

- 1. Species:** (Pale) Townsend’s big-eared bat (*Corynorhinus townsendii (palleescens)*)
- 2. Status:** Table 1 summarizes the current status of this species or subspecies by various ranking entity and defines the meaning of the status.

Table 1. Current status of *Corynorhinus townsendii (palleescens)*

Entity	Status	Status Definition
NatureServe	G3G4 T3T4	<i>Species is Vulnerable</i> At moderate risk of extinction or elimination due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.
CNHP	S2	<i>Species is Imperiled</i> At high risk of extinction or elimination due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.
Colorado State List Status	SGCN, Tier 1	Species of Greatest Conservation Need
USDA Forest Service	R2 Sensitive	Region 2 Regional Forester’s Sensitive Species
USDI FWS ^b	None	N/A

^a Colorado Natural Heritage Program.
^b US Department of Interior Fish and Wildlife Service.

The 2012 U.S. Forest Service Planning Rule defines Species of Conservation Concern (SCC) as “a species, other than federally recognized threatened, endangered, proposed, or candidate species, that is known to occur in the plan area and for which the regional forester has determined that the best available scientific information indicates substantial concern about the species’ capability to persist over the long-term in the plan area” (36 CFR 219.9). This overview was developed to summarize information relating to this species’ consideration to be listed as a SCC on the Rio Grande National Forest, and to aid in the development of plan components and monitoring objectives.

3. Taxonomy

Genus/species *Corynorhinus townsendii (palleescens)* is accepted as valid at both the species and subspecies levels (ITIS 2015).

4. Distribution, abundance, and population trend on the planning unit [12.53.2,3,4]:

Corynorhinus townsendii occurs throughout the west and is distributed from the southern portion of British Columbia south along the Pacific coast to central Mexico and east into the Great Plains, with isolated populations occurring in the central and eastern United States (WBWG 2005). The species can be found throughout Colorado except on the eastern plains. Distribution is strongly correlated with the availability of caves and cave-like roosting habitat, with population centers occurring in areas dominated by exposed, cavity forming rock and/or historic mining districts. (Ellison et al. 2004, CPW 2015).

A total of 11 *C. townsendii* occurrences have been reported within the planning area over the past 20 years, including hibernation and maternity use. Overall abundance, distribution, and trend information for this species within the planning area is not available.

Table 2. Known Occurrence Frequency within the Planning Area (NRIS database)

Known Occurrences in the past 20 years	11
Year Last Observed	2011

5. Brief description of natural history and key ecological functions [basis for other 12.53 components]:

In Colorado, *C. townsendii* is reported to occur across all four of the state’s ecoregions (i.e., Wyoming Basin, Colorado Plateau, Southern Rocky Mountains, Central Shortgrass Prairie) and in at least five community types (i.e., Saxicoline brush, sagebrush, semi-desert scrub, pinyon-juniper woodland, ponderosa pine woodland) (Ellison et al. 2003a cited in Gruver and Keinath 2006). Occurrence of roost site up to elevations of 10,000 feet indicates the species may also occur in lodgepole pine and spruce-fir communities (Siemers 2002 cited in Gruver and Keinath 2006).

Townsend’s big-eared bat requires spacious cavern-like structures for roosting during all stages of its life cycle, most notably for maternity and winter roosting. Typically, they use caves and mines (Pierson et al. 1999 cited in Gruver and Keinath 2006), but has also been reported to utilize buildings, bridges, rock crevices and hollow trees as roost sites (Ellison et al. 2004). Size of roost opening may influence the accessibility of predators to roosts and tends to regulate and maintain temperature and humidity profiles (Richter et al. 1993, Roebuck et al. 1999, cited in Gruver and Keinath 2006).

Mating generally occurs between October and February in both migratory sites and hibernacula. Maternity colonies form between March and June (based on local climactic factors), with a single pup produced between May and July. Males remain solitary during the maternity period. Winter hibernating colonies are composed of mixed-sexed groups that can range in size from a single individual to colonies of several hundred animals in the western U.S. (Ellison et al. 2004).

The species has been documented foraging in edge habitats along streams, adjacent to and within a variety of wooded habitats (see above). It often travels large distances while foraging, including movements of over 10 miles during a single evening. Over 90% of its diet is composed of moths. Seasonal movement patterns are not well understood, although there is some indication of local migration, perhaps along an altitudinal gradient (Ellison et al. 2004).

6. Overview of ecological conditions for recovery, conservation, and viability [12.53 7, 9?, 10, 11, 12]:

Gruver and Keinath (2006) identified the following management considerations to insure for long-term persistence of Townsend’s big-eared bat:

Institution of long-term education program: Conveying the positive benefits of bats and dispelling baseless myths about them form the base for a strong management-oriented conservation program for this species.

Protection of known roosting sites: Townsend’s big-eared bats are extremely sensitive to disturbance at roosts sites, particularly during the reproductive season and during hibernation.

Populations are especially susceptible to variations in survival and reproductive output. Therefore, human activity in and near roosts must be minimized or eliminated, especially during reproductive and hibernation periods. Adequate knowledge of roosts in terms of species use, type of use, seasonal use patterns, etc. is essential to providing for recovery, conservation, and viability of big-eared bats and other species in the long-term.

Assessment of patterns of roost use and movement: Townsend's big-eared bat is often assumed to exhibit a high degree of roost-site fidelity. Although certain types of colonies may show high fidelity to roosts (e.g., maternity colonies in caves), others may not (e.g., hibernation colonies in mines). A better understanding of patterns of roost use and fidelity is necessary to adequately protect roosting habitat through time and to adequately assess population trends.

Maintaining a mosaic of mature forest canopy: Timber harvest regimes, prescribed burns, and other vegetation management actions should strive to maintain a mosaic of mature forest canopy that can be perpetuated through time.

Elimination of exposure to toxins: Chronic exposure to pesticides and mining-related contaminants have probable but hard to quantify effects on Townsend's big-eared bat. Efforts to remediate indirect sources of exposure to toxins and eliminate direct exposure will benefit this and other species of wildlife.

7. Threats and Risk Factors

Gruver and Keinath (2006) summarized threats to Townsend's big-eared bats as follows:

Loss, modification, and disturbance of roosting habitat resulting from:

- *Uninformed closure of abandoned mines:* At a minimum, closure of historic or abandoned mines eliminates potential roosting habitat for Townsend's big-eared bat. In the worst case scenario, bats using a mine when it is closed have little chance of escape, resulting in both loss of habitat and direct loss of bats. On the Rio Grande National Forest, natural cave habitat is rare. However, the Forest contains several historic mining districts and adequate assessment of abandoned mines often involving underground investigations prior to closure is essential to the conservation and management of not only Townsend's big-eared bat but also seven additional species that utilize abandoned mines locally.
- *Recreation:* Human activity at roosts, particularly recreational exploration of caves and mine interiors, may lead to abandonment of the roost or unnecessary expenditure of crucial energy reserves. Townsend's big-eared bat is particularly sensitive to variations in survival and reproductive output. Therefore, human activity in and near roosts must be curbed, especially during reproductive and hibernation periods.
- *Renewed mining at historical sites:* An increase in renewed mining can directly impact Townsend's big-eared bats using abandoned mines in two ways:
 - by disturbing and displacing bats that may have been using a mine
 - by eliminating potential roosting habitat.

Furthermore, renewed mining can liberate heavy metals and other toxic materials, leading to contaminated water impoundments. With its close association to abandoned mines and reliance on open water for drinking, Townsend's big-eared bat may be more susceptible to ingestion of toxins following renewed mining at historical sites.

Loss, modification, and disturbance of foraging habitat resulting from:

- *Elimination of forest canopy:* Although Townsend's big-eared bat forages in a variety of habitat types, its flight and echolocation style makes it well suited to forage among the canopies and along the edges of mature forested stands. This species typically does not use large clear-cuts or regenerating stands in early seral stages.
- *Elimination or alteration of wetland habitat:* Forest wetlands represent abundant sources of insect prey and fresh water for drinking. Activities that reduce the productivity of wetlands likely impact local populations of Townsend's big-eared bat by reducing the quality of important foraging and drinking sites. Activities that alter the surface and subsurface hydrology of wetlands, including draining, stream diversion, and removal of shrub and overstory vegetation (e.g., through logging or grazing), ultimately reduce the value of wetlands to this species. As well, activities that increase sediment loads into wetlands (e.g., logging, grazing, road construction, mining) likely alter wetland soil and water chemistry and thus have potential to decrease the value of the wetland to Townsend's big-eared bats.
- *Conversion of native shrub and grasslands to urban or agricultural uses:* Encroachment of urban development and agriculture into areas of native vegetation likely alters the composition and abundance of insect prey in an area, and may affect the ability of Townsend's big-eared bat to find adequate prey. Encroachment may also disturb roosts by increasing the rate of human visitation, and increasing predation pressure from cats and other generalist predators associated with human settlement.

White Nose Syndrome:

White-nose syndrome (WNS) is a disease affecting hibernating bats. Named for a cold-loving white fungus that appears on the muzzle and other parts of bats, WNS is associated with the mortality of an estimated 5.5 million or more bats in eastern and mid-western North America. In some areas, 90 to 100 percent of bats have died. Although investigations are under way to better understand and potentially treat the disease, there is currently no known First documented in New York in the winter of 2006-2007, WNS has spread rapidly across the Eastern and Midwestern United States and eastern Canada and as of July 2015 has been detected in 26 states and 5 Canadian provinces. A newly discovered fungus, *Pseudogymnoascus destructans*, has been demonstrated to cause WNS (USDI Fish and Wildlife Service 2015).

In April 2013, USFS Region 2 finalized an Environmental Assessment to analyze options for management of caves and abandoned mines in response to the potential for human introduction and spread of the fungal spores associated with WNS (USDA Forest Service 2013). The management strategy uses an adaptive management approach to preventing WNS on 11 National Forests in USFS Region 2, including the Rio Grande National Forest. Currently, WNS has not been detected in Colorado and the closest known detection of fungal spores occurs in eastern Oklahoma. However, the introduction and spread of WNS in Colorado remains a critical concern for the conservation of several cave-dwelling bat species and warrants integration into the local AML closure program in regards to assessing underground bat population prior to (and potentially after) closure work and in relationship to periodic monitoring in collaboration with other partners.

8. Key literature:

Colorado Parks and Wildlife. 2015. Species profiles. Accessed online at: <http://cpw.state.co.us/learn/Pages/SpeciesProfiles.aspx> [07/18/2015]

Gruver, J.C. and D.A. Keinath. 2006. Townsend's Big-eared Bat (*Corynorhinus townsendii*): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: <http://www.fs.fed.us/r2/projects/scp/assessments/townsendsbigearedbat.pdf> [07/18/2015].

Ellison, L. E., M. B. Wunder, C. A. Jones, C. Mosch, K. W. Navo, K. Peckham, J. E. Burghardt, J. Annear, R. West, J. Siemers, R. A. Adams, and E. Brekke. 2003. Colorado bat conservation plan. Colorado Committee of the Western Bat Working Group. 90 pp. +appendices.

USDA Forest Service. 2013. Environmental Assessment for Cave and Abandoned Mine Management for White-Nose Syndrome. USFS Rocky Mountain Region, Lakewood, Colorado. April 2013. 20 pp.

USDI Fish and Wildlife Service. 2015. White-nose syndrome fact sheet. July 2015. 2 pp.

Western Bat Working Group (WBWG). 2005. *Myotis thysanodes*. Accessed online at: <http://wbwg.org/western-bat-species/> [07/18/2005].

9. Map of Known Occurrences and Modeled Suitable Habitat

Townsend's big-eared bats utilize a wide variety of habitat types. Common habitat associations described above include low and mid-elevation shrub, pinyon-juniper, and ponderosa pine types, and probably includes all forest types up to 10,000 feet (see above). Therefore, all structural stages within these vegetation cover types were used to represent potential suitable habitat (Figure 1). In addition, areas of water were included in the habitat model due to the species known use for foraging. These areas, which encompass most of the RGNF outside of alpine habitats, total 1,157,700 acres within the planning area. However, as noted above, utilization of habitats is likely to be limited by availability of roost sites.

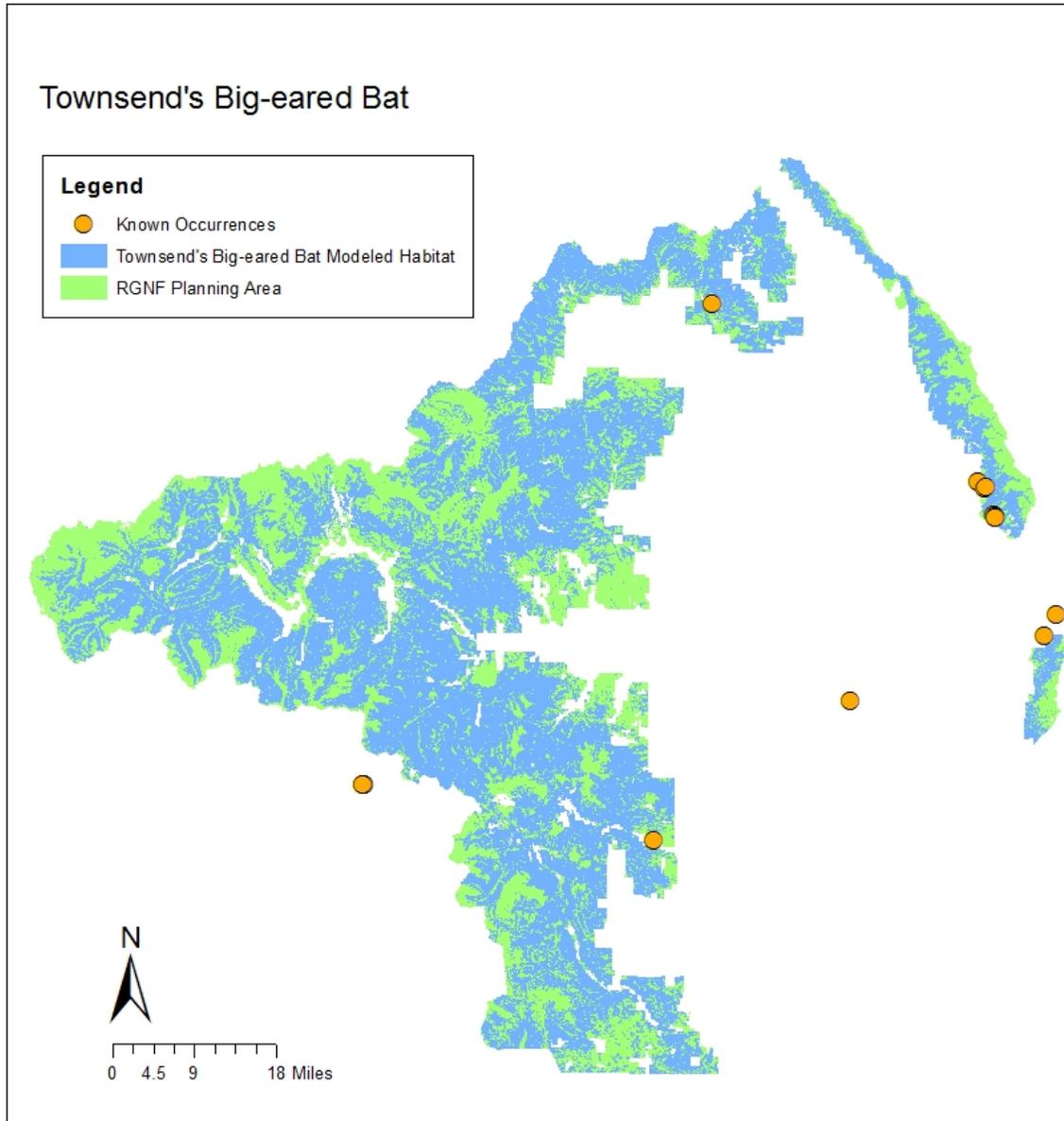


Figure 1. Townsend's Big-eared Bat Modeled Forest Habitat and Known Occurrences.