

Appendix F



Photo credit: Richard Howland

Endangered Species Act, Section 7 Consultation

INTRA-SERVICE SECTION 7 BIOLOGICAL EVALUATION FORM

Originating Person:

Steven Henry, Acting Refuge Manager
Great Swamp National Wildlife Refuge
241 Pleasant Plains Road
Basking Ridge, NJ 07920

Telephone Number: (413) 253-8688

Date:

I. Region: R5

II. Service Activity (Program): Management direction from the Great Swamp National Wildlife Refuge Comprehensive Conservation Plan (CCP)

III. Pertinent Species and Habitat:

A. Listed species and/or their critical habitat within the action area:

Bog Turtle (*Clemmys [Glyptemys] muhlenbergii*)
Indiana Bat (*Myotis sodalis*)

B. Proposed species and/or proposed critical habitat within the action area:

Northern long-eared bat (*Myotis septentrionalis*)

C. Candidate species within the action area:

None

D. Include species/habitat occurrences on a map.

The New Jersey Field Office has these maps.

IV. Geographic area or station name and action: Great Swamp National Wildlife Refuge, Basking Ridge, New Jersey

V. Location: See attached map

A. Ecoregion Number and Name: Hudson River/New York Bight

B. County and State: Morris County, New Jersey

C. Section, township, and range (or latitude and longitude):

D. Distance (miles) and direction to nearest town: 7 miles south of Morristown, NJ

E. Species/habitat occurrence:

A variety of habitats, including tussock sedge wet meadows, old fields, emergent marsh, upland forest, impoundments, red maple-tussock sedge wooded marsh, and shrub-swamp are found throughout the refuge. The refuge currently contains approximately 5,000 acres of forested bottomlands, 300 acres of upland forest, 700 acres of non-forested uplands, 500 acres of open water impoundments, 800 acres of managed and natural grasslands, 60 acres of scrub-shrub, and 315 acres of managed brushlands.

More than 240 species of birds have been recorded during various times of the year at Great Swamp NWR. The refuge provides significant migratory, wintering and nesting habitat for numerous waterfowl, waterbirds, and landbird species, particularly within the regional context of the urbanized New York City Metropolitan Area. Approximately 109 bird species have been recorded nesting within or near the refuge. Waterfowl species that utilize the refuge for foraging or resting during migration include mallard (*Anas platyrhynchos*), American black duck (*Anas rupripes*), green-winged teal (*Anas carolinensis*), American wigeon (*Anas americana*), Northern pintail (*Anas acuta*), gadwall (*Anas strepera*), Northern shoveler (*Anas clypeata*), blue-winged teal (*Anas discors*), Canada goose (*Branta Canadensis*), Ring-necked ducks (*Aythya collaris*), and bufflehead (*Bucephala albeola*). The most common waterfowl nesting on the refuge are wood duck (*Aix sponsa*), mallard, Canada goose, and an occasional hooded merganser (*Lophodytes cucullatus*), a State-listed Special Concern species. Approximately 87 species of land birds with varying levels of regional priority have been identified on the refuge.

Approximately 39 mammalian species have been identified at Great Swamp NWR. Common species include white-tailed deer (*Odocoileus virginianus*), raccoon (*Procyon lotor*), Virginia opossum (*Didelphis virginiana*), striped skunk (*Mephitis mephitis*), masked shrew (*Sorex cinereus*), smoky shrew (*Sorex fumeus*), and star-nosed mole (*Condylura christata*). Eight bat species, including the federally listed endangered Indiana bat, have been identified at the refuge. Other species of concern identified include Eastern red bat (*Lasiurus borealis*), Eastern small-footed bat, and hoary bat (*Lasiurus cinereus*). In addition to Indiana bat, certain bat species documented at the refuge including Northern long-eared bat, tri-colored bat and the little brown bat have been threatened by White-Nose Syndrome (WNS).

Great Swamp NWR hosts populations of the federal listed threatened bog turtle and state listed threatened wood turtle and the state-endangered blue spotted salamander (*Ambystoma laterale*). Management efforts to monitor, sustain and expand refuge populations are ongoing for both of these species. Two State-listed Special Concern species, including the box turtle (*Terrapene carolina*) and spotted turtle, remain common at the refuge. Additional species include the snapping turtle (*Chelydra serpentina*), Eastern painted turtle (*Chrysemys picta*), musk turtle (*Sternotherus odoratus*), and Eastern mud turtle (*Kinosternon subrubrum*).

VI. Description of proposed action

The draft CCP/EA evaluated four alternative scenarios for managing the refuge over the next 15 years. The CCP Planning Team and the NWR Senior Leadership Team have identified alternative B as the future management scenario.

Alternative B proposes consolidated management of habitat types to benefit migratory waterbirds, waterfowl, forest interior dwelling birds, Indiana bats, grassland birds, and rare reptiles.

Below are specific descriptions of the listed species that could potentially be affected by the management direction in this CCP. We are seeking informal consultation on our proposed management direction.

Bog Turtle (*Glyptemys [Glyptemys] muhlenbergii*)

In the early 1960s, Rutgers University researchers were the first to raise awareness about bog turtles being located in the newly established refuge. The refuge is one of three NWRs in the Northeast in which populations of the bog turtle are known to occur. Several sites on the refuge have either had recent or historic bog turtle activity (USFWS

2012b). In May 2004, active monitoring of the refuge's bog turtle populations began using methods such as radio-telemetry, mark recapture, and nest protection (Schmuck 2012). These studies provide important information on bog turtle habitat use, home-range size, and population density, as well as identifying new subpopulations on the refuge (USFWS 2012b).

Since May 2004, a total of 31 bog turtles have been captured at three sites on the refuge. Of these, 17 were captured during visual surveys, three in live catch box traps, two captured while copulating with a radio-tracked turtle, four captured in nest tubs as hatchlings, and five captured as hatchlings in nest cages after the nest was located by thread spooling, a technique used to locate nests of known gravid females. Of the bog turtles captured, two males and eight females were classified as breeding age, which is over the age of eight (Schmuck 2012).

Beginning in 2009, the refuge began monitoring nest sites to measure clutch size and nesting success at the refuge. In 2009, the refuge monitored two nests containing three eggs each, which had 33 percent and 100 percent nest success rates. Of the eggs that did not hatch, one egg was determined to be infertile and the second contained a developing embryo, which appeared to have drowned due the egg being located at the bottom of the nest. No nests were monitored in 2010. In 2011, the refuge monitored one nest containing five eggs; however, the nest failed due to flooding associated with Hurricane Irene. In 2012, the refuge monitored two nests, which contained three and five eggs each. The nest success rate was determined to be 100 percent and 40 percent, respectively, resulting in a total of five new hatchlings. The unhatched eggs were found to be infertile. All hatchlings were marked, measured, and released on site for future monitoring (Schmuck 2012).

In addition to active monitoring, habitat management and restoration efforts also began in 2004. Informal habitat assessments indicated a considerable portion of historic bog turtle habitat has degraded in quality due to encroachment of invasive plants and natural succession of tussock sedge-dominated wetlands to red maple swamps. Limited habitat restoration activities were conducted in select areas to open the canopy by girdling trees, cutting pole-sized trees and applying glyphosate to the stump to prevent re-growth, or injecting imazapyr into trunks of larger diameter trees. Habitat management activities also included the control of invasive plant species, such as Japanese stilt grass and common reed grass (USFWS 2012b).

The refuge will continue to conduct habitat restoration activities while also documenting the effects of habitat restoration practices, including herbicide application, on the refuge's bog turtle population and its habitat (USFWS 2012b).

One of the greatest threats to bog turtles is the loss of long-lived, wild, adult animals to a lucrative, illegal wildlife trade (USFWS 2001). Another serious threat is the continued loss, alteration or fragmentation of the highly specialized species' wetland habitat.

The overall objective in the recovery plan is to protect and maintain existing populations of this species and its habitat, enabling its eventual removal from the federal list of endangered and threatened wildlife and plants (USFWS 2001). The plan identifies five bog turtle recovery units and their subunits. The refuge lies in the Hudson River/Housatonic Unit, Wallkill River Watershed Subunit. Strategies in the draft CCP/EA follow the recovery plan's recommendations of tasks that, eventually, will lead to the delisting of this species. Those recommendations include the following strategies found on pp. 3-55 through 3-57 of the draft CCP/EA that are either already being implemented on the refuge or proposed.

- Continue to conduct invasive species management, when and where necessary. Some examples of management include the release of *Galericucella* spp. beetles to control purple loosestrife and application of herbicides to control common reedgrass.
- Continue to maintain and restore, when necessary, bog turtle and wood turtle habitats.
- Continue to conduct vegetation and wildlife surveys, such as waterfowl banding data collection and bog turtle and wood turtle surveys to monitor trends, especially for species of conservation concern.
- Continue to cooperate with partners, students, and volunteers to conduct vegetation and wildlife surveys and research.

- Increase management and restoration of open, spring-fed wetlands for the purpose of benefitting the federally threatened bog turtle. Continue or increase, if necessary, monitoring of the bog turtle population.
- Where feasible, suppress woody plant succession to maintain emergent areas or restore emergent habitat to improve habitat diversity and wildlife visibility.
- Increase monitoring, early detection/rapid response (EDRR), and control of invasive species, especially in areas where change in management or land use occurs or emergent infestations develop and along dispersal corridors (roads, ditches, trails, etc.).
- Research the feasibility and risk of low density grazing for control of select woody and invasive vegetation.
- Increase use of biological control, where possible and practical.
- Evaluate feasibility of future reintroduction of bog turtle hatchlings to increase population and genetic variability on the refuge.

Indiana Bat and northern long-eared bat

The Indiana bat, a State and federally listed endangered species, and the northern long-eared bat utilize riparian corridors at Great Swamp NWR for foraging and warm season roosting.

The refuge has accumulated six summers of intensive bat population and roosting ecology data. Mist-netting and banding of captured bats occurred from May 15 through August 15 from 2006 to 2010 and from June to August 2012. While previous years' netting targeted flight corridors expected to yield Indiana bats, netting in 2012 aimed to comprise foraging habitat of all native, cave-dwelling bats on the refuge and assess the impacts of WNS on species populations. These combined datasets may represent the richest pre- and post-WNS population monitoring database of any refuge in the Region (USFWS 2012a).

Prior to the discovery of WNS in New Jersey, research was conducted at the refuge during the summers of 2006 and 2007 to determine roost selection and landscape movements of Indiana bats (USFWS 2012a; M. Kitchell 2008). The primary goal of the study was to identify and characterize roosts selected by reproductively active female Indiana bats, although all bats captured during mist netting efforts were identified to species, examined to assess general health, and fitted with numbered aluminum bands. Research was continued for another three field seasons (from 2008 to 2010), collecting similar information (USFWS 2012a; L. White, In Prep.). Thus, three years of data were collected on bats at the refuge prior to detection of WNS in the State.

During the first two years of the study (2006 to 2007), a total of 520 bats representing six species were captured, including Indiana bat, little brown bat, big brown bat, Northern long-eared bat, red bat, and tri-colored bat (Bohrman and Fecske 2013). Twenty four female Indiana bats were radio-tracked to 74 roost sites, representing three colonies, and peak emergence counts of Indiana bats at four primary trees were 252, 164, 52, and 55 bats (M. Kitchell 2008). During the following three summers (2008 to 2010), a total of 680 bats representing seven species were captured, including the aforementioned species as well as hoary bat (*Lasiurus cinereus*) (Bohrman and Fecske 2013; L. White, In Prep). However, the number of bats captured among the three years differed ($P < 0.05$). For example, in 2008, 276 bats (representing 40.6 percent of all captures from 2008 to 2010) were captured; in 2009, the number was 231 (34.0 percent of all captures); and in 2010, 173 bats (25.4 percent of all captures) were captured. Decreasing numbers of captures over the three-year period were attributed to the emergence of WNS in New Jersey (Bohrman and Fecske 2013; L. White, In Prep.).

No research was conducted in 2011. However, the 2012 bat inventory and monitoring effort at the refuge comprised mist netting at a level of effort comparable to previous years (2006 to 2010), radio-telemetry, and both mobile and stationary acoustic surveys. Nine mist net sites were sampled across the refuge, seven of which were netted historically. Demographic and morphometric data were gathered for all captured bats. A combination of swab sample collection and wing score indexing was used to detect evidence of WNS, and individuals were fitted with numbered aluminum bands. Select bats were radio-tagged and tracked to roosts daily for the lifespan of the transmitters.

During the summer 2012, a total of 215 bats representing five species were captured. Proportions of little brown, Indiana, and big brown bats continued the trend from 2008-2010, with little brown bat captures dropping by an additional 3.8 percent and Indiana bat captures by 5.9 percent from 2010 to 2012, while big brown bat captures increased from 68.2 percent in 2010 to 82.8 percent in 2012. Relative proportions of Northern long-eared bats and tri-colored bats also declined, with Northern long-eared bat captures decreasing by 4.5 percent and tri-colored bat captures by 5.2 percent. Additionally, the proportion of Eastern red bats captured in mist-nets increased by 5.5 percent (USFWS 2012a). Wing Damage Index scores collected in 2012 were low across species but means scores were higher than those recorded in 2009 and 2011. An ectodermic swab sample taken from one of 30 bats sampled tested positive for *P. destructans* (USFWS 2012a).

The complete data from 2006 to 2012 demonstrate total declines of 39.9 percent in little brown bat captures, 16.6 percent in Indiana bat captures, 6.6 percent in Northern long-eared bat captures, 3.4 percent in tri-colored bat captures, and total increases of 57.7 percent in big brown bat captures and 9.2 percent in Eastern red bat captures since 2006 (USFWS 2012a). These trends suggest that WNS has caused a marked reduction in the number of Myotis species on the refuge, particularly little brown bats. Recent increases in the proportion of big brown bat and Eastern red bat captures suggest that these species are resistant or resilient to the fungus and may be experiencing population increases or range expansions, potentially resulting from recent niche vacancies or reduced roosting and foraging competition by Myotis.

The strategies related to Indiana bats can be found on page 3-75 through 3-82 of the draft CCP/EA. They include habitat improvements along riparian corridors, vernal pools, bottomland forest, and mature upland forest types.

- Continue to conduct invasive species management, as necessary.
 - Continue to allow dead trees and snags to persist (i.e., no cutting or removal), which would provide additional microhabitats (e.g., natural cavities), for various wildlife species, including bats, woodpeckers, owls, and other wildlife species.
 - Continue selective cutting using chainsaws or other techniques.
 -
- Monitoring Elements:
- Continue to conduct vegetation and wildlife surveys, such as Indiana bat surveys, to monitor trends, especially for species of conservation concern.
 - Continue to cooperate with partners, students, and volunteers to conduct vegetation and wildlife surveys, such as bat emergence counts

VII. Determination of effects:

A. Explanation of effects of the action on species and critical habitats in items III. A, B, and C (attach additional pages as needed):

Bog Turtles

We predict no adverse impacts on bog turtles from implementing the management direction for the following reasons.

- When conducting habitat management techniques, such as girdling red maple stems and grazing, we would adhere to guidelines in the most current Biological Opinion.
- The biological agents we would use to control invasive plants in bog turtle habitat would be species-specific and therefore would affect only the targeted, unwanted vegetation. They would have no effect on desired plant species at bog turtle sites, such as tussock sedge.

- The foot traffic of refuge staff monitoring bog turtles and their habitat and managing vegetation would not cause adverse effects at those sites because we would keep foot traffic and equipment hauling to a minimum to protect the seep vegetation. We would not drive vehicles, ORVs, or heavy equipment on turtle sites.
- Based on radio-telemetry tracking the refuge provides foraging, nesting, and hibernation habitat for the bog turtle. The bog turtles will continue to be tracked and trapping will continue in areas that have historically had bog turtles to find all areas this species occurs on the refuge. All known and historical bog turtle sites are closed to the public and not located near trails. We anticipate that these uses are not likely to adversely affect bog turtles.

Indiana bat

Based on the research done on the refuge using radio-telemetry tracking and bat acoustic surveys, the refuge provides foraging and roosting habitat for Indiana and northern long-eared bats. We are planning to continue acoustic surveys and periodic mist net surveys to assess the status of Indiana bats within the refuge. Currently roost sites are in closed areas of the refuge or off trails. Indiana bats will continue to be monitored with cooperation of many of our partners and with New Jersey USFWS Ecological Field Office throughout the State and if roost sites are found in public areas or trail corridors on the refuge public use in those areas will be re-evaluated. Bats are likely using the area around the boardwalk trail as a flight corridor or for feeding. This activity happens at dusk when visitors are not present. We anticipate that these uses are not likely to adversely affect Indiana bats because these activities do not coincide with the area where this species is known to occur. If Indiana or northern long-eared bats are found to have established maternity colonies in public use areas or near hiking trails, we would institute seasonal closures as necessary.

Disturbance by deer hunting to Indiana bats is unlikely because bats are gone from the refuge during the time of the hunt. The refuge also provides foraging, nesting, and hibernation habitat for the bog turtle. A small population occurs in a few acres of emergent wetland habitat in a refuge Safety Zone area. Additionally, several wetlands associated with seeps that historically have supported bog turtles are scattered throughout the refuge; in the recent past, single occurrences of the species have been documented in two of these areas. In general, activity of bog turtles during fall is limited as the animals reduce their movements and enter hibernacula (e.g., ground water-washed root systems of woody plants). Also, it is very unlikely that a hunter will encounter a bog turtle, as the primary population falls within a Safety Zone and much of the area is protected by fencing.

Disturbance by turkey hunting to Indiana bats is unlikely because bats are rare, they roost during the day under the exfoliating bark of trees or in structures, and are they most active at night. Also, it is very unlikely that a hunter will encounter a bog turtle, as the primary population falls within a Safety Zone and much of the area is protected by fencing. Additionally, because turkeys are an upland species, hunters are less likely to enter or remain in wetland habitats, where turtles are found. In fact, the type of habitat that bog turtles use (characterized by shallow water and deep “mucky” soils, USFWS 2012b) likely will be avoided by hunters as they travel to their desired turkey hunting areas.

B. Explanation of actions to be implemented to reduce adverse effects: N/A

VIII. Effect determination and response requested: [* = optional]

A. Listed species/designated critical habitat:

Determination

Response requested

no effect/no adverse modification

____ N/A

may affect, but is not likely to adversely affect species/adversely modify critical habitat

(species: Bog Turtle (*Clemmys [Glyptemys] muhlenbergii*) and Indiana Bat (*Myotis sodalis*))

Concurrence

may affect, and is likely to adversely affect species/adversely modify critical habitat (species: _____)

____ N/A

B. Proposed species/proposed critical habitat:

Determination

Response requested

no effect on proposed species/no adverse modification of proposed critical habitat (species: Northern long-eared bat (*Myotis septentrionalis*))

*Concurrence

is likely to jeopardize proposed species/adversely modify proposed critical habitat (species: _____)

____ Conference

C. Candidate species:

Determination

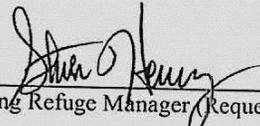
Response requested

no effect (species: _____)

____ *Concurrence

is likely to jeopardize candidate species (species: _____)

____ Conference


Acting Refuge Manager (Requestor)

8/14/2014
Date

IX. Reviewing ESFO Evaluation:

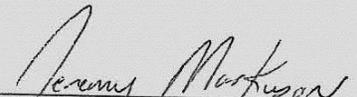
A. Concurrence Nonconcurrency _____

B. Formal consultation required _____

C. Conference required _____

D. Informal conference required _____

E. Remarks (attach additional pages as needed):


Endangered Species Biologist (Reviewer),
New Jersey Field Office

9-9-2014
Date


Assistant Supervisor, New Jersey Field Office

9 Sept 14
Date

Literature Cited

- Bohrman, J. and D. Fecske. 2013. White-nose syndrome surveillance and summer monitoring of bats at Great Swamp National Wildlife Refuge. Final Report. U.S. Fish and Wildlife Service, Great Swamp National Wildlife Refuge, Basking Ridge, New Jersey. 115 pp.
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- Schmuck, Evie. 2012. Summary of data collected on bog turtles (*Glyptemys muhlenbergii*) captured at Great Swamp National Wildlife Refuge.
- U. S. Fish and Wildlife Service. 2001. Bog turtle (*Clemmys muhlenbergii*), Northern Population, Recovery plan. Hadley, Massachusetts, 103 pp.
- . 2012a. Summary of bat research at Great Swamp National Wildlife Refuge, Morris County, New Jersey during 2006-2012. U.S. Department of the Interior, U.S. Fish and Wildlife Service, Great Swamp National Wildlife Refuge, 2012.
- . 2012b. Assessing effectiveness of habitat restoration activities at restoring historic bog turtle habitat at Great Swamp National Wildlife Refuge. U.S. Fish and Wildlife Service, Great Swamp National Wildlife Refuge, Basking Ridge, New Jersey. Information by Dorothy Fecske, Refuge Biologist, 2012.
- White, Lindsay. 2009. Roost selection of Indiana bats (*Myotis sodalis*) in northern New Jersey, at local and landscape levels. M.S. Thesis research proposal: William Paterson University, Wayne, NJ. 20 pp.