

Bat Habitat in the Black Hills:
Protection of Abandoned Mines

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This report covers work completed on evaluating and prioritizing abandoned mine workings for protection as bat habitat. Abandoned mine workings in the Black Hills have served to supplement the loss of natural underground bat roosting habitat. All eight species known to utilize underground roosting habitat have been documented using mine workings in the Black Hills region. These include: *Corynorhinus townsendii*, *Eptesicus fuscus*, *Myotis ciliolabrum*, *Myotis evotis*, *Myotis lucifugus*, *Myotis septentrionalis*, *Myotis thysanodes*, and *Myotis volans*. (Resultant of an oversight, the interim report for this project reported there was no record of *Myotis evotis* in abandoned mine workings in the Black Hills region. Known to use mine workings elsewhere (Nagorsen and Brigham 1993), one record for this species was documented at a site on private property at a mine owned by Homestake Mining Company on 9/9/00. Absence of this species from winter surveys of mines in the Black Hills is likely related to low population density and preference for roosting postures in crevices.

In addition to identification of sites used as bat habitat, this project developed priorities for protection of significant mine workings. Protection is generally associated with installation of a custom gate designed to permit bat passage but prevent unauthorized human entry. Gates are also designed to minimize any changes in existing air movement through the mine. Maintaining existing interior microclimate is an important management consideration of each site. These gates also serve to address issues of landowner liability and public safety.

In addition to gate protection, long-term management plans include maintaining existing surrounding conditions. In general, such management involves establishment of a "no treatment" buffer around the mine's access point(s). This protective buffer serves to maintain the existing interior microclimate. Removal of overstory or surrounding vegetation can alter

solar exposure of the portal resulting in potential changes in the site's interior microclimate. Vegetation can also provide a physical barrier to the amount of wind blowing across the portals that can also result in altered interior conditions. Current recommendation for buffers around roosts of *Corynorhinus townsendii* is 500 ft. (150m) horizontally (Pierson, et al 1999).

In contrast, growth of new vegetation around the portal may require removal during long-term management of the site. Such control prevents obstruction of flyways and reduction of existing levels of solar exposure. The goal of the management plan is to maintain, as closely as possible, the existing conditions of the site as currently used by bats.

In addition to gate installation, some sites may also require portal stabilization prior to gate installation. Several mines serving as bat habitat have closed in recent years owing to collapse of unstable portals. While many sites may have stable interiors, most mine workings present collapse features associated with the portal. Exposure to elements and resultant freezing and thawing at the mine's exterior result in loosening of rock with eventual collapse. Stabilizing the portal protects the mine and provides a stable location for mounting a closure gate.

Names assigned to these locations in this report may differ from legal or historic claims. Sites surveyed under this contract to date have included mines on federal, state and private land.

DECIDING WHAT TO GATE

Establishing priority for potential gating sites is based upon numerous considerations. The process is begun with a determination of bat usage. Mines serving as bat habitat for larger numbers of bats or greater species diversity are given more weight than a site providing habitat

to fewer bats or a single species. Location of the site is also considered, e.g., are other known sites serving the same purpose for the same species in the vicinity of the site?

Mines easily accessed, those in close proximity to human habitation, or high visibility from public thoroughfares are given precedence over more remote locations.

How the site is used by bats is also considered. With the exception of maternity/nursery roosts of *Corynorhinus townsendii*, sites providing wintering habitat are given more weight than summer use. As a result, management decisions must be based on seasonally specific information collected for each location. Survey data collected during the active season does not provide a valid basis for determining mine site use as bat hibernacula.

Mine characteristics are also considered (e.g., stability). Gating a site whose interior is unstable does little for the long-term protection of roosting habitat. It may also prove detrimental by encouraging bat usage in a site that will result in entrapment of a potentially significant number of bats following eventual collapse.

One such example of an unstable mine, used year-round by bats, and presenting serious safety hazards is Gold Bug Mine located on USFS property. The mine is timber-framed and has had numerous collapses in the last eight years. If located in stable material, this site would be at the top of the list for protection. As is, this site should be closed (in a manner that would not put bats at risk) as soon as possible.

Planned reclamation of King of the West should be conducted in a manner that will not put bats at risk. Level of bat use should be determined before the onset of any reclamation work.

Divide Load Mine – Located on USFS property, this mine is characterized by only three remaining open workings. One shaft is also located at this site posing a significant fall hazard (approximately 25ft. [8m] in depth). Previously fenced, the collar of this shaft has sloughed off dropping one side of the fence into the shaft. Two of the adits are located at opposing ends of a shallow pit. A central adit, nearly blocked from sloughing material along the cut's upper edge was surveyed on 4/17/01. No bats were identified or evidence of summer use was found in the 50 ft. (15m) long adit.

Pink Cabin Road Mine – This mine serves as hibernaculum for *Corynorhinus townsendii*, *Myotis thysanodes pahasapensis*, and *Myotis septentrionalis*. Single adit with interior shaft. Owing to the disturbance factor associated with safe entry, only the initial segment of the adit was surveyed. Located in close proximity to private homes, coupled with its interior fall hazard, this site should take high priority for gating. Gate construction date should be set following survey to determine mine usage during active season. USFS has agreed to gate this location.

Surveyed on 06/21/01, this location served as a night roost to *Corynorhinus townsendii* and *Myotis thysanodes pahasapensis* (see below). Only intermittent echolocation calls were noted on the detectors throughout the course of the survey. An additional *Myotis* species was recorded during the survey but could not be identified.

The nearest landowner gave permission for site access across his property to conduct the survey. He expressed sympathy with the protection of the mine and was knowledgeable of the importance of bats to the ecosystem. (A letter of thanks and a complimentary copy of *Bats of the United States* [Harvey M.J., et al 1999] was sent following the survey.)

PINK CABIN MINE - 6/21/01

Elevation - 5050 ft. (1539m)

SPECIES	SEX	FA (mm)	WT (gm)	AGE	NOTES
MYOTHY	M	40	7	A	Entering 21:40; mist net capture
CORTOW	M	44	10	A	Entering 22:40; harp trap capture

One nearby adit (steep slope) was also surveyed. It consists of a single passage down to a flooded base of unknown depth. If fallen into, loose surface material could make exiting difficult. There is no evidence of bat use of this site. Closure of this mine has been recommended.

Bloody Gulch Mine- Monitored intermittently since 1992, this single adit is located adjacent to the main road running through the bottom of the drainage (Portal photograph on page 32). It has a history of use as a summer and winter roost by small numbers of *Corynorhinus townsendii*. The visibility of this mine is somewhat obscured by trees although the waste rock pile is clearly visible from the road. At least two new private homes have been constructed in recent years within .5km of this site. Close proximity to the road, coupled with increasing development of this area puts this site at risk. Litter at this site has become much more common in recent years indicating an increase in human visitation.

This site was surveyed on the evening of 06/26/01 (see below). In addition to the bats attempting to use this site as a night roost, numerous passes of *Lasiurus cinereus* were recorded early in the course of the evening (2045 through 2115). Previous surveys in this area have not recorded this species.

A single harp trap was set over the mine's portal during this survey. This site is a very active night roost with near constant approaches of primarily *Myotis* species. No bats were day roosting in the mine. One pregnant *Myotis septentrionalis* was captured attempting entry of the mine. There have been no previous records of pregnant females of this species in this region of the Hills. The only other capture was an adult male *Myotis thysanodes pahasapensis*. Activity began to decline at 2300 with no activity heard after 2330. Survey was ended at 2400.

Based upon its year-round use and its close proximity to developing property, this site should be gated to protect this resource.

BLOODY GULCH MINE – (6/26/01)

Elevation – 5474 ft. (1668m)

SPECIES	SEX	FA (mm)	WT (gm)	AGE	NOTES
CORTOW	-	-	-	A	2125 – 2 approached trap – no captures
MYOSPP	-	-	-	A	Numerous approaches beginning 2130
MYOTHY	M	42	8	A	2230 capture, entering mine; Light fringe
MYOSEP	F	37	-	A	2245 capture, entering mine; Pregnant – no weight taken in order to minimize stress
EPTFUS	-	-	-	A	Bounced off harp trap, escaped - 2250

Domed Shaft Mine (a.k.a. MR-A18) - Located north of Rochford, this mine was last surveyed during the winter of 1993. It served as a hibernaculum for *Corynorhinus townsendii* at that time as well as a day roost for small numbers of males of this species.

The mine presents a variety of features. One adit extends approx. 30 ft. (9m) into an open cut at near ridge top. The cut's sides are comprised of unstable material that is constantly sloughing off material into the bottom of the cut. This cut is approximately 75 ft. (23m) long and 30 ft. (9m) deep at its uppermost portion. The point at which this first adit joins the cut is nearly blocked with piling of loose rock from above. When first surveyed in 1992, this opening could easily be crawled through on hands and knees. The portal of this adit has also been significantly reduced in size owing to sloughing of unstable material at the surface. Currently, the portal has been reduced to a tight squeeze (approx. 18 inches high by 30 inches wide)[45cm high by 76cm wide]whereas in 1992, it was possible to walk into the adit while bending down. The interior of this adit contains a shaft immediately adjacent to a narrow ledge. Rotten timbers form a makeshift barricade to this shaft but the site poses a significant fall hazard. Approximate depth of the shaft is 20 ft. (6m) with a diameter of approximately 8 ft. (2.5m). Above this shaft is a rounded stope or dome in which most of the bats have been found to hibernate.

Two smaller adits extend off the cut and serve primarily as night roosts. One summer survey in 1993 yielded a single day roosting *C. townsendii* in the lowermost of these two smaller adits.

An evening survey was conducted at this site on 6/23/01. A net was strung across the cut at its midpoint in an attempt to capture bats spiraling downward into the mine. A second net was placed across the portal of the adit containing the shaft. A brief interior survey of the adit

containing the shaft was conducted to rule out the site being used as a maternity roost of *Corynorhinus*. The lower adits were not surveyed in this manner. One *Corynorhinus* was observed avoiding the upper net but whether it was entering or exiting the mine could not be established. A single adult male *Corynorhinus* was captured in the mist net across the portal of the adit. Additional foraging passes of *Eptesicus fuscus* and unidentified *Myotis* species were noted throughout the course of the night flying above the forest canopy.

One oddity occurred during the survey with the capture of an adult male *Lasiurus cinereus* in the net stretched across the cut. A tree roosting species, this bat was likely foraging on large beetles and had dropped into the opening created in the forest canopy by the open mining cut. (Numerous beetles were caught in the mist nets during the course of the evening's survey.) This bat also had a recent fracture of the right forearm. (Injury was not a result of the entanglement in the mist net). Some swelling was noted around the fracture but the ability to fly did not appear impeded. No weight was taken to minimize handling and stress.

As noted, there has also been significant collapsing since 1993. Stabilizing portals would be required at this site as well as installment of cable netting over the loosened rock on the walls of the cut. Given the mine's use as a hibernaculum, it is recommended this site be protected as bat habitat.

In the interim between the last survey of 1993 and this year, this site became part of a timber sale. Trees were marked for cutting across the site and immediately adjacent to the mine. This was brought to the attention of the Forest Service and a request for establishing a protective buffer was made.

A site survey of this and other mine locations in this area was conducted on 5/15/01 with Jill Reeck, District Biologist for the Northern Hills Ranger District, Black Hills National Forest. Subsequent communications indicate this site was not afforded an archeological evaluation prior to the timber sale and as a result has been placed, for the present, within a twelve-acre exclusion buffer. Future management of this site should include wildlife concerns and protection of habitat.

DOMED SHAFT MINE 6/23/01

Elevation: 6000 ft. (1828 m)

SPECIES	SEX	FA (mm)	WT (gm)	AGE	NOTES
CORTOW	M	42	10	A	2210 capture; entering adit
CORTOW	-	-	-	A	2210 seen flying adjacent to the upper net above the cut
LASCIN	M	54	-	A	2230 capture; caught in net over cut
EPTFUS	-	-	-	A	Heard foraging above forest canopy intermittently throughout the evening from 2120

A-Frame Mine- Located north of Rochford, this mine is comprised of a single adit approximately 300 ft. (90m) in length. First identified in 1992, no summer surveys had been conducted at this site. This mine serves as a hibernaculum for at least four species: *Corynorhinus townsendii*, *Eptesicus fuscus*, *Myotis ciliolabrum*, and *Myotis septentrionalis*. Surveyed on 4/14/01, all four species were present.

An evening survey was conducted on 6/24/01. A single harp trap was set approximately 10 ft (3m) into the adit. Collapsed material at the portal prevents an effective seal around the trap (see photograph on page 32). Upon initial entry, the back of the adit has a height of approximately 8 ft. (2.5m). This site served as a night roost to at least three species: *Eptesicus fuscus*, *Myotis*

ciliolabrum, and *Myotis volans*. Numerous bat passes were heard throughout the course of the evening with *E. fuscus* being the most common. Most were foraging passes above the forest canopy. Both *E. fuscus* and unidentified *Myotis* species were observed foraging along the edge of the power line right-of-way located immediately to the south of this mine.

One side of the cut in which the portal is located is comprised of loose rock that has been sloughing into the bottom of the cut and decreasing the portal size. While not an immediate threat to closure, this will need to be stabilized as part of a long-term management plan.

Located well above the road (approx. 300 ft. [90m]) and hidden from view by forest, this

site, while warranting protection via gate installation, shows little sign of casual human disturbance.

A-FRAME MINE 6/24/01

Elevation 5834 ft. (1778m)

SPECIES	SEX	FA (mm)	WT (gm)	AGE	NOTES
EPTFUS	M	46	16	A	2135 capture
MYOVOL	M	38	7	A	2135 capture
MYOVOL	F	-	-	A	2135 capture; pregnant – biometrics not taken – released to minimize stress
MYOSPP	-	-	-	-	3 unidentified bats approached trap but did not attempt entry 2145
MYOCIL	M	32	5.5	A	2300 capture
EPTFUS	M	45	16.5	A	2300 capture; moderate wear of canines
EPTFUS	M	47	15.5	A	2300 capture
EPTFUS	M	48	15.5	A	2300 capture
EPTFUS	F	-	-	A	2325 capture; pregnant – biometrics not taken – released to minimize stress
MYOCIL	M	33	5.5	A	2330 capture

Slate Creek Mine

Newly identified following a conversation with the person holding the mineral rights to this claim, this mine is located on Forest Service immediately adjacent to Slate Creek. This area was recently closed to vehicular traffic by the USFS.

No warm weather surveys have been conducted at this site. Initial visit confirmed the location and included a cursory survey of the initial entry of the adit. Sloughing material at the portal has reduced the access to this mine to an irregular opening approx. 1 meter long by 30cm wide. (See photograph of portal on page 37) Initial entry into the adit requires a downward slide over collapsed material for a distance of approximately 3 meters. The floor of the adit is flooded from this point back beyond sight with flashlights. Scattered bat droppings were observed on the rock at the entry point indicating use during the active season.

Claimholder of the site stated the flooding occurs only at the entrance and dries out following a rise in floor level at some point farther inside. The majority of the mine is reported to be dry with only the initial entry flooded. Excluding the portal, the mine appears to be stable.

This mine has extensive workings based upon the description of the claimholder and the size of the waste rock pile (see photograph on page 36)

Poor weather conditions prevented a survey of this site before completion of this report. A survey is planned for mid-July, 2001.

BLM property

Sheeptail Gulch Mine- A brief interior survey was conducted on 9/9/00 at which time three *Corynorhinus townsendii* (Townsend's Big-eared Bat) were observed day roosting within the mine. Owing to this species susceptibility to disturbance, survey of the mine was brief.

Droppings deposited at the site were consistent with it being used as a night roost for a variety of species during the active time of year.

A night survey was conducted without capturing bats on 9/12/00. As this was a known Townsend's roost, netting might prove detrimental to the use of this site and survey was conducted using ultrasonic echolocation detectors and observation of the portal. The following species of bats were identified: *Corynorhinus townsendii* (Townsend's Big-eared Bat), *Eptesicus fuscus* (Big Brown Bat), *Myotis ciliolabrum* (Western Small-footed Bat). Additionally, two other *Myotis* species were recorded although species could not be identified.

Snowfall in this area was heavy during the winter of 2000-2001. An interior survey was conducted on 4/18/01. Significant snowfall was still present in this area (>1m in depth) although thawing had begun. The interior of the mine was very wet with water running from the ceiling down much of the walls. No bats were identified during the survey.

A site visit with Chuck Berdan, BLM, Belle Fourche, was conducted on 6/6/01. The portal of this adit, while currently open and clear of debris, is comprised of somewhat loosened rock. Stabilizing the portal will serve to assure this site remains open and provide a stable surface for attaching the gate. Currently, proposals for achieving this stability are being explored and will be formally submitted for

BLM consideration for funding. Any work conducted at this site should be undertaken only after summer bat use has been determined.

Elevation of this site is 5466 ft. (1666m). See portal photograph on page 34.

CUSTER STATE PARK- With the assistance of Gary Brundige and CSP staff, three mines were surveyed on the Park.

Spires' Cut Mine – Located in Norbeck Wildlife Refuge, this mine is located near a ridge top and consists of workings off the bottom of an open cut through the ridge top. (See photograph on page 33.) The identified underground workings are connected and accessible by two separate portals. Both openings are small (with the larger approx. 1m by 0.5m). *Corynorhinus townsendii* and *Myotis ciliolabrum* were identified using this location as a hibernaculum. Dropping piles within this site also indicate use as a maternity/nursery roost. While not definitive, droppings are characteristic in size/appearance to those of *C. townsendii*.

This site was surveyed on the evening of 6/28/01. Early arrival at the site allowed a search for additional openings that might have been obscured by snowfall during the previous survey. No additional openings were identified.

Before setting up for the evening's survey, a brief interior survey was conducted to determine if the site was being used as a *Corynorhinus* maternity site. No bats were observed. The smallest portal into the underground workings was blocked with a tarpaulin and a single mist net was

strung across the larger portal. An adjacent tree made sealing the portal difficult and a single *Corynorhinus* seen emerging from the site was able to escape without capture.

A single net was also placed across a pool that had collected in the bottom of the cut immediately adjacent to the underground workings. The size of this pool was approximately 5ft. wide by 20 ft. long (1.5m x 6m) with greatest depth approximately 2ft. (60cm). It is unknown whether this pool is ephemeral or contains water throughout the active season. Supplied by snowmelt/rainfall, and given its somewhat sheltered location, it may serve as a drinking source for much of the active season. The cut is an extremely active flyway for at least four species of bats, all of which appeared to be drinking from this pool. Single net placement was ineffective in capturing bats at this site. (Additional nets were unavailable as the pool was unknown before our arrival.)

The arrival *en masse* of a group of *Myotis ciliolabrum* likely represented a nearby maternity roost. (The single net across the pool afforded them room on either side to drink. Future surveys will include more nets.) There are numerous crevices within the face of the large rock outcropping characteristic of this ridge (see photograph on page 33). Such locations have been exploited by *M. ciliolabrum* in other areas.

SPIRES' CUT MINE – 6/28/01

Elevation: 6262 ft. (1908m)

SPECIES	SEX	FA (mm)	WT (gm)	AGE	NOTES
CORTOW	-	-	-	A	Seen emerging at 2120
CORTOW	-	-	-	A	2 seen drinking but avoided net- 2130
MYOCIL	-	-	-	A	Approx. 8-10 drinking from pool; all captures escaped net (2 fell into water and were observed taking off from the surface of the water)
EPTFUS	M	46	17.15	A	2135 capture
MYOVOL	M	39	8	A	2215 capture
MYOVOL	M	40	9	A	2215 capture
EPTFUS	M	43	15	A	2245 capture
EPTFUS	M	45	15.5	A	2310 capture
EPTFUS	M	44	17.5	A	2345 capture

B.A.R. Mine – Located immediately adjacent to French Creek, this mine consists of a single timber-framed shaft within the interior of a natural crevice carved out of the canyon wall by the flow of the creek. Depth of the shaft is unknown owing to collapsed rubble at a depth of approximately 20 ft. (6m). Openings through the rubble are small and unlikely to provide access to bats to any workings below this blockage. The natural cave in which this mine occurs is used as a hibernaculum by three species: *Corynorhinus townsendii*, *Eptesicus fuscus*, and (either) *Myotis lucifugus* or *M. volans*. High ceilings in this cave likely provide protection from casual disturbance at this site. One passage off the main chamber showed evidence of a maternity/nursery roost of an undetermined species. Natural camouflage makes this location difficult to locate, particularly during summer when undergrowth is leafed out. As this location is immediately adjacent to a trail, it was suggested posting a sign within the cave to encourage visitors to minimize disturbance of bats. Fall hazards associated with this location are comparable to naturally existing conditions in this vicinity. Gating of this site, given current information, is not warranted.

IVANHOE MINE

Elevation: 5161 ft. (1573m)

Located on a saddle between ridge tops near an edge of the Galena burn area in Custer State Park, any open workings at this site are via a single open shaft. Other workings near this shaft are all closed. We were unable to determine the depth of the shaft or to confirm whether drifts off the shaft exist. The collar has sloughed back to a point preventing a view of the bottom. Based upon sounds of falling rock dropped from the surface, the central shaft is several hundred feet deep. The large piling of waste rock indicates the likelihood of drifts off the main shaft. Shaft diameter at the collar is approximately 5 meters but tapers to 3 meters. Some sloughing of material is evident but the sides appear generally stable. A sturdily constructed wire fence surrounds the shaft.

An evening survey was conducted on 6/27/01. Given the logistical difficulties and safety issues associated with netting this site, it was decided to initially monitor for activity levels using only ultrasonic echolocation detectors (BATBOX III, *Stag Electronics*, UK).

While the saddle served as an active flyway for at least four species of bats, there was but one possible instance of bat entry into this site. Identified only as a *Myotis* species, and given low light levels, it is possible this bat simply flew across the shaft without entering. If drifts off the shaft do not exist or have collapsed, this site would not provide suitable bat habitat. Determining the existence of these drifts could be accomplished by lowering a video camera from a central point above the center of the shaft. Upper portion of the shaft appears free of debris. If side drifts can be confirmed, additional monitoring of this site would be warranted. Autumn surveys could potentially provide some information on whether the site is used as a hibernaculum.

PRIVATELY OWNED MINE PROPERTY

Storm Mountain Camp- This property, located near Rockerville, is owned by the Methodist Church and is used year-round. With the assistance of Scott Lash, (then) site manager, four mines were surveyed on this property. Three of these mines are shallow adits providing only minimal roosting habitat. Scattered droppings indicate two of these are used as night roosts. The first of these adits (closest to the building containing the camp's kitchen) presents a fall hazard at the rear of the adit. A shaft of approx. 3 meters depth would be difficult to climb out of should a fall occur. Restricting human access to this site is recommended. The second site is immediately adjacent to a small creek near a small amphitheatre. Little more than a glory hole, there is no recommendation for this site. The third of these sites is situated near a ridge top and is approx. 10 meters in length. The floor of this adit was flooded with iced entry (northerly aspect) (See photograph on page 37). Temperature during cold weather is certain to drop below minimum requirements for bat hibernation. Site is stable and extent of summer use could not be determined owing to flooding of floor. Some scattered droppings on walls indicate this site to be used during the active season, probably as a night roost.

The fourth mine is immediately adjacent to Spring Creek and is extensive in its underground workings. There are no interior fall hazards within this mine. It is frequently visited by people staying at the camp during the summer months. With unrestricted access, it is also visited occasionally during the hibernation season. *Corynorhinus townsendii* has been documented at this mine in the past. Surveyed in March, species identified were *Myotis thysanodes*, *Myotis septentrionalis*, and *Myotis ciliolabrum*. Information concerning a management plan is being considered by the camp's Board. Initial response of the director of the camp was positive to restricting access during winter to protect this site as a hibernaculum.

Joe Dollar Mine - This site is part of a proposed land exchange with the USFS. Surveyed in April, this site contained the largest number of *Myotis thysanodes* and *Myotis septentrionalis* ever documented in the Black Hills. Additionally, *Corynorhinus townsendii*, *Myotis ciliolabrum*, and *Myotis lucifugus* and/or *Myotis volans* were also identified during this survey. This site contains approximately 1km of passages. Bats were identified throughout the mine. Once the land exchange is completed, the FS has expressed support for gating the site to protect it as bat habitat.

On 5/02/01, a site visit with USFS and SDGFP personnel was conducted to view this location and discuss protection of this mine. (See photograph on page 34) In the interim between the April survey and this time, the small adit immediately opposite the main Joe Dollar entrance had sloughed closed. This adit was dug open by hand and surveyed for use by bats. Droppings indicated summer use and a single *Myotis septentrionalis* was identified using the site as a hibernaculum. The interior of this site also contains cracks and fissures that could easily provide additional roosting for other bats. This serves to provide an all too vivid example of the precarious future faced by many abandoned mines in the Black Hills. (See photographs on page 35, 36)

B. Madsen mine - Identified during the summer of 2000, this mine is adjacent to a private road near Maitland. The road is privately owned and maintained. Owner gave permission for a winter survey of this site. No bats were identified although droppings indicate summer use as a night roost. Extremely unstable and supported by aging timbers throughout, this mine appears near collapse. Owner was informed of mine's condition. Barring collapse during the winter, the

owner gave verbal permission for a summer trapping survey. No gate is recommended for this site.

L. Jones Mine – This mine is adjacent to a summer cottage located in the same development as the Madsen property described above. Located near Maitland, this mine is above the common privately owned road through the development of largely seasonally inhabited cottages. This mine contained hibernating *Corynorhinus townsendii* although a complete survey could not be conducted of this site. Fall hazards occur within the interior of these workings that are connected via two portals. Ropework would be required to access the majority of the mine. Such activity would cause significant disturbance to the area in which the identified *Corynorhinus* were hibernating.

The owner of this property has tentatively agreed to the development of a management plan for this site including restricting access during the hibernation season through installation of a bat gate. In addition to several telephone calls, Mr. Jones has received a written outline of a management plan and complimentary copies of *Bats of the United States* (Harvey et al, 1999) and *Bats and Mines* (Tuttle and Taylor, 1998).

Olmstead Property, private mine – Located north of Rochford, this large mine is accessed via a single adit. There is evidence of a shaft on the ridge above this adit but it has been collapsed for many years. The majority (perhaps all) of the interior of this mine is flooded (including winter months). An exhaustive survey of the interior of this mine has not been conducted during the winter. Owners of this property are seasonal residents and have given permission for a survey to

be conducted. An exterior trapping/netting survey at the mine's portal will be carried out before the end of the nursery season, 2001.

The mine is purported to extend back over 500 ft. (150m) and contain several side drifts and stopes.

CONTINUED CLOSINGS

Documentation of additional mine closures of known bat habitat has also been collected. In addition to the sites noted previously (Diana Mine and the small adit near Joe Dollar are described in this report), other mines known to serve as bat habitat have been lost to natural degradation.

One such site was used as a hibernaculum by three species (*Corynorhinus townsendii*, *Eptesicus fuscus*, and *Myotis ciliolabrum*) and a day roost by *Corynorhinus*. It was located on USFS property near the site of the old ranger station just east of Rochford. This mine was last surveyed in 1992. It is not known when closure of this site occurred.

Two smaller adits (<6m in length) located in Bloody Gulch, east of Rochford, were also found to have sloughed closed. Both were used as hibernacula by *Corynorhinus townsendii*. Both sites were last surveyed in the early 1990's.

The latter two serve to highlight how little we know of the role of abandoned mines serving as bat habitat in the Black Hills region. Can it be assumed that such sites, given their small number of bats, play only a limited role in supporting the existing population in the Hills? One of these

sites recorded temperatures below freezing during a winter survey in which two individual *C. townsendii* were found hibernating. Do sites with such low numbers represent significant habitat? Have the relatively recent occurrences of these smaller sites simply altered the distribution of bats in the Hills or are they indicators of remnants of decimated populations? Given the colonial tendencies of many species during the hibernation period (Jewel Cave serves here as a relevant regional example), what roles do these previously numerous mine sites serve? Do individuals roosting in these harsher conditions represent a source of improved genetic diversity? A recent study of a European species indicates an improved survival rate for offspring resulting from outbreeding (Rossiter et al, 2001). While direct comparisons cannot be drawn with this study, particularly in light of the limited information we have collected on reproductive behavior for our species (*Corynorhinus* in particular), it should serve as a reminder as to how little we know about the factors influencing bats and their success as species.

Most of the questions posed above have not yet begun to be answered. What is certain is that sites serving as winter habitat for eight species of bats are in rapid and drastic decline. Loss of wintering habitat is likely the single greatest threat facing bats in this region. Any conservation measures not incorporating protection of such sites in its agenda will ultimately fail in meeting its goal of protecting these important animals.

SITES RECOMMENDED FOR PROTECTION

Based upon surveys conducted to date, the following locations are recommended for gate installation with suitable management plans developed and implemented.

Site names are followed by property ownership.

DIANA MINE (USFS)

PINK CABIN (USFS)

A-FRAME (USFS)

BLOODY GULCH (USFS)

JOE DOLLAR (PRIVATE/USFS)

DOMED SHAFT (USFS)

SHEEPTAIL GULCH (BLM)

L. JONES (PRIVATE)

STORM MOUNTAIN CREEKSIDE (PRIVATE)

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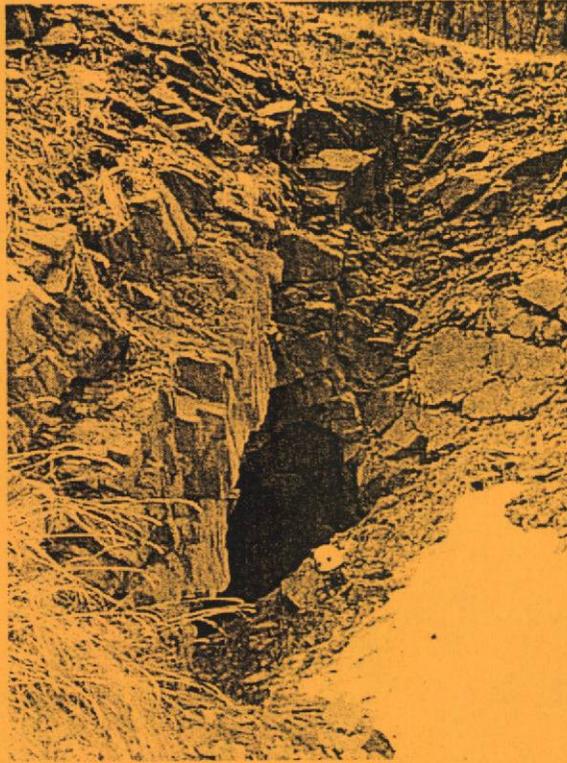
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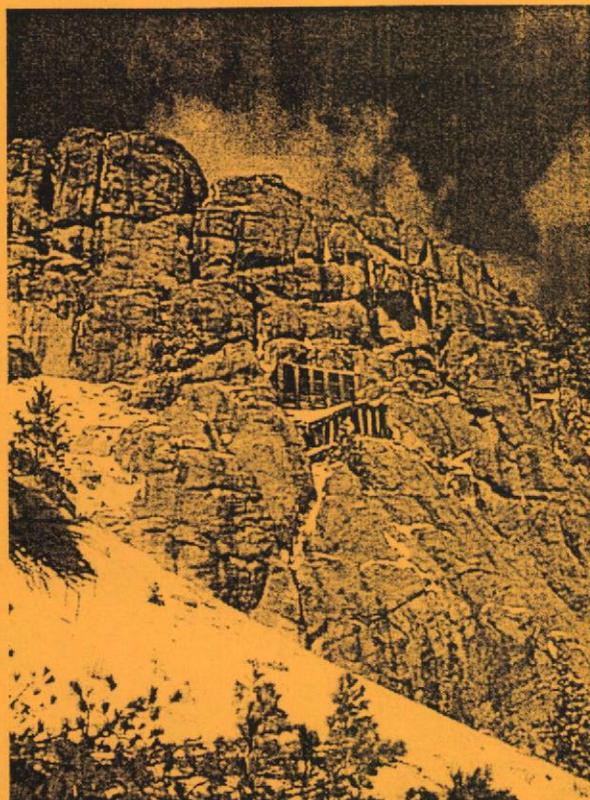
APPENDIX I



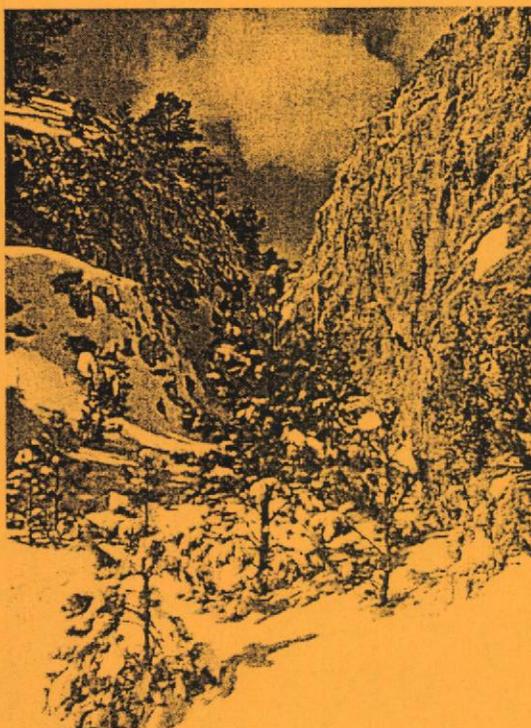
↑ A-FRAME MINE w/ helmet for scale



↑ BLOODY GULCH MINE



↑ SPIRES' CUT MINE – Ridge in which mine is located; viewed from below



↑ SPIRES' CUT MINE – Cut is immediately adjacent to portal (not visible)



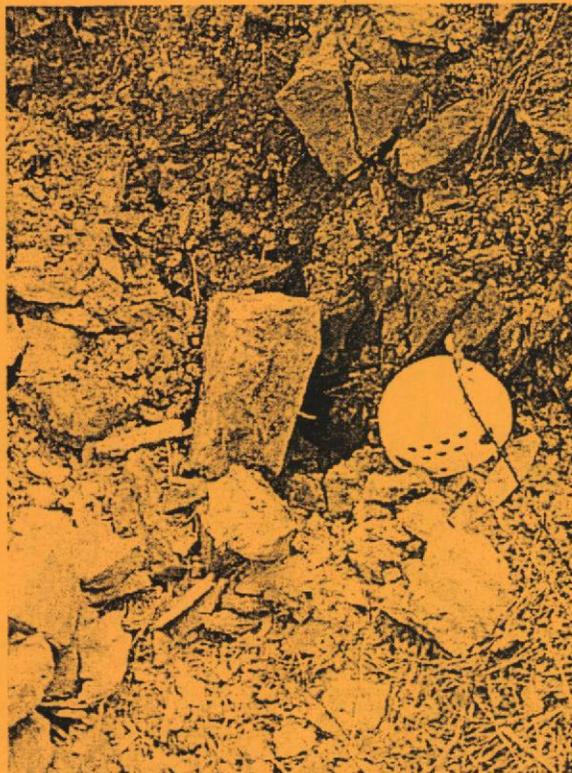
↑ SHEEPTAIL GULCH MINE



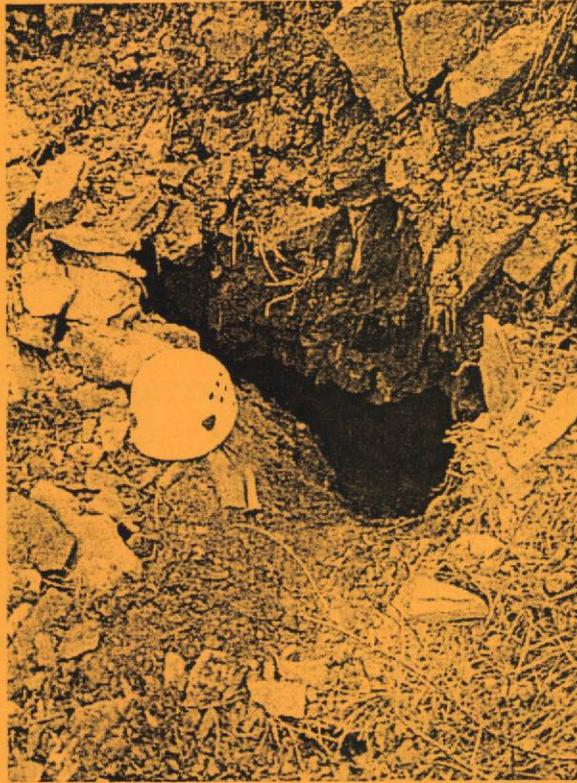
↑ JOE DOLLAR MINE



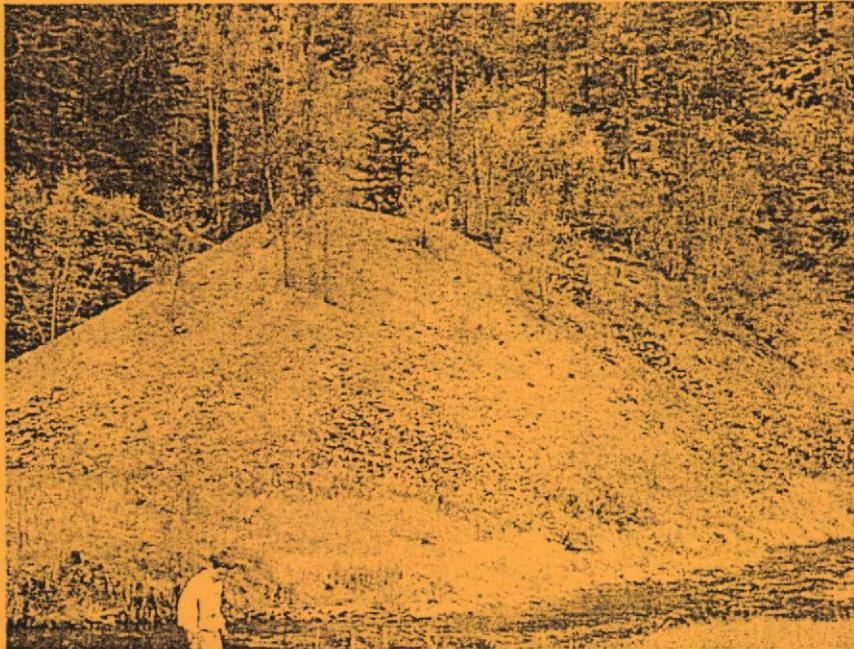
↑ Small adit opposite Joe Dollar – Note unstable material above portal



↑ Small adit opposite Joe Dollar following closure of adit
Despite appearance of dark spot at center of photo, the adit was completely closed



↑ Small adit opposite Joe Dollar after removal of recently sloughed material



↑ SLATE CREEK MINE – Waste rock pile adjacent to creek



↑ SLATE CREEK MINE – Portal – near closure from sloughed materials



↑ Storm Mountain Mine