Northern Long-eared Myotis

Myotis septentrionalis

REGULATORY STATUS

USFWS: Threatened
USFS R2: No special status
USFS R4: No special status
Wyoming BLM: No special status
State of Wyoming: Nongame Wildlife

CONSERVATION RANKS

USFWS: No special status
WGFD: NSS2 (Ba), Tier II
WYNDD: G1G2, S1
Wyoming Contribution: LOW
IUCN: Least Concern

STATUS AND RANK COMMENTS

Northern Long-eared Myotis (*Myotis septentrionalis*) was listed as threatened under the Endangered Species Act in 2015 [1]. In Wyoming, the species is covered by a 4(d) rule [2]. The species has been assigned a global range rank of G1G2 because of uncertainties of the effects of White-nose Syndrome (WNS) on the persistence of the species [3]. The rank of G1G2 indicates that across the species range, it is at very high or high risk of extinction [3].

NATURAL HISTORY

Taxonomy:

There are no recognized subspecies of Northern Long-eared Myotis [4]. Historically, Northern Long-eared Myotis was classified as a subspecies of Keen's Myotis (*M. keenii*). Literature referencing Keen's Myotis outside of the Pacific Northwest refers to *M. septentrionalis* [5].

Description:

Northern Long-eared Myotis is identifiable in the field. The species is a small vespertilionid bat but is medium in size among *Myotis* species. Dorsal pelage is dull yellow-brown while ventral pelage is pale gray. The calcar often has a slight keel. The ears and wing and tail membranes are translucent and light brown [6]. Northern Long-eared Myotis has relatively long ears (17–19 mm) with a long, pointed tragus [5], although individuals in Wyoming typically have shorter ears than average (14–16 mm), which may complicate identification [7]. Volant juvenile individuals are identical in appearance to adults, but the growth plates in the phalanges of juveniles are visible throughout the first summer [5, 8]. Northern Long-eared Myotis is similar in appearance to other sympatric *Myotis* species. Within the Wyoming range of the species, these include the Little Brown Myotis (*M. lucifugus*), Fringed Myotis (*M. thysanodes*), Long-eared Myotis (*M. evotis*), Western Small-footed Myotis (*M. ciliolabrum*), and Long-legged Myotis (*M. volans*). Northern Long-eared Myotis can be distinguished by its translucent, light brown ears and wing and tail membranes and its long, pointed tragus.

Distribution & Range:
Northern Long-eared Myotis is widely distributed across Canada and the Midwestern and eastern United States. It is generally considered an eastern species and is quite rare in the western portions of its distribution. Wyoming is on the extreme western edge of the species' range. In Wyoming, the species has only been documented in the northeastern corner of the state in the vicinity of the Bear Lodge Mountains and Black Hills. Across its range, local distributions change seasonally as the species moves between summer ranges and winter hibernacula [5]. While no shifts in distribution have been documented, large declines and local extinctions resulting from WNS infection have been observed across the species range where the disease currently occurs [9-11].

Habitat:
Basic knowledge of habitat use and associations of Northern Long-eared Myotis in Wyoming is limited. Across its range, Northern Long-eared Myotis is strongly associated with forests and is considered a forest obligate by some researchers. In summer, the species frequents a wide variety of day and night roosts. Trees are most frequently used as roosts. Specifically, tall, large-diameter trees are preferred across the species range. In the Black Hills of South Dakota, female Northern Long-eared Myotis roosted in highly decayed, large-diameter Ponderosa Pine (*Pinus ponderosa*) snags [12]. Maternity colonies may also include roosts such as human-made structures and buildings [5]. In Wyoming, the species is only known from the Black Hills region in areas dominated by contiguous Ponderosa Pine forest [13, 14]. At Devils Tower National Monument, male Northern Long-eared Myotis roosted in a variety of structures including standing dead and live Ponderosa Pine, fallen Ponderosa Pine trees, small Bur Oak (*Quercus macrocarpa*) snags, and a rock crevice [15]. It is likely that roost selection of both male and female Northern Long-eared Myotis across their range in Wyoming is similar to the findings presented above. During winter, Northern Long-eared Myotis hibernates. Across the species range, including in the Black Hills of South Dakota, caves and abandoned mines are used as hibernacula [5, 16]. Currently, there are no known Northern Long-eared Myotis hibernacula in Wyoming. However, evidence suggests that summer habitat is generally close to winter hibernacula (< 56 km), making it likely that the species overwinters in the state [5]. Within hibernacula, Northern Long-eared Myotis often clusters in deep crevices.

Phenology:
Phenology of Northern Long-eared Myotis in Wyoming largely unknown but is assumed to be similar to other portions of its range. Northern Long-eared Myotis breeds from July to September. Females store sperm over winter, and a single egg is fertilized in spring when they emerge from hibernation [5]. In northern portions of its range, parturition likely occurs mid-July. Offspring are volant by early August [5]. Northern Long-eared Myotis begins visiting hibernacula from late July to early September. Northern Long-eared Myotis typically enter hibernation from September to November and leave the hibernacula from March to May. Length of hibernation varies with latitude and local environmental conditions [5].

Diet:
Northern Long-eared Myotis consumes a wide variety of small insects. Small moths (Lepidoptera) comprise a large proportion of the species' diet [17].

CONSERVATION CONCERNS

Abundance:
Continental: WIDESPREAD
Wyoming: RARE
There are no estimates of abundance of Northern Long-eared Myotis in Wyoming. The species occupies a small portion of northeastern Wyoming and typically comprises a relatively small proportion of mist-net captures and acoustic detections [18, 19]. However, surveys conducted within contiguous forested habitat in the Bear Lodge Mountains and Black Hills found the species to be among the most common bat captured during mist-net surveys, suggesting the species may be locally common [13, 14].

Population Trends:
Historic: UNKNOWN
Recent: UNKNOWN
There are no estimates of historic or recent population trends of Northern Long-eared Myotis in Wyoming. In the eastern United States, the species has undergone large declines where it is affected by WNS [9, 20]. As of 2015, WNS has not been documented in Wyoming [21], and declines of Northern Long-eared Myotis resulting from the disease have not occurred in the state.

Intrinsic Vulnerability:
HIGH VULNERABILITY
Multiple factors make Northern Long-eared Myotis highly vulnerable to extrinsic stressors. Foremost of these is the species susceptibility to WNS. Northern Long-eared Myotis has low fecundity, giving birth to only one pup per year [5]. As a result, the species may have a difficult time recovering from population declines. Northern Long-eared Myotis also has specific requirements for roosting and hibernacula habitat. The species prefers to roost in tall, large diameter trees [5]. During winter, the species hibernates in caves and abandoned mines. Both roost trees and hibernacula are often limited landscape features.

Extrinsic Stressors:
MODERATLY STRESSED
The most important stressor to Northern Long-eared Myotis outside Wyoming is WNS. The pathogenic fungus *Pseudogymnoascus destructans* (formerly *Geomyces destructans*) that causes WNS was unintentionally introduced to North America in 2006 [22]. Multiple lines of evidence suggest large declines of several bat species, including Northern Long-eared Myotis, in eastern North America have resulted from WNS. Annual declines of 30 to 99% have been documented at hibernacula known to have WNS infected bats, with local extinctions of Northern Long-eared Myotis at 69% of monitored hibernation sites in the northeastern United States [11, 22]. Similarly, large declines in acoustic detections during the summer have been documented in many areas of eastern North America [9, 20]. As of 2015, WNS has not been documented in Wyoming [21]. It is assumed that WNS will eventually occur in Wyoming, but it is unknown if WNS will affect bats to the same degree in Wyoming as in other areas of North America. Northern Long-eared Myotis is also negatively affected by some commonly applied timber harvest and forest management practices and minimally or unaffected by others [23]. Because the species is restricted to forest habitats, practices that reduce or fragment forest habitat are likely to negatively affect Northern Long-eared Myotis. In other parts of its range, Northern Long-eared Myotis was generally not detected passing through or foraging in clear-cuts [24], suitable habitat for the species decreased following an increase in forest openings and proportion of edge habitat [25], and occupancy

decreased with increasing amount of edge in the landscape [26]. In a highly fragmented landscape, Northern Long-eared Myotis was entirely constrained to forest fragments and the probability of forest fragment occupancy was positively related to fragment area [27 28]. Conversely, selective harvest techniques such as diameter-limit or single tree removal that maintain contiguous forest cover or generate only small openings may minimally affect or even benefit the species [23, 29]. While the effects of forest fragmentation have not been evaluated in Wyoming, patterns seem to be consistent across a variety of forest types where the species occurs, making it likely that effects would be similar in Wyoming. Finally, natural or anthropogenic disturbance events that reduce the number of suitable roost trees are likely to negatively affect Northern Long-eared Myotis. The species may tolerate removal of some roost trees, but the level of removal tolerated before the species abandons an area is likely dependent on local forest conditions [30]. Disturbance from visitors to caves and abandoned mines used as hibernacula represents a substantial threat to cave-roosting bats and bat habitat where human visitors occur [31]. Even a small number of short duration disturbances lead to significant increases in arousal events and subsequent energy expenditures that may lead to increased mortality of hibernating bats [32, 33].

KEY ACTIVITIES IN WYOMING

State and federal wildlife and land management agencies have taken several actions to protect Northern Long-eared Myotis and other bat species from WNS. Specifically, the Black Hills National Forest implemented an adaptive management strategy for caves and abandoned mines to limit the potential for introduction and spread of WNS [34, 35]. The Wyoming Game and Fish Department (WGFD) along with the Wyoming Bat Working Group developed "A strategic plan for white-nose syndrome in Wyoming" in 2011 [36]. This plan is intended to minimize the impacts of WNS once it is detected in adjacent states or within Wyoming. To facilitate early detection of the disease, WGFD requires researchers to use the Reichard Wing-Damage Index [37] to evaluate all bats captured during research activities for signs of WNS infection as well as to implement WNS decontamination protocols when handling bats or conducting hibernacula surveys. Beginning in 2012, WGFD personnel placed temperature and humidity loggers in a number of known or suspected hibernacula across Wyoming to determine if climatic conditions at these sites are favorable for growth of *P. destructans*. Preliminary results suggest that temperature and relatively humidity in known hibernacula could facilitate the growth of the fungus [38, 39]. Personnel have also begun collecting swabs of hibernating bats and hibernacula substrates in an effort to assist with early detection of *P. destructans*. Collectively, WGFD and the Wyoming Natural Diversity Database (WYNDD) have conducted statewide systematic and project-specific surveys for bats since 2008, with numerous, smaller scale projects occurring prior to this time. In 2010, the WGFD conducted an inventory of forest bats in northeastern Wyoming. During these surveys, 27 Northern Long-eared Myotis were captured at seven sites [19]. In 2010 and 2011, WYNDD conducted an inventory of bats at Devils Tower National Monument. During this inventory, four Northern Long-eared Myotis were captured at two sites, and > 100 acoustic detections from 16 sites were recorded [18]. In 2014, WYNDD initiated a study to evaluate occupancy and habitat associations for Northern Long-eared Myotis in Wyoming. Preliminary analyses indicate that across the species currently accepted range in northeastern Wyoming, the probability of a site being occupied by the species was approximately 50%. During mist-net surveys associated with this work in 2014 and 2015, Northern Long-eared Myotis was generally among the most commonly captured bat species, suggesting it may be relatively abundant in suitable habitat in the Black Hills and Bear Lodge Mountains [13, 14]. In 2015, WYNDD initiated a

study to identify and characterize day roosts at Devils Tower National Monument. Eight Northern Long-eared Myotis were captured and fitted with radio transmitters and tracked back to 10 day roosts [15].

ECOLOGICAL INFORMATION NEEDS

Habitat use and associations of Northern Long-eared Myotis are poorly understood in Wyoming. While the species is known to occur in Wyoming in the spring, summer, and fall, there are no known Northern Long-eared Myotis hibernacula in Wyoming. Summer day roost use is largely unknown in Wyoming. Both hibernacula and summer day roosts represent critical habitat components for persistence of the species in Wyoming. Estimates of abundance and population trends of Northern Long-eared Myotis in Wyoming are not available. However, these data would be useful in the face of potential stressors such as WNS or forestry management practices. As of 2015, WNS has not been documented in Wyoming, but continued monitoring for the disease is essential so that appropriate measures can be put in place to potentially minimize the effect of the disease in Wyoming.

MANAGEMENT IN WYOMING

This section authored solely by WGFD; Nichole L. Bjornlie. Very little is known about the wintering locations of Northern Long-eared Myotis in Wyoming. Although WNS has not been detected in the state, the slow westward progression of the fungus necessitates the need for these data before it reaches Wyoming. Consequently, priorities will focus on locating and monitoring hibernacula as well as other roost locations (e.g., maternity roosts) to monitor populations and recommend and assist with bat-friendly closures of important caves and mines. Additional priorities will focus on further defining the distribution of the species in the state to help direct future management and conservation efforts. Mist-net surveys will continue to implement WNS protocols and assessment in an effort to assist with early detection should the disease reach the state. Habitat assessments will be incorporated with survey efforts to better understand what influences species presence and distribution at a finer scale. In addition to inventory projects, WGFD, in collaboration with the Wyoming Bat Working Group and other state-wide partners, will implement the North American Bat Monitoring Program that will use acoustic monitoring to assess state and region-wide bat trends. Additional priorities will include updating and revising the Conservation Plan for Bats in Wyoming and the Strategic Plan for WNS in Wyoming. Finally, outreach and collaboration with private landowners will remain a priority to ensure conservation of bats and bat habitat.

CONTRIBUTORS

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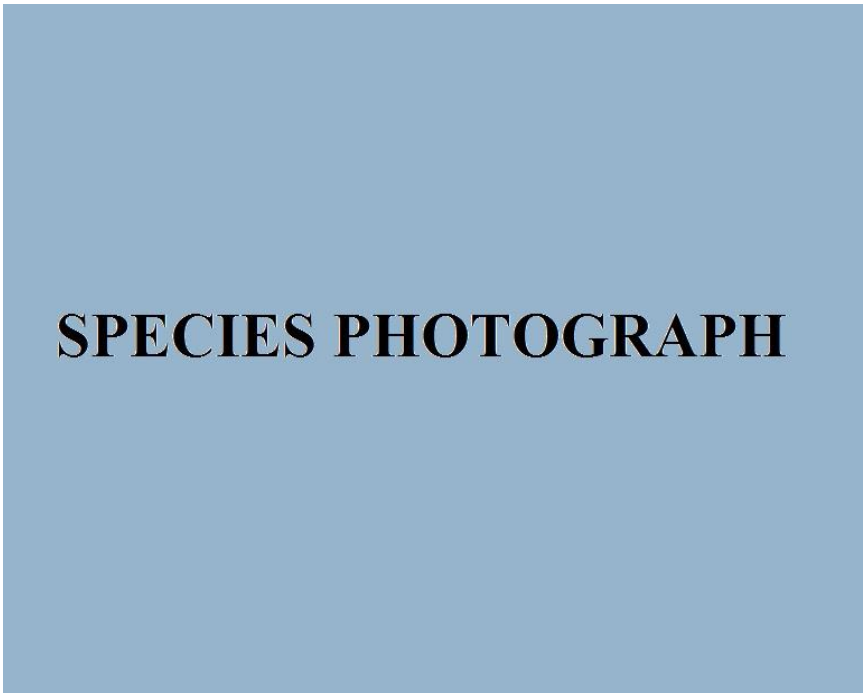

Figure 1: Photo not available.

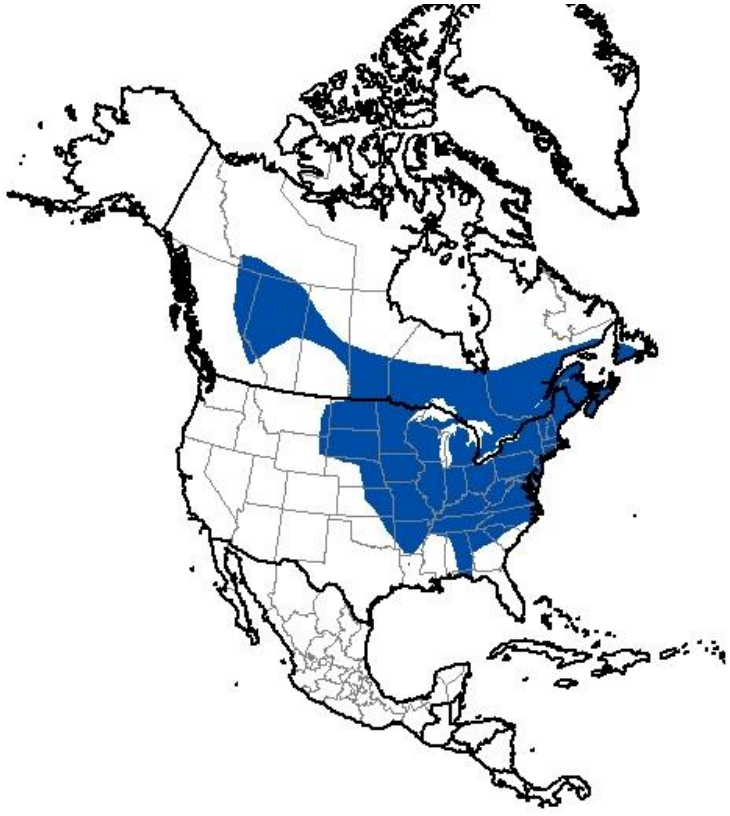

Figure 2: North American range of *Myotis septentrionalis*. (Map from: Patterson, B. D., et al. (2007) Digital Distribution Maps of the Mammals of the Western Hemisphere, version 3.0, NatureServe, Arlington, Virginia.)

Figure 3: Northern Long-eared Myotis habitat near Devils Tower National Monument in Crook County, Wyoming. (Photo courtesy of WYNDD)

STATE MAP

Figure 4: Map not available.