

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



### Status

**State:** Species of Concern  
**Federal:** None  
**Other:** Western Bat Working Group  
High Priority Species

### Population Trend

**Global:** Declining (Pierson et al. 1999)  
**State:** Declining (Pierson 1988, Pierson and Rainey 1996)  
**Within Inventory Area:** Unknown

### Data Characterization

The location database for the Townsend's western big-eared bat (*Corynorhinus townsendii townsendii*) within its known range in California includes 20 data records dated from 1987 to 2000. Of these records, 6 were documented within the past 10 years; of these, 1 was of high precision and can be accurately located within its survey area. None of these records are located within the inventory area.

A moderate amount of literature is available for the Townsend's western big-eared bat because of its rare and declining status. Most of the information available is on the natural history, distribution, population status, and threats to this species. A conservation assessment and conservation strategy has been published.

### Range

Townsend's big-eared bats occur throughout most of western North America from British Columbia to central Mexico, east to the Black Hills of South Dakota, and across Texas to the Edwards Plateau (Hall 1981, Kunz and Martin 1982). Isolated, relictual populations of this species are found in the southern Great Plains and the Ozark and Appalachian Mountains (Hall 1981, Kunz and Martin 1982). The subspecies *pallescens* occurs in Washington, Oregon, California, Nevada, Idaho, Arizona, Colorado, New Mexico, Texas, and Wyoming. The subspecies *townsendii* occurs in Washington, Oregon, California, Nevada, Idaho, and possibly southwestern Montana and northwestern Utah (Hadley 1959, Hall 1981). In California, the boundary between *pallescens* and *townsendii* runs north-south approximately through the center of the Central Valley, with *C. t. townsendii* on the west side (Hall 1981). This species occurs from near sea level to well above 3,160 meters above sea level (Pearson et al. 1952, Nagorsen and Brigham 1993).

## Occurrences within the ECCC HCP/NCCP Inventory Area

Townsend's big-eared bat is found throughout California, but specific details on its distribution within the central Coast Ranges are not well known. Records of this species include sites in the coastal lowlands and agricultural areas of Marin, Napa, Alameda, and San Mateo Counties and nearby hills (Pierson 1988). However, there are no published records of Townsend's big eared bat within Contra Costa County. Because of the scarcity of suitable habitat including mines and caves, it is unlikely that significant maternity roosts of this species occur in the county. However, future research may show that small numbers of individual bats roost in buildings, bridges, or other structures within the inventory area.

## Biology

### Habitat

Townsend's big-eared bats occur in a variety of habitats throughout California, but they are most commonly associated with desert scrub, mixed conifer forest, and pinon-juniper or pine forest habitat. Within these communities, they are specifically associated with limestone caves, mines, lava tubes, and buildings (Dalquest, 1947, 1948; Graham 1966; Pearson et al. 1952; Kunz and Martin 1982; Pierson et al. 1991; Dobkin et al. 1995).

During hibernation, Townsend's big-eared bats typically prefer habitats with relatively cold (but above freezing) temperatures in quiet, undisturbed places. These areas are often in the more interior, thermally stable portions of caves and mines (Barbour and Davis 1969, Dalquest 1947, Humphrey and Kunz 1976, Pearson et al. 1952, Zeiner et al. 1990). Hibernating bats are often found in ceiling pockets (Pierson et al. 1991). In central California, solitary males and small clusters of females are also known to hibernate in buildings (Pearson et al. 1952, Kunz and Martin 1982). Females may roost in colder places than males during these periods (Pearson et al. 1952).

During spring and summer, females establish maternity colonies in the warm parts of caves, mines, and buildings (Dalquest 1948, Pearson et al. 1952, Twente 1955, Pierson et al. 1991). In California, some maternity roost may reach 30°C (86°F) (Pierson et al. 1991). Favored roost locations for females and young are often in a ceiling pocket or along the walls just inside the roost entrance (Pierson et al. 1991). Night roosts may include buildings or other structures, such as bridges (Pierson et al. 1996, Rainy and Pierson unpublished manuscript).

### Foraging

Townsend's big eared bats feed primarily on small moths, but also take other insects, including flies, lacewings, dung beetles, and sawflies (Whitaker et al. 1977; Kunz and Martin 1982). Radio-tracking studies in northern California

have found Townsend's big-eared bats foraging within forested habitats and along heavily vegetated stream corridors, avoiding open, grazed pasture land (Pierson and Fellers 1998, Pierson et al. 1999). Individuals may travel up to 13 kilometers from their day roost (Pierson et al. 1999).

## Reproduction

Female Townsend's big-eared bats arrive at maternity roost sites in early spring and give birth to a single offspring in late spring or early summer after an approximately 3-month gestation period (Pearson et al. 1952). In California, young are born over a 3- to 5-week period beginning in late May. Maternity colonies disperse in fall, and mating occurs in fall and winter. The peak of copulations occurs from November through February, although some females apparently mate before arriving at hibernacula (Kunz and Martin 1982). Females are sexually mature and mate in their first autumn. However, as in most bats, females store sperm, and ovulation does not occur until early spring (Pearson et al. 1952). Ovulation may occur either before or after females leave hibernation. Townsend's big-eared bats are large at birth, weighing approximately 25% of the mother's postpartum mass (Kunz and Martin 1982). Young grow rapidly, reaching adult size in approximately 1 month, and capable of flight in 2.5 to 3 weeks. They are fully weaned by 6 weeks (Pearson et al. 1952).

## Demography

Band recoveries show longevity records of up to 16 years, 5 months (Paradiso and Greenhall 1967) and 21 years, 2 months (Perkins 1994). Pearson et al. (1952) estimated the annual survivorship for Townsend's big-eared bats was about 50% for young and 80% for adults.

## Behavior

Townsend's big-eared bat is a relatively sedentary species for which no long-distance migrations have been documented (Pearson et al. 1952, Barbour and Davis 1969, Humphrey and Kunz 1976). The longest seasonal movements recorded for this species are 32.2 kilometers in California (Pearson et al. 1952) and 39.7 kilometers in Kansas (Humphrey and Kunz 1976).

Townsend's big-eared bats hibernate in mixed-sex aggregations of 100 to 500 individuals. They periodically arouse during winter and move to alternate roosts. Individuals actively forage and drink throughout winter (Brown et al. 1994). Hibernation is prolonged in colder areas and intermittent where climate is predominately not freezing (Kunz and Martin 1982).

## Ecological Relationships

Townsend's big-eared bat is a lepidopteran specialist, with a diet consisting of more than 90% moths (Pierson et al. 1999). Night roosts of this species often include other bat species, including pallid bat (*Antrozous pallidus*), big brown bat (*Eptesicus fuscus*), California myotis (*Myotis californicus*), small-footed myotis (*M. ciliolabrum*), long-eared myotis (*M. evotis*), little brown bat (*M. lucifugus*), fringed bat (*M. thysanodes*), long-legged bat (*M. volans*), and Yuma myotis (*M. yumanensis*).

## Threats

Townsend's big-eared bats are highly sensitive to roost disturbance. Activities that can result in significant disturbance or loss of habitat include mine reclamation, renewed mining, water impoundments, recreational caving, loss of building roosts, and bridge replacement (Kunz and Martin 1982, Pierson et al. 1999). Pesticide contamination may also threaten this species in agricultural areas (Geluso et al. 1976).

## Conservation and Management

Townsend's big-eared bat has been classified as a High Priority species by the Western Bat Working Group for all populations throughout its range. This classification indicates that this species is imperiled or is at high risk of imperilment. In 1994, a Townsend's big-eared bat conservation strategy was initiated as part of the Idaho Conservation Effort. This strategy was prepared by a team of experts from 8 participating states and resulted in the publication of the Species Conservation Assessment and Conservation Strategy for the Townsend's big-eared bat (Pierson et al. 1999). The species conservation assessment summarizes the life history and habitat requirements, historical and current distribution and abundance of this species throughout its range, its current status, and threats to the species in each state. The conservation strategy is a plan that, if successful, will remove or minimize identified threats and promote restoration or recovery of the species.

## Species Distribution Model

A species distribution model was not developed for Townsend's big-eared bat because the specific habitat features for this species could not be mapped on a regional scale.

## Literature Cited

- Barbour, R. W. and W. H. Davis. 1969. *Bats of America*. University Press, Lexington, KY.
- Brown, P. E., R. D. Berry, and C. Brown. 1994. Foraging behavior of Townsend's big-eared bats (*Plecotus townsendii*) on Santa Cruz Island. Pp. 367–369 in W. L. Halvorson and G. J. Maender, editors. Fourth California Islands Symposium, Santa Barbara Museum of Natural History, Santa Barbara, CA.
- Dalquest, W. W. 1947. *Notes on the natural history of the bat Corynorhinus rafinesquii in California*. Journal of Mammalogy 28:17–30.
- . 1948. *Mammals of Washington*. University of Kansas Publ. Mus. Nat. Hist. 2:1–444.
- Dobkin, D. S., R. G. Gettinger, and M. G. Geredes. 1995. *Springtime movements, roost use, and foraging activity of Townsend's big-eared bat (Plecotus townsendii) in central Oregon*. Great Basin Naturalist 55:315–321.
- Geluso, K. N., J. S. Altenbach, and D. E. Wilson. 1976. *Bat mortality: pesticide poisoning and migratory stress*. Science 194:184–186.
- Graham, R. E. 1966. *Observations on the roosting habits of the big-eared bat, Plecotus townsendii in California limestone caves*. Cave Notes 8:17–22.
- Handley, C. O. Jr. 1959. A revision of American bats of the genera Euderma and Plecotus. Proceedings of the U.S. National Museum 110:95–246.
- Hall, E. R. 1981. *Mammals of North America. Volume II*. Second edition. New York, NY: John Wiley and Sons.
- Humphrey, S. R. and T. H. Kunz. 1976. *Ecology of a Pleistocene relict, the western big-eared bat (Plecotus townsendii), in the southern great plains*. Journal of Mammalogy. 57:470–494.
- Kunz, T. H. and R. A. Martin. 1982. *Plecotus townsendii*. Mammalian Species 175:1–6.
- Nagorsen, D. W. and R. M. Brigham. 1993. Bats of British Columbia. Volume 1: The Mammals of British Columbia. Royal British Columbia Museum Handbook. UBC Press, Vancouver, BC.
- Paradiso, J. L. and A. M. Greenhall. 1967. *Longevity records for American bats*. American Midland Naturalist 78:251–252.

- Pearson, O. P., M. R. Koford, and A. K. Pearson. 1952. Reproduction of the lump-nosed bat (*Corynorhinus rafinesquei*) in California. *Journal of Mammalogy* 33:273–320.
- Perkins, J. M. 1994. Longevity records in two vespertilionids. *Bat Research News* 35:79–80.
- Pierson, E. D. 1988. The status of Townsend's big-eared bats in California: Preliminary results 1987–1988. Unpublished Progress Report, Wildlife Management Division, California Department of Fish and Game, Sacramento, CA.
- Pierson, E.D. and W.E. Rainey. 1996. The importance of mines as roosting habitat for bats: *Plecotus townsendii* in California. *Bat Research News* 32:83.
- Pierson, E. D., W. E. Rainey, and D. M. Koontz. 1991. Bats and mines: experimental mitigation for Townsend's big-eared bat at the McLaughlin Mine in California. Pp. 313–342 in *Proceedings of Thorne Ecological Institute. Issue and technology in management of impacted wildlife*, April 8–10, 1991. Snowmass, CO.
- Pierson, E. D., M. C. Wackenhut, J. S. Altenbach, P. Bradley, P. Call, D. L. Genter, C. E. Harris, B. L. Keller, B. Lengus, L. Lewis, B. Luce, K. W. Navo, J. M. Perkins, S. Smith, and L. Welch. 1999. Species conservation assessment and strategy for Townsend's big-eared bat (*Corynorhinus townsendii townsendii* and *Corynorhinus townsendii pallescens*). Idaho Conservation Effort, Idaho Department of Fish and Game, Boise, ID.
- Twente, J. W., Jr. 1955. *Some aspects of habitat selection and other behavior of cavern-dwelling bats*. *Ecology* 36:706–732.
- Zeiner, D. C., Jr. W. F. Laudenslayer, K. E. Mayer, and M. White (editors). 1990. *California's wildlife. Volume III. Mammals*. Sacramento, CA: California Department of Fish and Game.