

## Townsend's Big-eared Bat (*Corynorhinus townsendii*)

### Legal Status

*Federal:* USFS: Sensitive; BLM: Sensitive. Formerly listed as USFWS category 2 candidate (USFWS 1985; USFWS 1994) under the Endangered Species Act.

*State:* CDFG: Species of Special Concern (1993)



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*CNDDDB Rank:* G4T3T4S2S3; Global rank, G4 = Apparently Secure: Uncommon but not rare; some cause for long-term concern due to declines or other factors. T Rank, T3T4 = Same as global rank but related only to the status of the subspecies throughout its range, T3T4 somewhere between a T3 = Vulnerable: At moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors, and a T4 = Apparently Secure: Uncommon but not rare; some cause for long-term concern due to declines or other factors; State Rank, S2S3 = somewhere between an S2 indicating imperiled in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the state, and an S3 which indicates vulnerable in the state due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.

*Western Bat Working Group:* High Priority

*IUCN: Red list category:* VU: A2c (vulnerable to extinction)

*Recovery Plan:* No species recovery plan has been written for the subspecies *C. t. townsendii* (occurring in northern California), but both eastern subspecies *C. t. virginianus* and *C. t. ingens* are federally listed and have recovery plans. The Species Conservation Assessment and Conservation Strategy for the Townsend's big-eared bat (Pierson *et al.* 1999) provides conservation measures and a recovery plan for the western subspecies (*C. t. townsendii* and *C. t. pallescens*).

### Species Description and Life History

The Townsend's big-eared bat (*Corynorhinus townsendii*) is a member of the taxonomic Order Chiroptera and Family Vespertilionidae. It is a medium-sized (8-14 g) bat with rabbit-like ears, a small indistinct face and overall brownish coloration. This species is related in appearance to only one other bat with very large ears, the pallid bat (*Antrozous pallidus*), which is larger overall, light-colored, with large eyes and a distinct muzzle.

The life history of the Townsend's big-eared bat centers on reproduction and meeting the energetic demands of a small insectivorous mammal. Its annual cycle includes an approximate 7 to 8 month period of peak activity in spring and summer when insects are most available and reproduction occurs. Pregnant females gather in maternity colonies which range in size from a few to several hundred individuals. Males usually roost elsewhere, singly or in small numbers. Maternity colonies form between March and June (based on local climatic factors), with a single pup born between May and July (Pearson *et al.* 1952). Maternity colonies cluster tightly together to share body heat and the appearance of the cluster is characteristic. Although roost site fidelity is variable in areas with many potential roost sites, it is quite high in California where roosting habitat is scarce (Sherwin *et al.* 2003).

The Townsend's big-eared bat uses daily and seasonal periods of hibernation to conserve energy when it is inactive. In winter months when insect prey is less available this species extends hibernation over weeks or months and it may migrate locally to suitable hibernation sites. In the Sacramento Valley, bats may hibernate, migrate, or reside year-round and alternate between activity and hibernation depending on weather and insect availability.

### **Habitat Requirements and Ecology**

In California, this species occurs in many habitats including active agricultural areas, riparian communities, coastal habitat types, oak woodland, conifer forest, desert scrub, and native prairies. Pierson and Rainey (1998a) suggested that its distribution appears to be constrained primarily by the availability of suitable roosting sites and the degree of human disturbance at roosts.

#### *Roosting Ecology*

The roosting behavior of the Townsend's big-eared bat leaves it highly vulnerable to disturbance. Roosting habitat is limited to caves, mines, tunnels, and other features that mimic caves, such as large tree hollows, abandoned buildings with cave-like attics, water diversion tunnels, and internal spaces in bridges. For example, of the six maternity colonies known along the California coast, five colonies are in the attics of old buildings and one colony roosts in a cave-like feature of a bridge (Fellers and Pierson 2002). Open spaces under bridges are often used as night roosts by individual animals. Within these features (caves, mines, other structures) bats typically roost in highly visible areas on open surfaces, rarely seeking shelter in crevices as many other bat species do (Barbour and Davis 1969, Dalquest 1947). The distribution of the Townsend's big-eared bat is limited to regions with appropriate roosting habitat.

#### *Foraging Ecology*

Foraging occurs primarily along edges of wooded habitats and along streams (Kunz and Martin 1982). This species both feeds in the air and gleans insects off leaf surfaces. Radio-tracking and light-tagging studies have also documented it feeding in closed forest

and woodland settings, within the canopy of oaks (Pierson and Rainey 1998b), particularly along vegetated stream corridors, over corn and alfalfa fields (Fellers and Pierson 2002), and occasionally over hay crops and vineyards. The Townsend's big-eared bat has also been captured while flying over damp, marshy patches of meadow and in willow riparian vegetation (Pierson pers. comm.). Commuting distances (from roost site to primary foraging area) known from telemetry studies conducted up to 2001 varied from 1-13 kilometers (Fellers and Pierson 2002). Commuting distances vary among individuals and within species based on season, sex, reproductive condition, and the availability of suitable foraging habitat (Fellers and Pierson 2002). Moths and butterflies comprise over 90% of the diet of this species and its guano has a distinctive golden-colored, fine-grained appearance due to the prevalence of wing scales comprising the pieces.

### **Species Distribution and Population Trends**

In California, Townsend's big-eared bat populations have been concentrated in the limestone formations of the Sierra Nevada and Klamath mountain ranges, the volcanic formations in the Columbian Plateau (e.g., Lava Beds National Monument), and throughout mining districts. In Yolo County, this species is documented (CNDDDB 2007) at three mine sites in the Little Blue Ridge, and likely occurs in other areas of the western portion of the county where caves and mines occur in the steeper canyons and rock outcrops. However, some populations of Townsend's big-eared bat may be located in buildings and other anthropogenic structures such as tunnels and bridges. Another CNDDDB (2007) record occurs on the Yolo-Napa county border at the Homestake Mine. Although the mine is just inside of Napa County, Townsend's big-eared bats from this roost site forage and occur inside Yolo County, and other may occur at other mine sites or areas in the County with abandoned buildings. A Townsend's big-eared bat was collected and submitted to the Yolo County Health Department from the Rumsey area in 1993 (Constantine unpubl. data). The only other health department record for Townsend's big-eared bat is from "Putah Canyon" in 1954 (Constantine unpubl. data).

Pierson and Rainey (1998a) reported on the distribution, status and management of this species in California. They found that during the previous 40 years, there had been a 52% loss in the number of maternity colonies, a 45% decline in the number of available roosts, a 54% decline in the total number of animals, and a 33% decrease in the average size of remaining colonies for the species as a whole across the state. The populations that have shown the most marked declines are along the coast, in the Mother Lode country, and along the Colorado River. Townsend's big-eared bats have declined notably in San Francisco Bay area counties, where native habitat and rural land have undergone conversion for agriculture (i.e., wine production) or suburban/urban development. At the Homestake Mine near the Yolo County line, an adult female population of 140 and a winter population with both sexes of 166 noted in 1950 had declined to 105 and 27 (respectively) by 1987-91 (Pierson and Rainey 1998a). Depressed populations may recover when roost sites are protected (e.g., gating a mine to prevent human entry) if suitable foraging habitat remains.

## Threats to the Species and Other Conservation Issues

The cause of local population declines is most likely disturbance and the destruction of roost sites. Activities such as recreation in caves and mines, abandoned mine closure, and renewed mining at historical sites have all contributed to this species' decline. For example, roosting habitat in historical mine shafts is lost when renewed mining uses open pit methods. Dependence on abandoned mines puts this species at risk if mine reclamation and renewed mining projects do not mitigate for roost loss, or do not conduct adequate biological surveys prior to mine closure.

The Townsend's big-eared bat is vulnerable to human disturbance and colonies have abandoned roost sites after human visitation (Humphrey and Kunz 1976). Pierson (pers. comm.) stated that some maternity colonies have abandoned newborns after being disturbed. Pierson *et al.* (1999) also reported that Townsend's big-eared bats are threatened by the loss of clean water, loss of roosting and foraging habitat, and by the disturbance or destruction of winter roosts. The impacts on insect prey availability from the use of pesticides and herbicides may also threaten populations of this species. Bat biologists from the California Bat Working Group conducted a bat species status assessment workshop in Davis in 2007 as part of ongoing efforts to produce a California Bat Conservation Plan. This species was ranked in the top 5 species of conservation concern.

A species conservation assessment and conservation strategy for the Townsend's big-eared bat (Pierson *et al.* 1999) was produced as part of efforts to allow opportunities for state and federal agencies and other interested parties to stabilize and recover this species and its ecosystems. This species is at risk of being listed as threatened or endangered under the Endangered Species Act. The conservation strategy addressed cave and mine management, pesticides, vegetative conversions, timber harvest, and inventory, monitoring, and research protocols.

Monitoring is needed to determine current population trends and status. More information is needed to help determine the seasonal home ranges and movements, particularly during winter months, and the foraging requirements in different habitats. In addition, information is needed to determine the amount of relatedness within and between different populations to help conserve populations.

## Contributors to this species account

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## References

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