

Bats and Mines: Abandoned Does Not Always Mean Empty

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by Jacqueline J. Belwood and Rachel J. Waugh

Large numbers of cave-dwelling bats now use abandoned mines as regular roosting sites. Driven from their traditional roosts by human disturbance and cave commercialization, cave-dwelling bats often have little choice. Like caves, abandoned mines offer bats the advantage of a stable microclimate, reduced risk from predation and disturbance, and protection from adverse weather. But mines are not safe and permanent roosts either; mine reclamation operations increasingly mean mine closures.

Hard-rock mining, which encompasses only about 3% of mining operations in North America, provides the structures that cave-dwelling bats find so attractive. The industry dates back over one hundred years in the United States and falls under the jurisdiction of the General Mining Law of 1872. Designed to encourage the settlement and economic development of the western states, the law allows anyone who believes they have found a valuable mineral deposit on federal land to lay claim to it.

Miners retain rights to a claim simply by demonstrating that \$100 worth of work has been done on the land each year. They can then purchase it for between \$2.50 and \$5.00 per acre by obtaining a patent. After patenting a claim, owners can do whatever they choose with the land, with little or no concern for the environment. Provisions regulating reasonable restoration, or reclamation, of the landscape do not exist under the 1872 law. As a result, most mines that are no longer productive are simply abandoned.

Tens of thousands, perhaps even hundreds of thousands, of abandoned mines exist today in the United States. Not even the Bureau of Mines knows the exact number, because federal recording of mining claims was not required until 1976. The number is likely significant since at least 10,000 occur on National Parks Service property alone.

Abandoned mines can pose a serious, even fatal, hazard to curiosity seekers or amateur prospectors. Potential dangers include cave-ins from loose rock and rotten timber, deep water at the bottom of shafts, poisonous gases, oxygen-deficient "bad air," and discarded, but active, explosives. With hazard and liability abatement in mind, the U.S.D.A. Forest Service, the Bureau of Land Management, and the National Parks Service have begun large-scale projects to reclaim abandoned mines on their properties. In most cases, biological surveys are not conducted on mines before they are closed.

Abandoned mines currently are reclaimed in one of four ways: by backfilling, sealing with concrete, blasting, or by gating. Only gating allows continued use by bats, while protecting the public from mine mishaps. Past research has shown that many bats, including several endangered species, will tolerate gates at cave or mine entrances if dimensions between bars are of adequate size and the gate does not impede airflow, thus altering climatic stability within. However, a great deal more research is needed on the potential widescale use of gates in bat protection. Some species, such as Mexican free-tailed bats (*Tadarida brasiliensis*), do not appear to tolerate "conventional" gates used in bat caves, and other species, including endangered gray bats (*Myotis grisescens*), require a modified design for nursery colonies. The degree to which gates can be used to protect the roosts of other endangered

species, such as lesser long-nosed bats (*Leptonycteris curasoae*), has not yet been investigated.

BCI member Kirk Navo, a wildlife biologist with the Colorado Division of Wildlife, found that in Colorado alone, 8,000 abandoned mines have been identified as potential hazards and are candidates for closure. About 2,000 have already been sealed, a trend that continues at a rate of about 600 per year. In California, 1,500 mines have been closed since about 1970, and similar figures exist for Montana, Nevada, and Arizona. These areas reflect the gold-, copper-, and silver-rich deposits of the North American West. Other heavily mined areas include the Midwest and southeastern states.

The need to safeguard the public from hazards of abandoned mines is real. However, their widespread use by bats poses another serious problem when the mines are closed. Twenty-nine of the 42 recorded bat species in the United States can now be found in abandoned mines. In some cases, they are present only for a night or two, using mines as stopovers during migration [see "How North America's Bats Survive the Winter," page 7]. But, many bats, including several endangered and threatened species, now use mines as their permanent and only residence in both summer and winter.

Thirteen of Colorado's 17 bat species now use abandoned mines to some degree. Mines are the state's only known roosts of Townsend's big-eared bat (*Plecotus townsendii*), already endangered in other portions of its range and a candidate for federal listing as well. Similarly, in Arizona, endangered lesser long-nosed bats roost primarily in mines, as do threatened California leaf-nosed bats (*Macrotus californicus*) and southwestern cave bats (*Myotis velifer*) in California.

In Kentucky and Tennessee, a 1983 U.S. Army Corps of Engineers survey of 114 mines found that 28% of the shafts contained bats. This and other studies showed that Rafinesque's big-eared bats (*Plecotus rafinesquii*) and small-footed bats (*Myotis leibii*), both candidates for federal protection, use abandoned mines year-round. The largest known hibernating populations of both these species occur in mines in Tennessee and New York, respectively. In Wisconsin, up to 95% of hibernating bats use abandoned mines. Some of these populations number close to a million individuals and are among the largest concentrations of hibernating bats known anywhere in the world.

Are bats that live in mines in real danger? The answer is clearly yes. Just two years ago, an important population of about 20,000 hibernating little brown bats (*Myotis lucifugus*) was sealed in an abandoned mine in rural New Jersey [BATS, Winter 1989-90]--the state's primary hibernaculum for the species. Fortunately, the action was discovered in time to re-open the entrance before the bats died.

A similar incident nearly occurred at a large mine in Wisconsin. Only intervention by BCI and other conservation groups prevented an estimated quarter million hibernating little brown bats from being fumigated. The problem is not confined to the United States. In England, thousands of endangered greater horseshoe bats (*Rhinolophus ferrumequinum*) were found dead only after the re-opening of several large mines.

No doubt several North American bat species have already suffered similar fates. Dr. Patricia Brown of the Maturango Museum in Ridgecrest, California, estimates that about 10% of the abandoned mines she has examined in that state contain bats. Since California has already capped 1,500 mines, this could mean as many as 150 mines with bats have been lost. A similar situation is likely in other western states where mine reclamation programs are already in effect, as well as in the North and East where particularly large bat concentrations occur.

What can we do to help solve the problem? First, the issue must receive greater attention. Mining company officials and representatives from state and federal lands, where the majority of publically owned mines are located, must be educated about the scope of the bat-mine problem. They should also be encouraged to develop regulations designed to lessen the impact of reclamations on bats.

Much to their credit, the Bureau of Land Management's California Desert District Office has recently directed mine operators to implement closure methods, where appropriate, that do not preclude use by bats. This is an important

step forward, one that could serve as a model for other BLM districts and federal agencies.

In addition, the many citizens groups and politicians working to reform the antiquated 1872 Mining Law need to be educated about the importance of bats and the threats that other aspects of mining pose to these animals [see "Bats, Cyanide, and Gold Mining," page 17]. The Mineral Policy Center, a non-profit organization based in Washington, D.C., has proposed changes to the 1872 law that would require reclamation of all abandoned mines. The group was formed primarily to lessen environmental impacts of the mineral industry in the United States. In brief, reclamation would ensure the physical and chemical safety of humans and wildlife as well as return of the land to pre-mining productive uses. Efforts would also entail the recontouring of dumps, pits, and other physical by-products of a mining operation to conform to surrounding landscapes in an aesthetically pleasing manner.

It is important to broaden the scope of these reforms to provide for the safeguarding of all wildlife, especially bats, that live in abandoned mines. Large colonies of many bat species now appear to rely solely on abandoned mines for roost sites, indicating that bat use of mines is more than just a recent phenomenon. When mining activities create wildlife habitats as significant as bat roosts--however inadvertently--these resources should be protected. This is especially true since many occur on public lands.

Regardless of possible changes to the General Mining Law of 1872, the protection of abandoned mines currently housing bats must be ensured. To identify existing bat mines, adequately trained personnel will need to conduct thorough censuses on all mines scheduled for reclamation. Censusing will need to be carried out in summer and winter months to identify sites used both as maternity roosts and hibernacula before a decision is made to seal a mine or to protect it. In Colorado, Kirk Navo has already begun this process by preparing guidelines on how surveys in abandoned mines should be conducted and by recruiting a corps of some 200 volunteers to survey the state's mines for bats.

Mining interests and wildlife protection need not be in conflict. The Homestake Mining Company, under the direction of Environmental Manager Ray Krauss, was instrumental in successfully relocating a colony of Townsend's big-eared bats living in one of their mine tunnels, and in protecting the best known maternity roost for this species in Napa County, California. Homestake accomplished both actions without compromising current mining operations [*BATS*, Spring 1989].

Efforts such as these can also be used as models, especially in the western United States. Bat biologist Dr. Elizabeth Pierson, who assisted with Homestake's efforts, reports that their success has inspired others to initiate projects protecting mine and cave-dwelling colonies of big-eared bats. They include the Sonora Mining Company in the California Mother Lode country, several California Forest Service districts, and Sequoia National Park.

Because of human activities, many historical cave roosts can no longer be used by bats. The mining industry has a rare opportunity to help with an alternative: to turn what they no longer need, abandoned mine tunnels, into protected roost sites. Mining organizations and government agencies working together with bat biologists and conservation groups can ensure that bats dwelling in mines will be able to roost undisturbed far into the future.

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SPECIAL NOTE: Shortly before going to press, BCI learned that the Wisconsin mine highlighted in this article and in "How North America's Bats Survive the Winter" will be re-opened this fall. The potential impact that resumption of mining operations will have on bats is unknown at this time. The mine contains many miles of interconnecting passageways, and it may or may not be possible to reopen parts of the mine without harm to

hibernating bats.

Mine officials have contacted the Wisconsin Department of Natural Resources and Dr. Elmer Birney from the University of Minnesota, to obtain recommendations on how to minimize the negative effects that the operation may have on the bats. If successful, this cooperative collaboration between the mining company and conservationists can serve as a model for future operations.

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Reform of the General Mining Law of 1872 is currently being discussed in Congress, and the impact of reclamation on bats and other wildlife must be considered. We encourage BCI members to write to their congressional representatives to voice their concern. Members who want more information on this important issue, or want to know what they can do in their own state, can contact Dr. Belwood at BCI for a list of references and regional sources (512/327-9721). Also contact the Mineral Policy Center, 1325 Massachusetts Ave. NW, #550, Washington, DC 20005 for additional information.



Abandoned mines like this have become critical bat habitat, but they are also tempting to explorers and can be extremely dangerous. Efforts are now underway in many states to close such mines, in most cases without conducting biological surveys.



Mines are Colorado's only known roosts for Townsend's big-eared bat, a candidate for federal endangered listing. Colorado's abandoned mines are being closed at the rate of 600 per year. Until just recently, none were surveyed for bats.



As traditional roosts are increasingly disturbed by humans, many cave-dwelling bats have little choice but to seek alternative roosts in mines. Twenty-nine of the United States' 42 bat species can be found in mines at some time, including Rafinesque's big-eared bats, who rely on mines year-round.



Wildlife protection and mining operations do not need to be in conflict. With help from biologists, Homestake Mining Company in northern California successfully relocated a colony of Townsend's big-eared bats and provided a protected roost away from mining operations.

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