

Townsend's Big-eared Bat

Corynorhinus townsendii

REGULATORY STATUS

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

CONSERVATION RANKS

USFWS: No special status
WGFD: NSS3 (Bb), Tier II
WYNDD: G4, S2B/S1N
Wyoming Contribution: LOW
IUCN: Least Concern

STATUS AND RANK COMMENTS

Two subspecies of Townsend's Big-eared Bat (*Corynorhinus townsendii*), Virginia Big-Eared Bat (*C. (formerly Plecotus) t. virginianus*) and Ozark Big-eared Bat (*C. (formerly Plecotus) t. ingens*), were listed as Endangered under the Endangered Species Act (ESA) in 1979¹. Neither subspecies occurs in Wyoming. Townsend's Big-eared Bat has been assigned both a breeding season and non-breeding season state conservation rank by the Wyoming Natural Diversity Database because of increased extrinsic stressors during hibernation.

NATURAL HISTORY

Taxonomy:

There are five recognized subspecies of Townsend's Big Eared Bat. The geographic distribution of these subspecies has previously been called into question by taxonomic authorities². The most recent literature indicates that only *C. t. townsendii* occurs in Wyoming²⁻⁴. Earlier authors also assigned *C. t. pallescens* throughout much of western North America, including Wyoming⁴. Prior to 1992, Townsends Big-eared Bat was included in the genus *Plecotus*. Phylogenetic evidence based on morphological and genetic differences placed New World Big-eared Bats in the genus *Corynorhinus*⁵. It is important to note that literature from the New World prior to this time refers to Townsend's Big-eared Bat as *P. townsendii*. Additionally, the United States Fish and Wildlife Service still uses the genus *Plecotus* for Virginia Big-eared Bat and Ozark Big-eared Bat.

Description:

Townsend's Big-eared Bat is easily identified in the field. The species is medium in size among bat species that occur in Wyoming. As the common name suggests, Townsend's Big-eared Bat has large, rounded ears ranging from 30–39 mm in length with long, pointed tragi measuring 11–17 mm. When in torpor or hibernation, the ears may curl back, forming distinctive “rams horns”. The species also has a distinctive nose with large, raised pararrhinal glands that form a “U” over

the top of the snout ³. Dorsal pelage is slate gray with hair tips ranging from cinnamon to black-brown. Ventral pelage is slightly lighter in color and ranges from light slate gray to buff. In many populations, females are slightly larger than males but are otherwise identical in appearance ⁶. Other large-eared bat species found in Wyoming include Spotted Bat (*Euderma maculatum*) and Pallid Bat (*Antrozous pallidus*). Unlike Townsend's Big-eared Bat, Spotted Bat has black dorsal pelage with three white spots, and Pallid Bat is smaller with inconspicuous parahinal glands ³.

Distribution & Range:

Townsend's Big-eared Bat is widely distributed across the western half of North America from British Columbia to southern Mexico. Wyoming marks the northeastern edge of this distribution, and confirmed breeding has been documented in 5 of the 28 latitude/longitude degree blocks in the state ⁷. Two subspecies exist in geographically disparate populations in the eastern United States and include Virginia Big-eared Bat, which is found in Kentucky, North Carolina, Tennessee, Virginia, and West Virginia, and Ozark Big-eared Bat, which is found in Arkansas and Oklahoma ¹. Changes in distribution may be observed seasonally as the species moves between summer habitat and winter hibernacula. However, Townsend's Big-eared Bat typically does not undergo long-distance migrations, with movements of approximately 64 km or less reported in portions of its range ⁶.

Habitat:

Across its range, Townsend's Big-eared Bat is found in a variety of xeric to mesic upland habitats ranging from shrublands to woodlands to montane forests ^{3, 6, 8, 9}. At regional and local scales, distribution is limited by suitable roosting habitat. The species is considered a cave obligate, requiring natural caves or cave-like structures, such as abandoned mines, throughout the year. In the summer, day roosts generally include caves and mines, although the species will occasionally use abandoned buildings or large hollow trees ³. Males roost singly in cooler locations, while females congregate in maternity colonies in warmer areas. In winter, Townsend's Big-eared Bat hibernates in caves and mines. Within hibernacula, the species selects relatively cold locations, often near the entrance or other areas that experience air movement, but may move to warmer locations during extreme cold ⁶.

Phenology:

The phenology of Townsend's Big-eared Bat in Wyoming is largely unknown but is assumed to be similar to other portions of its range. The species hibernates from early fall to early spring. Movements from summer range to winter hibernacula begin in late summer, with individuals arriving at hibernacula by October ³. Reproductive phenology is similarly unknown in Wyoming. In California, mating occurred primarily in the fall but was occasionally documented throughout the winter. Females store sperm over the winter and ovulate upon arousal from hibernation in the spring. A single pup is born following a 40–60 day gestation period. Juveniles are capable of flight at about 3 weeks of age but continue to nurse for up to 6 weeks following birth ^{3, 6}.

Diet:

Townsend's Big-eared Bat is strictly insectivorous and primarily consumes small moths in the family Lepidoptera ¹⁰.

CONSERVATION CONCERNS

Abundance:

Continental: WIDESPREAD

Wyoming: UNCOMMON

There are no robust abundance estimates for Townsend's Big-eared Bat in Wyoming. While the species is widely distributed across Wyoming in a number of different habitat types, Townsend's Big-eared Bat typically represents a very small proportion of mist-net captures and acoustic recordings, suggesting that the species occurs at low density in the state¹¹⁻²¹. However, Townsend's Big-eared Bat is commonly detected during hibernacula surveys across Wyoming²².

Population Trends:

Historic: UNKNOWN

Recent: UNKNOWN

There are no robust population trend estimates for Townsend's Big-eared Bat in Wyoming. However, several authors have reported marked declines in abundance across the western United States over the past several decades³. It is unknown if similar trends have occurred in Wyoming.

Intrinsic Vulnerability:

HIGH VULNERABILITY

Townsend's Big-eared Bat is highly vulnerable to extrinsic stressors. The species is considered an obligate of caves and abandoned mines, and it is thought that the distribution and abundance of populations is limited by the presence of suitable, undisturbed roost sites on the landscape³. Additionally, Townsend's Big-eared Bat displays high site fidelity, especially at hibernacula and maternity colonies. Given the inherent rarity of these features on the landscape, the species may be unable to find new roost sites should existing sites be lost or degraded³. Townsend's Big-eared Bat exhibits low fecundity, with females giving birth to a single pup each year⁶. This makes it difficult for populations to recover following declines.

Extrinsic Stressors:

MODERATELY STRESSED

The primary stressor to Townsend's Big-eared Bat in Wyoming and across its continental distribution is the loss, modification, and disturbance of roosting habitat. Disturbance from visitors to caves and abandoned mines represents a substantial stressor to bats using these structures. During hibernation, even a small number of disturbances can lead to a significant increase in arousal events and energy expenditure that may increase mortality of hibernating bats^{9, 23, 24}. Townsend's Big-eared Bat may be more prone to disturbance during hibernation than other bat species because it often selects locations near the entrance of caves and mines. Additionally, the species is reliant upon caves and abandoned mines year round, making it prone to disturbance throughout the year. Abandonment of roosts used as hibernation sites and maternity sites following human disturbance has been documented across the species' range³. Townsend's Big-eared Bat may also be vulnerable to White-Nose Syndrome (WNS). The pathogenic fungus that causes WNS, *Pseudogymnoascus destructans* (formerly *Geomyces destructans*), was unintentionally introduced to North America in 2006²⁵ and has led to large declines of several bat species in eastern North America²⁵. *P. destructans* has been documented on a subspecies of Townsend's Big-eared Bat, Virginia Big-eared Bat, but no mortalities resulting from WNS have been documented in this subspecies to date²⁶. It is currently unknown if and how WNS will affect Townsend's Big-eared Bat in the west.

KEY ACTIVITIES IN WYOMING

State and federal wildlife and land management agencies have taken several actions to protect Townsend's Big-eared Bat 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^{27, 28}. 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 2011²⁹. This plan is intended to minimize the impacts of WNS if it is detected in Wyoming or adjacent states. 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 Index³⁰, and 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 relative humidity in known hibernacula could facilitate the growth of the fungus^{22, 31}. 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 2011, the WGFD conducted an inventory of forest bats in southeastern Wyoming; Townsend's Big-eared Bat was not captured during these surveys, but recordings of the species were made at nine sites³². From 2012 to 2015, WGFD conducted an inventory of cliff and canyon habitats across western Wyoming and captured Townsend's Big-eared Bat at eight sites and made acoustic recordings of the species at 17 sites^{19, 20, 33-35}. In 2011, 2012, and 2013, WYNDD conducted a bat inventory across southern Wyoming and captured Townsends Big-eared Bat at five sites made acoustic recordings of the species at 16 sites^{11, 12, 17}. In 2016, WYNDD made the first documentation of the species at Devils Tower National Monument, and two Townsend's Big-eared Bats were fitted with radio transmitters and tracked to day roosts at this site. Finally, the WGFD periodically conducts hibernacula surveys at both known and suspected hibernacula throughout the state; Townsend's Big-eared Bat is frequently encountered at low numbers during these surveys²².

ECOLOGICAL INFORMATION NEEDS

Despite nearly a decade of systematic survey efforts for bats in Wyoming, Townsend's Big-eared Bat remains understudied in Wyoming. The species would benefit from a better understanding of habitat use, especially in relation to landscape features used during hibernation and at maternity colonies. Additional information is also needed on the amount and degree of disturbance at important roosts and the impact of those disturbances on populations. Information on abundance and population trends is largely unavailable but is important in the face of growing stressors. It is also unknown how WNS might affect Townsend's Big-eared Bat in Wyoming and across North America.

MANAGEMENT IN WYOMING

This section authored solely by WGFD; Nichole L. Bjornlie. Although Townsend's Big-eared Bat is one of the more commonly encountered bats during hibernacula surveys, little is still known about the majority of wintering locations of the species in Wyoming. Although WNS has

not been detected in the state, the 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. In 2016, the WGFD began 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, the 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

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Figure 1: A Townsend's Big-eared Bat in Wyoming. (Photo courtesy of Robert J. Luce, WGFD)



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

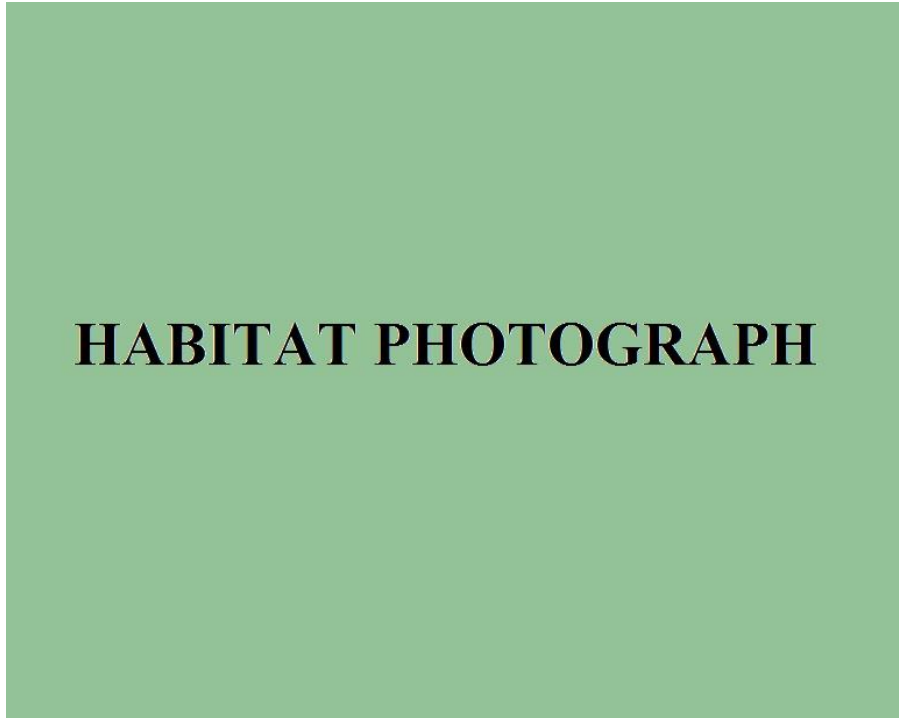


Figure 3: Photo not available.

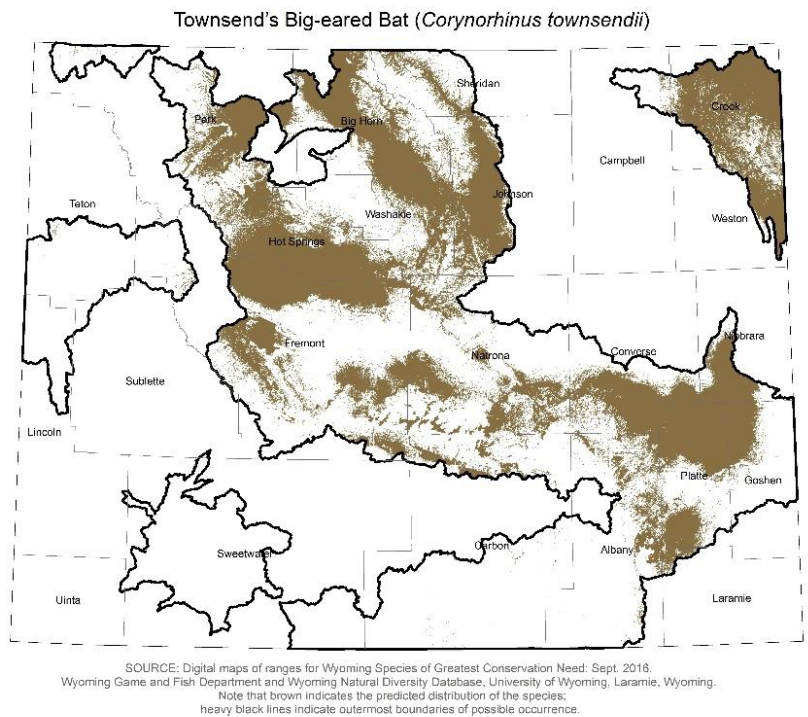


Figure 4: Range and predicted distribution of *Corynorhinus townsendii* in Wyoming.



Figure 5: A captured Townsend's Big-eared Bat in hand showing the distinctive face and ears. (Photo courtesy of Leah H. Yandow, WGFD)