Species Status Assessment

Class: Mammalia
Family: Vespertilionidae
Scientific Name: *Myotis septentrionalis*
Common Name: Northern myotis

Species synopsis:

The northern myotis *(Myotis septentrionalis*), previously called the northern long-eared bat, was formerly regarded as conspecific with Keen's myotis (*Myotis keenii*). Since van Zyll de Jong (1979, 1985) and Jones *et al.* (1992) *M. keenii* and *M. septentrionalis* have generally been regarded as separate species. Most literature under the name *M. keenii* actually pertains to *M. septentrionalis*. No subspecies are recognized.

The northern myotis ranges widely across much of Canada and the U.S., but is patchily distributed and rarely found in large numbers (Barbour and Davis 1969). It is more common in the northern part of its range than in the southern (Harvey 1992), and western (Caceres and Barclay 2000) portions. It occurs in all Canadian provinces, in the Yukon and Northwest Territories, and in eastern, midwestern, and some southern states (Caceres and Barclay 2000). It is listed as vulnerable across much of its range (NatureServe 2013). It is found throughout forested areas of New York.

Recent trends suggest this species is in severe decline in NY and elsewhere in the Northeast (Turner *et al.* 2011).

I. Status

a. Current and Legal Protected Status

i. Federal ____Threatened_____ **Candidate?** ___Yes___

ii. New York ____Not Listed_____

b. Natural Heritage Program Rank

Global ____G2_____

New York ____S3S4_____ **Tracked by NYNHP?** __No__

Other Rank:

IUCN Red List— Least Concern
COSEWIC – Designated Endangered in an emergency assessment in February 2012.

Status Discussion:

The northern myotis was formerly common in New York. Since 2008 it has been one of the least frequently encountered bats and is now presumed to be rare. This species is predicted to become extirpated due to WNS (Langwig et al. 2012). Its listing status thus does not reflect the current trends and abundance.

II. Abundance and Distribution Trends

a. North America

Abundance

__X__ declining ____ increasing _____stable _____unknown

Distribution:

__X__ declining _____increasing _____stable _____ unknown

Time frame considered: __Rapid recent decline from 1985-2011 _____

b. Regional

Abundance

__X__ declining _____increasing _____stable _____unknown

Distribution:

__X__ declining _____increasing _____stable _____ unknown

Regional Unit Considered: _Rapid recent decline in Northeast _____
Time Frame Considered: ____1985 - 2011 _____

c. Adjacent States and Provinces

CONNECTICUT **Not Present _____** **No data _____**

Abundance

__X__ declining ____increasing ____stable ____ unknown

Distribution:

__X__ declining ____increasing ____stable ____unknown

Time frame considered: ___Rapid recent decline_____
Listing Status: _____Not listed_____ SGCN? __Yes__

MASSACHUSETTS **Not Present _____** **No data _____**

Abundance

__X__ declining ____increasing ____stable ____ unknown

Distribution:

__X__ declining ____increasing ____stable ____ unknown

Time frame considered: _Rapid recent decline from 1987 - 2012_____
Listing Status: _____Endangered_____ SGCN? __Yes__

NEW JERSEY **Not Present _____** **No data _____**

Abundance

__X__ declining ____increasing ____stable ____ unknown

Distribution:

__X__ declining ____increasing ____stable ____ unknown

Time frame considered: ___Rapid recent decline_____
Listing Status: _____Not Listed_____SGCN? __No___

ONTARIO **Not Present _____** **No data _____**

Abundance

__X__ declining ____increasing ____stable ____unknown

Distribution:

__X__ declining ____increasing ____stable ____unknown

Time frame considered: ____Rapid recent decline _____
Listing Status: _____

PENNSYLVANIA Not Present _____ No data _____

Abundance

__X__ declining ____increasing ____stable ____unknown

Distribution:

__X__ declining ____increasing ____stable ____unknown

Time frame considered: _Rapid recent decline from 2004 - 2011_____
Listing Status: _____Not Listed_____ SGCN? __Yes____

QUEBEC Not Present _____ No data _____

Abundance

__X__ declining ____increasing ____stable ____unknown

Distribution:

__X__ declining ____increasing ____stable ____unknown

Time frame considered:___Rapid recent decline _____
Listing Status: _____

VERMONT Not Present _____ No data _____

Abundance

__X__ declining ____increasing ____stable ____unknown

Distribution:

__X__ declining ____increasing ____stable ____unknown

Time frame considered: ___Rapid recent decline from 2004 – 2011 _____
Listing Status: _____Endangered _____ SGCN? ___Yes___

d. NEW YORK **No data _____**

Abundance

__X__ declining ____increasing ____stable ____unknown

Distribution:

__X_ declining ____increasing ____stable ____unknown

Time frame considered: _Rapid recent decline from 1985 - 2013_____

Monitoring in New York.

Winter hibernacula surveys

Summer acoustic survey

Mist netting (non-target species for surveys mostly aimed at detecting presence/absence of Indiana bats)

Trends Discussion:

The northern myotis was formerly common in NY and regularly encountered throughout northeastern North America. Since the arrival of white-nose sydrome (WNS), the species has become rare throughout the region, with observed decline in NY exceeding 95% (Turner *et al.* 2011), suggesting a severely declining trend. Encounters are currently so rare that assessment of trends since 2011 have been uncertain. It is unclear whether these declines have resulted in reduced distribution in NY or elsewhere.

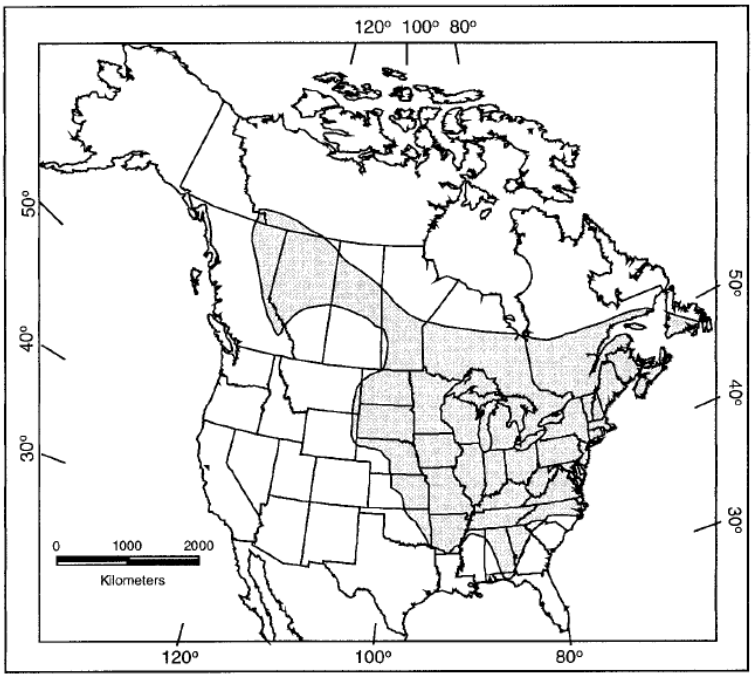

Figure 1. Range of the northern myotis in North America (Caceres and Barcalay 2000).

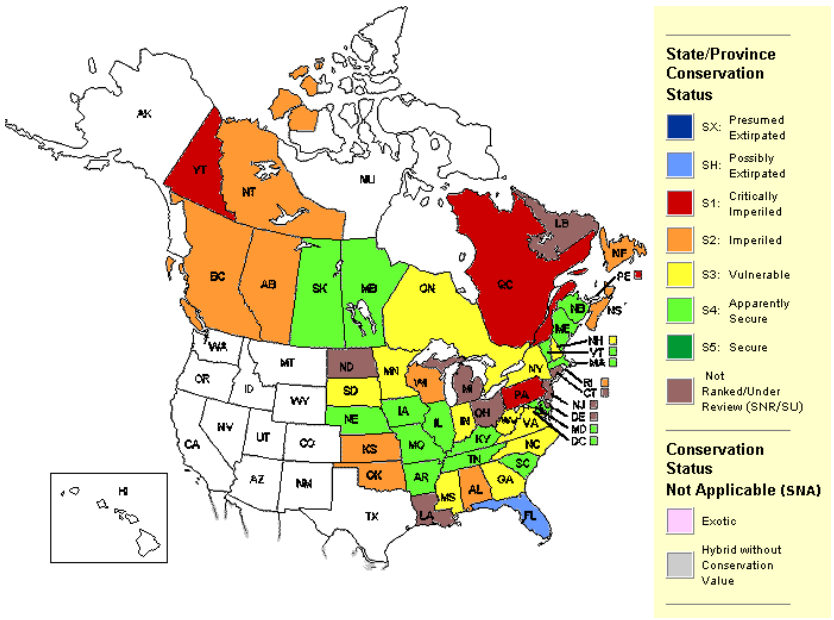

Figure 2. Conservation status of the northern myotis in North America (NatureServe 2012).

III. New York Rarity, if known:

Historic	# of Animals	# of Locations	% of State
prior to 1970	_____	_____	_____
prior to 1980	_____	_____	_____
prior to 1990	_____	_____	_____

Details of historic occurrence:

The northern long-eared bat was observed in 62% of hibernacula surveys prior to 2007 (NYSDEC winter survey database).

CPUE for mist net surveys prior to 2008 was 0.36/net-night state-wide (NYSDEC files).

Current	# of Animals	# of Locations	% of State
	_____	_____	_____

Details of current occurrence:

Encounters in NY hibernacula have declined by >97% in sites where WNS has been present for 2 or more years (Turner *et al*. 2011).

CPUE for recent mist net surveys has averaged 0.01/net-night (NYSDEC files).

New York's Contribution to Species North American Range:

% of NA Range in New York	Classification of New York Range
____ 100 (endemic)	**__X__ Core**
____ 76-99	**___ Peripheral**
____ 51-75	**____ Disjunct**
____ 26-50	**Distance to core population:**
__X__ 1-25	_____

IV. Primary Habitat or Community Type:

1. Caves and Tunnels
2. Mine/Artificial Cave Community
3. Northeastern Upland Forest
4. Northeastern Wetland Forest

Habitat or Community Type Trend in New York:

___ Declining __X___Stable ____ Increasing ____Unknown

Time frame of decline/increase: _____

Habitat Specialist? ____ Yes __X__ No

Indicator Species? ____ Yes __X___ No

Habitat Discussion:

Although the published literature frequently associates the northern long-eared bat with forests in later stages of successional development, the frequency of encounter prior to 2007 suggests that the species may be found in a wide variety of forest types.

Aside from a tendency to favor deep crevices for hibernation, the species shows no strong preferences for particular cave or mine characteristics (Caceres and Barclay 2000). Most bat hibernacula in NY contained this species prior to 2007, supporting the notion that the species does not exhibit preference for rare environmental conditions.

The northern myotis overwinters primarily in multi-species hibernacula in caves or abandoned mines and generally comprise a small proportion of the total number of individuals (Caceres and Pybus 1997).

Individuals may travel considerable distance from hibernacula to seasonal habitat. The maximum reported 56 km (Nagorsen and Brigham 1993) is short compared to other *Myotis* and probably understates their capability.

Environmental conditions in caves are prime for the fungus, *Pseudogymnoascus destructans*, formerly *Geomyces*, which is the causative agent of white-nose syndrome (New Hampshire Fish and Game 2013). Hibernacula therefore serve as reservoirs for the disease (Lorch et al. 2013). In New York, sites with warmer temperatures experienced significantly more severe declines than sites with cooler temperatures (Langwig et al. 2012). Environmental reservoirs increase the likelihood that a species will go extinct from the disease.

Short migratory movements between summer roost and winter hibernacula between 56 km (35 mi) and 89 km (55 mi) have been documented most often (Nagorsen and Brigham 1993 p. 88; Griffin 1945, p. 53). However, movements from hibernacula to summer colonies may range from 8 to 270 km (5 to 168 mi) (Griffin 1945, p. 22).

Much of the published literature (Krusic *et al.* 1996, Thomas 1988, Jung *et al.* 1999, Lacki and Schwierjohann 2001, Broders and Forbes 2004) suggests presence of the species in spring and summer is correlated with the availability of features that often associated with older forests, such as uneven forest age with a significant percentage of trees of advanced age, multi-layered vertical structure and standing snags. Capture data from NY and elsewhere, however, suggest that the northern myotis does not require older forests.

Maternity colonies are often established beneath peeling bark or within hollow trees or cavities (Caceres and Pybus 1997) and thus the presence of large, partially dead or decaying trees may be a major habitat feature for the species. Frequent roost-switching has been reported and females may preferentially select roost sites with high solar exposure (Lacki and Schwierjohann 2001).

The species' preferred habitat has often been characterized as "cluttered" (Patriquin and Barclay 2003, Carter and Feldhamer 2005) and the bat is well-adapted to foraging in dense vegetation, often at canopy level. Site occupancy has been documented as being inversely related to the proportion of edge habitat within a patch (Yates and Muzika 2006) leading to its characterization as a species of forest interiors (Henderson and Broders 2008).

V. New York Species Demographics and Life History

__X__ **Breeder in New York**

__X__ **Summer Resident**

__X___ **Winter Resident**

_____ **Anadromous**

_____ **Non-breeder in New York**

_____ **Summer Resident**

_____ **Winter Resident**

_____ **Catadromous**

_____ **Migratory only**

_____**Unknown**

Species Demographics and Life History Discussion:

Northern myotis are mostly solitary or gathered in small groups, but in the spring the females cluster in maternity colonies, although still in small numbers. Most maternity colonies are thought to be in hollows in tree limbs or under the loose bark, and several have been found in shaded artificial bat houses. Small maternity colonies have also turned up behind shutters and in buildings (Whitaker and Hamilton 1998).

Northern myotis enter hibernation in October and November, and emerge in March or April. It does not make extended migrations, often hibernating in nearby caves and mines. It typically chooses those used concurrently by bats of other species, primarily *Eptesicus fuscus*, *Perimyotis subflavus*, *Myotis lucifugus*, and *Myotis sodalis*. However, the bats are often partitioned within the hibernaculum, with the other Myotis usually in large colonies and the northern myotis single or in groups of two or three. Like the little brown myotis, the northern-long eared myotis often emerge in winter and fly around briefly, but the function of the behavior is not known, as they don't feed at this time even when insects are available (Whitaker and Rissler 1993). An average weight loss of 41% and 45% in hibernating females and males has been reported (Whitaker and Hamilton 1998).

Little is known about the food habits of this species but it appears to be a moth strategist, with various beetles, flies, caddis flies, and spiders also an important component of their diet (Whitaker and Hamilton 1998).

Like many other eastern colonial bats, the northern myotis does exhibit delayed fertilization. Mating is believed to occur in August and September, when the species can be found swarming at the entrances to caves along with other species such as the little brown myotis, Indiana bat, and tri-colored bat. Maternity colonies may number up to 100 individuals (Whitaker and Hamilton 1998).

Fecundity is low, with females bearing a single offspring annually (Caceres and Barclay 2000). There is much variation in the birth dates for this species, but it usually occurs in July, or at least later than in most other eastern U.S. bats (Whitaker and Hamilton 1998). Though sex ratio at birth is 1:1, most studied populations are heavily male-biased suggesting that females have a higher mortality rate, perhaps due to energetic costs or other hazards associated with reproduction. This species is long-lived, with the oldest recorded individual found dead in the cave where it had been banded 19 years before (Hall *et al.* 1957). Juvenile mortality is thought to be high.

VI. Threats:

White-nose syndrome (WNS), discovered in New York in 2006, has caused severe mortality in several species of bats, and resulted in formally common bat species becoming rare across the landscape (Frick *et al.* 2010). The threat posed by white-nose disease far exceeds all other threats. Even prior to the arrival of the disease, hibernating populations were known to be susceptible to depletion of stored energy reserves and subsequent death due to excessive arousal during hibernation, as might take place during human intrusion in hibernacula. The presence of the disease greatly exacerbates this threat (Carl Herzog, pers. comm.).

Hibernating bats are susceptible to direct harm from vandalism, although this is thought to be a relatively minor threat (Carl Herzog, pers. comm.).

Wind turbines pose a localized and relatively minor threat (Carl Herzog, pers. comm.).

Hibernacula flooding and collapse threaten bats in some hibernation sites, but the threat is not significant at the population level (Carl Herzog, pers. comm.).

Are there regulatory mechanisms that protect the species or its habitat in New York?

__X__ No **____ Unknown**

____ Yes

Describe knowledge of management/conservation actions that are needed for recovery/conservation, or to eliminate, minimize, or compensate for the identified threats:

Prevention of intrusions into hibernacula is the only currently known management action able to reduce the impact of white-nose disease.

Species declines suggest that habitat availability is not limiting for populations.

Conservation Actions discussed at Expert Meeting in December 2013:

- Work with landowners to erect gates to regulate access to the selected hibernacula. [Partially completed]
- Continue to survey new potential hibernacula as they are discovered. [Ongoing]
- Survey winter populations as indicated in the objectives, develop alternative population monitoring techniques [Ongoing]
- Protect hibernacula and wintering areas
- Operational measures for wind projects
- Coordinate with nuisance wildlife control officers
- Locate maternity colonies
- Coordinate with cavers
- Include LBB conservations actions re: WNS National Plan, page 18

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