KUHNTIA EUPATORIOIDES	FALSE BONESET		E	G5T5	S1
LATHYRUS VENOSUS	VEINY VETCHLING		E	G5	SH
LECHEA INTERMEDIA VAR INTERMEDIA	LARGE-POD PINWEED			G5T4T5	S2
LEMNA VALDIVIANA	PALE DUCKWEED		E	G5	S1
LINUM SULCATUM	GROOVED YELLOW FLAX		E	G5T5	S1
MONARDA CLINOPODIA	BASIL BEEBALM		E	G5	SH
ONOSMODIUM VIRGINIANUM	VIRGINIA FALSE-GROMWELL		E	G4	S1
PANICUM OLIGOSANTHES VAR OLIGOSANTHES	FEW-FLOWER PANIC GRASS			G5T5?	S1S2
PENSTEMON LAEVIGATUS	SMOOTH BEARDTONGUE		E	G5	S1
PHLOX PILOSA	DOWNY PHLOX		E	G5T5	SH
PINUS PUNGENS	TABLE MOUNTAIN PINE		E	G4	S1.1
PRUNUS ALLEGHANIENSIS	ALLEGHENY PLUM		E	G4T4	S1
PRUNUS PUMILA VAR DEPRESSA	LOW SAND CHERRY			G5T5	S2
PTELEA TRIFOLIATA	WAFER-ASH		E	G5T5	S1
PYCNANTHEMUM CLINOPODIOIDES	BASIL MOUNTAIN-MINT		E	G2	S1

NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS	GRANK	SRANK
PYCNANTHEMUM TORREI	TORREY'S MOUNTAIN-MINT		E	G2	S1
RANUNCULUS MICRANTHUS	ROCK BUTTERCUP			G5	S2
RANUNCULUS TRICHOPHYLLUS VAR TRICHOPHYLLUS	THREAD-LEAF WATER BUTTERCUP			G5T5	S2
RHYNCHOSPORA GLOBULARIS	COARSE GRASS-LIKE BEAKED-RUSH		E	G5?	S1
RIBES MISSOURIENSE	MISSOURI GOOSEBERRY		E	G5	S1
RUDBECKIA FULGIDA	ORANGE CONEFLOWER		E	G5T4?	S1
SALIX LUCIDA SSP LUCIDA	SHINING WILLOW			G5T5	S1
SCUTELLARIA NERVOSA	VEINED SKULLCAP			G5	S2
SEDUM TELEPHIODES	ALLEGHENY STONECROP			G4	SX.1
SELAGINELLA RUPESTRIS	ROCK SPIKE-MOSS			G5	S2
SOLIDAGO RIGIDA	PRAIRIE GOLDENROD		E	G5T5	S1
STACHYS TENUIFOLIA	SMOOTH HEDGE-NETTLE			G5	S3
STELLARIA PUBERA	STAR CHICKWEED		E	G5	SH
TRIOSTEUM ANGUSTIFOLIUM	NARROW-LEAF HORSE-GENTIAN		E	G5	S1
VALERIANELLA RADIATA	BEAKED CORNSALAD		E	G5	S1
VERBENA SIMPLEX	NARROW-LEAF VERVAIN		E	G5	S1
VICIA CAROLINIANA	CAROLINA WOOD VETCH		E	G5	S1
VIOLA CANADENSIS	CANADIAN VIOLET		E	G5T?	S1
108 Records Processed					

Code	Definition
Federal Status	Federal Status (U.S. Fish and Wildlife Service definitions)
LT	Taxa formally listed as threatened.
Species Status	State Status
E	Endangered: Applies to a species whose prospects for survival within the state are in immediate of extinction within NJ.
T	Threatened: Applies to species that may become Endangered if conditions surrounding it begin to or continue to deteriorate.
S Rank	State Rank Definitions
S1	Critically imperiled in New Jersey.
S2	Imperiled in New Jersey.
S3	Rare in state. Species ranked S3 are not yet imperiled in state but may soon be if additional populations are destroyed.
B	Refers to the breeding population of the element in the state.
N	Refers to the non-breeding population of the element in the state.
Note:	To express uncertainty, the most likely rank is assigned and a question mark added (e.g., G2?). A range is indicated by combining two ranks (e.g., G1G2, S1S3).
Source: http://www.nj.gov/dep/parksandforests/natural/heritage/spplant_ap1.html for complete code definitions.	

Natural Heritage Rare Species Reporting Form

This form is used to report a personal field sighting of a rare species tracked by the Natural Heritage Database. It may also be used to summarize locational information from a published or unpublished report. Species tracked include those appearing on the Special Plants of New Jersey List and the Special Animals of New Jersey List. The Office of Natural Lands Management can provide copies of the lists upon request. Note: For anadromous fish species, only reports of spawning areas are requested. For most bird species, only breeding reports are requested. Consult the Endangered and Nongame Species Program to determine if a non-breeding report of a bird species is desired.

In order for this form to be processed, the sections preceded by an asterisk (*) must be completed.

Send completed form to : DEP - Division of Parks and Forestry, Office of Natural Lands Management, Natural Heritage Program, PO Box 404, Trenton, NJ 08625-0404. Forms for endangered and nongame wildlife will be forwarded to the Endangered and Nongame Species Program for review.

Common Name _____

***Scientific Name** _____

Today's Date _____

Location:

***Location Map:** A mapped location of the occurrence must accompany this form. The ideal format is to locate the site on a photocopied section of a USGS 7.5 minute topo map, and to also sketch a second map showing finer details. Be sure to provide the name of the USGS map.

***Directions to Site:** Describe how to get to the site from a readily relocated permanent landmark such as a road intersection.

Biology/Habitat:

***Date and Approximate Time of the Observation:**

Weather Conditions (animal reports):

clear ___ overcast ___ calm ___ windy ___

Describe temperature, precipitation, and other significant weather factors:

Identification: How was the species identification made? Was it based on a sighting, tracks, call, or road kill? Name the identification manuals used or the experts consulted. Were there identification problems?

***Number of Individuals Observed:**

1-10 ___ 11-50 ___ 51-100 ___ 101-1000 ___ 1001-10,000 ___ >10,000 ___

If possible, provide the exact number of individuals. For rhizomatous plants such as grasses and sedges, what was counted as an individual - separate culms or entire clumps or patches?

Life Stages Present: Check off life stages observed or provide an estimate of the numbers of individuals for each life stage.

For plants:

vegetative ___ in bud ___ flower ___ fruit ___ seed dispersing ___ seedling ___ dormant ___

For animals: eggs ___ larvae ___ immature ___ adult female ___

adult male ___ adult, sex unknown ___

Associated Species: List any associated species such as predators, prey, food plants, parasites, host species, and additional rare species observed at the site.

***Additional Biological Data:** What else was observed? Provide information on the general condition or vigor of the individuals and viability of the population, and animal behavior such as mating or nesting behavior.

Habitat Data: Describe the general area where the occurrence is located. List natural community types, dominant vegetation, and information on the physical environment such as substrate type, hydrology, moisture regime, slope, and aspect. Also, if possible, provide information on the surrounding land use.

Conservation: Are there natural or man made threats to this occurrence? Please describe.

Ownership: If known, please provide landowner name, address, phone #.

Information Source: *Name and Address and Phone # (of person filing report):

*Does this information come directly from a field visit , or a published or unpublished report?

Citation: For information taken from a published or unpublished report, please provide a copy of the cover page and the pertinent portions of the report. If a copy can not be provided, list below the author, date, title, publisher, and page numbers.

Voucher: Was the observation vouchered with a photograph? a specimen? If possible, attach a copy of the photograph. If specimen voucher, please provide the name of the repository:

Confirmation: Would you accompany a biologist to the site if needed? yes no.

Additional Comments: (use extra sheets if needed)

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Department of Environmental Protection

P. O. Box 402

Trenton, NJ 08625-0402

Last Updated: April 28, 2003

Bald Eagle, *Haliaeetus leucocephalus*

Status: *State:* Endangered

Federal: Threatened (proposed for de-listing)

Identification

Adult bald eagles are distinguished by their large size (7- to 8-foot wingspan), full white heads and tails and dark brown, almost black body. They reach their adult size by the time they can fly. Their adult plumage, however, develops in their fifth year.

Prior to that, their juvenile appearance varies from year to year. In their first year, their wings are slightly broader and entirely dark brown. The next year they begin to molt their flight feathers and the trailing edge of their wings appears symmetrically serrated as

shorter adult feathers replace the longer juvenile ones. Their plumage is usually mottled, brown and white, and is widely variable with a considerable amount of white on the breast and belly. Bald eagles are even more mottled in their third year and begin to show signs of change from dark brown to light yellow in their eye and bill color, and may have some lighter plumage appearing on their heads and tails.

During their fourth year, bald eagles begin to appear unmistakable as our national symbol. This is when they are transitioning from juvenile to adult and appear for the first time with a white head and tail. At this age, they retain some brown in the white plumage, giving them a dirty appearance. They also retain some white flecking in the brown of their bodies. In their next molt, they attain the clean white head and tail and solid brown body plumage of a full adult bald eagle.



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Habitat

Bald eagle habitat consists of areas of forest that are associated with bodies of water. With fish as their primary diet, bald eagles in New Jersey have historically been associated with the forests near the Delaware River and Bay as well as all the rivers that empty into the Atlantic Ocean and Delaware Bay (Niles 1995). In northern and central New Jersey, bald eagles are resident on inland reservoirs and on the Delaware River. Throughout the state, these large birds require a nesting location that is safe from the threat of human disturbance and usually choose their nest tree accordingly. Typically, the tree they choose for building their large nests is a “super-canopy” tree that is taller than the trees immediately surrounding it. By nesting in such a tree, eagles can place their nest within the shelter of the crown and still be above the surrounding trees, enabling them to arrive and depart from the nest with ease.

In the northern part of the state, where the topography is hilly or mountainous, eagles can nest in trees that are on a slope and therefore have one side that is higher than its neighboring trees on the slope below it. Occasionally,

bald eagles will choose a lone tree in an open field.

In addition to nesting habitat, eagles also have habitat requirements for foraging and wintering, which might overlap their nesting habitat, but not necessarily. Foraging habitat for bald eagles consists of large perch trees near a body of water. Both of these elements are critical due to the “sit and watch” foraging behavior of eagles. Wintering habitat consists of the same, with the added condition of open, ice-free water. Parts of the Delaware River, such as the Delaware Water Gap, where the current is swift and the river remains open, or deep reservoirs with enough current or a dam to keep part of the water ice-free, serve as good wintering habitat for eagles. The tidal areas of southern New Jersey marshes are also ideal locations for winter foraging.

Status and Conservation

Long before the introduction of the pesticide DDT after World War II, habitat destruction, shootings and poisonings had greatly reduced the population of bald eagles in the lower 48 contiguous states. But the widespread use of DDT, which caused eagles to lay thin-shelled eggs that were often crushed during incubation, pushed the bird to the brink of extinction. New Jersey, where DDT was heavily used, in part for mosquito control, was no exception. By 1970, only one eagle nest remained in the state. Consequently, the bald eagle was listed as endangered under New Jersey’s new Endangered Species Act in 1974 and listed as federally endangered throughout the lower 48 states in 1978.

Management of the state’s only nest began in 1982, when biologists began climbing the nest tree to retrieve the thin-shelled eggs. They were then incubated in the lab underneath chickens before being returned to the nest as 10-day-old chicks, which were quickly cared for by the nest's adults. Shortly thereafter, the state launched a “hacking” program through which 60 eaglets, primarily from Canada, were released into the heart of New Jersey’s bald eagle habitat between 1983 and 1989. Those efforts, combined with the 1972 federal ban on DDT, paid off rather quickly, with the appearance of the state's second eagle nest in 1988. Since

then, biologists also have been successful in encouraging eagles to nest in certain areas by building “starter nests,” which eagles add to once they adopt them for nesting (Clark and Niles 1998). Building nests for eagles works best when a pair has already claimed a territory, and the birds may be drawn to a sturdy nest in a super-canopy tree.

Since the second nest appeared, the number of eagle nests has increased steadily ever since. In 2001, a record 27 bald eagle nests were active statewide, mostly in southern New Jersey. A record 34 young fledged that year (Smith et al. 2001).

Bobolink, *Dolichonyx oryzivorus*

Status:

State: Threatened

Federal: Not listed

Identification

Amid a sea of agriculture, the bubbly “bobo-o-link!” song of the bobolink echoes from within an overgrown weedy field. On a fall day at Cape May, a chorus of “plink” notes is heard overhead as a flock of bobolinks passes above a fallow grassland. These are the song and call of the bobolink, a sparrow-sized member of the blackbird family.

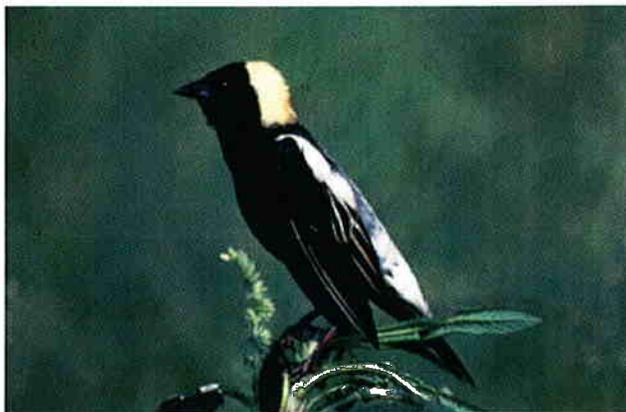


Photo by S. Maslowski, courtesy US FWS

Bobolinks exhibit sexual dimorphism (gender differences) in plumage during the breeding season. The nuptial male is black overall with a creamy nape and hindneck, a white rump, and white scapulars (feathers at the base of the wing). The plumage of the female, which camouflages her during nesting, is relatively drab. The female is buffy with dark brown streaking on the back, sides, and rump and has dark stripes on the head. In non-breeding plumage, adult males resemble females. Immature bobolinks also resemble adult females but are more yellow and lack streaking on the sides of the body. All ages and sexes have a short, finch-like bill and pointed tail feathers.

Habitat

Bobolinks inhabit low-intensity agricultural habitats, such as hayfields and pastures, during the breeding season. In addition, lush fallow fields and meadows of grasses, forbs, and wildflowers are occupied. Bobolink nests are often placed in areas of greatest vegetative height and density. Although small numbers of bobolinks may nest in grasslands of 2 to 4 hectares (5-10 acres), larger sized fields support higher densities of nesting pairs (Jones and Vickery 1997a).

Similar habitats are occupied by bobolinks throughout their annual cycle. During migration, bobolinks inhabit fallow and agricultural fields, as well as coastal and freshwater marshes. On their South American wintering grounds, they occur in grasslands, marshes, rice fields, and farm fields.

Status and Conservation

Historic clearing of forests in the eastern United States during the 1700s and 1800s enabled numerous grassland species to expand their ranges, inhabiting the growing agricultural landscape. As a result, the bobolink became a common breeding species in the hayfields and pastures of New Jersey. However, by the early 1900s, bobolink

population declines were noted in the Northeast. The slaughter of migrant bobolinks in rice fields of the southern United States, market hunting, and modernized farming techniques likely caused this decline. During the 1960s and 1970s, changing agricultural practices, the conversion of fallow fields to forests, and the development of agricultural lands further shrunk bobolink populations in New Jersey.

Modern farming techniques, including frequent rotation of hayfields, early mowing of hay, decreased vegetative diversity, and the change from warm-season to cool-season grasses, have rendered agricultural fields less favorable for nesting bobolinks. In addition, alfalfa (*Medicago sativa*) fields, which offer poor nesting habitat for bobolinks, have replaced many timothy (*Phleum* spp.) and clover (Fabaceae) fields. The area of land cultivated as hay fields in the northeastern United States declined from 12.6 to 7.1 million hectares (31.1 to 17.5 million acres) from 1940 to 1986 (Martin and Gavin 1995). During the same period, the percentage of sites where alfalfa replaced hay increased from 20% to 60% (Bollinger and Gavin 1992). Habitat loss is largely responsible for the decline of bobolink populations in the United States and New Jersey detected by the Breeding Bird Survey from 1966 to 1999 (Sauer et al. 2000).

Due to population declines and habitat loss, the bobolink was listed as a threatened species in New Jersey in 1979. The New Jersey Natural Heritage Program considers the bobolink to be “demonstrably secure globally,” yet “imperiled in New Jersey because of rarity” (Office of Natural Lands Management 1992).

Bog Turtle, *Clemmys muhlenbergii*

Status:

State: Endangered

Federal: Threatened

Identification

The bog turtle is a tiny, dark turtle with a distinct orange patch behind the tympanum (ear membrane) on either side of the head. The scutes (scale-like horny layers) of the carapace (upper shell) are brown or black and may have yellow or reddish centers. Likewise, the plastron (underneath shell) is brownish-black with a light yellow or mahogany center. The limbs are brown and may be mottled with variable



© Robert Zappalorti

amounts of dark yellow, orange, or red blotching. Bog turtles, one of the smallest and most secretive of North America's turtles, measure only 7.6 to 10 cm (3.0 to 3.9 in.) long as adults. The male bog turtle has a concave plastron while that of the female is flat or slightly convex. In addition, the male has a long, thick tail and long foreclaws.

Habitat

Bog turtles inhabit calcareous (limestone) fens, sphagnum bogs, and wet, grassy pastures that are characterized by soft, muddy substrates (bottoms) and perennial groundwater seepage. Bog turtle habitats are well-drained and water depth rarely exceeds 10 cm (four in.) above the surface. Flora associated with bog turtle habitats include sedges (*Carex* spp.), rushes (*Juncus* spp.), mosses, and grasses. These habitats may also contain red maple (*Acer rubrum*), alder (*Alnus* spp.), skunk cabbage (*Symplocarpus foetidus*), cattail (*Typha* spp.), willow (*Salix* spp.), highbush blueberry (*Vaccinium corymbosum*), jewelweed (*Impatiens capensis*), swamp rose (*Hibiscus palustris*), dogwoods (*Cornus* spp.), shrubby cinquefoil (*Potentilla fruticosa*), buttonbush (*Cephalanthus occidentalis*), rice-cut grass (*Leersia oryzoides*), wool-grass (*Scirpus cyperinus*), arrowhead (*Sagittaria* spp.), watercress (*Nasturtium officinale*), St. Johnswort (*Hypericum* spp.), blue vervain (*Verbena hastata*), sundew (*Drosera* spp.), pitcher plant (*Sarracenia purpurea*), cinnamon fern (*Osmunda cinnamomea*), and sensitive fern (*Onoclea sensibilis*). Because open areas are favored for basking and nesting, vegetative succession may cause the dispersal or loss of bog turtle colonies.

Many of the emergent wetlands inhabited by bog turtles have served as pastures during historic or current times. Grazing by livestock maintains the successional stage and softens the ground, creating favorable conditions for these turtles. Although controlled grazing is beneficial, overgrazing can result in excessive fecal runoff that may degrade water quality or encourage the growth of undesirable plant species.

Linear drainage ditches provide an alternative habitat for bog turtles in some areas of the state. These ditches, which have healed over time, may support remarkably high bog turtle densities.

Status and Conservation

Due to population declines, restricted habitat preference, habitat loss, and collecting, the bog turtle was listed as an endangered species in New Jersey in 1974. Declining throughout its range, this turtle is also listed as threatened in Maryland, North Carolina, South Carolina, and Georgia and endangered in Massachusetts, Connecticut, New York, Pennsylvania, Delaware, and Virginia. In 1997, the U.S. Fish and Wildlife Service included the bog turtle on its list of federally threatened species. The New Jersey Natural Heritage Program considers the bog turtle to be, “globally, either very rare and local throughout its range or found locally in a restricted range or because of other factors making it vulnerable to extinction throughout its range,” and, “imperiled in New Jersey because of rarity” (Office of Natural Lands Management 1992).

Since the 1970s, biologists have studied the life history, habitat use, and distribution of the bog turtle in New Jersey. Current conservation efforts include habitat management, population monitoring, land acquisition, and landowner outreach. Since most bog turtle populations occur on private lands, biologists devote substantial amount of time educating private landowners about bog turtle conservation. Private landowners can benefit from having bog turtles on their land through various federal cost-sharing programs, which provide funding for habitat management and improvement. Biologists from the New Jersey Endangered and Nongame Species Program (ENSP) are presently implementing a watershed-based management strategy for the protection of critical bog turtle areas.

Cooper's hawk, *Accipiter cooperii*

Status:

State: Endangered

Federal: Not listed

Identification

On a cool fall day at Cape May Point, observers scan the skies as streams of accipiters zip past at tree-level. Darting through the cedars in pursuit of a yellow-rumped warbler is a Cooper's of the three species American accipiters-hawks that prey birds. The Cooper's well as its accipiter sharp-shinned hawk (*Accipiter striatus*) and the goshawk (*A.* are forest-nesting are able to quickly through dense cover chasing prey.



hawk, one of North-woodland chiefly on hawk, as cousins, the (*Accipiter northern gentilis*), raptors that maneuver while

About the size of a crow, the Cooper's hawk has short, rounded wings and a long, narrow tail. When soaring, the head extends beyond the wrist, making it appear large-headed. In flight, the silhouette of a Cooper's hawk appears cross-shaped, whereas the similarly plumaged sharp-shinned hawk looks small-headed and T-shaped. Sharp-shinned hawks usually exhibit a shorter, more squared-off tail. In addition, the wing beats of the Cooper's hawk are stiffer and more powerful than the fluttery wing beats of the sharp-shinned hawk.

© B.K. Wheeler/ VIREO

The adult Cooper's hawk has a dark cap, blue-gray back, and rusty, barred underparts. The juvenile's back is brown with rufous (reddish brown) feather edges and sparse white spotting, and the underparts are light colored with brown vertical streaking on the breast. In all ages, the tail is usually rounded and has a white edge along the tip. Juveniles molt into adult plumage during their second year. Eye color changes from yellow-green in immature birds to dark orange or red in adults. Females are significantly larger than males. The call of the Cooper's hawk, which is often given during the breeding season, is a loud and nasal "cak-cak-cak."

Habitat

During the breeding season, Cooper's hawks inhabit deciduous, coniferous, and mixed riparian or wetland forests. In southern New Jersey, breeding habitats include large, remote red maple (*Acer rubrum*) or black gum (*Nyssa sylvatica*) swamps and, on occasion, Atlantic white cedar (*Chamaecyparis thyoides*) swamps. Within these sites, high-bush blueberry (*Vaccinium corymbosum*) and greenbrier (*Smilax rotundifolia*) typically dominate the shrub layer. Adjacent upland pine or mixed pine/oak forests

provide an additional habitat buffer for nesting Cooper's hawks. In northern New Jersey, Cooper's hawks inhabit mixed riparian woodlands, eastern hemlock (*Tsuga canadensis*) / white pine (*Pinus strobus*) forests, and conifer plantations. Dominant tree species within such habitats may include red maple, sugar maple (*Acer saccharum*), eastern hemlock, white pine, black birch (*Betula lenta*), white oak (*Quercus alba*), scotch pine (*Pinus sylvestris*), and Norway spruce (*Picea abies*).

Cooper's hawk nest sites are often located within sub-climax forests that provide a closed canopy, moderate to heavy shrub cover, and trees more than 30 years old. Territories often contain forest edges and small openings along streams or roads, which may be used for hunting. In northern New Jersey, Cooper's hawk territories contained over 70% forested habitat within 0.3 km (0.2 miles) of nest sites and were, on average, 0.5 km (0.3 miles) away from the nearest house (Bosakowski et al. 1993). Home ranges of breeding Cooper's hawks in the United States may comprise 105 to 1,800 hectares (260 to 4,450 acres) (Johnsgard 1990, Rosenfield and Bielefeldt 1993).

During the 1970s, when the Cooper's hawk was first listed as an endangered species in New Jersey (1974), breeding was documented only within large, contiguous forests. As the Cooper's hawk population increased, pairs have nested in smaller woodlots containing mature trees and fragmented woods within agricultural, suburban, or urban landscapes. This may be attributed to both a larger breeding population and increased fragmentation of forested habitats. Cooper's hawks may exhibit limited tolerance for human disturbance and habitat fragmentation.

Cooper's hawks, which occur year-round in New Jersey, use many of the same habitats in winter as during the breeding season. However, because of limited prey availability during the winter months, habitat use during this season is less restrictive than during the breeding season. Consequently, Cooper's hawks forage within a variety of forest types as well as woodland edges. Wintering hawks may also frequent residential areas where they hunt songbirds and doves at bird feeders. Cedar forests, conifer groves, and other dense woods that provide protection from harsh weather are favored for roosting.

Status and Conservation

Until the mid-1930s, many raptor species, including the Cooper's hawk, were shot in large numbers during migration and on their breeding grounds because of suspected poultry and game bird predation. Regardless, the Cooper's hawk remained a fairly common breeding species in New Jersey's forests until the 1950s when habitat loss caused population declines. In addition, the pesticide DDT impaired reproduction and contributed to population declines observed from the 1950s to 1970s. Due to the reduction in the state's breeding population and the loss of habitat, the Cooper's hawk was listed as an endangered species in New Jersey in 1974. The New Jersey Natural Heritage Program considers the Cooper's hawk to be "apparently secure globally," yet "rare in the State (breeding)" (Office of Natural Lands Management 1998). Concern for this species is evident in nearby states, such as New Hampshire, Rhode Island, and Connecticut, where it is listed as threatened, and Massachusetts and New York, where it is considered a species of Special Concern. The National Audubon Society also included the Cooper's hawk on its Blue List of Imperiled Species from 1971 to 1982 and in 1986, the final year of the list.

Following the nationwide ban of DDT in 1972 and the reforestation of fallow lands throughout the state, Cooper's hawk populations began to recover. Cooper's hawks experienced increases in New Jersey Christmas Bird Counts from 1959 to 1988 and Breeding Bird Surveys from 1980 to 1999 (Sauer et al. 1996, Sauer et al. 2001). Other recent surveys have also shown a substantial increase in the breeding population of Cooper's hawks in New Jersey. As a result, the status of the Cooper's hawk was reclassified from endangered to threatened in New Jersey in 1999. The loss of large, contiguous forests remains a threat to this species and warrants the continued protection of Cooper's hawk nesting habitats.

MUSSELS

FRESHWATER MUSSELS:

Dwarf wedgemussel, *Alasmidonta heterodon*

Status: *State:* Endangered *Federal:* Endangered

Brook floater, *Alasmidonta varicosa*

Status: *State:* Endangered (pending) *Federal:* Species of Special Concern

Green floater, *Lasmigona subviridis*

Status: *State:* Endangered (pending) *Federal:* Species of Special Concern

Yellow lampmussel, *Lampsilis cariosa*

Status: *State:* Threatened (pending) *Federal:* Species of Special Concern

Eastern lampmussel, *Lampsilis radiata*

Status: *State:* Threatened (pending) *Federal:* Not listed

Eastern pondmussel, *Ligumia nasuta*

Status: *State:* Threatened (pending) *Federal:* Not listed

Tidewater mucket, *Leptodea ochracea*

Status: *State:* Threatened (pending) *Federal:* Not listed

Triangle floater, *Alasmidonta undulata*

Status: *State:* Threatened (pending) *Federal:* Not listed

Identification

All freshwater mussels have a calcium carbonate bivalve shell that is divided into a left and right half. The shell consists of three layers; the outer periostracum, the middle calcium carbonate, and the inner nacre. The periostracum (or epidermis) protects underlying calcium carbonate from the corrosive action of low pH water and damage from moving sand and gravel. A thin prismatic layer of crystalline calcium carbonate lies beneath the periostracum. The nacre or mother-of-pearl is the innermost and often thickest layer of the shell. It is comprised of thin, stacked calcium carbonate plates that lie parallel to the shell's surface. In many species, the color and texture of the nacre are important for identification.

Lateral and pseudocardinal teeth, separated by an interdentum, are located dorsally inside the shell. Lateral teeth are elongated and raised interlocking structures along the hinge line of a valve, whereas pseudocardinal teeth are triangular-shaped hinge teeth near the shell's anterior-dorsal margin. The interdentum is a flattened area of the hinge plate between the lateral and pseudocardinal teeth. The three points of apposition, which are taxonomically important in most species, serve to hold the two valves together. Some groups entirely lack lateral and pseudocardinal teeth. The umbo or beak is the dorsally raised, inflated area of the bivalve shell. Representing the oldest part of the shell, umbones appear as external swellings and are often points of taxonomic significance.

The valves are held closed by internal muscles. Empty shells show scars of former mussel attachment areas. Freshwater mussels have a large, muscular foot that extends between the valves and functions in locomotion and anchorage. The anterior and posterior retractor muscles draw the foot into the shell, while the anterior protractor helps in foot extension. Large anterior and posterior abductors draw the shell together.

Habitat

New Jersey's Endangered and Threatened Freshwater Mussel Species:

The **dwarf wedgemussel** is a rare freshwater mussel with a trapezoid-to-ovate or "humpbacked" shell rarely exceeding 1.5 in. in length. It is characterized by having two lateral teeth on the right valve of the shell, but only one on the left (thus the species name *heterodon*). The ventral margin is mostly straight. The beaks are low and rounded, projecting only slightly above the hinge line. The periostracum, or outer shell, is dark brown or yellowish brown and often exhibits greenish rays in young mussels. The nacre, or inner shell, is bluish or silvery white.

The dwarf wedgemussel once existed in 70 localities within 15 major Atlantic slope drainage basins from New Brunswick, Canada to North Carolina (U.S. Fish and Wildlife Service 1993). Today however, this species is thought to be extirpated from all but approximately 30 small sites in New Hampshire, Vermont, Maryland, North Carolina, New York, Connecticut, Virginia, and New Jersey.

In New Jersey, the dwarf wedgemussel historically inhabited areas of the Delaware, Hackensack, and Passaic rivers. These populations, however, are thought to

be extirpated because of water quality degradation and other factors. There are only three known active state occurrences of this elusive species; the Paulins Kill, Pequest River, and a portion of the upper Delaware River.

Preferred habitat of the dwarf wedgemussel ranges from muddy sand to sand and gravel/pebble bottoms in rivers and creeks with slow to moderate current. Favoring clean and relatively shallow water with little silt deposition, this species is known to co-occur with other freshwater mussels such as the eastern elliptio (*Elliptio complanata*), triangle floater (*Alasmidonta undulata*), creeper (*Strophitus undulatus*), eastern floater (*Pyganodon cataracta*) and eastern lampmussel (*Lampsilis radiata*).

Fish species identified as suitable hosts for the dwarf wedgemussel include the tessellated darter (*Etheostoma olmstedii*), mottled sculpin (*Cottus bairdi*) and Johnny darter (*Etheostoma nigrum*, not found in N.J.) (Michaelson and Neves 1995).

The **brook floater** has a small, kidney-shaped shell that is slightly thicker towards the anterior. There is a conspicuous posterior slope with wavy ridges perpendicular to the growth lines. The ventral margin is straight and slightly concave centrally. The outer shell color ranges from yellowish brown to dark brown and the nacre is a glossy bluish-white to orange in the umbo region. The pseudocardinal teeth exist as weak knobs and lateral teeth are absent. The species has a bright orange to pinkish foot.

The brook floater ranges from the Savannah River Basin in South Carolina north to the St. Lawrence River Basin in Canada and west to the Ohio River Basin of West Virginia. In New Jersey, there are reported occurrences in the Stony Brook, Musconetcong, Raritan, Lamington and upper Delaware rivers.

Habitat of the brook floater includes rapids or riffles on rock and gravel substrates. The species prefers small streams and is commonly associated with the eastern elliptio (*Elliptio complanata*) (Clarke 1981). Reported host fishes for the species that occur in New Jersey include the slimy sculpin (*Cottus cognatus*), longnose dace (*Rhinichthys cataractae*), golden shiner (*Notemigonus crysoleucas*) and pumpkinseed (*Lepomis gibbosus*).

The **green floater** is a small, rare mussel with an ovate trapezoid shell that is fragile and thin. The posterior ridge is rounded. The outer shell is light yellow or brown with many green rays, especially in juveniles. The pseudocardinal and lateral teeth are small and delicate. The beak cavity is shallow. The nacre can be white to blue and is iridescent towards the posterior end.

The green floater can be found from the Cape Fear River Basin in North Carolina north to the Hudson River Basin and westward to St. Lawrence River Basin in New York. In New Jersey, the species once occurred in the Passaic, Raritan, Delaware, and Pequest rivers, but is now represented by a single known individual in the Stony Brook in Mercer County.

This species can be found in smaller streams, most often in pools and eddies with gravelly and sandy bottoms (Ortmann 1919). It is averse to strong currents (Clarke



Photo courtesy North Carolina Wildlife Resources Commission

1985). The host fish is not known. There is some evidence that the green floater may not require a host fish in order to complete its life cycle (Barfield and Watters 1998, Lellis and King 1998).

The **yellow lampmussel** has a medium-sized shell, with males elliptical and somewhat elongate and females more ovate. Shells are moderately inflated and thick. The anterior margin is rounded and the ventral margin is slightly curved. The umbos are swollen and raised above the hinge line. The pseudocardinal teeth are compressed and the beak cavity is somewhat deep. The periostracum is smooth, shiny and usually yellow with brown patches.

The nacre is white to bluish white. There may be green or black rays on the posterior slope.

The species ranges from Georgia to the Lower Ottawa River Canada and eastward to Nova Scotia. New Jersey occurrences of the yellow lampmussel are restricted to the Delaware River.

The yellow lampmussel prefers large rivers that drain more than 1,200 sq. Km (Strayer 1993), and is often found in sand/silt substrates. Although the host fish has not been identified, a migratory species such as the alewife is the suspected host.

Shells of the **eastern lampmussel** are elliptical and have a rounded posterior ridge. The posterior and anterior ends are rounded and swollen umbos extend above the hinge line. The periostracum is brown and extensively rayed. The nacre is white and may be tinged with pink or salmon. This species has long lateral teeth and two pseudocardinal teeth on the left and right valves.

The eastern lampmussel ranges from South Carolina north to the St. Lawrence River Basin. In New Jersey, the species is known from locations in the Ramapo, Pequannock, and Wallkill rivers.

The eastern lampmussel is found in a variety of habitats. It is reported to prefer medium to coarse sands. The host fish is unknown.

The **eastern pondmussel** can be distinguished by its bluntly pointed posterior and distinctive posterior ridge. The shells are elongate and twice as long as wide. The dorsal margin is straight and the ventral margin (the side that opens) is curved. The beaks are low and located in the anterior quarter of the shell. The lateral teeth are long and straight. The pseudocardinal teeth are compressed. The nacre is white, but can also vary



Photo courtesy North Carolina Wildlife Resources Commission

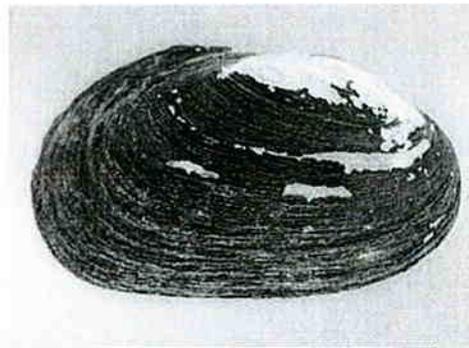


Photo courtesy North Carolina Wildlife Resources Commission

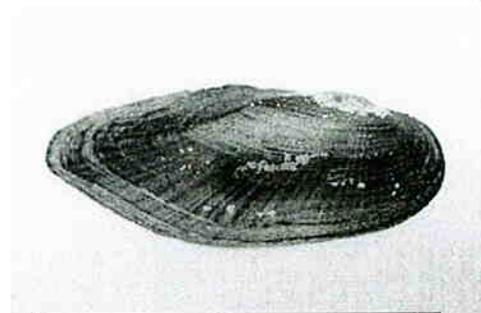


Photo courtesy North Carolina Wildlife Resources Commission

from an iridescent blue to salmon. The periostracum is greenish yellow to dark olive or brown.

The eastern pondmussel occurs from Cape Fear River Basin, North Carolina, to the St. Lawrence River Basin, Canada, and westward through northern parts of the continent's Interior Basin. In New Jersey, the species can be found in the Delaware River and several of its tributaries.

The eastern pondmussel is often associated with tidewaters. The host fish is unknown.

The **tidewater mucket** appears similar to the yellow lampmussel. The shell is small; males are elliptical and females are ovate, subinflated and thin. The anterior end is rounded; the posterior margin is evenly rounded, somewhat pointed in males and truncated in females. The beaks are moderately swollen, raised above the hinge line, and are located near the middle of the shell. The periostracum is yellow to brown or olive green and is often covered with fine green rays. The pseudocardinal teeth are compressed; the lateral teeth are short and curved. The beak cavity is shallow and the nacre is bluish-white and sometimes pink.

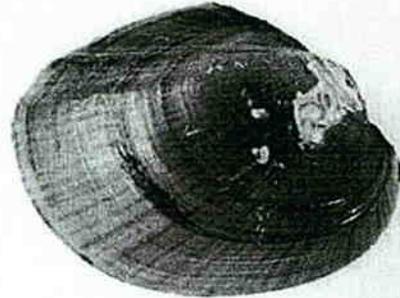


Photo courtesy North Carolina
Wildlife Resources Commission

The tidewater mucket ranges from the Savannah River Drainage Basin in Georgia north into Nova Scotia. In New Jersey, the species occurs in the Delaware River.

This species is associated with tidewaters and can be found in sand/silt substrates. The host fish is undetermined.

The **triangle floater** is a small, ovate to triangular shaped mussel. The lateral teeth are absent, but there is an interdental projection in the left valve. The pseudocardinal teeth are large and well-developed. The periostracum is yellowish-green to black and is extensively rayed. The nacre is pinkish-salmon posteriorly and whitish on the anterior portion.

The triangle floater is a generalist and can be found in a variety of stream and river habitats. The host fish is not determined.

Status and Conservation

The dwarf wedgemussel is afforded protection through federal and state Endangered Species acts, federal and state Clean Water acts, Flood Hazard Area Control Act rules (stream encroachment), and environmental reviews of proposed development projects. The other species listed above are scheduled to be listed as state endangered or threatened in late 2001/early 2002. Federal and state Clean Water acts, stream encroachment rules, environmental reviews of proposed development projects and the state Endangered Species Act will serve to help protect existing populations.

Vesper Sparrow, *Pooecetes gramineus*

Status:

State: Endangered

Federal: Not listed

Identification

The “bay-winged bunting,” as it was formerly known, was given the name “vesper sparrow” because it frequently sings during the early evening hours and well into the night. The rich, musical song of the vesper sparrow, which is reminiscent of the song sparrow's (*Melospiza melodia*) melody, consists of a pair of repeated notes, represented as, “here-here where-where,” followed by a series of descending trills. The first two notes are long, slurred, low-pitched whistles while the latter two notes are higher-pitched. The call of the vesper sparrow is a short “hsip.”

The vesper sparrow is a stocky, short-tailed, grayish-brown sparrow with a streaked breast. The upperparts are pale gray-brown and marked with black streaking. The breast is grayish white and streaked with black. A brown cheek patch, which reaches behind the eye, is adjacent to a white sub-mustachial stripe that extends down from the bill. A thin, dark malar stripe (mustache) also extends from the bill, separating the white sub-mustachial stripe from the white throat. There is a white eye-ring that stands out against the brown cheek. Rich brown lesser coverts appear as chestnut shoulder patches on adults. However, the brilliance of these patches is variable and, depending on the view of the bird, may be difficult to see. The wings are marked with a pair of narrow, white wing bars. The tail, which is a key diagnostic indicator in flight, is notched and black with white outer tail feathers, similar to that of a junco (*Junco hyemalis*). The bill is conical-shaped with a dark upper mandible (jaw) and a flesh-colored lower mandible. Likewise, the legs are flesh colored. The iris is reddish brown to dark brown. Although males are slightly larger, the sexes are otherwise similar. Juveniles resemble adults but are buffer overall, have broader wing bars, and lack the chestnut shoulder patches.



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Habitat

Inhabitants of open areas, vesper sparrows reside in cultivated fields, grasslands, fallow fields, and pastures. Agricultural fields containing crops of corn, soybean, alfalfa (*Medicago sativa*), hay, timothy (*Phleum* spp.), wheat (*Agropyron* spp.), or strawberry may be occupied. Farmed areas that are adjacent to fallow fields or contain uncultivated strips along fence-rows are favored. These fallow areas provide nesting habitat, cover, foraging sites, and singing perches. On active farmlands, human disturbance and crop

harvesting can threaten nesting sparrows. Fallow fields and grasslands provide a safer haven for nests.

Vesper sparrow habitats are typically sparsely vegetated with patches of bare ground, low vegetation (1 to 8 in.), and scattered shrubs or saplings. Habitats are typically dry and well drained. Nests are placed within clumps of herbaceous cover that afford protection from predators. Elevated perches, such as fence posts, shrubs, or weeds, provide singing posts from which males can advertise their territories and attract mates. Territory size may range from 0.5 to 3.2 hectares (1.2 to 7.9 acres). Similar habitats are used throughout the year.

Status and Conservation

The vesper sparrow was formerly a common, widespread breeding species within agricultural fields and pastures in the Garden State. Turnbull (1869), Stone (1894a, 1894b), Griscom (1923), Hausman (1935), and Cruickshank (1942) considered it to be a common to abundant summer bird in open cultivated areas of northern New Jersey and the Pine Barrens. However, even at this time, these authors noted its rarity in areas with suburban development. By the 1950s and 1960s, the vesper sparrow, which was by then considered an uncommon breeding species, had undergone population declines resulting from increased development of rural farmlands. Further declines in the Northeast were noted during the mid-1970s and early 1980s. The number of vesper sparrows detected on New Jersey Christmas Bird Counts plummeted from an average of 44 per year in 1971-1973 to four per year in 1983-1985. Likewise, numerous breeding populations documented in the state in the early 1980s were absent by the mid-1990s. The Breeding Bird Survey has shown a significant annual decline in the number of vesper sparrows detected on surveys in the New Jersey from 1966 to 1999 (Sauer et al. 2000).

Due to its dependence on habitats created by farming, the vesper sparrow has suffered significant population declines resulting from the ebb of agriculture in New Jersey. Consequently, the vesper sparrow was listed as a threatened species in New Jersey in 1979. As the breeding population continued to decline and nesting habitat dwindled, the status of the vesper sparrow was reclassified as endangered in 1984. Currently, it is a rare and local breeding species in the state. The New Jersey Natural Heritage Program considers the vesper sparrow to be “demonstrably secure globally.” yet “imperiled in New Jersey because of rarity” (Office of Natural Lands Management 1992). The National Audubon Society included the vesper sparrow on its Blue List of Imperiled Species from 1978 to 1980 and listed it as a local problem species in 1982 due to declines in the eastern population. Throughout much of the Northeast, the vesper sparrow has declined and, as a result, has been listed as endangered in Connecticut and Rhode Island, threatened in Massachusetts, and of special concern in New York.

Wood Turtle, *Clemmys insculpta*

Status:

State: Threatened

Federal: Not listed

Identification

As the taxonomic name insculpta indicates, the wood turtle is distinguished by the sculpted or grooved appearance of its carapace, or upper shell. Each season a new annulus, or ridge, is formed, giving each scute (a scale-like horny layer) a distinctive pyramid-shaped appearance. As the turtle ages, natural wear smooths the surface of the shell. While the scutes of the carapace are brown, the plastron, or underneath shell, consists of yellow scutes with brown or black blotches on each outer edge. The legs and throat are reddish-orange. The male wood turtle has a concave plastron while that of the female is flat or convex. The male also has a thicker tail than the female. Adult wood turtles measure 14 to 20 cm (5.5 to 8.0 in.) in length (Conant and Collins 1991).



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Habitat

Unlike other turtle species that favor either land or water, the wood turtle resides in both aquatic and terrestrial environments. Aquatic habitats are required for mating, feeding, and hibernation, while terrestrial habitats are used for egg laying and foraging. Freshwater streams, brooks, creeks, or rivers that are relatively remote provide the habitat needed by these turtles. Consequently, wood turtles are often found within streams containing native brook trout (Salvelinus fontinalis). These tributaries are characteristically clean, free of litter and pollutants, and occur within undisturbed uplands such as fields, meadows, or forests. Open fields and thickets of alder (Alnus spp.), greenbrier (Smilax spp.), or multiflora rose (Rosa multiflora) are favored basking habitats. Lowland, mid-successional forests dominated by oaks (Quercus spp.), black birch (Betula lenta), and red maple (Acer rubrum) may also be used. Wood turtles may also be found on abandoned railroad beds or agricultural fields and pastures. Nevertheless, wood turtle habitats typically contain few roads and are often over one-half of a mile away from developed or populated areas (Zappalorti et al. 1984). Individuals from relict or declining populations are also sighted in areas of formally good habitat that have been fragmented by roads and development.

Status and Conservation

Historically, the wood turtle was a fairly common species within suitable habitat in New Jersey. By the 1970s, however, declines were noted as wood turtles were absent from many historic sites due to habitat loss and stream degradation. Consequently, the wood turtle was listed as a threatened species in New Jersey in 1979. The New Jersey Natural Heritage Program considers the wood turtle to be “demonstrably secure globally,” yet “rare in New Jersey” (Office of Natural Lands Management 1992).

Since the late 1970s, biologists have monitored and surveyed wood turtle sites in New Jersey, providing valuable data regarding the life history, reproduction, and habitat use of these turtles in the state. There is, however, a continuing need to examine the productivity and juvenile survival of wood turtles, which may be threatened by disturbance or predation.

In 1995, the wood turtle was proposed for inclusion on the federal endangered species list. Despite declines in several northeastern states, populations were considered stable enough throughout the species' entire range to deny listing. However, the wood turtle was considered by the U.S. Fish and Wildlife Service as a species that, “although not necessarily now threatened with extinction may become so unless trade in them is strictly controlled” (U.S. Fish and Wildlife Service 1995). As a result, international trade of these turtles is strictly monitored and regulated through the CITES Act (Convention on International Trade in Endangered Species of Wild Flora and Fauna Act). The New Jersey Endangered Species Act prohibits the collection or possession of wood turtles.

APPENDIX D: LOCAL & REGIONAL CONSERVATION GROUPS

The following non-profit groups may be of interest to readers of this report. Listing does not constitute an endorsement by Holland Township or Kratzer Environmental Services.

<p>Association of NJ Environmental Commissions</p> <p>ANJEC is a private, nonprofit educational organization for environmental commissioners, concerned individuals and organizations to protect natural resources and improve the quality of life in NJ.</p>	<p>www.anjec.org</p>
<p>Bowman's Hill Wildflower Preserve</p> <p>The mission of Bowman's Hill Wildflower Preserve is to lead people to a greater appreciation of native plants, to an understanding of their importance to all life, and to a commitment to the preservation of a healthy and diverse natural world.</p>	<p>www.bhwp.org</p>
<p>Central Jersey Trout Unlimited</p> <p>Our mission is to conserve, protect and restore New Jersey's cold water fisheries and their environments.</p>	<p>www.cjtu.org</p>
<p>ConserveOnline</p> <p>ConserveOnline is a "one-stop" online, public library, created and maintained by The Nature Conservancy in partnership with other conservation organizations.</p>	<p>www.conserveonline.org</p>
<p>Conserve Wildlife Foundation of New Jersey</p> <p>The Conserve Wildlife Foundation of NJ is a private, not-for-profit organization dedicated to conserving and protecting New Jersey's endangered and threatened wildlife.</p>	<p>www.conservewildlifenj.org</p>
<p>D&R Greenway Land Trust</p> <p>D&R Greenway Land Trust is a non-profit land preservation organization for central New Jersey. Its mission is to preserve and protect a network of natural lands and open spaces, to provide appropriate access and to inspire a conservation ethic for land preservation.</p>	<p>www.drgreenway.org</p>
<p>Delaware River Greenway Partnership</p> <p>The mission of the Delaware River Greenway Partnership is to promote the public and private stewardship of a regional corridor of natural, historic, cultural, scenic and recreational resources along the Delaware River and its tributaries, and to acknowledge the nationally recognized Delaware River system through a public/private partnership.</p>	<p>www.delawarivergreenway.org</p>
<p>Delaware Riverkeeper Network</p> <p>The Delaware Riverkeeper is the voice of the Delaware River and its streams, championing their rights as living members of our community, and is leader for the Delaware Riverkeeper Network.</p>	<p>www.delawariverkeeper.org</p>
<p>Earth Share of New Jersey</p> <p>A coalition of leading environmental organizations working to promote human health and welfare through environmental management, conservation, advocacy, research, education, and grassroots organizing in New Jersey.</p>	<p>www.earthsharenj.org</p>
<p>Garden State EnviroNet</p> <p>New Jersey environmental news and information.</p>	<p>www.gsenet.org</p>
<p>Highlands Coalition</p>	<p>www.highlandscoalition.org</p>

<p>The Highlands Coalition seeks to protect and enhance the sustainability of natural and human communities in the Highlands region of PA, NJ, NY and CT</p>	
<p>Hunterdon Coalition</p>	<p>www.hunterdoncoalition.org</p>
<p>The Hunterdon Coalition is made up of a mix of local officials and activists to promote public involvement in land use decisions.</p>	
<p>Hunterdon County Soil Conservation District</p>	<p>www.state.nj.us/agriculture/rural/natsrc.htm</p>
<p>The New Jersey Department of Agriculture helps to protect and conserve the state's soil, water and related natural resources technical, financial and regulatory assistance and provides educational outreach to landowners throughout the state.</p>	
<p>Hunterdon County - Rutgers Cooperative Research and Extension</p>	
<p>www.co.hunterdon.nj.us/depts/rutgers/rutgers.htm</p>	
<p>The Cooperative Extension serves as the educational outreach arm of the US Dept. of Agriculture to provide research based information concerning agriculture, nutrition and food safety.</p>	
<p>Hunterdon Land Trust Alliance</p>	<p>www.hlta.org</p>
<p>The HLTA's mission is to preserve the county's scenic beauty, and its environmental and historic resources; to provide for the permanent preservation of farmland and to support and foster agricultural viability; and to promote the conservation and appropriate management of woodlands and open space.</p>	
<p>International Rivers</p>	<p>www.irn.org</p>
<p>International Rivers Network protects rivers and defends the rights of communities that depend on them.</p>	
<p>Musconetcong Watershed Association</p>	<p>www.musconetcong.org</p>
<p>The Musconetcong Watershed Association's mission is to protect, preserve and enhance the natural, historical and recreational resources of the Musconetcong River watershed.</p>	
<p>National Wildlife Federation</p>	<p>www.nwf.org</p>
<p>The National Wildlife Federation promotes wildlife conservation.</p>	
<p>Native Plant Society of New Jersey</p>	<p>www.npsnj.org</p>
<p>The Native Plant Society of NJ is a statewide non-profit organization founded for the appreciation, protection, and study of the native flora of New Jersey.</p>	
<p>Natural Resources Defense Council</p>	<p>www.nrdc.org</p>
<p>The Natural Resources Defense Council's purpose is to safeguard the Earth: its people, its plants and animals and the natural systems on which all life depends.</p>	
<p>NatureServe</p>	<p>www.natureserve.org</p>
<p>NatureServe is a network providing the scientific basis for effective conservation of rare and endangered species and threatened ecosystems. NJ Natural Heritage Program is the local program for NJ:</p>	
<p>www.state.nj.us/dep/parksandforests/natural/heritage/index.html</p>	
<p>New Jersey Aquarium</p>	<p>www.njaquarium.org</p>
<p>The New Jersey Academy for Aquatic Sciences promotes the understanding, appreciation and protection of aquatic life and habitats through research, education and youth development programs.</p>	
<p>New Jersey Audubon</p>	<p>www.njaudubon.org</p>
<p>The NJAS is a statewide non-profit organization which fosters environmental awareness and a conservation ethic among NJ's citizens; protects NJ's birds, other animals, and plants, especially endangered and threatened species; and promotes preservation of NJ's valuable natural habitats.</p>	
<p>New Jersey Community Water Watch</p>	<p>www.waterwatchonline.org/nj</p>

<p>New Jersey Community Water Watch is a joint program between AmeriCorps and the NJPIRG Law and Policy Center that works to empower students and community members to address water quality problems in NJ's urban areas through education, cleanups and stream monitoring.</p>	
<p>New Jersey Conservation Foundation</p>	<p>www.njconservation.org</p>
<p>The NJCF mission is to preserve New Jersey land and natural resources for the benefit of all now and for future generations. As a leading innovator and catalyst for saving land, NJCF: creates and promotes strong land use policies; protects strategic lands.</p>	
<p>New Jersey Future</p>	<p>www.njfuture.org</p>
<p>New Jersey Future's mission is to achieve smart growth statewide: growth that protects New Jersey's open lands and natural resources, improves communities, transportation and housing choices through research, policy analysis, public education and advocacy.</p>	
<p>New Jersey Chapter Sierra Club</p>	<p>www.newjersey.sierraclub.org</p>
<p>Mission is to explore, enjoy, and protect the wild places of the earth; To practice and promote the responsible use of the earth's ecosystems and resources; To educate and enlist humanity to protect and restore the quality of the natural and human environments.</p>	
<p>New Jersey Section - American Water Works Association</p>	<p>www.njawwa.org</p>
<p>The NJAWWA is dedicated to the promotion of public health and welfare in the provision of drinking water of unquestionable quality and sufficient quantity by advancing the technology, science, management and government policies relative to the stewardship of water.</p>	
<p>Regional Planning Partnership</p>	<p>www.planningpartners.org</p>
<p>The Regional Planning Partnership is an independent civic action group committed to improving the quality of community life through sound land use planning and regional cooperation in the Raritan and Delaware Rivers region.</p>	
<p>Save Our Resources Today</p>	<p>www.sort.org</p>
<p>Environmental news, links and calendar of events.</p>	
<p>The Nature Conservancy - New Jersey chapter</p>	<p>www.nature.org/wherewework/northamerica/states/newjersey/</p>
<p>The mission of the Nature Conservancy is to preserve the plants, animals and natural communities that represent the diversity of life on Earth by protecting the lands and waters they need to survive.</p>	
<p>Watershed Partnership for New Jersey</p>	<p>www.wpnj.org</p>
<p>The Watershed Partnership for NJ is a statewide network of watershed education and outreach representatives from more than 70 non-profit, government, educational and private organizations.</p>	
<p>Wild New Jersey</p>	<p>http://www.wildnj.com/</p>
<p>Created to foster an understanding of, and respect for, wildlife and wild places in the Garden State.</p>	