

Tricolored Bat

Perimyotis subflavus

Federal Listing	N/A
State Listing	SC
Global Rank	G3/G4
State Rank	S1
Regional Status	Very High



Photo by USFWS

Justification (Reason for Concern in NH)

Populations of tricolored bats, like many other bat species, are believed to be decreasing, however the data is lacking in NH due to the very low population numbers. The likely reasons for the possible declines are White-Nose Syndrome (WNS) along with the destruction or degradation of winter habitat (hibernacula) and summer habitat (roosting and foraging areas). Like other bat species, the tricolored bat's life history is different from the typical life history of small mammals. Individuals are relatively long-lived and have a low reproductive rate. Tricolored bats give birth to two young per year (Fujita and Kunz 1984), although only one may survive to reproductive age. The slow reproductive rate would, in turn, lead to a slow population recovery time. Since tricolored bats are found in cave/mine habitats that are relatively rare and at risk, this species is at risk of population decline if such habitats are lost or degraded. Tricolored bats 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.

Distribution

Data on the current and historic range of tricolored bats in New Hampshire are too few to allow a regional population comparison. The winter distribution data of tricolored bats are limited to three mine localities with historically as many as five individuals in Mascot Lead Mine, three individuals in Mt. Kearsarge Lead Mine (Merrimack County), and one individual in Red Mine (Grafton County). One individual was also collected at Ruggle's Mine in Grafton (Grafton County), which is a potential but unsurveyed hibernaculum. The latest hibernacula surveys in the winters of 2014-2015 found only one individual in one mine. Five definite summer records are known from New Hampshire. One individual is known from Canaan (Grafton County) and Chenger (2005) reported single individuals captured in the towns of Bartlett (Carroll County), Bean's Purchase (Coos County), Wentworth (Grafton County) and Warren (Grafton County). Possible echolocation call sequences have been recorded from Albany (Carroll County), Bartlett (Carroll County), New Boston (Hillsborough County), and possibly Nottingham (Rockingham County). These data indicated a potentially broad summer distribution of tricolored bats in New Hampshire.

Habitat

Tricolored bats hibernate in caves or mines, although they occasionally use other structures. For successful hibernation, tricolored bats require habitat with low levels of human disturbance and a proper microclimate (e.g., temperature stability). Although tricolored bats hibernate singly or in groups of two or three, individual hibernacula can have large populations of tricolored bats, including over 750 individuals from a single mine in New York (Hicks 2003). Therefore, the protection of

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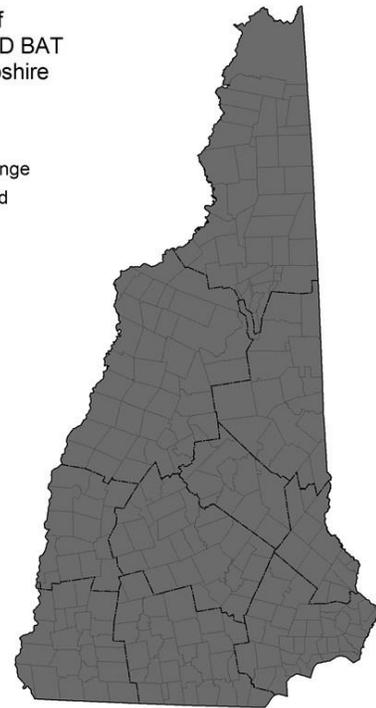
hibernacula is an important conservation concern.

No available data describe the summer habitat requirements of tricolored bats in New Hampshire. The few available data on summer habitat use and life history come from the Midwest (Veilleux et al. 2003, Veilleux et al. 2004, Veilleux and Veilleux 2004). After leaving hibernacula, female tricolored bats from maternity colonies in live or dead foliage of deciduous trees (Veilleux et al. 2003). The birth and weaning of young occur within these foliage roosts. Some data indicate that females prefer to roost in oak and maple trees (Veilleux et al. 2003). Although tricolored bats are a foliage-roosting species, individuals occasionally roost in man-made structures (Whitaker 1998).

NH Wildlife Action Plan Habitats

- Caves and Mines
- Hemlock Hardwood Pine Forest
- Appalachian Oak Pine Forest
- Floodplain Habitats
- Lowland Spruce-Fir Forest
- Northern Hardwood-Conifer Forest
- Northern Swamps
- Temperate Swamps

Distribution of
TRICOLORED BAT
in New Hampshire



Distribution Map

Current Species and Habitat Condition in New Hampshire

The sparse data on winter or summer occurrences of tricolored bats in New Hampshire prevent an analysis of the trends and viability of winter or summer populations. Priority conservation actions include winter surveys at New Hampshire mines that have not been surveyed.

Population Management Status

No population management efforts are directed at the conservation of tricolored bats.

Regulatory Protection (for explanations, see Appendix I)

- NHFG Permit for collection or possession

Quality of Habitat

NHNHB has ranked both Mt. Kearsarge and Mascot Lead Mine as “B/C”, indicating “fair to good quality and prospects for long-term conservation”. Red Mine was ranked “B”, indicating “good quality and prospects for long-term conservation”. Ruggle’s Mine has not been ranked by NHNHB. Although each mine with known wintering bats has been assessed for long-term conservation prospects, no research has determined the microclimate quality.

Habitat Protection Status

Most bat hibernacula in NH are not protected. Three are on state land but only two are gated. One hibernacula on private land has a conservation easement with a special management unit defined around the mine entrance but is not gated. The other hibernacula are located on private land.

Habitat Management Status

The only ongoing habitat management action occurring in New Hampshire is the bat gate at the Mascot Lead Mine (see Caves and Mines habitat profile). A census prior to gate installation (in 1992) found no tricolored bats, and two were documented in the winter following installation. The 2004 winter survey documented five tricolored bats. In 2015 there was one individual in Mascot Mine.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a “medium” or “high” score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat degradation and conversion due to changes in mine configuration from landowner & natural causes, including reopening or closing mines (Threat Rank: High)

Changes in the mine entrances can block access or change the temperature and humidity within the mine. Bats have specific ranges of temperatures and humidity they require for hibernating. Reopening of mines for active use can disturb or kill hibernating bats, or make the mine unsuitable for hibernating.

Disturbance from humans exploring bat hibernacula (Threat Rank: High)

Active cavers and casual cave explorers disturb bats when they enter occupied caves and mines. Noise, light, changes in temperature and airflow, and physical contact can all disturb bats (Thomas 1995). In winter during hibernation, these disturbances can cause bats to arouse from hibernation and thus use up precious stored energy. Bats susceptible to White-Nose Syndrome are especially vulnerable to disturbance, as the disease already causes increased numbers of arousals and depletion of stored fat.

Tricolored bats occurred in small numbers at all of NH’s known mine hibernacula prior to White-Nose Syndrome. The largest population occurred at a mine that is easily accessible by explorers.

Mortality and species impacts (loss of fitness) due to White-Nose Syndrome (Threat Rank: High)

Tricolored bats have been decimated by White-Nose Syndrome (WNS), a fungal disease that affects bats during hibernation. The fungus, *Pseudogymnoascus destructans*, grows into the wings, muzzles and ears of the bats (Lorch et al. 2011), disrupting metabolic functions (Meteyer et al. 2009, Cryan et al. 2013, Verant et al. 2014) and causing bats to arouse from hibernation more frequently and stay

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awake longer than uninfected bats (Lorch et al. 2011, Reeder et al. 2012). This causes them to use up stored energy (fat) at a much higher rate (Reeder et al. 2012). Bats cannot replenish their fat stores in winter as their food source is unavailable. They perish from starvation, some first flying out the hibernacula in mid-winter in a desperate search for food. Since bats are in hibernation they do not mount an immune response to this disease.

WNS was first found in NH in 2009. Winter surveys in 2010 showed a 75% decline and by 2011 declines had reached 99% for tricolored bats. Surveys over the winters of 2014 and 2015 echoed this with only two individuals found in two different hibernacula. However, the numbers of this species found in NH hibernacula has traditionally been very low. States with larger populations of tricolored bats have seen similar drops on overall populations (Turner et al. 2011).

Habitat conversion due to negative perceptions of bats by homeowners that results in loss of roosting habitat in buildings (Threat Rank: Medium)

Tricolored bats sometimes use human structures for roosting, usually in the attic or walls. Humans often do not like having bats roosting in their buildings, particularly in houses and businesses and so remove them, mostly through exclusion. Exclusions done when pups are in residence can lead to the death of the pups. Bats entering the parts of buildings that humans use may be killed due to fears about the bats.

List of Lower Ranking Threats:

Species impacts from agricultural pesticide use causing prey declines

Habitat degradation from succession that causes loss of drinking and foraging habitats

Habitat degradation from timber harvest that removes summer roosting and foraging areas

Habitat degradation from roads and powerline development

Mortality and conversion of migratory habitat due to wind turbine development

Habitat conversion and degradation due to removal of summer roosting and foraging areas

Actions to benefit this Species or Habitat in NH

Promote organic practices and integrated pest management (IPM)

Primary Threat Addressed: Species impacts from agricultural pesticide use causing prey declines

Specific Threat (IUCN Threat Levels): Pollution / Agricultural & forestry effluents / Herbicides & pesticides

Objective:

Provide technical assistance to organizations that provide education, technical assistance and funding to farmers and homeowners on organic growing practices and IPM.

General Strategy:

Work with the Northeast Organic Farmers Association, UNH Cooperative Extension, NRCS, nursery stock growers, garden centers, garden clubs, landscapers and others to educate farmers, homeowners and commercial landscapers on using IPM and organic practices

Political Location:

Statewide

Watershed Location:

Statewide

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Develop standard processes to reduce the effect of wind energy production on bats

Primary Threat Addressed: Mortality and conversion of migratory habitat due to wind turbine development

Specific Threat (IUCN Threat Levels): Energy production & mining

Objective:

Develop and implement rules on siting and operation of wind turbines to reduce mortality of bats during construction and operation

General Strategy:

Develop and implement siting rules that protect migration routes and occupied habitat from wind turbine development. Develop required operational mitigation measures such as curtailment to reduce bat mortality post-construction. Develop these in conjunction with nearby states to provide consistency to energy developers across the northeast.

Political Location:

Northeast, Statewide

Watershed Location:

Statewide

Monitor bat populations

Objective:

Continue to monitor hibernating and summer bat populations.

General Strategy:

Monitor hibernacula at least every three years for the presence and abundance of bats. Resurvey summer mist netting sites that have been historically monitored such as Surry Mountains Dam and New Boston Air Force Station.

Political Location:

Statewide

Watershed Location:

Statewide

Protect occupied roosting trees

Primary Threat Addressed: Habitat degradation from timber harvest that removes summer roosting and foraging areas

Specific Threat (IUCN Threat Levels): Biological resource use

Objective:

Prevent occupied roosting trees from being cut down.

General Strategy:

Develop voluntary BMPs for forestry that help landowners and foresters identify and protect known and potential roosting trees during harvesting operations. Provide these guidelines to organization

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building trails or otherwise potentially cutting trees. BMPs could include time of year restrictions for cutting, tree size limitation and other techniques. Coordinate with other states for consistency.

Political Location:

Northeast, Statewide

Watershed Location:

Statewide

Prevent disturbances to hibernating bats

Primary Threat Addressed: Disturbance from humans exploring bat hibernacula

Specific Threat (IUCN Threat Levels): Human intrusions & disturbance

Objective:

Prevent recreational use of known bat hibernacula during the hibernation period

General Strategy:

Through education, bat-friendly gates and other means prevent people from entering hibernacula during the hibernation period.

Political Location:

Coos County, Grafton County, Merrimack County, Rockingham County

Watershed Location:

Androscoggin-Saco Watershed, Upper CT Watershed, Middle CT Watershed, Pemi-Winni Watershed, Merrimack Watershed, Coastal Watershed

Protect summer colonies in buildings

Primary Threat Addressed: Habitat conversion due to negative perceptions of bats by homeowners that results in loss of roosting habitat in buildings

Specific Threat (IUCN Threat Levels): Human intrusions & disturbance

Objective:

Protect summer colonies in buildings without compromising public health

General Strategy:

Protect summer colonies by prohibiting exclusion of bats from buildings during the time they have non-volant young (May 15-August 15). Exceptions should be available in the case of a documented rabid bat in the building or other public health issue. Develop materials for wildlife control operators and homeowners about bats in houses and their reproductive cycle to build support for the rule change and compliance afterwards.

Political Location:

Statewide

Watershed Location:

Statewide

Participate in efforts regarding White-Nose Syndrome

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Primary Threat Addressed: Mortality and species impacts (loss of fitness) due to White-Nose Syndrome

Specific Threat (IUCN Threat Levels): Invasive & other problematic species, genes & diseases / Invasive non-native/alien species/diseases / Named species

Objective:

Assist in the research, management and planning efforts to control the spread of, find a treatment for, and recover bat species affected by White-Nose Syndrome

General Strategy:

Participate in regional, national and international research, management and planning efforts to control the spread of, find a treatment for, and recover bat species affected by White-Nose Syndrome. Continue to participate in national research projects such as acoustic transects and emergence counts. Continue to participate in research efforts as requested. Participate in regional and national workshops, plans and projects for conservation, recovery and communications about White-Nose Syndrome.

Political Location:

National, Northeast, Statewide

Watershed Location:

Statewide

Protect hibernacula from structural damage

Primary Threat Addressed: Habitat degradation and conversion due to changes in mine configuration from landowner & natural causes, including reopening or closing mines

Specific Threat (IUCN Threat Levels): Energy production & mining

Objective:

Protect hibernacula from structural damage such as changes to mine opening or configuration.

General Strategy:

Work with owners of hibernacula to encourage them to voluntarily refrain from changing the opening or the configuration of the interior of mines, unless it is to erect a bat-friendly gate over the opening. Encourage the installations of bat-friendly gates.

Political Location:

Coos County, Grafton County, Merrimack County, Rockingham County

Watershed Location:

Androscoggin-Saco Watershed, Upper CT Watershed, Middle CT Watershed, Pemi-Winni Watershed, Merrimack Watershed, Coastal Watershed

References, Data Sources and Authors

Data Sources

Town data on the tricolored bat's winter distribution were compiled from New Hampshire Natural

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Heritage Inventory – Bat Hibernaculum Record data sheets, museum specimens, and college/university teaching collections. Summer distribution was determined from the published and gray literature of bat research in New Hampshire, as well as from specimen collections. NHFG unpublished data includes capture records provided by researchers as part of their reporting requirements for obtaining scientific collecting permits in NH.

The winter distribution of tricolored bats at known hibernacula was determined from New Hampshire Natural Heritage Survey – Hibernacula Survey Data Sheets. Scott Reynolds and Heather Durham conducted 1999 and 2000 winter surveys (Durham 2000).

Data Quality

Data on the distribution of tricolored bats in New Hampshire are extremely limited but of high quality because qualified bat biologists identified the animals. The major knowledge gap is the paucity of occurrence records and research into distribution patterns.

The quality and extent of data varied between mines.

2015 Authors:

Emily Preston, NHFG

2005 Authors:

Jacques Veilleux, Franklin Pierce University; D. Scott Reynolds, St. Paul's School

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