

**ASSESSMENT OF SELECTED ABANDONED MINES FOR USE BY BATS
IN THE GARNET AND AVON AREAS: 2002**

A Report to:

Bureau of Land Management
Missoula Field Office
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ABSTRACT

Eight mine workings at six locations were identified by BLM personnel of the Missoula Field Office for assessment of use by bats in summer 2002 prior to reclamation. Six of eight workings (three in “downtown” Garnet, one in Cayuse Gulch, one in Wet Mulkey Gulch, and one near McGinnis Creek) were in the Garnet Range, one working (Tiger Gulch) was near Blackfoot City north of Avon, and one working (Copper Creek) was in the John Long Mountains northwest of Philipsburg.

The Copper Creek working was not visited because of access problems. Information provided by BLM personnel about this mine indicated that little by bats was likely at present because the portal is mostly blocked with a wooden door. The three workings in the town of Garnet and the working near McGinnis Creek were examined on 11 July, the workings at Cayuse Gulch, Wet Mulkey Gulch, and Tiger Gulch were examined on 26 July, and Wet Mulkey Gulch was revisited on 3 August.

None of the workings examined appeared to provide important roosting habitat to bats, with the exception of the adit in Wet Mulkey Gulch, and no overnight activity was detected at any mine, again with the exception of Wet Mulkey Gulch. All workings appeared to be shallow, with single portal access and no detectable air movement. However, no workings were entered for a full internal assessment. There was a moderate amount of activity at the Wet Mulkey Gulch adit, indicating that some bats (at least one species of *Myotis*) are using the mine probably as a night roost. No bats were captured in August, but the bats that appeared at the adit came from other locations. Of the mines examined, the adit in Wet Mulkey Gulch is the only one currently used by bats during summer and is the best candidate for a bat-friendly gate.

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INTRODUCTION

Several species of North American cave-dwelling bats have been adversely affected in recent decades by a variety of human-induced environmental changes to caves, including cave closures, impoundments, and vandalism or other direct human disturbances (see Humphrey 1978, Tuttle 1979, LaVal and LaVal 1980, Sheffield et al. 1992.). These, and landscape changes such as deforestation (including loss of large trees with basal hollows) and agricultural development, have forced many bat species to abandon traditional sites in search of new roosts and hibernacula. As a result, some cave-dwelling species in the eastern and Midwestern United States are listed as threatened or endangered under the U.S. Endangered Species Act. Several additional widely distributed species are “species of concern” (former C2 candidates for listing) by the U.S. Fish and Wildlife Service (Harvey et al. 1999).

Abandoned mines offer a variety of subterranean microclimates similar to those in natural caves (Tuttle and Stevenson 1978, Tuttle and Taylor 1994) and can provide suitable habitat for roosting and hibernating bats. Abandoned mines now serve as principle roosts and hibernacula for many cave-dwelling species (Tuttle and Taylor 1994), and are important for populations occupying marginal habitats (Gates et al. 1984) in areas where there are continued threats to primary natural roosts. It is widely acknowledged that natural cave environments are the most stable and desirable long-term habitats for bats, but abandoned mines may provide a suitable alternative. Thus, both types of subterranean features deserve management consideration for protection as important bat habitat.

Mine reclamation (including closure to restrict human access) is of interest to wildlife managers because reclamation activities can have significant negative impacts on bat populations (see Sheffield et al. 1992, Richter et al. 1993). It is important that closure is done properly, to minimize disturbance to bats. The majority of bat species in Montana use caves and mines. It is important, therefore, to determine the extent and magnitude of mine use by bats in the state, and identify situations where access by humans to abandoned mines can be restricted while maintaining mine attractiveness to bats.

Increased concern over bat populations nationally, coupled with increased emphasis on the closure of abandoned mines on public lands in Montana, has prompted Bureau of Land Management (BLM) biologists to assess abandoned mines for bat activity prior to mine closure (e.g., Hendricks 1997, 2000a, 2000b; Hendricks et al. 1999). In some situations where caves are also present, baseline counts and sampling at caves have been initiated for future monitoring and possible management or mitigation activities (e.g., Hendricks 1998, 2000b, Hendricks et al. 2000). One cave/mine-dwelling species of particular interest and reported from the Garnet Range, Townsend’s Big-eared Bat (*Corynorhinus townsendii*), is a designated Special Status species by the BLM in Montana, a “species of concern” by the U.S. Fish and Wildlife Service, and a high priority species by the Western Bat Working Group. Concern for this species has resulted in several recent studies (e.g., Sherwin et al. 2000) as well as the development of a status assessment and conservation strategy (Pierson et al. 1999).

STUDY AREA AND METHODS

BLM personnel in the Missoula Field Office provided a list of mine workings for assessment of use by bats. Access to each was discussed with BLM personnel prior to field visits. Eight mine workings at six locations were identified by BLM personnel of the Missoula Field Office for assessment of use by bats in summer 2002 prior to reclamation (Fig. 1). Six of eight workings (three in “downtown” Garnet, one in Cayuse Gulch, one in Wet Mulkey Gulch, and one near McGinnis Creek) were in the Garnet Range of Granite County (McGinnis Creek working was just into Missoula County), one working (Tiger Gulch) was near Blackfoot City north of Avon, in Powell County, and one working (Copper Creek) was in the John Long Mountains northwest of Philipsburg, also in Granite County.

For each mine site visited, the presence or absence of open portals was the first variable noted. If a mine working had not collapsed, then the dimensions of each opening were measured or estimated, any obstructions (grating, cable netting, fallen timbers or rock, etc.) noted. Extent of underground workings visible from the portal was estimated with the aid of a hand-held spotlight. Temperature of outward airflow, if present, was also measured. The Copper Creek working was not visited because of access problems, and is not shown in Fig. 1. Information provided by BLM personnel about this mine indicated that little use by bats was likely at present because the portal is mostly blocked with a wooden door.

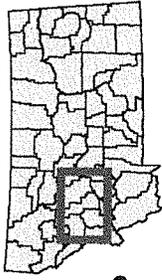
Bat detectors (ANABAT II; Titley Electronics, Ballina, Australia) and mist nets were deployed at workings where the mine working otherwise appeared potentially suitable for bats. Detector units (consisting of an ultrasound detector, timer/tape-driver, and a voice-activated cassette tape recorder) were set before dusk facing portals or aimed across shafts, and left in place overnight. Recorded calls were analyzed on an IBM compatible PC using ANABAT II zero-crossings analysis interface module (ZCAIM) and software.

Assignment of vocalizations was achieved by matching time-frequency structure of field recordings with a reference set of calls obtained from captured individuals and published descriptions of vocalizations (e.g., Fenton et al. 1983, O’Farrell 1997). However, bat species can show significant variation in call structure (Betts 1998, Barclay 1999), and flying bats were not actively tracked (O’Farrell et al. 1999) to maximize quality and quantity of diagnostic sequences. Furthermore, units recorded bats exiting roosts or flying near potential roosts. Roost-exit calls and calls in high clutter tend to be fragmentary, lacking diagnostic features necessary for species identification (O’Farrell 1999). Therefore, no species-level identifications were made in this study, and *Myotis* designations (as a group) were assigned to recordings with vocalizations of short duration (< 3 msec) with a relatively linear, perpendicular call pattern. Direct observation of bat activity while netting also allowed determination of identification to the *Myotis* group.

Number of “passes” (defined here as a distinct vocalization with at least a 1 sec gap between prior and following vocalizations) was recorded as a measure of relative activity at each site; relative activity as presented here is useful primarily as an index for comparison with other sites under similar weather conditions.

Mine sites inspected for bats: 2002

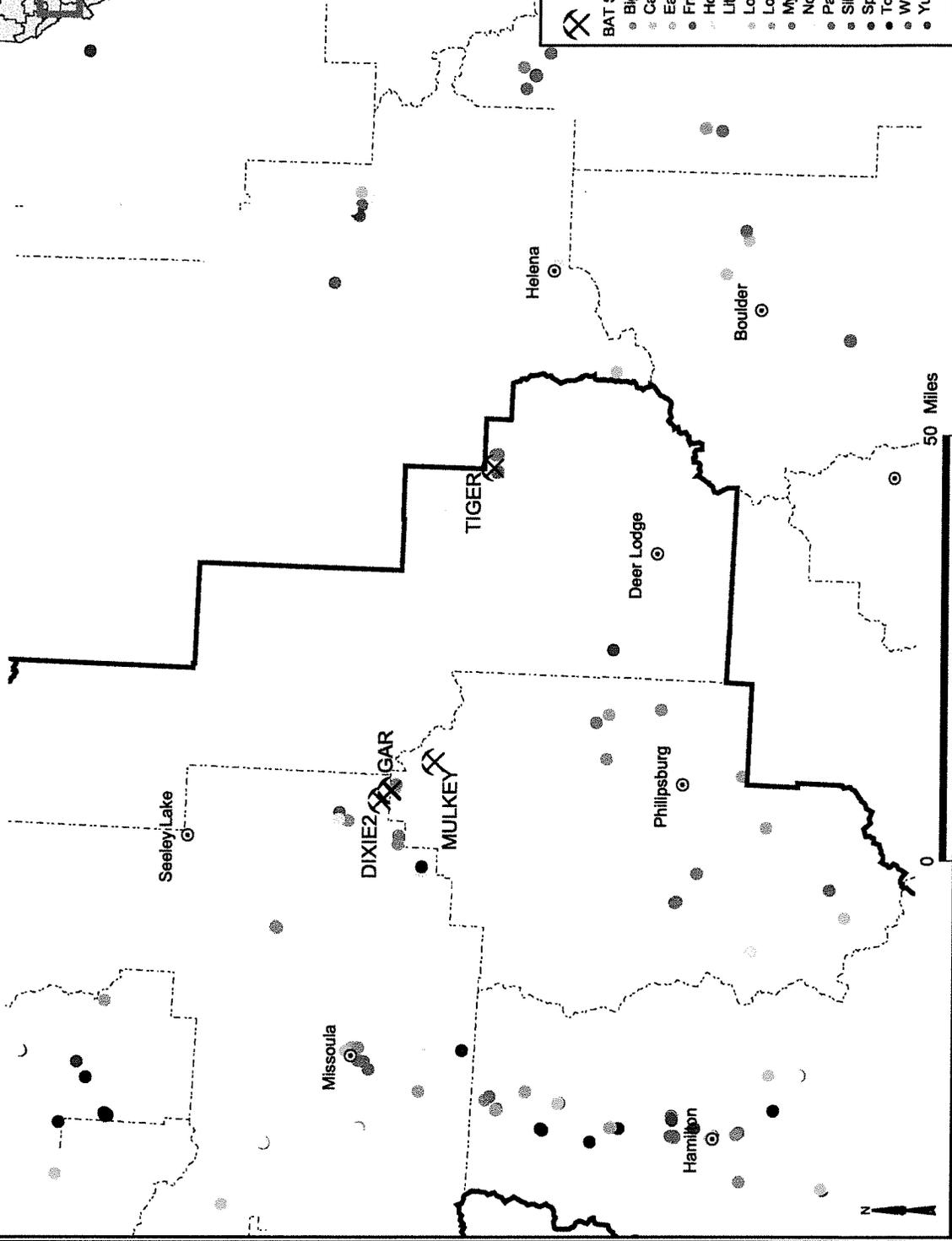
FOCUS AREA



Mine sites

BAT SPECIES

- Big Brown Bat
- California Myotis
- Eastern Red Bat
- Fringed Myotis
- Hoary Bat
- Little Brown Myotis
- Long-eared Myotis
- Long-legged Myotis
- Myotis spp.
- Northern Myotis
- Pallid Bat
- Silver-haired Bat
- Spotted Bat
- Townsend's Big-eared Bat
- Western Small-footed Myotis
- Yuma Myotis



Capture of bats was attempted using a 50-denier mist net of 2.8 m length set across portals to block access as much as possible. Netting was attempted only at the Wet Mulkey Gulch adit for about 3.5 hours (20:00 until 23:30), but no bats were captured (see Results for additional details).

RESULTS

Below I provide a summary of the findings for each mine working examined for actual or potential use as roosting habitat by bats. Each assessment is based on external examination of the portal area and overnight monitoring with an ANABAT bat detector. The Wet Mulkey Gulch adit in the Garnet Range was deemed of sufficient potential to net for bats at the portal.

Garnet Range Mine Sites

Six of the seven mines visited and evaluated occur in the Garnet Range. Three open adits in the Garnet Ghost Town area of Granite County (two near the Mary Anderson #5521 patented claim [**GAR-1** and **GAR-2**], one near building #12a [**GAR-3**]), and the single open adit of Dixie Mine #2 in the nearby McGinnis Creek drainage [**DIXIE2**] of Missoula County, were inspected externally for potential or actual use by bats on 11-12 July 2002 during very warm weather. The Cayuse Gulch adit (**CAYUSE**) was inspected on 26 July. Location of this adit could not be GPS'd due to inadequate satellite coverage and is not shown in Fig. 1. The adit in Wet Mulkey Gulch (**MULKEY**) was inspected on 26 July and revisited on 3-4 August.

GAR-1: N46°49'34.8", W113°20'36.2" (7.8m accuracy). This site is marked with a state DEQ mineshaft sign. The entrance is mostly blocked, and no airflow was detected. An ANABAT bat detector was set overnight to record any activity at or near the portal. None was detected. This site currently has low potential for use by bats. Installation of a gate may make the site more attractive, especially as a summer night roost.

GAR-2: N46°49'33.7", W113°20'35.4" (8.8m accuracy). This site is not marked with a state DEQ mineshaft sign. The trench leading to the portal is mostly blocked by collapsed ceiling debris but a web-free opening was present; no airflow was detected. An ANABAT bat detector was set overnight to record any activity at or near the portal. None was detected. This site currently has low potential for use by bats. Installation of a gate may make the site more attractive, especially as a summer night roost.

GAR-3: N46°49'29.3", W113°20'26.2" (6.3m accuracy). This site is not marked with a state DEQ mineshaft sign. The portal is blocked with logs; no airflow was detected. An ANABAT bat detector was set overnight to record any activity at or near the portal. None was detected. This site currently has low or no potential for use by bats. Installation of a gate may make the site more attractive, especially as a summer night roost.

DIXIE2: N46°49'33.7", W113°20'35.4" (8.8m accuracy). This site is not marked with a state DEQ mineshaft sign. A trench leads to a portal partly blocked by collapsed ceiling debris. The adit declines a short distance from the portal to a level (?) working of unknown length (at least 2

m); the portal was web-free; no airflow was detected. An ANABAT bat detector was set overnight to record any activity at or near the portal. None was detected. This site currently has low potential for use by bats, although minimal use as a summer night roost is possible.

CAYUSE: Not GPS'd (T12N, R14W, Sec. 14NE). This site is a shallow working remaining in what was apparently a larger underground working that is now something of a pit on a hillside. The portal was web-free and about 1.0 x 0.8 m in height and width, with an adit extending nearly level beyond the portal for perhaps 3-4 m. No air movement was detected at the portal. The site was deemed not worth monitoring overnight. This site is unlikely to be used by bats and is not worth gating.

MULKEY: N46°45'14.9", W113°15'57.2" (10m accuracy). This site is a working of undetermined length. The portal was web-free and about 1.0 x 1.2 m in height and width. Workings are level for at least 25 m beyond the portal. No air movement was detected at the portal. The portal was netted for 3.5 hours on the evening (22:00-23:30) of 3 August, then monitored overnight with an ANABAT detector. During netting (temperature 70°F at the start, 57°F at the end) under a partly cloudy sky, bats made 26 passes beginning at 21:27; all bats came to the portal from outside of the mine. Bats approaching the portal were unidentified *Myotis* (visual identification), with some of passes occurring upslope from the mine and above the treetops. No bats were captured even though some hovered in front of the net. Additional activity occurred at the adit during the night after netting at the portal ceased. During 23:45-01:56 there were 48 passes, at 03:47 there was a single pass, and during 04:57-05:51 there were an additional 14 passes. Most passes were classified as unidentified *Myotis*, but a second kind of bat (classified as *Eptesicus/Lasionycteris* [Big Brown/Silver-haired]) made a half dozen passes prior to 02:00. The Wet Mulkey Gulch site received a moderate level of bat activity near the portal and appeared to be used during summer as a night roost by an undetermined number of individuals. There are several limestone outcrops in the area that could provide additional roosting habitat.

Other Mine Sites

TIGER: N46°40'40.2", W112°32'00.3" (10m accuracy). This site north of Avon appears to be another small mine working. The portal was partially collapsed, web-free, and 0.7 x 1.4 m in height and width. No air movement was detected at the portal. Workings beyond the portal appear to be level, extending no more than about 8-10 m. The site was deemed not worth monitoring overnight. This site is unlikely to be used by bats and is not worth gating.

COPPER: Not GPS'd (T9N, R14W, Sec. 31NE). The Copper Creek working northwest of Philipsburg was not visited because of access problems. Information provided by BLM personnel about this mine indicated that little use by bats was likely at present because the portal is mostly blocked with a wooden door. However, if access issues are clarified then the site should probably be checked for potential use by bats if the portal was not obstructed. This could best be determined by entering the workings.

DISCUSSION AND RECOMMENDATIONS

Several species of bats are known from the part of Montana where the summer 2002 mine assessments were conducted (Fig. 1). However, only two species have been identified in the Garnet Range with reasonable certainty (Hendricks 1997, 2000): Western Long-eared Myotis (*Myotis evotis*) and Townsend's Big-eared Bat (*Corynorhinus townsendii*). Therefore, some consideration should be given to documenting the species of bats that occur on the Billings Field Office lands by conducting a general survey of bats at a variety of sites using multiple techniques (bat detectors, visual inspection of caves/mines, netting and trapping mines, caves, and water sources). This would provide baseline information on bat diversity, reproductive activity, relative abundance, and species distributions across the landscape managed by the Billings Field Office, and offer a sounder basis for assessing abandoned mines as bat habitat during reclamation projects.

Because none of the workings examined in 2002 was entered to look for the presence of bats or their spoor, it is impossible to conclude with absolute certainty that workings with no activity at the time of the assessment are not used at all. Furthermore, seasonal use of the workings is not possible to determine because all assessments were conducted during summer. Thorough assessment of abandoned mines use by bats should follow the multi-season protocols presented in Pierson et al. (1999). Nonetheless, portal configuration and apparent underground extent of most of the workings visited makes them unlikely to be used as roosting habitat to any great extent. The adit in Wet Mulkey Gulch appeared to offer the best roosting habitat of the set of seven mines examined. It is likely used mostly during summer as a night roost, based on the observed pattern of bat activity there in early August. Because the full underground extent of the mine is unknown, however, it might also provide habitat suitable to bats for hibernation. Of the mine adits assessed during summer 2002, this one is worth consideration for gating.

A few bats might use each of the other mine sites as summer night roosts (where brief stops are made during nocturnal foraging to digest meals) if the portals were open or gated, but use by many individuals is not likely at any site. The Cayuse Gulch, Tiger Gulch and Dixie Mine #2 adits have the lowest potential for use by bats. Lack of activity around the monitored sites in mid- and late-July indicates little current use by bats and low potential for use if portals were gated just for them. All sites are unsuitable as maternity roosts because they are probably too cold, and few individuals are likely to use these sites as hibernacula (but use for hibernation is certainly possible) because the workings are probably not extensive enough to provide a suitable diversity of microclimates.

To conclude, the Wet Mulkey Gulch adit offers the best combination of features for use as roosting habitat by bats: a mine at relatively low elevation (4850 ft) and moderate year-round climate, an unobstructed portal leading to workings of sufficient length to provide a variety of microclimates while also buffering bats from extreme fluctuations in temperature and possibly humidity (little or no movement of air through the mine), and a site with little evidence of recent human disturbance.

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