SPECIES PROFILE

Northern Myotis

Myotis septentrionalis

Federal Listing: Not listed
State Listing: Not listed
Global Rank: S4
State Rank: Not ranked
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Element 1: Distribution and Habitat

1.1 Habitat Description

During winter, the northern myotis requires cave or mine habitat that provides adequate characteristics for successful hibernation. Such characteristics include proper microclimate (i.e. temperature stability) and a low level of human disturbance. During hibernation, the northern myotis often retreats into small holes, cracks, and crevices in the walls and ceiling (John Whitaker, Indiana State University, personal communication, Durham 2000), though they will also cling to the wall and ceiling surface. It is unknown whether the northern myotis prefers caves and mines with large numbers of small crevices for hibernation. Northern myotis is often found deep within mine shafts (Durham 2000). Northern myotis bats are known to use caves and mines year-round and often maintain some activity throughout the winter months (Whitaker & Rissler 1992).

In the White Mountain National Forest (WMNF), sixty-six percent of northern myotis roosted in snags (dead trees) and the remainder roosted in live trees (Sasse 1995), They will use a variety of deciduous species, and choice may be influenced by availability. Large, tall trees with intact bark and moderate levels of decay are commonly chosen, especially if they have hollows (Sasse 1995). Most roost trees used by northern myotis in West Virginia were located in 70-90 year-old intact forests that had not been logged in 10 to 15 years (Owen et al. 2003). However, some females have been observed roosting in actively managed industrial forests in West Virginia (Menzel et al. 2002).

1.2 Justification

Like other bats, northern myotis' life history is different from the typical life history of other small mammals. Individuals are relatively long lived and have a low reproductive rate, generally giving birth to a single young each year (Whitaker and Hamilton 1998). Since northern myotis is found in relatively rare, at-risk habitats during winter (caves/mines), they are at risk of population decline if such habitats are lost or degraded. Their slow reproductive rate would, in turn, lead to a slow population recovery time.

Northern myotis are of conservation concern in New Hampshire for the above reasons and because of the lack of knowledge about the species' population status in New Hampshire. Northern myotis represents approximately 12.5% of New Hampshire's overwintering bats and has been documented in each of New Hampshire's known hibernacula (table 1). Individuals have not been banded at these hibernacula, and therefore no data on population turnover are available.

The majority of data describing summer population status is limited to the region of the WMNF (Sasse 1995, Krusic 1996, Chenger 2005), with limited additional data from other regional surveys. No systematic surveys have confirmed its statewide distribution or provided population estimates. Because most bat species are experiencing population declines, it is important to establish such baseline data to monitor population trends.

1.3 Protection and Regulatory Status

No specific Endangered Species Act or RSA 212 regulations govern take, transport, or use of this species. Scientific collecting or research requiring capture of individuals requires a permit through New Hampshire Fish and Game Department (NHFG). Possession of live bats requires a permit under NHFG FIS 800.

1.4 Population and Habitat Distribution

Winter distribution of the northern myotis includes each of New Hampshire's seven hibernacula (figure 1). The concentration of northern myotis among the hibernacula ranges from fewer than 1% (Mascot Lead Mine) to 47% (Bristol Mine) of the total bat population. Northern myotis in New Hampshire tend to be less common (fewer than 1% of hibernating bats) in the large hibernacula such as Mascot Lead Mine, intermediate (less than 20%) at medium-sized mines such as Paddock Copper Mine and Mt. Kearsarge Lead Mine, and relatively abundant in small hibernacula such as Bristol Mine, Beebe River Mine, and the Red Mine (table 1). This pattern is consistent with hibernaculum surveys in Vermont (Trombulak 2001).

Summer records are known from Carroll, Coos, Cheshire, Grafton, and Hillsborough counties. Of 141 summer captures of the northern myotis in New Hampshire, 74.2% are from the White Mountain National Forest (Sasse 1995, Krusic 1996, Chenger 2005), 24.3% are from northern Cheshire County (Chenger 2002, J.P. Veilleux, unpublished data) and 3.5% are from Merrimack and Hillsborough County (LaGory et al. 2002, Reynolds, unpublished data). Any apparent geographical clustering may be an artifact of sampling effort.

1.5 Town Distribution Map

Not completed for this species.

1.6 Habitat Map

1.7 Sources of Information

Town data on species distribution during winter were compiled by examining New Hampshire Natural Heritage Inventory – Bat Hibernaculum Record data sheets. Summer distribution data were determined by examining published and gray literature of research on bat populations in New Hampshire, as well unpublished bat survey data (J. Veilleux).

1.8 Extent and Quality of Data

Data on the distribution of northern myotis in New Hampshire are mainly limited to the two regions described in element 1.4 (WMNF and northern Cheshire County). The quality of existing data, in relation to accuracy of identification of individuals and echolocation calls, is believed to be good. However, a Master's student with little experience identified bats in the WMNF. Although it may be confused with the little brown bat, the northern myotis is relatively easy to identify.

1.9 Distribution Research

Potential winter hibernacula in New Hampshire need to be surveyed. Likewise, statewide studies (using mist-netting and Anabat acoustic survey equipment) are needed to determine the summer distribution of northern myotis. Mist-netting surveys should incorporate banding into the capture protocol and should list all banding records in the Northeast Banding Database developed by the Northeast Working Group on Bats (NEWGB). An intensive banding program using state-issued wing bands would yield data on the summer distribution of all bat species in New Hampshire and might indicate where summer populations of bats in New Hampshire spends each winter.

Element 2: Species/Habitat Condition

2.1 Scale

Due to the relatively small number of viable mines in New Hampshire, each mine has been treated individually as a conservation planning unit in the habitat profile.

2.2 Relative Health of Populations

Northern myotis is known from each of the seven mine hibernacula in New Hampshire (table 1), and there has been decline in northern myotis within the two largest hibernacula over the last 15 years. Between 1993 and 2004, Mascot Mine had a 91% reduction in the northern myotis population (figure

1). Similarly, Paddock Copper Mine had a 53% reduction in the northern myotis population between 1991 and 1999. The data are too sparse to determine whether this decline represents an increase in mortality or a reduction in population recruitment.

2.3 Population Management Status

Northern myotis are not specifically managed in New Hampshire. The bat gate at Mascot Lead Mine is a conservation tool for hibernating bats collectively, but this mine has also seen the greatest reduction in northern myotis over the last 12 years. Lack of data on the summer distribution of northern myotis hinders effective management.

2.4 Relative Quality of Habitat Patches

The New Hampshire Natural Heritage Survey (NHNHS) has ranked all known northern myotis bat hibernacula according to habitat quality and prospects for long-term conservation. Carter's Mine (Grafton County), Paddock Copper Mine (Grafton County), and Bristol Mine (Grafton County) each received an 'A', indicating excellent quality and prospects for long-term conservation. Dodge Mine (Grafton County) was ranked 'B', indicating good quality and prospect for long-term conservation. Both Mt. Kearsarge Lead Mine and Mascot Lead Mine were ranked as 'B/C', indicating fair to good quality and prospects for long-term conservation. Beebe River Mine was ranked as 'C', indicating fair quality and/or prospects for long-term conservation. However, NHNHS ranking does not appear to reliably assess the value of northern myotis mine habitats, because the two hibernacula in serious decline received a 'B/C' (Mascot Lead Mine) and an 'A' (Paddock Copper Mine).

2.5 Habitat Patch Protection Status

Five of the seven known mines (Carter's Mine, Beebe River Mine, Bristol Mine, Paddock Copper Mine, Red Mine) are located on private land, and two (Mascot Lead Mine and Mt. Kearsarge Lead Mine) are managed by the DRED. Each mine identified as a potential habitat is located on private land. The exact location of one mine (Keyes Mine) could not be determined, and therefore its protection status is unknown.

2.6 Habitat Management Status

The only ongoing habitat management practice in New Hampshire is the bat gate at Mascot Lead Mine. Bat gates (see Caves and Mines habitat profile). Mascot Lead Mine, which was gated in 1992, had lost all but 11 individuals by 2004, despite having 67 northern myotis in 1992 and 127 in 1993. These results testify to the need for further study of northern myotis' management needs in New Hampshire.

2.7 Sources of Information

NHNHS – Hibernacula Survey Data Sheets were examined to determine the winter populations at known hibernacula. To determine habitat patch protection status, each hibernaculum (both known and potential) was mapped on the Conservation Lands GIS data layer (GRANIT – 2003 data). The physical attributes of four of the known bat hibernacula (Mt. Kearsarge Lead Mine, Paddock Copper Mine, Carter's Mine, and Red Mine) were recorded in 1999 and 2000 by Durham (2000). Data were used to generate mine maps and to examine species-specific thermal preferences.

2.8 Extent and Quality of Data

The quality and extent of data collected varies between the mines. For example, there have been four winter surveys at Mascot Lead Mine since 1987, two of which were conducted since installation of the bat gate in 1992. Red Mine has been surveyed four times since 1986, and the Mt. Kearsarge Lead Mine and Paddock Copper Mine have been surveyed five times since 1986. Carter's Mine (three surveys since 1989), Beebe River Mine (three surveys since 1988), and Bristol Mine (one survey in 1989), have generally been surveyed less frequently. With the exception of data collected in 1999 and 2000 at Red Mine, Paddock Copper Mine, Carter's Mine, and Mt. Kearsarge Lead Mine (Durham 2000), no microclimate data have been collected at any of these sites. Furthermore, there are no known bat surveys from Ruggle's Mine.

2.9 Condition Ranking

2.10 Condition Assessment Research

A research priority for overwintering northern myotis is to determine the cause of population decline in Mascot Lead Mine and Paddock Copper Mine. Once microclimate data (primarily temperature) have been obtained at each hibernaculum for an entire winter, the data can be used to assess microclimate at potential hibernacula throughout the state.

Research priorities for summering northern myotis include a statewide mist-netting survey, telemetry studies to determine roosting and foraging behavior, life history studies, and diet analysis.

Element 3: Species and Habitat Threat Assessment

3.1.1 Recreation

See Caves and Mines habitat profile.

(A) Exposure Pathway
Caves and abandoned mines are natural destinations for spelunkers. Though spelunkers may never come into contact with bats, noise and lights may rouse bats from hibernations, depleting bats' scarce energy reserves.

(B) Evidence
Northern myotis occur at hibernacula that may experience high levels of human disturbance (Beebe River Mine, Carter Mine, and Paddock Copper Mine). Carter Mine and Paddock Copper Mine are the two largest hibernacula for northern myotis, comprising over 50% of the known hibernating population of the species, and both of these mines are considered 'at risk'. Paddock Copper Mine and Beebe River Mine have seen the largest decline in hibernating northern myotis since 1986, whereas northern myotis populations within the gated hibernaculum (Mascot Lead Mine) remained stable during this same period.

3.1.2 Development (Habitat Loss and Conversion), Unsustainable Harvest (Forestry Operations and Management)

(A) Exposure Pathway
As New Hampshire land is deforested, northern myotis will experience summer roosting habitat loss and degradation. Individual bats (particularly non-volant young) may experience direct mortality if deforestation or disturbance occur during the parturition or lactation period. The cumulative result of habitat loss, degradation, and possibly direct mortality may lead to a reduction in population size.

(B) Evidence
Northern myotis generally relies on intact interior forests (Carroll et al. 2002, Owen et al. 2003, Patriquin and Barclay 2003) but will use forest edge habitat as well (Hogberg et al. 2002). Northern myotis relies on multiple roost trees per colony (Sasse and Pekins 1996), with a series of secondary roosts that are often clustered around a primary roost tree (Sasse 1995). Northern myotis uses a variety of trees as roosts (Sasse 1995, Owen et al. 2002) and relies more on living hardwoods and closed canopy habitat than do Indiana bats (Foster and Kurta 1998). These data suggest strong fidelity to core roosting areas within intact forest habitats. Although northern myotis is known to use human structures (Caceres and Barclay 2000), deforestation or fragmentation appears to be a substantial threat to this species. Logging, particularly at higher elevations such as the WMNF, also seems to pose a substantial threat.

3.1.3 Energy and Communication Infrastructure

Element 4: Conservation Actions

4.1.1 Gating, Habitat Protection

See Caves and Mines habitat profile.

4.1.2 Site-Selection and Pre-Construction Regulations, Regulation and Policy

4.1.3 Documenting roosting habits, Habitat Protection

(A) Removal of summer roosting habitat due to development, removal of summer roosting habitat due to logging.

(B) Justification
- Identifying summer roost areas of northern myotis and determining whether individual bats return to specific roost areas year-to-year will allow managers to better assess the effects of logging

and development.
- The data on summer demographics of northern myotis are limited to the northern part of the state. It is therefore unclear whether documentation of roosting habits (e.g., annual fidelity to roost areas) will be relevant to populations that occur in the southern half of the state, where development is intense.
- Data on the spatial scale of northern myotis' summer roosting is limited. However, the average home range of northern myotis in West Virginia is 65 ha, so it is reasonable to plan logging and development activity at such a scale (Owen et al. 2003).

(C) Conservation Performance Objective
Integrate critical roosting habitats into a wildlife database. Determining summer habitat requirements for northern myotis bats is intended to allow informed decisions about limiting or ameliorating development and logging in bat habitat. In addition, broad protection of habitat areas may also preserve smaller habitat attributes, such as preferred species of roost tree.

(D) Performance Monitoring
Observation of summer habitat use will allow managers to decide whether limiting or mitigating development and logging is successful. Observations should be long-term, perhaps including periodic monitoring over a 10-year period.

(E) Ecological Response Objective
Maintain populations in delineated areas. Since data are too few to allow a valid estimate of current northern myotis population at summer roost areas, the minimal ecological response should be the maintenance of those populations initially located by biologists.

(F) Response Monitoring
Long-term monitoring may include summer surveys in areas used by northern myotis every three years. These data may reveal whether northern myotis remains faithful to specific habitats and roost areas each summer. Managers, in turn, will make better decisions about the maintenance of northern myotis populations in areas threatened by development or logging.

(G) Implementation
After summer habitat is identified, the state should coordinate the following:
- An intensive short-term radio-telemetry study to determine specific patterns of habitat use by individual bats
- The establishment of a long term monitoring program to determine if northern myotis remain faithful to small summer roost areas

(H) Feasibility
The technical competence to determine general summer habitat areas of northern myotis (mist-netting and acoustic monitoring) and roosting habits (radio telemetry) is available. The overall feasibility of conducting this research is limited by funding.

4.2 Conservation Action Research

Element 5: References

5.1 Literature

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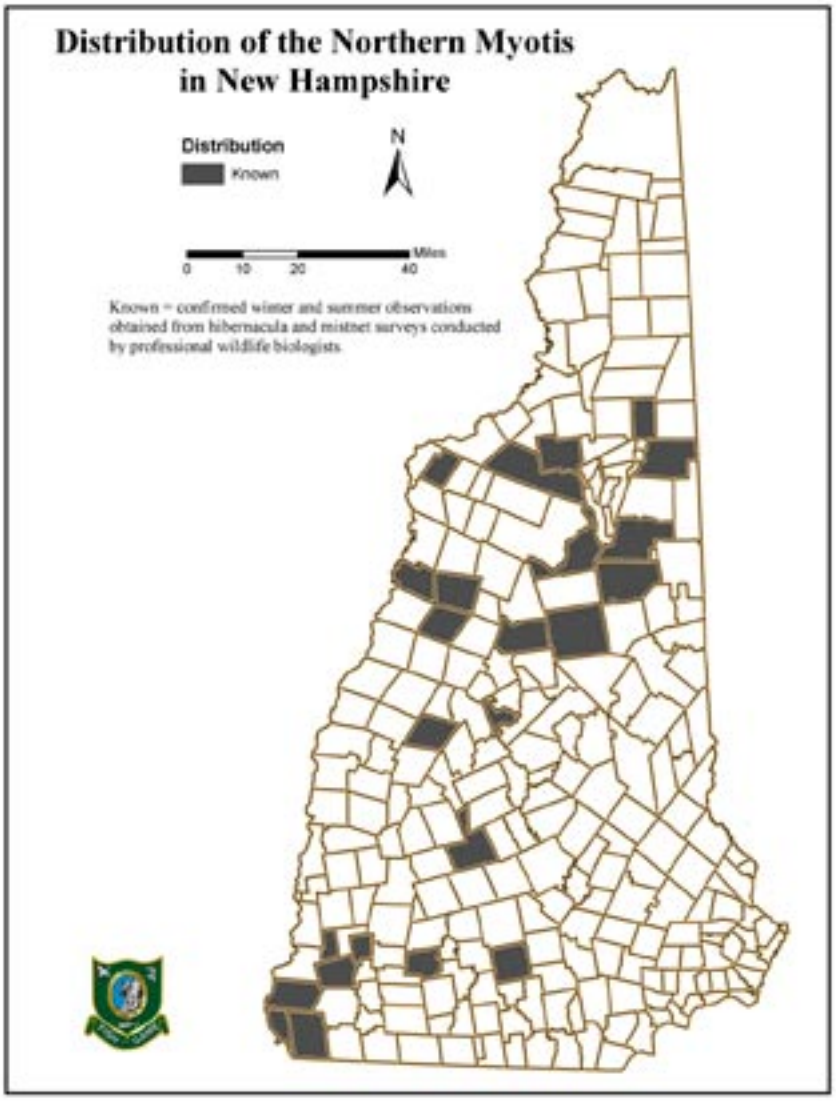
Distribution of the Northern Myotis
in New Hampshire
Distribution
Known
N
0
10
20
40
Miles
Known = confirmed winter and summer observations
obtained from hibernacula and mistnet surveys conducted
by professional wildlife biologists.