

NOTES

WINTER OBSERVATIONS OF ALLEN'S BIG-EARED BAT
(*IDIONYCTERIS PHYLLOTIS*) IN NEW MEXICODILLON S. METCALFE¹, JACKSON D. BAIN¹, SHAWN C. THOMAS¹,
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Abstract.—Limited data are known about winter habits of Allen's Big-eared Bat (*Idionycteris phyllotis*) throughout the southwestern U.S. and northern and central Mexico. Herein, we report on several winter observations of the species in New Mexico. In central parts of the state, we observed a solitary individual in a drill hole of an abandoned mine during two consecutive winters, January 2020 and 2021, in the Caballo Mountains of Sierra County. In southwestern New Mexico, several museum specimens further demonstrate that abandoned mines are used as winter roosts, likely hibernacula, in the Burro Mountains and Little Bear Mountain of Grant County. These data on winter roosts as well as limited winter captures of volant individuals suggest that some Allen's Big-eared Bats might move to lower, more arid rocky habitats in New Mexico during cooler months. Winter observations, thus far in New Mexico, represent some of the lowest elevations for this species in the state. Observations from the Caballo Mountains also represent the easternmost records in New Mexico, and guano from species in another mine in the mountain range suggests the area possibly is used during warmer months of the year. Thus far, abandoned mines appear to be important winter roosts for this species. Additional studies on Allen's Big-eared Bat are warranted to better understand and protect this uncommon species in need of conservation.

Key Words.—abandoned mines; bats; hibernacula; roost; Southwestern USA; winter ecology.

Allen's Big-eared Bat (*Idionycteris phyllotis*) occurs from the southwestern U.S. to central Mexico (Czaplewski 1983; O'Shea et al. 2018). In the U.S., Allen's Big-eared Bat is considered a sensitive species by all states in which the species occurs (O'Shea et al. 2018), and relatively little is known about many aspects of its biology (Adams 2003). This species resides in a variety of habitats from desert scrub to montane fir forests, although individuals primarily are captured in rocky forested montane areas during warmer months of the year (Findley et al. 1975; Czaplewski 1983; Hoffmeister 1986; O'Shea et al. 2018). Data on seasonal movements and winter hibernacula are limited or absent in many accounts for this species (Findley et al. 1975; Czaplewski 1983; Hoffmeister 1986; Adams 2003; O'Shea et al. 2018). Herein, we report on winter observations for Allen's Big-eared Bats from central and southwestern New Mexico.

We conducted surveys for bats in several mines in the Caballo Mountains, Sierra County, New Mexico, during the winters of 2019/2020 and 2020/2021 (Fig. 1). On 9 January 2020 and 28 January 2021, we surveyed for bats in the Sueños Mine (6.2 km N, 8.5 km E Caballo Post Office; 1,590 m elevation) on the eastern side of the Caballo Mountains. The Sueños Mine has two connected entrances (i.e., portals) with airflow between them. The main horizontal passageway (i.e., adit) was driven straight into an east-facing hillside for about 85 m. Along its length, four lateral short passageways (i.e.,

drifts; 1.5, 3, 4.5, and 7.6 m in length) were excavated at right angles, with only the longest drift having another right-angle bend within its 7.6 m total length. A vertical shaft connected the single adit to the surface 54.9 m from the adit portal. Rocks along the adit and short drifts had many domes, crevices, and cracks.

On 26 January 2021, we surveyed for bats in an unnamed abandoned mine located on the western side of the Caballo Mountains (8.1 km N, 6.7 km E Caballo Post Office; 1,421 m elevation; Fig. 1). This mine contained a single adit with a large underground room (i.e., stoping) that is open to the surface on the hillside above, creating an open 13.1 m trench about 9.1 m deep to the adit floor. The adit continued beyond the underground room for 12.2 m before the underground passageway bent at a right angle for another 8.5 m. For our research on winter observations, we also examined museum specimens and associated field notes, when available, in the natural history collections at Western New Mexico University (WNMU), Silver City. We also accessed museum databases via VertNet (VertNet.org) for additional specimens and data from late October through March throughout its entire distribution.

On 9 January 2020, we surveyed the first 30.5 m of the single horizontal adit of the Sueños Mine for bats and observed > 30 Townsend's Big-eared Bats (*Corynorhinus townsendii*) both in clusters and roosting solitarily, as well as a solitary Allen's Big-eared Bat (Fig. 2). In the first

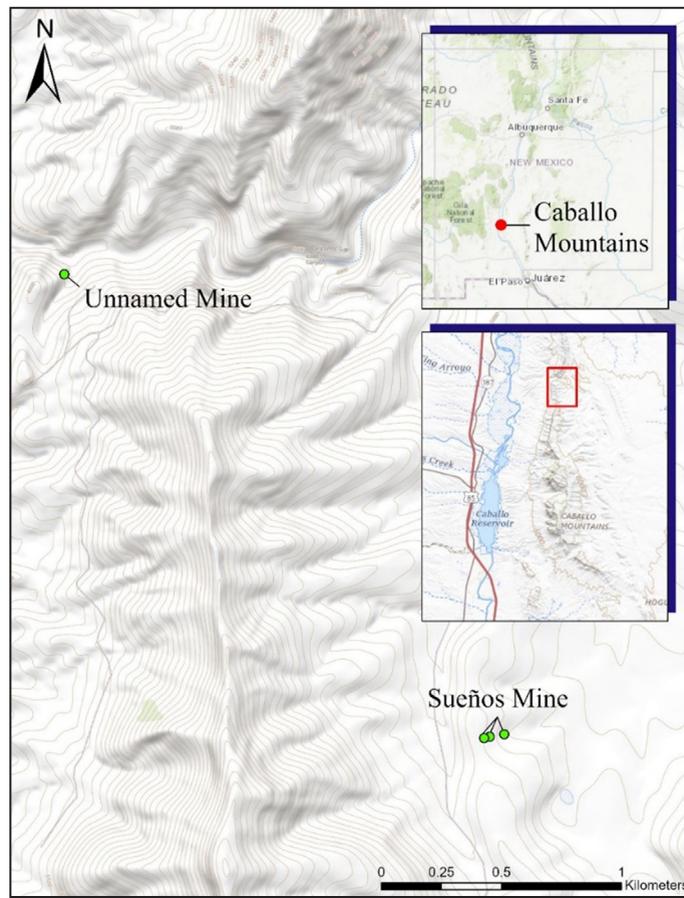


FIGURE 1. Topographic map showing the location of two mines in the north end of the Caballo Mountains, Sierra County, New Mexico, where observations of Allen’s Big-eared Bats (*Idionycteris phyllotis*) were documented during winter surveys. Green dots represent openings of abandoned mines with observations of *I. phyllotis*, either live individuals or guano of this species.

short side drift about 9.1 m from the main entrance, an Allen’s Big-eared Bat was situated in a drill hole roosting with its ventral side on the rocks about 1.4 m above the floor of the drift (Fig. 2). Climatic conditions generally were cool and humid at the site, as specific details on temperature and relative humidity were not recorded on this day of observation.

On 28 January 2021, we again surveyed the Sueños Mine for wildlife. We documented a solitary Allen’s Big-eared Bat in the same side drift and same drill hole (Fig. 3). Other bats observed in the mine on this day included 41 Townsend’s Big-eared Bats and two Pallid Bats (*Antrozous pallidus*). Townsend’s Big-eared Bats roosted in clusters and solitarily from about 6.1 m to 30.5 m from the entrance along the single adit. Both Pallid Bats roosted deep in a ceiling crack about 39.6 m from the portal. We recorded temperatures throughout the mine from 5.0° C to 13.9° C, with the relative humidity at 28%. We documented airflow between the two portals on this date. The Sueños Mine of Sierra County represents the easternmost distributional record for Allen’s Big-eared Bat in New Mexico and most arid location in the state (Findley et al. 1975; Keith Geluso, unpubl. report).

On 26 January 2021, we surveyed an unnamed mine on the western side of the Caballo Mountains. We observed one Townsend’s Big-eared Bat and three Pallid

Bats. A large pile of guano was located at the right-angle bend in the back of the adit as well as scattered guano throughout much of the mine, along with insect remnants. Through molecular sequence data of fecal pellets, analyses identified four species including Pallid Bats, Townsend’s Big-eared Bats, Allen’s Big-eared Bats, and either the Long-eared Myotis (*Myotis evotis*) or Fringed Myotis (*Myotis thysanodes*). These two Myotis species cannot be differentiated via molecular techniques at this time (Faith Walker, unpubl. report) but based on the habitat and distribution of these two species in New Mexico, the Fringed Myotis is the most likely species inhabiting the mine (Findley et al. 1975). We recorded temperatures throughout the mine from 5.6° C to 13.9° C, with the relative humidity at 41%. It is unclear when the guano from Allen’s Big-eared Bat was deposited. Some individuals have been captured drinking during cooler months over water resources (Geluso 2007 and see below) suggesting bats might also feed during cooler months. In contrast, guano from Allen’s Big-eared Bats might represent occupancy during warmer months in this low-elevation mountain range. Surveys in riparian habitats along the Rio Grande as well as surrounding arid foothills in Sierra County would be valuable to understand whether this species only occurs in the area during winter or also in summer.



FIGURE 2. A solitary Allen's Big-eared Bat (*Idionycteris phyllotis*) roosting in a drill hole in the Sueños Mine 9 January 2020, Sierra County, New Mexico. (Photographed by Jackson D. Bain).



FIGURE 3. A solitary Allen's Big-eared Bat (*Idionycteris phyllotis*) roosting in a drill hole in the Sueños Mine 28 January 2021, Sierra County, New Mexico. (Photographed by Dillon S. Metcalfe).

Via museum queries and searches, we discovered five other observations of Allen's Big-eared Bats collected from mines during colder months (late October to March). All specimens were from two localities in southwestern New Mexico. Four of the five specimens were from the Cora Miller Mine, Grant County, New Mexico (about 7 mi [11 km] south of Cliff; WNMU #2468, 2469, 2823, 2824). All four individuals were females, with collection dates of 31 October 1971 (WNMU#2468), 12 December 1970 (WNMU#2823 and 2824), and 17 December 1971 (WNMU#2469). Reported weights for two individuals were 13.5 and 14 g, whereas another individual was noted as being extremely fat. Another female (WNMU#3298) located in a drill hole 27 October 1974 in the Little Bear Mountain, 5 mi (8.1 km) northwest of Silver City was extremely fat with no embryos (Denise Friedrich, unpubl. report). To our knowledge, no other details are available for that specimen. Being at the upper limits of known weights for the species (Czaplewski 1983), these individuals had likely stored fat for prolonged hibernation, but more needs to be learned about the winter habits of this rare species. Although another specimen (WNMU#3941) was reported in museum databases as hibernating, original notes from Bruce J. Hayward on file at the museum at WNMU demonstrated that the individual was captured in a mist net 17 April 1982 (not 18 April) during a mammalogy field trip at a pond 0.4 km above the Gila River in Davis Canyon (about 7 mi [11 km] south of Cliff; Bruce Hayward, unpubl. report).

To date, all known winter observations of Allen's Big-eared Bats are female from both abandoned mines (observations discussed above) and captures over water sources from November to March: one female captured over stock tank 10 March 2005, Grant County, New Mexico, 1,542 m elevation (Geluso 2007) and

one female captured over earthen pond 10 February 1996, Catron County, New Mexico, 1,761 m elevation (Museum of Southwestern Biology [MSB] #208513; William Gannon, unpubl. report). It is unclear whether males roost in different types of roosts or are not as active as some females during winter. In summer in northern Arizona, males and females roost in different habitats and types of roosts, with females selecting Ponderosa Pine (*Pinus ponderosa*) snags and males roosting in sandstone cliffs within Pinyon-juniper (*Pinus edulis-Juniperus* spp.) Woodlands (Solvesky and Chambers 2009). In Utah, however, females also roosted in cliffs (Siders and Jolley 2009).

During warmer months in New Mexico, most Allen's Big-eared Bats are known from Ponderosa Pine Forests and above, with some observations known from oak-piñon-juniper-pine transition and riparian cottonwood-sycamore forests (Jones 1965, 1966; Findley et al. 1975; Keith Geluso, unpubl. report). In the Gila National Forest of southwestern New Mexico, Bruce Hayward and Duston Hunt (unpubl. report) reported Allen's Big-eared Bats only from Ponderosa Pine Forests and Douglas Fir (*Pseudotsuga menziesii*) Forests at elevations ranging from 1,768 to 3,048 m, whereas there was no mention of the species in Pinyon-juniper Woodlands and Pine-oak Woodlands from elevations of 1,463 m to 2,469 m. In Arizona, several reports of Allen's Big-eared Bats exist from Mexican Pine-oak Woodlands with low lying areas consisting of riparian habitats (Commissaris 1961; Hoffmeister 1986); however, there is one observation of an individual captured 1.6 km away from woodland vegetation near Portal, Arizona, in mesquite (*Prosopis* sp.) and white-thorn acacia (*Acacia* sp.; Commissaris 1961) habitats. It was unknown whether the individual lived in this habitat or visited the water source to

drink from nearby riparian areas (Commissaris 1961; Hoffmeister 1986).

These limited winter observations from New Mexico only were reported from pinyon-juniper oak habitats and desert scrublands (WNMU specimens; MSB #208513; Geluso 2007; this study). Elevations of winter observations were from 1,421 m in the unnamed mine in Sierra County (this study), 1,440 m in the Cora Miller Mine in Grant County (WNMU specimens), 1,541 m in the Big Burro Mountains in Grant County (Geluso 2007), 1,590 m in the Sueños Mine (this study), and 1,761 m in the Mogollon Mountains in Catron County (MSB #208513). The lowest reported captures during warmer months of the year were at the Glenwood Fish Hatchery, Catron County, in a riparian woodland surrounded by Pinyon-juniper Woodlands at 1,446 m (Jones 1961; Jones and Suttkus 1972; Keith Geluso, unpubl. report). The next lowest summer captures were at 1,960 m on the edge of the San Mateo Mountains (5.7 km east, by road, of Springtime Campground in Piñon/juniper and Oak Woodland, Keith Geluso, unpubl. report), with all other localities at higher elevations (Jones 1965, 1966; Findley et al. 1975; Bruce Hayward and Duston Hunt, unpubl. report; see Keith Geluso, unpubl. report). These data tend to suggest some individuals might move to lower, more arid habitats in winter, but more data are needed to understand the winter ecology of this species.

While we cannot confirm whether the same individual was observed in consecutive winters, observations of an Allen's Big-eared Bat in the same drill hole might suggest site fidelity. If accurate, site fidelity of winter roosts might be important for the species as other drill holes and cracks were common throughout the Sueños Mine. Specific environmental conditions potentially existed within and around the drill hole that enabled the individual to survive winter dormancy. O'Shea et al. (2018) commented on management practices and concerns regarding Allen's Big-eared Bats, but those authors only mention management practices regarding summer roosts in trees. We find that human access to abandoned mines in cooler months is another concern because, to date, all winter observations are from mines. Documentation of a few volant individuals during winter months suggests that automated acoustic recording devices might further assist in locating individuals, especially if individuals might move seasonally to lower elevations or into habitats/areas not suspected as normally inhabited by the species in New Mexico. Winter surveys for Allen's Big-eared Bat and studies following individuals to winter retreats throughout its distribution are warranted to better understand and protect this uncommon species in need of conservation.

Acknowledgments.—We thank Montana Horchler, Alexi Kimiatek, and Ethan Sandoval for assistance in the field and Jason Corbett for programmatic support. We thank Denise Friedrick at Western New Mexico University for tracking down original catalogs and field notes of museum specimens in their collections. Molecular work was conducted by the Bat Ecology and Genetics Laboratory at the University of Northern Arizona, Flagstaff. This collaborative work was initiated because of photographs submitted to iNaturalist (www.inaturalist.org). We thank Bat Conservation International for funding for surveys of vertebrates in abandoned mines.

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