

Western Small-footed Myotis

Myotis ciliolabrum

REGULATORY STATUS

USFWS: No special status
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: NSS4 (Cb), Tier II
WYNDD: G5, S4
Wyoming Contribution: LOW
IUCN: Least Concern

STATUS AND RANK COMMENTS

Western Small-footed Myotis (*Myotis ciliolabrum*) has no additional regulatory status or conservation rank considerations beyond those listed above.

NATURAL HISTORY

Taxonomy:

There is considerable uncertainty regarding the taxonomy of Western Small-footed Myotis. At the species level, it is unclear if Western Small-footed Myotis and California Myotis (*M. californicus*) constitute two recently diverged species or a single morphologically variable species¹. Prior to 1984, Western Small-footed Myotis was considered the western subspecies of *M. leibii*, now commonly referred to as Eastern Small-footed Myotis². Additionally, Eastern Small-footed Myotis and Western Small-footed Myotis were referred to as *M. subulatus* as recently as 1981³. Currently, Western Small-footed Myotis is considered monotypic⁴. Some researchers suggest two subspecies, *M. c. ciliolabrum*, and *M. c. melanorhinus*⁵, but subspecific designations are not widely applied.

Description:

Western Small-footed Myotis is identifiable in the field by skilled observers. The species is quite small among bats in the genus *Myotis*. Dorsal pelage is pale light brown to light yellowish brown. Ventral pelage is similar to dorsal pelage but lighter in color, almost white. The face is dark brown to black forming a distinctive face mask contrasting with the light pelage. Similarly, the ears and patagia are dark brown to black. The ears are relatively long, ranging from 11 to 16 mm in length. The tragus is slender and tapering and is approximately half the total length of the ear. As the name suggests, the species has very small feet that are less than half the length of the tibia. The calcar is distinctively keeled. Where sympatric, Western Small-footed Myotis is very similar in appearance to California Myotis. However, the tail of Western Small-footed Myotis

extends approximately 2–4 mm beyond the uropatagium, while the tail of California *Myotis* does not extend beyond the uropatagium^{5 6}.

Distribution & Range:

Western Small-footed *Myotis* is widely distributed across western North America. Wyoming is central to the continental distribution of Western Small-footed *Myotis*, and the species occurs throughout the state in a variety of environments. Locally, seasonal changes in distribution may be observed as individuals move between summer range and winter hibernacula.

Habitat:

Western Small-footed *Myotis* is generally associated with arid landscapes, usually in the vicinity of cliffs, canyons, rock-outcrops, or badlands. It also occurs near riparian areas in a variety of other habitat types including montane forests, juniper woodlands, various shrublands, and grasslands⁵. In summer, Western Small-footed *Myotis* utilizes a variety of day roosts. Generally, these include rock features such as crevices in cliffs or rock-outcrops, but the species will also roost in crevices in badland formations, eroded stream banks, under rocks, and even in cracks in the ground. Occasionally, Western Small-footed *Myotis* will roost in buildings or other man-made structures⁵. In winter, the species hibernates in a variety of settings, but most frequently in caves or abandoned mines⁵.

Phenology:

Phenology of Western Small-footed *Myotis* is poorly understood across its range and in Wyoming in particular. A single non-volant pup is born in late June or July. It is likely that, like other *Myotis*, Western Small-footed *Myotis* breeds in the fall prior to entering hibernation. The species enters hibernation late in the fall and emerges as early as March⁵.

Diet:

Western Small-footed *Myotis* feeds on flying insects. Insects from the order Lepidoptera are most frequently consumed, but Diptera, Hemiptera, Coleoptera, and Trichoptera are also eaten⁵.

CONSERVATION CONCERNS

Abundance:

Continental: WIDESPREAD

Wyoming: COMMON

There are no robust estimates of abundance for Western Small-footed *Myotis* in Wyoming. Survey data from across Wyoming suggests that the species is well represented within bat communities and may be relatively common in suitable habitat⁷⁻¹³.

Population Trends:

Historic: UNKNOWN

Recent: UNKNOWN

Both historic and recent population trends for Western Small-footed *Myotis* in Wyoming are unknown.

Intrinsic Vulnerability:

MODERATE VULNERABILITY

Western Small-footed *Myotis* is moderately vulnerable to extrinsic stressors in Wyoming. Western Small-footed *Myotis* has low fecundity, producing only one offspring per year⁵.

Western Small-footed Myotis hibernates in caves and abandoned mines during the winter, which are rare landscape features.

Extrinsic Stressors:

MODERATELY STRESSED

White-nose Syndrome (WNS) is a fungal disease that affects hibernating bats. WNS has killed several million bats in North America^{14, 15}. The pathogenic fungus *Pseudogymnoascus destructans* (formerly *Geomyces destructans*) that causes WNS has not been detected within the range of Western Small-footed Myotis or in Wyoming to date¹⁶, but it is thought that the disease will continue to expand westward. It is unknown if Western Small-footed Myotis will be affected by WNS, but Eastern Small-footed Myotis and other hibernating bat species have experienced large population declines from the disease¹⁴. Similar to other insectivorous organisms, Western Small-footed Myotis is negatively affected by pesticide use, both from reduced food availability and acute and chronic toxicity from the pesticides themselves¹⁷. Disturbance from visitors to caves and abandoned mines used as hibernacula represents a significant threat to cave-roosting bats and bat habitat¹⁷. Even a small number of short-duration disturbances can significantly increase arousal events and subsequent energy expenditures that may lead to increased mortality of Western Small-footed Myotis¹⁸. Western Small-footed Myotis may be negatively affected by global climate change¹⁹. In northern Colorado, long-term monitoring of bat species, including Western Small-footed Myotis, indicated that the number of reproductive (i.e., pregnant, lactating, or post-lactating) females declined by approximately 50% under drought conditions that mimicked those predicted by climate change models¹⁹. While this decline was not statistically significant, it is biologically relevant. Given the geographic proximity and habitat similarities between this study location and Wyoming, it is likely that similar patterns could occur in Wyoming.

KEY ACTIVITIES IN WYOMING

Bats have received increasing research attention across North America and in Wyoming. To address concerns regarding potential WNS infection of bats in Wyoming, the Wyoming Game and Fish Department (WGFD) in cooperation with the Wyoming Bat Working Group authored “A strategic plan for white-nose syndrome in Wyoming” in 2011. This document presents a plan of action to minimize impacts of WNS if it is detected in states adjacent to or in Wyoming²⁰. To facilitate early detection of the disease, WGFD requires researchers to evaluate all bats captured during research activities for signs of WNS infection using the Reichard Wing-Damage Index²¹. 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 those sites are favorable for growth of *P. destructans*. Personnel have also begun collecting swabs from hibernating bats and hibernacula substrates in an effort to assist with early detection of *P. destructans*. While placing loggers, surveyors also searched for hibernating bats and detected Western Small-footed Myotis at seven sites²²⁻²⁴. WGFD conducts periodic surveys at known hibernacula throughout the state, including known Western Small-footed Myotis hibernacula. Currently, 49 Western Small-footed Myotis hibernacula have been documented, with 1 to 33 individuals observed during winter surveys, which represents a small fraction of the number of individuals captured during summer survey efforts. Several studies have been completed or are underway that have increased our understanding of bat species in the state, including Western Small-footed Myotis. Both WGFD and the Wyoming Natural Diversity Database (WYNDD) have conducted numerous bat inventories across the state including a statewide forest bat

inventory from 2008 to 2011^{9, 10, 13, 25-27}, a statewide inventory of cliffs, caves, and rock outcroppings from 2012 to 2015^{11, 12}, an inventory of bats at Devils Tower National Monument from 2010 to 2011, a bat monitoring effort in southern Wyoming from 2011 to 2013^{7, 8, 28}, and bat surveys in northeastern Wyoming in 2014 and 2015²⁹. Western Small-footed Myotis was frequently captured and recorded during these investigations^{11, 12, 25-27, 29, 30}. In 2011, 2013, 2014, and 2015, WYNDD conducted multi-taxa inventories, which included bat surveys, within the Ferris Mountain Wilderness Study Area (WSA), Gardner Mountain WSA, Fortification Creek WSA, and North Fork WSA. Several bat species were detected within these four WSAs including Western Small-footed Myotis³¹⁻³³. In 2015, WYNDD developed a bat monitoring plan and initiated survey activities at Bighorn Canyon National Recreation Area (BICA). The primary objective of this monitoring plan is to develop a baseline activity level or other index of abundance for Little Brown Myotis (*M. lucifugus*) that can be used to detect changes in populations within BICA through time, but Western Small-footed Myotis was frequently captured and recorded throughout the area. In addition to research activities, many conservation organizations and federal and state agencies, including WGFD, have developed outreach and education materials to inform the general public of the importance bats and concerns regarding the persistence of bats in the future.

ECOLOGICAL INFORMATION NEEDS

There is considerable uncertainty regarding the taxonomy of Western Small-footed Myotis, with some researchers suggesting synonymy with California Myotis. Clarification of this taxonomic uncertainty may change state and global rankings and conservation priorities for both species. While Western Small-footed Myotis is known to hibernate in caves and abandoned mines in Wyoming, the full breadth of suitable hibernacula for the species in the state is poorly understood. Hibernation sites represent critical habitat components for bats, and a better understanding of hibernacula selection and use would benefit Western Small-footed Myotis. Abundance and population trends of the species in Wyoming are largely unknown but would be valuable in light of potential threats such as WNS. Furthermore, while WNS has not been documented in Wyoming to date, continued monitoring is essential to ensure that potential mitigation actions can be implemented.

MANAGEMENT IN WYOMING

This section authored solely by WGFD; Nichole L. Bjornlie. Very little is known about the wintering locations of Western Small-footed Myotis in Wyoming. Although WNS has not been detected in the state, the westward progression of the fungus and recent confirmation of WNS in Washington 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. In 2016, WGFD will begin a project in collaboration with the state of Nebraska to evaluate occurrence, abundance, and reproductive status of bats in eastern Wyoming, which represents an important zone of overlap between eastern and western bat species. 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 assist with state and region-wide assessment of 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

Ian M. Abernethy, WYNDD
 Nichole L. Bjornlie, WGFD
 Kaylan A. Hubbard, WYNDD

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Figure 1: A Western Small-footed Myotis in Wyoming. (Photo courtesy of Robert J. Luce, WGFD)



Figure 2: North American range of *Myotis ciliolabrum*. (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: Rock outcrop typical of Western Small-footed Myotis roosting and foraging habitat in Fremont County, Wyoming. (Photo courtesy of Ian M. Abernethy)

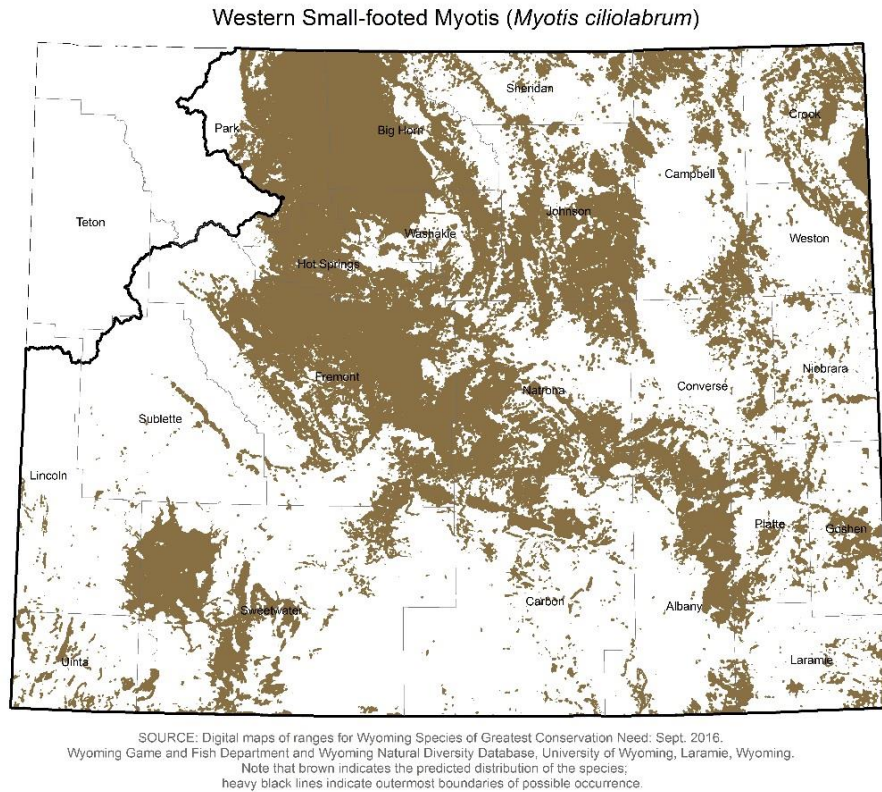


Figure 4: Range and predicted distribution of *Myotis ciliolabrum* in Wyoming.



Figure 5: Ventral view of a Western Small-footed Myotis captured in Wyoming. (Photo courtesy of Shelly Johnson, WGFD)