

New Jersey Fact Sheet: Forest Management and Indiana Bats

Introduction

The Indiana bat (*Myotis sodalis*) is a small insectivorous mammal that inhabits the eastern half of the United States. In New Jersey, this bat species is known to occur in the Northern and Central Highlands regions, with potentially suitable habitat existing throughout the northern part of the state. As a nocturnal insectivore, the Indiana bat consumes large quantities of flying insects, including mosquitoes and agricultural pests. In 1967, sharp declines put this mammal on the federal endangered species list, and in 1973 it became the state's only endangered bat species.

From April through September, Indiana bats typically inhabit both upland and wetland forests. Female Indiana bats form maternity colonies with as many as 100 individuals that gather and raise their young together. Males spend the summer alone or in small groups, often living near the maternity colonies. In the fall, these animals will begin their migration back to their overwintering sites, which are typically within a 30-mile radius of their summer territory, but can be more than 100 miles away. During this time they mate and forage in preparation for hibernation. From late October to April, Indiana bats hibernate with other bat species in caves and old mines. This species is a crucial component in New Jersey's ecosystems and provides significant benefits to agriculture and public health.

Threats and Decline

The Indiana bat, one of nine bat species in New Jersey, faces several threats, including human disturbance, habitat destruction, and disease, as well as having a slow reproductive rate and specialized habitat requirements. A recent threat is the onset of White-Nose Syndrome (WNS), a fungus that disrupts the bats' regular hibernation cycle, often killing them. Prior to the current population decline that started in the late 1960s, nearly 85 percent of all Indiana bats in New Jersey hibernated in only seven caves. This limited distribution, combined with reduced numbers of bats, makes this species vulnerable to disturbance. This species requires specific conditions for hibernation, and even small changes in temperature, moisture, and air flow at overwintering



Indiana bat (*Myotis sodalis*) (© Adam Mann, Environmental Solutions and Innovations, USFWS)

sites can be damaging. Successful rearing of young also depends on the conditions surrounding the maternity colony. Females have a low reproductive rate, giving birth to only one or two offspring per year. Such low fecundity means that even minimal mortality to young can result in severe impacts to the population.

Habitat Requirements

The United States Fish and Wildlife Service (USFWS) has determined minimum suitable habitat characteristics for the summer range of this endangered bat species. Typically, forested wetlands and forested uplands provide the best resources for the Indiana bat. For every acre of forest, at least 16 "roost trees" should be present. These roost trees can be described as:

- Live shagbark hickory (*Carya ovata*) trees
- Lightning-struck trees, 9 inches in diameter or more
- Dead or dying trees with some exfoliating (flaking) bark remaining
- Any tree greater than 26 inches in diameter

Roost trees provide individual bats with cover from predators and harsh weather conditions while also providing a microclimate of optimal temperatures. In general, summer roosts will fall into two categories, the primary roosting sites and the alternate roosting sites.

Primary roosting sites are typically in open, sunny patches adjacent to water, and are occupied repeatedly throughout the summer. Alternate roosting sites are inhabited far less frequently, but are sometimes found within a forest interior. These sites are generally used when the primary roosts are unavailable or when conditions there are unfavorable, for example when predators or parasites are present. Optimum foraging conditions are often closely related to sources of water, so riparian and wetland habitats are highly valuable. In some instances, early successional meadows may also be good sources of food.

Management Planning

This mammal is known to occur in Sussex, Passaic, Morris, Union, Essex, Somerset, and Hunterdon counties, with potential habitat in Warren, Bergen, Middlesex, and Mercer counties. In these counties it is critical to consider the Indiana bat's habitat requirements while managing forests. Before any management plans are implemented, it is important to determine if this species occupies the project site. The New Jersey Endangered and Non-game Species Program (ENSP) maintains a mapping tool called the Landscape Project that provides information to landowners regarding rare and endangered wildlife occurrences. Information regarding this tool can be found on ENSP's website. A list of municipalities that have Indiana bat records is also maintained by the USFWS and can be found on the USFWS New Jersey Field Office website. This information should be incorporated into a Forest Stewardship Plan that will then outline certain precautions to avoid adverse effects to Indiana bats while also improving the habitat.

With proper planning, a Forest Stewardship Plan can not only meet a landowner's goals and objectives, but also avoid harm to an existing bat population while improving or maintaining suitable habitat. Improved habitat for Indiana bats will also benefit many other bat species and wildlife that occur in New Jersey as well as enhance economic and ecological value to a forest stand.



Indiana bats inhabit forested uplands and wetlands that provide cover, food, and water (John Parke, NJA)

Managing and Improving Potential Habitat

Several options are available to provide suitable habitat for Indiana bats. Due to the sensitivity of this species, landowners managing or creating habitat for this species should consult a natural resource professional as well as the appropriate state and federal agencies before implementing management activities. A Forest Stewardship Plan that focuses on wildlife habitat management will often present the best options, including:

- Maintain 60% canopy closure (USFWS)
- Preserve snags (standing dead trees) and dead or dying trees (USFWS)
- Preserve shagbark hickories (*C. ovata*) and other valuable roost trees (USFWS)
- Selectively remove trees near valuable roost trees to provide more solar exposure
- Girdle select trees to create more standing snags
- Create small forest openings to serve as foraging areas
- Create artificial roosts using shingles, asphalt paper, bat boxes, etc



(Left to right) Shagbark hickories (*C. ovata*) naturally have exfoliating bark that provides Indiana bats with vital roosting sites (John Parke, NJA); however, roost trees can be created by girdling select trees (Don Donnelly, NJA) or by preserving standing snags (Kristen Meistrell, NJA). Artificial roosts can also be created using various materials (shingles, asphalt paper, etc.) that mimic structural elements of a roost tree (John Parke, NJA)



Indiana bats spend the winter hibernating in caves and abandoned mines, like this one in Morris County (left, © Christopher Magarelli). This mammal often hibernates in large groups (middle, © John R. Omer, USFS) along with other bat species, including the little brown bat (*Myotis lucifugus*) (right, Kristen Meistrell, NJA)

- Create artificial water sources (small ponds, vernal pools) for drinking water and increased foraging opportunities

Girdling, selective removal of competitive vegetation, herbicide application, and prescribed burns can also be integrated in order to promote tree vigor and forest health. Certain restrictions and regulations may apply to wetland or riparian (stream or river) areas, so it is important to consult an approved forester or natural resource professional.

Preventing Disturbance in Known Locations

The USFWS maintains a list of Best Management Practices to guide forestry operations in known or potential Indiana bat habitat. Each site and project may require additional precautions, so it is important to consult ENSP and USFWS for proper guidance; however, some recommendations include:

- Implement operations during the hibernation period (typically November 15 through March 31)
- Limit forestry operations within 300 feet of a water source
- Limit forestry operations within 500 feet of a known hibernaculum
- Avoid the use of prescribed burns within 1,000 feet of a known hibernaculum

- Minimize forest fragmentation and preserve large, contiguous tracts of habitat

Financial and Technical Assistance

A Forest Stewardship Plan that incorporates some of the management practices discussed above can promote a healthy ecosystem that is beneficial to Indiana bats and other wildlife. An approved forester or natural resource professional can assist with the development and implementation of the plan, however; the landowner is generally responsible for all costs and applicable fees.

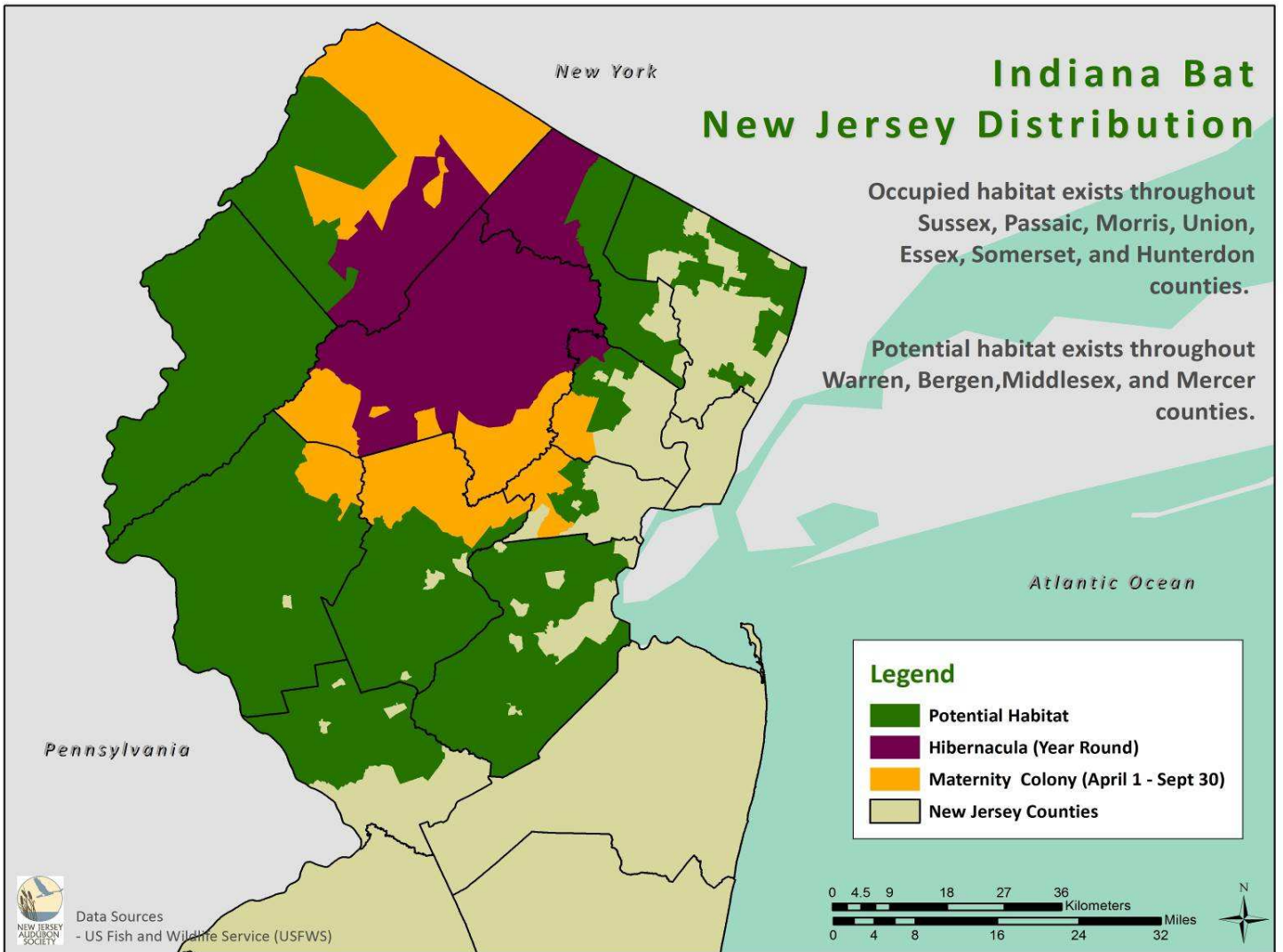
The Natural Resources Conservation Service (NRCS) offers technical and financial assistance to forest landowners through the Environmental Quality Incentives Program (EQIP). Eligible landowners with 10 acres or more of forest land may receive cost-share assistance for the development and implementation of a Forest Stewardship Plan. Forest Stewardship Plans cost-shared through EQIP must be prepared by an NRCS approved Technical Service Provider (TSP). A list of TSPs can be found at a local NRCS service center or on the NJ NRCS website.

NRCS office locations and more detailed information about NRCS assistance and the EQIP program can be found at: www.nj.nrcs.usda.gov/



Bat populations throughout the United States have been in decline due to habitat destruction and the onset of White Nose Syndrome (little brown bat pictured, left, New York Dept. Environmental Conservation). Biologists have been diligently researching and monitoring these populations (middle, © Bryon Dubois) while several preventative measures have been taken to minimize disturbance to bats, including gate installations at known hibernacula (right, © Joe Milmo, USFWS)

Indiana Bat New Jersey Distribution



 Data Sources
- US Fish and Wildlife Service (USFWS)

For More Information:

General Information on NRCS Forestry Programs

www.nj.nrcs.usda.gov/technical/forestry/index.html

Information on NRCS EQIP Program

www.nj.nrcs.usda.gov/programs/eqip/forestry.html

Locating an NRCS TSP

<http://techreg.usda.gov/CustLocateTSP.aspx>

List of NJDEP-Approved Consulting Foresters

www.state.nj.us/dep/parksandforests/forest/ACF.pdf

NJDEP, Division of Fish and Wildlife-Indiana Bats

<http://www.nj.gov/dep/fgw/ensp/pdf/end-thrtened/indianabat.pdf>

USFWS Information and Management for Indiana Bats

<http://www.fws.gov/northeast/njfieldoffice/Endangered/Ibat.html>

USFWS New Jersey Field Office Procedure for Consultation

<http://www.fws.gov/northeast/njfieldoffice/Endangered/consultation.html>

Conserve Wildlife Foundation of NJ-Indiana Bats

<http://www.conservewildlifenj.org/species/fieldguide/view/Myotis%20sodalis/>

US Forest Service-Indiana Bats

<http://www.fs.fed.us/database/feis/animals/mammal/myso/all.html#WILDLIFE DISTRIBUTION AND OCCURRENCE>

Bat Conservation International, Forest Management and Bats

<http://www.batcon.org/pdfs/ForestMgmtandBats.pdf>

Federal and State Agency Contact Information:

New Jersey ENSP

Division of Fish and Wildlife

Department of Environmental Protection

P.O. Box 400

Trenton, NJ 08625

(609) 292-9400

<http://www.state.nj.us/dep/fgw/ensphome.htm>

US Fish and Wildlife Service

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927 North Main Street, Building D

Pleasantville, NJ 08232

(609) 646-9310

<http://www.fws.gov/northeast/njfieldoffice/>

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