

**MINE ASSESSMENTS FOR BAT ACTIVITY,  
HELENA NATIONAL FOREST: 1999**

A Report to:

Townsend Ranger District  
Helena National Forest  
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## ABSTRACT

Seven abandoned mines on the Helena National Forest in Lewis and Clark County (one mine) and Broadwater County (six mines) were surveyed for actual or potential bat use during August 1999. Mines surveyed included the Armstrong Mine (Helena District), West Fork Indian Creek adit (Townsend District), Hog Hollow adit (Townsend District), Little Giant adit (Townsend District), Cold Springs shafts (Townsend District), and Sadie S Mine/Slim Sam (Townsend District). Mines were inspected visually for evidence of bat use and the potential for use by bats. In addition, six of seven sites (the seventh site was considered unusable by bats) were monitored overnight with electronic ultrasound bat detectors, and three mines were mist-netted for at least two hours after dark (weather permitting).

There was evidence (visual or vocal) of current or recent bat use at all suitable mine sites (one of the shafts at the Cold Springs site was collapsed and not usable by bats in its current condition). Most sites appeared to be used as night roosts at the time of monitoring, but the West Fork Indian Creek adit was also a day roost. Activity at all sites was low to moderate. Weather inhibited netting activity, but one Western Long-eared Myotis (*Myotis evotis*) was captured entering the Armstrong Mine, and four Long-legged Myotis (*M. volans*), one Western Long-eared Myotis, and one Western Small-footed Myotis (*M. ciliolabrum*) were captured entering the West Fork Indian Creek adit.

The Armstrong Mine, West Fork Indian Creek adit, and Sadie S Mine/Slim Sam are moderate to large and multi-leveled, and each has the potential for year-round use. The underground extent of the open fenced shaft at the Cold Springs site is unknown but probably not very large. The Little Giant and Hog Hollow adits are small (17.5 m and 25.5 m total workings, respectively) and likely used only as night roosts. Active or passive protection of all used sites is recommended, although the location and small size of the Little Giant adit make closure a suitable option with little deleterious impact likely on the local bat fauna.

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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 human disturbances (see Humphrey 1978, Tuttle 1979, LaVal and LaVal 1980, Sheffield et al. 1992). These, and landscape changes such as deforestation, habitat fragmentation, 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 U. S. have been federally listed as threatened or endangered under the U. S. Endangered Species Act.

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 (Tuttle and Taylor 1994).

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). Therefore, it is important that closure is done in such a way as to minimize disturbance to bats in the mines affected. Because the majority of bat species in Montana use caves and mines, it is especially important to determine the extent and magnitude of mine use by bats in the state, and identify situations where abandoned mines can have human access restricted while maintaining their attractiveness to bats.

Increased concern over bat populations nationally, coupled with increased emphasis on the closure of abandoned mines on public lands, has prompted U.S. Forest Service biologists in Montana to assess abandoned mines for bat activity prior to mine closure. A number of abandoned mines on Forest Service lands in the Helena National Forest are scheduled for closure in the near future. Some of these mines may provide habitat critical for hibernation, reproduction, and warm-season roosting by bats, including Townsend's Big-eared Bat (*Corynorhinus townsendii*), a species previously documented on the Townsend Ranger District and designated Sensitive by the U.S. Forest Service in Region 1, identified as a high priority species in 1998 by the Western Bat Working Group, and designated as a species of concern (former C2 Candidate for listing) by the U.S. Fish and Wildlife Service.

Objectives of the 1999 abandoned mine survey on Helena National Forest lands were 1) identify specific mine workings from a designated list that were used by bats, 2) where possible, identify the bat species using abandoned mines in the project area, and 3) make recommendations for future management activity at each designated mine site.

## METHODS

Abandoned mines identified by Helena National Forest personnel for survey work (7 total workings) were visited 9-13 August 1999. Each site was inspected visually to determine the size of openings and gather some idea as to the extent of the underground workings (usually by estimating sizes of tailings piles). Accessible adits that were deemed safe were entered and examined for bat spoor (primarily droppings); shafts were not entered. Underground temperature and relative humidity were recorded at most workings at the area farthest from the portal that was visited, and the presence or absence of air flow was also noted.

Ultrasound detectors (ANABAT II; Titley Electronics, Ballina, Australia) were used at all suitable sites (6 of 7 workings) to record overnight bat activity. Detector units (consisting of an ultrasound detector, timer/tape driver, and a voice-activated cassette tape recorder) were set before dusk, usually within the entrance hauls of adits and facing into the mine, or aimed across shaft portals, and retrieved the following morning. Recorded calls provided evidence of the timing and magnitude of nocturnal activity at each site, and can be used for future analyses of tentative species presence (not completed at the time of this report).

At three workings, a single mist net (50-denier, 2 ply, 2.6 m x 2.6 m) was set across the portal and left open for two hours after dusk (until about 23:00 MDT). Captured bats were identified to species with the aid of keys in van Zyll de Jong (1985) or Nagorsen and Brigham (1993). Individuals were sexed, aged, measured (forearm, weight), reproductive status noted, then released.

## RESULTS

**Armstrong Mine:** The Armstrong Mine (T8N R5W S6NWNW) is located at about 6100' elevation above Minnehaha Creek on the Helena District in Douglas-fir forest. The mine appears to have extensive, multi-level workings. Only the upper-most portal was open and surveyed, on 9 August. No bat droppings were seen in the first 35 m of entrance passage (the point where small pools of standing water are present), but the floor was damp and dark, making detection of droppings difficult. Temperature at this point was 54°F, relative humidity = 90% (outside values were 76°F and 35%, respectively).

A male Western Long-eared Myotis (*Myotis evotis*) was captured entering the mine on 9 August at 21:17 MDT (Appendix 1). Two other passes were noted while netting, at 21:28 and 21:33. The detector recorded one additional pass within the mine entrance at 02:34.

**West Fork Indian Creek adit:** This adit is located just inside the forest boundary on the Townsend District (T7N R1W S35NESE) along West Fork Indian Creek at 5600' elevation. This mine has a large entrance (2.5 x 2.7 m) that leads into a large area of ceiling collapse 15.5 m from the portal, and extends an unknown distance beyond the collapse (at least another 15 m). Dripping water could be heard beyond the large collapsed area. Temperature at the collapse was 65°F with 78% relative humidity at 09:20 on 11 August. Scattered droppings were noted in the first 15.5 m.

The entrance was netted on 10 August. First activity noted was at 21:01, a small bat emerging from the mine. This individual finally passed over the net on its way out of the mine. Ten more passes occurred prior to 21:14, all from bats outside of the mine. Between 21:14 and 22:31 six individuals were captured (Appendix 1): four Long-legged Myotis (*M. volans*; 2 male, 2 female), one Western Long-eared Myotis (female), one Western Small-footed Myotis (*M. ciliolabrum*; male). Numerous passes were recorded on the detector throughout the night until 05:30.

**Hog Hollow adit:** This adit is on the Townsend District (T6N R1W S20SWNW) above Hog Hollow, at 6720' elevation. There is a single open portal (2.2 m x 1.9 m) with very little collapse at the entrance. This mine extends from the portal a maximum of 18.5 m, with total workings of 25.5 m, splitting at 11 m into two parallel drifts. Temperature at the drift at 14:15 on 11 August was 59°F with 78% relative humidity. A few droppings were noted in the first 11 m.

This mine was not netted, but two passes were detected within the mine between 22:55 and 23:32 on 12 August.

**Little Giant adit:** This adit is on the Townsend District (T6N R1W S2NENE) on the east side of Giant Hill above West Fork Indian Creek, at 5940' elevation. There is a single open portal (1.0 m x 1.9 m) leading to 17.5 m of workings in a single passage; the mine is damp near the drift. Temperature at the drift was 53°F at 13:15 on 12 August (outside temperature = 65°F) with 94% relative humidity. Two recently active Barn Swallow nests were inside the mine near the portal, and a few scattered bat droppings were noted. Bat detector equipment malfunctioned during the night of 12 August.

**Cold Springs shafts:** These two shafts are on the Townsend District (T6N R1W S2NWNE) atop a bench on the NW side of Giant Hill above West Fork Indian Creek, at 6020' elevation. Several

additional fenced workings are down slope in this area. One shaft is an unfenced pit about 3 m deep with a very small opening obstructed by shrubs, leading to an unknown depth. This working is unsuitable for current bat use. A second, fenced shaft 10-12 m east is open at the portal (ca. 3.5 x 1.5 m) with some fallen timbers as partial obstructions. Greatest visible depth was about 8 m; an active pigeon nest was present about 4 m below the surface and a few Barn Swallows emerged from the portal.

During the night of 12 August, five passes by bats were recorded between 21:09 and 01:38.

**Sadie S Mine/Slim Sam:** This mine is on the Townsend District (T6N R1W S28NWNW) above Slim Sam Creek, at 6150' elevation. There are two open portals to this mine. The lower portal (1.8 x 1.4 m) is partly obstructed by a wooden door, the upper portal (ca. 12 m elevation upslope) is about 1.0 x 1.5 m among some partly collapsed timbers. There is noticeable air movement in the mine. There are at least three levels to the mine, and the upper portal is on the third level. The first (lowest) level was completely inspected. It consists of about 88 m of workings. From the portal, the mine extends straight back for 35.8 m, then bends 90° left for 23.2 m. Smaller side workings make up the remaining total on this level. Near the bend there is a ladder extending up into the upper two levels. At least two stopes exist on the second level. The third level appears heavily timbered and extends to the east (right) from the level 1 portal. Temperature on 11 August (17:30) 54.5 m from the portal on level 1 was 55°F with 95% relative humidity; respective values at the sharp bend (35.8 m from the portal) were 55°F with 91% relative humidity. Outside temperature at this time was 62°F. Scattered bat droppings were found up to the sharp bend on level 1, and a few were noted on level 2.

The entrance was netted on the evening of 12 August. No captures were made, and only one pass occurred (at 21:20). A detector inside the mine just beyond the ladder leading into the upper levels recorded one pass at 22:00. The upper portal was not monitored.

## DISCUSSION

Bat activity, or evidence or recent activity, was recorded at six of seven mine workings; the seventh working (the unfenced collapsed Cold Springs shaft) was unsuitable for bat use. At all workings with evidence of bat use, the results indicate they are mostly used as night roosts. However, the West Fork Indian Creek adit was also used as a day roost by at least one individual at the time of the surveys. The mines with more extensive workings (Armstrong, West Fork Indian Creek adit, Sadie S Mine/Slim Creek) were generally too cold to be used for maternity sites. Maternity sites are usually placed where warmer temperatures aid rapid development of the young and milk production in adult females; because internal surveys were incomplete, the use of these mines for this purpose cannot be entirely ruled out. These three mines also have potential for use as hibernacula, because they are relatively complex, and offer a diversity of microclimates.

Three species of bats were identified during the surveys (Appendix 1). One species (Western Long-eared Myotis) was captured at the most isolated of the mine workings in the group surveyed, the Armstrong. All three species (Western Long-eared Myotis, Long-legged Myotis, Western Small-footed Myotis) were captured at the West Fork Indian Creek adit, and would be expected throughout the survey area. Each of these species has been captured in mines and caves elsewhere in Montana (e.g., Hoffmann et al. 1969, Swenson 1970, Swenson and Shanks 1979, Hendricks et al. 2000), during both summer and winter. The presence of other bat species in the area is likely, and failure to detect a species during this brief survey should not lead to the conclusion that they are not present in the area, nor that they are not using the workings surveyed.

## MANAGEMENT RECOMMENDATIONS

- 1) Six abandoned mine workings offer habitat suitable for bats, as indicated by visual and vocal evidence of current or recent bat use. Accessibility of these workings to bats should be maintained if possible.
- 2) The preferred management action is to do nothing at any site where human encroachment is not a problem. However, human access to the larger mines (Armstrong, West Fork Indian Creek adit, Sadie S Mine/Slim Creek) should be restricted, either through gating or grating using bat-friendly designs, as these three workings have the greatest potential for significant year-round use.
- 3) The Hog Hollow adit is isolated from other underground workings. Even though it receives low use and is a small working, its relative isolation increases its value to the bats in that area. Human visits to the working are unlikely to affect bat use, as the site is used as a temporary night roost by bats, a time of day when most human activity at the site is unlikely to occur. Nevertheless, gating is an option to consider, as this assures greater protection for the bats using the site.
- 4) The Little Giant adit is the least significant of the sites with evidence of bat use, because of its small size, and the presence of several other mine workings and natural openings in the

area that probably offer alternative roost sites. Because this working abuts a road, permanent closure is an option to consider due to its potential hazard to humans (the portal is relatively unstable). Closure will have minimal impact on the local bat fauna. However, closure should be conducted when the working is not being used as a nesting site by Barn Swallows.

- 5) Little can be said about the Cold Spring shafts. The unfenced collapsed shaft can be filled, as it is currently unsuitable for use by bats. The significance of the fenced shaft for bats in the area is unknown because entry was not made to determine the size of the working. Nevertheless, there was bat activity at the site. If this working is to be made more secure to prevent accidental entry by livestock or humans, then a bat-friendly grate could be installed over the portal, and is preferable to the current fence.
- 6) Consider using gates instead of grates, on the larger mine portals at least, if not all sites to be secured against unauthorized human entry. This allows future entry into the mines by authorized individuals to survey for continued use by bats. Cable netting, though often of suitable mesh size to allow passage by bats, seems to be susceptible to unauthorized human entry all too frequently, and its use is not recommended.

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Appendix 1. Bats captured during abandoned mine surveys on the Helena National Forest in 1999.

Species <sup>1</sup>	Date	Time	Mine	County	Sex	Age	Forearm Length (mm)	Weight (g)
MYEV	9 Aug	21:17	Armstrong	Lewis and Clark	M	Ad	39.6	6.8
MYVO	10 Aug	21:14	W. Fk. Indian Cr.	Broadwater	M	Ad	39.1	7.1
MYVO	10 Aug	21:20	W. Fk. Indian Cr.	Broadwater	M	Ad	40.0	7.0
MYVO	10 Aug	21:25	W. Fk. Indian Cr.	Broadwater	F	Ad	39.1	7.6
MYVO	10 Aug	21:40	W. Fk. Indian Cr.	Broadwater	F	Ad	39.6	7.5
MYEV	10 Aug	21:40	W. Fk. Indian Cr.	Broadwater	F	Ad	38.2	7.0
MYCI	10 Aug	22:31	W. Fk. Indian Cr.	Broadwater	M	Ad	32.6	5.5

<sup>1</sup> MYEV (Western Long-eared Myotis, *Myotis evotis*), MYVO (Long-legged Myotis, *M. volans*), MYCI (Western Small-footed Myotis, *M. ciliolabrum*).