

## Session 2

# Interest Group Perspectives on Constraints, Experiences, Trends, and Needs

Session Chairperson:  
Vance Greer  
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### **National Association of Abandoned Mine Land Programs**

*Mark Mesch, Utah Division of Oil, Gas, and Mining, Salt Lake City, Utah*

### **Perspective of the Interstate Mining Compact Commission/Eastern Regulatory Authority States on Bat Conservation and Mining**

*Dr. Richard Wahrer, Kentucky Department for Surface Mining Reclamation and  
Enforcement, Frankfort, Kentucky*

### **Bat Conservation in Mine Reclamation in Eleven Western States and the Western Interstate Energy Board Perspective on Habitat Preservation**

*Homer E. Milford, Abandoned Mine Land Bureau, Mining and Minerals Division,  
New Mexico Energy, Minerals, and Natural Resources Department, Santa Fe,  
New Mexico*

### **Kentucky Coal Industry Perspective on Bat Conservation and Mining**

*Stephen Cawood, McBrayer, McGinnis, Leslie, and Kirkland, PLLC, Lexington,  
Kentucky*

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*Dave Flemming, U.S. Fish and Wildlife Service, Atlanta, Georgia*

**Bat-Compatible Closures of Abandoned Underground Mines in National Park System Units**

*John Burghardt, National Park Service, Denver, Colorado*

**The Evolution of Federal Policy and Practice to Conserve Bats on Lands Managed by the Forest Service**

*Laurie Fenwood, U.S. Forest Service, Vallejo, California*

**The Role of the Bureau of Land Management in Bat Conservation**

*Fred Stabler, Bureau of Land Management, Washington, D.C.*

**International Association of Fish and Wildlife Agencies**

*Terry Johnson, Arizona Department of Game and Fish, Phoenix, Arizona*

# **NATIONAL ASSOCIATION OF ABANDONED MINE LAND PROGRAMS**

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## **Abstract**

In 1977, Congress passed the Surface Mining Control and Reclamation Act (SMCRA). Title IV of the Act established the Abandoned Mine Land Reclamation Program (AML). The purpose of AML is to address both land and water resources that have been: 1) adversely affected by past mining activity; or 2) left in an unreclaimed or inadequately reclaimed condition. The Act levies fees on currently mined coal in the United States to pay the costs of this nationwide reclamation effort. With a National program in place, Congress authorized States and Native American Tribes to establish their own AML programs and, in 1983, the States and Tribes organized an informal association.

Today, the National Association of Abandoned Mine Land Programs (NAAMLPL) is comprised of 26 State abandoned mine programs and three Native American programs. With representation covering virtually the entire nation from Alabama to Alaska and West Virginia to Wyoming; and over 20 years of reclamation experience that has addressed the entire gambit of mining including surface and underground coal, hard-rock, and even uranium, the NAAMLPL has a depth and breadth of on-the-ground experience unmatched by any other organization.

The mission of the National Association of Abandoned Mine Land Programs is to: (1) Provide a forum for current issues, common problems, and new technologies regarding abandoned mine reclamation, (2) Foster positive and productive relationships between the States and Tribes represented by the Association and the Federal government; (3) Serve as an effective, unified voice when representing the States/Tribe's common viewpoints; and (4) Coordinate, cooperate, and communicate with the Interstate Mining Commission Compact and Western Interstate Energy Board and all other organizations dedicated to wise use and restoration of our natural resources.

During this session, I will highlight the constraints AML programs face, their varied experiences, current trends and future needs as members of the Association attempt to deal with the issues of conserving bats and reclaiming past mining impacts.

## **Results of State AML Program Survey**

Based on my survey of AML programs in our States, Alabama they have closed about 1,200 mine openings. They have installed about 35 bat compatible closures associated with the closure of 900 horizontal openings. Most of their bat surveys are based on external surveys. Alaska works closely with the Forest Service to determine the presence of bats in mines. They have not yet done any bat compatible closures. Arizona works with their fish and game department who

conducts the bat surveys both internally and externally. The Arizona fish and game program makes recommendations based on its surveys to the State AML program concerning protecting bats during mine closure. Most of the protective effort for bats involves fencing rather than the construction of gates. Arkansas AML has not yet installed any bat gates although gates have been installed by the National Park Service. The program relies on visual checks prior to closure. Colorado has mobilized a force of volunteers that conduct a preliminary external survey. Mines indicating promise as bat habitat are then prioritized for internal surveys by professionals. Colorado currently leads the nation in the number of bat gates installed. Indiana is investigating bat habitat on both AML sites and on active mining surface disturbances as it affects forested areas utilized by the Indiana Bat. They have been installing bat gates for about the last 2 years. They have installed 12 gates on adits and 4 other types of closures. They do an initial external survey with AML staff, then if the mine appears to have been used by bats, they have a survey conducted by a professional from Indiana State University to determine the bat species and type of bat use of the mine. Indiana is also doing post gate installation monitoring through the use of Hart traps, mist netting, or ANABAT detection. Iowa reports that have primarily surface mining areas with no underground mine openings. Iowa consults its fish and game department to determine the methods necessary to protect Indiana Bat habitat during surface mining. Kansas has no mine closures so their focus is on surface mining disturbance. Kansas works with their fish and game department to enhance bat habitat by tree plantings during reclamation. Kansas AML does its own bat surveys with mist netting and ANABAT detection. Mine pits reclaimed by Kansas to promote Gray Bat habitat are now showing use by the Gray Bat. Kentucky AML is installing bat gates. Kentucky AML does not do any survey work because of the dangers involved with abandoned mine openings. They install gates wherever there is any chance of the site being used by bats. Currently, Kentucky has installed 50 bat gates. Maryland has installed one bat gate where the mine was known to be inhabited by bats. It received a large aircraft cable net style closure. They rely on their State fish and game to identify mine openings with potential for bat usage. Michigan has no active coal mining and has no AML funds. Michigan has a lot of abandoned iron mines and has used State funds to protect bats at these mines. Missouri has not yet installed any bat gates although they are making plans for installation in the future. Most of their mines are very shallow and are usually flooded. Their survey work to date has been with State AML staff. Missouri is also considering bat habitat mitigation with surface structures. Montana works with the Nature Conservancy to perform internal and external surveys on mine sites scheduled for reclamation. All of their gate designs are based on a gate built into a large culvert. They have installed 12 of these gated culverts. The Navajo nation has gated about 10 mine openings. They only do external surveys. They are doing some post installation monitoring of the gates. New Mexico has gated over 186 mine openings. They have excellent bat survey techniques and do extensive post installation monitoring. Ohio has installed 13 gates at mine openings, 11 at coal mines and 2 at old gravel bars. Ohio only uses external surveys and installs a gate wherever the mine opening appears to provide suitable bat habitat whether or not they find bats actually using the site. Oklahoma has not yet installed any bat gates but has three in the design phase for installation in coal mines. Oklahoma works with the U.S. Fish and Wildlife Service in order to conduct the bat surveys. Texas works extensively with the National Park Service who does the bat survey work and design planning. They have typically used cable nets for the bat closures. Utah AML does its own internal surveys and has installed 120 bat compatible closures. Utah is in the development stage of building a data base that would link all

available bat gate information to habitat characteristics that could be accessed by other bat researchers. West Virginia has installed 10 bat gates. They work with the Forest Service to obtain bat surveys of mine openings. Wyoming has installed from 75 to 100 bat gates both in coal and non-coal settings. They had worked with their State fish and game department for the initial bat surveys and now work with a private consultant. Wyoming uses angle iron bat gates because of the common incidence of vandalism.

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Mark Mesch is a reclamation biologist with the Utah Abandoned Mine Reclamation Program since 1988 and currently administers that program.

# **PERSPECTIVE OF THE INTERSTATE MINING COMPACT COMMISSION EASTERN REGULATORY AUTHORITY STATES ON BAT CONSERVATION AND MINING**

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## **Abstract**

The Interstate Mining Compact Commission (IMCC) is an advisory or consultative agency that provides a collective voice for its member States and serves as a liaison with Federal agencies and Congress. With its informational research service and networking capabilities, these IMCC members are able to discuss unique and innovative approaches to regulation, successful experimental practices and offer input to policy development.

For the purpose of this presentation, the member States were queried as to the specifics of their own Protection and Enhancement Plans of Federally endangered bat species. Additionally, the working relationships of the coal industry, fish and wildlife agencies, and mining regulators on developing these plans are discussed. Most State programs did not have Plans as few, if any, endangered species of bats were found near mining areas, though fish and wildlife agencies required stringent tree clearing dates. Even when these species were found in permit areas, there was no universal agreement between the States and the U.S. Fish and Wildlife Service (FWS) on when to implement Plans and the development of short and long-term habitat enhancements.

The Interstate Mining Compact Commission (IMCC) is a multi-State governmental organization representing the natural resource interests of its member States. These member States, consisting of Alabama, Arkansas, Illinois, Indiana, Kentucky, Louisiana, Maryland, Missouri, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, South Carolina, Tennessee, Texas, Virginia, and West Virginia, have significant interests in the mining of coal and noncoal minerals. The purposes of the Compact are not only to advance the protection and restoration of land, water and other resources affected by mining, but also to maintain an efficient and productive mining industry and increase economic and other benefits attributable to mining. The functions of the IMCC are: (1) to be the liaison between the State regulatory agencies and Federal government and Congress; (2) to monitor regulatory and legislative developments; (3) to communicate State positions on Federal rulemakings and national legislation; (4) to interact with environmental and industry groups; and (5) to provide mining and mineral education outreaches to the public.

## **Status of Bat Protection Programs**

In an effort to ascertain the status of bat protection programs among the IMCC States, a questionnaire was mailed out to the mining regulatory agency. Twelve States responded with

follow up phone conversations with relevant personnel. Often, the questionnaire was answered by that State's fish and game agency. The questions and a summary of responses are given below:

1. List the endangered species of bats that are found in, or near, your mining permit areas.

Response: Eight States reported the presence of the Indiana bat (*Myotis sodalis*) though not always near their coalfield regions. Four States responded with records of the gray bat, (*Myotis grisescens*). The Virginia big eared bat (*Coryrhinus townsendii virginianus*) was found in one State and the Ozark big eared bat (*Coryrhinus townsendii ingens*) was also found in one State. Four States reported no Federally listed endangered bat species.

2. Enclose your agency's protection and enhancement plans for endangered species of bats.

Response: The majority of the States that responded did not have a formal bat protection and enhancement plan generated by the regulatory agency. These States deferred to the recommendations of their State wildlife agency and the FWS. Two States have a plan that address only potential roost tree removal. One State uses a plan developed by Bryan and MacGregor (1988) that applies to rare and endangered wildlife species found in abandoned mine portals. One State has developed bat protection and enhancement guidelines for the coal industry for tree clearing through reclamation.

3. Discuss the parameters that are used to trigger a bat protection and enhancement plan. List any databases that you use in location determination.

Response: Before action is taken developing a protection and enhancement plan for the endangered species, most States accessed various databases (Nature Conservancy, Nature Preserves, FWS Ecological Services, or State fish and game reports) to identify any records near the proposed mining permit areas. Three States reported that biologists from their fish and game or regulatory agency conducted site visits to the permit area to assess potential habitat. One State uses a "critical distance," or, the proximity of bat records to the permit area, that will initiate a preliminary site inspection.

4. Describe the methodologies used to determine if a specific permit area might qualify as bat habitat.

Response: Though a few of the States defer to FWS, who, in turn, determine bat presence by mist netting, State biologists assess proposed permit areas in most States. Potential habitat is evaluated based on the presence of potential roost trees, abandoned mine portals, caves, wooded riparian areas and the proximity of a watering area. Again, if the database reveals bat records in or adjacent to the permit area, suitable habitat is usually assumed.

5. List short-term bat habitat enhancements you implement after mining.

Response: Eight States either do not implement short-term enhancements because the bat species do not occur in the coal regions, or defer to the development of long-term enhancements. The remaining four States use a combination of tree girdling, the installation of bat boxes, and the creation of wetlands and shallow water depressions to provide suitable bat habitat until long-term enhancements, such as tree planting, can take effect.

6. List long-term enhancements and any specific revegetation plans you implement after mining.

Response: Only three States do not have reforestation/revegetation plans. States that do not contain bat species in their coalfields often still plant potential roost tree species. States that have endangered bat species in the vicinity of the permit will usually encourage fish and wildlife or forestland post mining land uses and request that exfoliating bark species be used in their reclamation plans. Four States actively participate in the gating of caves and abandoned mine portals, supplemented with reforestation in these areas and along riparian zones.

7. With regard to bat protection, describe your agency's relationship with state and/or federal fish and wildlife agencies. Specify these agencies' concerns with mining impacting the endangered bat species.

Response: States that do not have bat species in their coalfield regions maintain an excellent relationship with State and Federal fish and wildlife agencies. The States that recorded bat species in the coalfields interacted well with their State fish and game groups, although communication with the regulatory agency and FWS ranged from good to poor. Criticisms of FWS by State agencies included an increased demand for mist netting; the inclusion of all tree species, regardless of size, as potential roost trees; the requirement of a mandatory stream buffer zone; the shortening of the tree clearing period from eight months to six and the requirement of bat habitat enhancements in areas that the species has never been recorded.

8. List the main concerns of your state's coal industry with regard to bat protection procedures and plans.

Response: The primary concern of the coal industry with bat protection and enhancement plans is time. Permit acquisition can be delayed due to preliminary environmental assessments in potential bat habitat areas and the corresponding bat protection and enhancement plan development. Scheduling of mine operations is difficult to accomplish as tree clearing dates may vary depending on the distance from a hibernaculum or elevation. Another major concern is the requirement by FWS for maintaining a stream buffer zone, which may cause a significant change in the mining plan.

## **Conclusion**

Among the IMCC states, bat protection and enhancement measures vary from nearly non-existent to highly detailed. Deference should be given to USFWS for consultations involving endangered bat species. Nevertheless, the mining regulatory agencies are charged to review and issue permits that allow maximum resource recovery with minimal environmental impact, consistent with State or Federal regulations.

Based on this questionnaire and conversations with the regulators and State fish and wildlife biologists, three issues must be addressed in order to provide consistency in the review and implementation of bat protection and enhancement policies. First, an updated and approved bat protection document is needed for all of the States where bats are found in the resource mining areas. Endangered species recovery plans need to be revised and approved. These documents would set forth the standards from which regional protection and enhancement plans could be assembled. Second, the FWS field offices need to be consistent with all of the affected States when developing, and consulting on, protection plans. As it is now, some field offices require stream buffer zones and other offices are mainly concerned with the determination of potential roost trees. Third, all documents and protection and enhancement plans need to be based on published research. More research is needed on foraging behavior, diet and summer habitat as well as the success of present enhancements, to legitimize the bat policy of a regulatory agency.

## **References**

Bryan, H.D. and J.R. MacGregor. 1988. A guide to the suitability of abandoned mine portals as habitats for rare or endangered wildlife in Alabama. Alabama State Department of Industrial Relations, Montgomery, Alabama. 16 p.

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Dr. Richard J. Wahrer is an Environmental Scientist for the Kentucky Department for Surface Mining Reclamation and Enforcement in the Division of Permits.

# **BAT CONSERVATION IN MINE RECLAMATION IN ELEVEN WESTERN STATES AND THE WESTERN INTERSTATE ENERGY BOARD PERSEPECTIVE ON HABITAT PRESERVATION**

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## **Abstract**

The Western Interstate Energy Board (WEIB) is an association of 12 western States and 3 western Canadian provinces. The Board serves as the energy arm of the Western Governors' Association. The ultimate purpose of the Board, as established in Public Law 91-461, is to "...enhance the economy of the West and contribute to the individual and community well-being of the region's people" by providing the instruments and framework for cooperative efforts among western States on energy-related topics. Within that broad charge, the Board, which is comprised of one-gubernatorial appointee per State, has set certain priorities and created committees to address these priorities in depth.

One of those committees is the Reclamation Committee, which is comprised of representatives of the five western States with active coal mining. These States have Office of Surface Mining (OSM)-funded abandoned mine land (AML) programs: Colorado, Utah, New Mexico, Wyoming, and Montana. This talk will summarize the information collected from these AML Programs on their bat conservation activities. The experience and trends in native-American Tribes and non-OSM funded western State AML reclamation programs will also be presented.

Disclaimer: Only the abstract has been approved by WIEB. The rest of the paper may or may not reflect the position of WIEB.

## **Introduction**

Neither the five member States of the WIEB Reclamation Committee nor the 12 western States and 3 western Canadian provinces of the full board have a formal bat policy. However, the five western States that make up the membership of WIEB are the five western States that have OSM funded Abandoned Mine Land (AML) programs. These five States are Colorado, Montana, New Mexico, Utah, and Wyoming. You have and will continue to hear much about the experiences of these five States in bat conservation activity in their AML programs. The game and fish departments of the majority of these States are also active in bat conservation. This talk will summarize the information collected from the WIEB State AML programs on their bat conservation activities. The experience and trends in native-American tribes and 11 western States in bat habitat conservation in mine safeguarding will be summarized.

## **Survey Method**

In the non-OSM funded States, mine safeguarding has only become a State function in the recent past. Though Nevada has had an AML program since 1987, its funding has been so small that only fencing of mine shafts could be preformed. In Arizona, the State mine inspector's office safeguarded a small number of mines, but a State AML program only got underway last year. Idaho's AML program also started in 1999. California, Oregon, and Washington's programs are or may become active during the year 2000.

The survey was conducted between May and November 2000. A number of questions were asked but, due to the different levels of development of the AML programs in different States, only information common to the majority of States will be discussed.

In the past, no comprehensive national data has been collected on bat-friendly closures of mines. There are not even reliable estimates on the number of abandoned mines for most States. The majority of abandoned mines in the west are non-coal mines and few, if any, States have completed an inventory of them. OSM has a data bank for coal mines. That data bank also has information on non-coal mines in the States whose AML programs have OSM funding. Len Meyer is collecting data for his paper at this conference on Bat Friendly Closures (BFCs) from all States. The five State AML programs funded through OSM are now safeguarding more non-coal mines than coal mines. The opportunity now exists for OSM to start collecting extensive data on the mine habitat of bats in the United States. If OSM, in cooperation with other agencies, could decide on the nature of the data that should be collected, OSM's database would be the logical place for storage of this information. A national database would be helpful in future evaluations of the status of bat species.

AML programs are housed in different agencies in different States. In some States, the AML programs are only beginning to be formed and BFC information was only available from the State game and fish agencies. Information on OSM activity in building BFCs was obtained for the States of Washington and California. Information on other Federal agency programs was generally obtained from State game and fish or AML programs. Federal agencies that have constructed BFCs include: U.S. Bureau of Land Management (BLM); U.S. Forest Service (FS), U.S. National Park Service (NPS), U.S. Department of Defense (DOD), OSM, and a few BFCs by other agencies. Some local governmental groups have also built BFCs. Mining companies in Arizona, California, and Nevada have also built BFCs in response either to awareness of their importance to bat conservation or to comply with a governmental agency requirement. Mining companies have also built a small number of BFCs in OSM funded States, but reliable data on them was not available.

## **Limitations of Survey Data**

The level of confidence in the data is moderate at best. For the OSM funded States, the number of BFCs is probably accurate, but there are differences in what is counted as a BFC. The original

intent was to collect information on different subtypes of BFCs: bat grates/gates; cable net modified with bat windows; plain cable net; and portals safeguarded with something to allow continued airflow. This effort was abandoned because the information was not available. Thus, all reported BFCs are included in one count for the entity. The OSM-funded State AML programs have little or no knowledge of other agency BFCs within their State.

For the non-OSM funded AML program States, information was collected generally from both a geological or AML reclamation agency as well as game and fish department. In most cases, the numbers represent the best available estimate. In spite of these disclaimers as to reliability, the data provides an overall assessment of BFCs in the western States. It is estimated that the region-wide error on BFCs numbers is less than 5%, excluding the questions of how a BFC is defined.

### **Survey Results**

Table 1 provides a little information on the status and starting dates of the AML programs in eleven western States and two tribes. Following this are columns giving: (1) the name of the agency within that jurisdiction that has been performing bat habitat assessments; and (2) the agencies that make the decision on which mines have bat habitat values warranting safeguarding by BFCs. In many cases, BFCs have been installed for reasons other than to protect known bat habitats. No effort was made to collect information on how many BFCs were built for non-bat reasons. As there is a different definition of BFCs in different jurisdictions, this term has been used for bat grates, bat gates, cable net, or any other possible closure that may allow bat usage. In other words, whatever the State reported as a BFC. The number of BFCs completed by the year 2000 and then the number currently in some stage of planning for construction are separated by a colon. As AML programs differ in the length of the planning phase, these numbers have little meaning, but generally refer to the next one to three years. The five States with OSM-funded AML programs have little knowledge of the number of BFCs constructed by other agencies within their State. In non-OSM funded States, information was more commonly known about non-State BFC construction. Information was not collected from Alaska, Hawaii, or the Canadian provinces.

The following are some of the individuals providing information for this survey. Arizona: Alene Jones/AML, Tim Snow/GF & Ron Kerns/USFW; California: Stephen Reynolds/AML, Steve Newton-Reed/AML; Colorado: Julie Annear/AML, Jim McArdle/AML; Hopi: Riley Blinkwell/AML; Idaho: Erick Wilson/AML; Montana: Jack Yates/AML; Navajo: Daryl Martinez/AML; Nevada: Dave Pullion/AML, Doug Hunt/FW, Pete Bradley/FW. Oregon: Ben Mundy/AML; Utah: Mark Mesh/AML; Washington: John Fleckstein/GF, Dave Norman/AML; Wyoming: Ed Francis/AML. From OSM: Ginger Kaldenbach & Len Meier.

**Table 1: Bat Friendly Closures (BFCs) by States, Tribes and Other Programs in the West**

State or Tribe	AML Program Started	Assessment	BFC Decision by	BFC's by AML Program		BFC's by other Agencies (BLM, FS, OSM, etc.)	Follow-up studies done by
				Completed	Planning		
Colorado	OSM Funded	G&F	G&F	321	28	BLM 30? Other ?	G&F
Hopi	Started	AML	AML	1	0	-0-	AML
Montana	In 1980's	NHP (G&F)	G&F and AML	5	0	-?-	AML
Navajo	Bat	AML	AML	4	0	-0-	AML
New Mexico	Habitat Evaluation	AML and Contractor	AML and Contractor	127	31	Private 4? Other ?	BCI Contractor
Utah	Started between	AML and Contractor	AML	290	30	-?-	AML
Wyoming	1990 - 1995	G&F or Contractor	G&F and Contractor	69	3	-?-	G&F
Arizona	1999	G&F	Just starting	0	4	Total - 71? USF & WS 1:3 BLM 28:? NPS 10:? FS 1:? Other Gov. 12:? Private 16:?	
California	2000	AML, but recognize the need for better assessment	AML Just starting	0	0	Total 200? FS & BLM 150? NPS 60? OSM 8:2 Private Some	
Idaho	1999	G&F	G&F and AML	6	12	FS 45?	
Nevada	1987-fencing only 2000?-closures?	G&F just starting	Just starting	0	0	BLM 12 Private 8+?	
Oregon	2000 inventory phase to choose 10 sites.	Probably will be Federal G&F	Just starting	0	0	BLM 4 FS ?	
Washington	2000	Program just starting	Just starting	0	0	OSM 23:1 FS 2:? BLM 1:?	

## Summary

The trend of the past decade is remarkable. We have gone from a very small number of BFCs on caves to over 1,200 BFCs in 11 States. The following summary table highlights the great progress made in the past decade by the WIEB States in the protection of bat habitat through assessment and the construction of BFCs.

### Summary of Bat Friendly Closures (BFCs) In Eleven Western States as of the Year 2000

OSM Funded AML Programs		
	AML Program BFCs completed: planned	BFC closures by other agencies (BLM, FS, NPS, OSM, etc.)
Colorado	321:28	? BLM-30
Hopi	1:0	0
Montana	5:0	?
Navajo	4:0	0
New Mexico	127:31	4?
Utah	290:30	?
Wyoming	69:3	?

Non-OSM Funded AML Programs		
Arizona	0:4	69?
California	0:0	200?
Idaho	6:12	45?
Nevada	0:0	20+?
Oregon	0:0	4?
Washington	0:0	26?
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Totals =	817:108	398?

This data is variable in its accuracy. Due to different definitions of a BFC, all closures that bats could possibly pass through are included. Record keeping is also variable in different programs regarding BFCs. OSM funded programs started bat assessments and BFCs between 1990 and 1995. The other State AML programs only started in 1999 or 2000.

Of the 1,200 BFCs in 11 western States, about 800 have been constructed in the five States with OSM funding. The education of the public as well as agency staff on the need for bat habitat preservation must be continued. The cooperative effort between Bat Conservation International and the BLM has made great strides in this area. However, the major problem in most States is a lack of funds for bat habitat assessment as well as for mine safeguarding. Though education must be continued, the major impediment to progress is funding.

The most important change that could occur to improve bat habitat conservation in mines would be the release of the funds due the State AML programs under SMCRA. The diversion of these funds by the Congress remains the major funding problem for those five WIEB States. Funding is an even greater problem in the non-SMCRA funded States. To date, State funding is totally inadequate and Federal land management agencies have not even made significant contributions to efforts on the lands they own and manage, with the possible exception of the National Park Service. Assistance must be given to Arizona, California, and Nevada where a significant proportion of the Nation's abandoned mine problem exists.

If the mine bat habitat is going to be adequately preserved in these States, greater funding is essential for their AML programs. Federal land management agencies have not yet moved from the planning stage to construction on a meaningful scale in these States. The BLM and Forest Service in Arizona and Nevada have safeguarded only about a tenth of one percent of their mine openings. Hopefully these States are on the threshold of getting funding from their legislatures that will allow them to take a more active role in safeguarding and BFC construction. However, the responsible parties in most western States, the Federal land management agencies that own the majority of the abandoned mines, must start active programs to correct the problem. The OSM-funded States are carrying the burden on Federal lands in their States. The BLM and Forest Service must carry the burden in the other States. It is unfair to lump the two agencies together, as the BLM has made commendable efforts. However, Federal land management agency activity remains totally inadequate. The trends are encouraging, but unless adequate funding is developed, we will not see these trends continue.

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Homer Milford has served as the Environmental Coordinator for the New Mexico AML Program for the past 10 years. He received his bachelors in Biology from the University of New Mexico and Masters in Biology from University of Idaho followed by two years at the State University of New York. He has conducted hundreds of underground bat habitat assessments in conjunction with Dr. Scott Altenbach over the past 10 years. He coauthored with Dr. Altenbach the publication "Evaluation and Management of Bats in Abandoned Mines in the Southwest."

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In the non-OSM funded States, mine safeguarding has only become a State function in the recent past. Though Nevada has had an AML program since 1987, its funding has been so small that only fencing of mine shafts could be preformed. In Arizona, the State mine inspector's office safeguarded a small number of mines, but a State AML program only got underway last year. Idaho's AML program also started in 1999. California, Oregon, and Washington's programs are or may become active during the year 2000.

The survey was conducted between May and November 2000. A number of questions were asked but, due to the different levels of development of the AML programs in different States, only information common to the majority of States will be discussed.

In the past, no comprehensive national data has been collected on bat-friendly closures of mines. There are not even reliable estimates on the number of abandoned mines for most States. The majority of abandoned mines in the west are non-coal mines and few, if any, States have completed an inventory of them. OSM has a data bank for coal mines. That data bank also has information on non-coal mines in the States whose AML programs have OSM funding. Len Meyer is collecting data for his paper at this conference on Bat Friendly Closures (BFCs) from all States. The five State AML programs funded through OSM are now safeguarding more non-coal mines than coal mines. The opportunity now exists for OSM to start collecting extensive data on the mine habitat of bats in the United States. If OSM, in cooperation with other agencies, could decide on the nature of the data that should be collected, OSM's database would be the logical place for storage of this information. A national database would be helpful in future evaluations of the status of bat species.

AML programs are housed in different agencies in different States. In some States, the AML programs are only beginning to be formed and BFC information was only available from the State game and fish agencies. Information on OSM activity in building BFCs was obtained for the States of Washington and California. Information on other Federal agency programs was generally obtained from State game and fish or AML programs. Federal agencies that have constructed BFCs include: U.S. Bureau of Land Management (BLM); U.S. Forest Service (FS), U.S. National Park Service (NPS), U.S. Department of Defense (DOD), OSM, and a few BFCs by other agencies. Some local governmental groups have also built BFCs. Mining companies in Arizona, California, and Nevada have also built BFCs in response either to awareness of their importance to bat conservation or to comply with a governmental agency requirement. Mining companies have also built a small number of BFCs in OSM funded States, but reliable data on them was not available.

## **Limitations of Survey Data**

The level of confidence in the data is moderate at best. For the OSM funded States, the number of BFCs is probably accurate, but there are differences in what is counted as a BFC. The original

intent was to collect information on different subtypes of BFCs: bat grates/gates; cable net modified with bat windows; plain cable net; and portals safeguarded with something to allow continued airflow. This effort was abandoned because the information was not available. Thus, all reported BFCs are included in one count for the entity. The OSM-funded State AML programs have little or no knowledge of other agency BFCs within their State.

For the non-OSM funded AML program States, information was collected generally from both a geological or AML reclamation agency as well as game and fish department. In most cases, the numbers represent the best available estimate. In spite of these disclaimers as to reliability, the data provides an overall assessment of BFCs in the western States. It is estimated that the region-wide error on BFCs numbers is less than 5%, excluding the questions of how a BFC is defined.

### **Survey Results**

Table 1 provides a little information on the status and starting dates of the AML programs in eleven western States and two tribes. Following this are columns giving: (1) the name of the agency within that jurisdiction that has been performing bat habitat assessments; and (2) the agencies that make the decision on which mines have bat habitat values warranting safeguarding by BFCs. In many cases, BFCs have been installed for reasons other than to protect known bat habitats. No effort was made to collect information on how many BFCs were built for non-bat reasons. As there is a different definition of BFCs in different jurisdictions, this term has been used for bat grates, bat gates, cable net, or any other possible closure that may allow bat usage. In other words, whatever the State reported as a BFC. The number of BFCs completed by the year 2000 and then the number currently in some stage of planning for construction are separated by a colon. As AML programs differ in the length of the planning phase, these numbers have little meaning, but generally refer to the next one to three years. The five States with OSM-funded AML programs have little knowledge of the number of BFCs constructed by other agencies within their State. In non-OSM funded States, information was more commonly known about non-State BFC construction. Information was not collected from Alaska, Hawaii, or the Canadian provinces.

The following are some of the individuals providing information for this survey. Arizona: Alene Jones/AML, Tim Snow/GF & Ron Kerns/USFW; California: Stephen Reynolds/AML, Steve Newton-Reed/AML; Colorado: Julie Annear/AML, Jim McArdle/AML; Hopi: Riley Blinkwell/AML; Idaho: Erick Wilson/AML; Montana: Jack Yates/AML; Navajo: Daryl Martinez/AML; Nevada: Dave Pullion/AML, Doug Hunt/FW, Pete Bradley/FW. Oregon: Ben Mundy/AML; Utah: Mark Mesh/AML; Washington: John Fleckstein/GF, Dave Norman/AML; Wyoming: Ed Francis/AML. From OSM: Ginger Kaldenbach & Len Meier.

**Table 1: Bat Friendly Closures (BFCs) by States, Tribes and Other Programs in the West**

State or Tribe	AML Program Started	Assessment	BFC Decision by	BFC's by AML Program		BFC's by other Agencies (BLM, FS, OSM, etc.)	Follow-up studies done by
				Completed	Planning		
Colorado	OSM Funded	G&F	G&F	321	28	BLM 30? Other ?	G&F
Hopi	Started	AML	AML	1	0	-0-	AML
Montana	In 1980's	NHP (G&F)	G&F and AML	5	0	-?-	AML
Navajo	Bat	AML	AML	4	0	-0-	AML
New Mexico	Habitat Evaluation	AML and Contractor	AML and Contractor	127	31	Private 4? Other ?	BCI Contractor
Utah	Started between	AML and Contractor	AML	290	30	-?-	AML
Wyoming	1990 - 1995	G&F or Contractor	G&F and Contractor	69	3	-?-	G&F
Arizona	1999	G&F	Just starting	0	4	Total - 71? USF & WS 1:3 BLM 28:? NPS 10:? FS 1:? Other Gov. 12:? Private 16:?	
California	2000	AML, but recognize the need for better assessment	AML Just starting	0	0	Total 200? FS & BLM 150? NPS 60? OSM 8:2 Private Some	
Idaho	1999	G&F	G&F and AML	6	12	FS 45?	
Nevada	1987-fencing only 2000?-closures?	G&F just starting	Just starting	0	0	BLM 12 Private 8+?	
Oregon	2000 inventory phase to choose 10 sites.	Probably will be Federal G&F	Just starting	0	0	BLM 4 FS ?	
Washington	2000	Program just starting	Just starting	0	0	OSM 23:1 FS 2:? BLM 1:?	

## Summary

The trend of the past decade is remarkable. We have gone from a very small number of BFCs on caves to over 1,200 BFCs in 11 States. The following summary table highlights the great progress made in the past decade by the WIEB States in the protection of bat habitat through assessment and the construction of BFCs.

### Summary of Bat Friendly Closures (BFCs) In Eleven Western States as of the Year 2000

OSM Funded AML Programs		
	AML Program BFCs completed: planned	BFC closures by other agencies (BLM, FS, NPS, OSM, etc.)
Colorado	321:28	? BLM-30
Hopi	1:0	0
Montana	5:0	?
Navajo	4:0	0
New Mexico	127:31	4?
Utah	290:30	?
Wyoming	69:3	?

Non-OSM Funded AML Programs		
Arizona	0:4	69?
California	0:0	200?
Idaho	6:12	45?
Nevada	0:0	20+?
Oregon	0:0	4?
Washington	0:0	26?
Totals =		
	817:108	398?

This data is variable in its accuracy. Due to different definitions of a BFC, all closures that bats could possibly pass through are included. Record keeping is also variable in different programs regarding BFCs. OSM funded programs started bat assessments and BFCs between 1990 and 1995. The other State AML programs only started in 1999 or 2000.

Of the 1,200 BFCs in 11 western States, about 800 have been constructed in the five States with OSM funding. The education of the public as well as agency staff on the need for bat habitat preservation must be continued. The cooperative effort between Bat Conservation International and the BLM has made great strides in this area. However, the major problem in most States is a lack of funds for bat habitat assessment as well as for mine safeguarding. Though education must be continued, the major impediment to progress is funding.

The most important change that could occur to improve bat habitat conservation in mines would be the release of the funds due the State AML programs under SMCRA. The diversion of these funds by the Congress remains the major funding problem for those five WIEB States. Funding is an even greater problem in the non-SMCRA funded States. To date, State funding is totally inadequate and Federal land management agencies have not even made significant contributions to efforts on the lands they own and manage, with the possible exception of the National Park Service. Assistance must be given to Arizona, California, and Nevada where a significant proportion of the Nation's abandoned mine problem exists.

If the mine bat habitat is going to be adequately preserved in these States, greater funding is essential for their AML programs. Federal land management agencies have not yet moved from the planning stage to construction on a meaningful scale in these States. The BLM and Forest Service in Arizona and Nevada have safeguarded only about a tenth of one percent of their mine openings. Hopefully these States are on the threshold of getting funding from their legislatures that will allow them to take a more active role in safeguarding and BFC construction. However, the responsible parties in most western States, the Federal land management agencies that own the majority of the abandoned mines, must start active programs to correct the problem. The OSM-funded States are carrying the burden on Federal lands in their States. The BLM and Forest Service must carry the burden in the other States. It is unfair to lump the two agencies together, as the BLM has made commendable efforts. However, Federal land management agency activity remains totally inadequate. The trends are encouraging, but unless adequate funding is developed, we will not see these trends continue.

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Homer Milford has served as the Environmental Coordinator for the New Mexico AML Program for the past 10 years. He received his bachelors in Biology from the University of New Mexico and Masters in Biology from University of Idaho followed by two years at the State University of New York. He has conducted hundreds of underground bat habitat assessments in conjunction with Dr. Scott Altenbach over the past 10 years. He coauthored with Dr. Altenbach the publication "Evaluation and Management of Bats in Abandoned Mines in the Southwest."

# KENTUCKY COAL INDUSTRY PERSPECTIVE ON BAT CONSERVATION AND MINING

Stephen C. Cawood  
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## Introduction

Good Afternoon. My name is Steve Cawood, and I am a lawyer in private practice in Lexington, Kentucky. I have been asked to share with you this afternoon some of the coal industry's concerns about how those involved with the mining industry can best protect and enhance the habitat for bats in the areas where mining is expected to take place.

By way of background, it may be helpful to you to understand that for more than 25 years I practiced in Pineville, Kentucky, a small town in the center of the Southern Appalachian coal industry. I have represented two small city governments and private citizens groups in bringing the first two successful Lands Unsuitable Petitions thus far practiced in Kentucky, the Cannon Creek Reservoir case, on behalf of the City of Pineville, and the Fern Lake/Cumberland Gap case, on behalf of the City of Middlesboro. I have also represented the State of Kentucky in takings litigation stemming from a Lands Unsuitable Petition. Back in the early 70's (when God first began to give shape to the earth), I represented a Kentucky citizens group intervening in the Tellico Dam litigation, the first major endangered species act litigation in the Eastern United States.

I come to you today as a designated hitter for what remains of the coal industry in Eastern Kentucky. This is because I happen to represent both a surface mining company and a deep miner, conducting mining operations on the Western side of the Pine Mountain. Pine Mountain is a faulted upthrust of limestone lying just west of Kentucky's border with Virginia, a geological feature which is prime habitat for the Indiana bat, *myotis socialis*.

I would also like to make clear that I'm not speaking to you today on behalf of the National Mining Association, the Kentucky Coal Association, or for that matter, any specific client that our firm represents. I come here today as a lawyer somewhat familiar with the problems experienced in the field by those producing coal in Southern Appalachia.

The first major concern of the coal industry I think would be that there is an amazing dearth of knowledge about our subject matter. I would suggest to you that the airline ticket packages issued for our collective travel here to St. Louis today would far exceed all of the scientifically valid knowledge that's currently in print about the endangered bats we seek to protect and enhance. The mining industry, those regulators charged with protecting bats, and those members of the public concerned with encouraging both regulators and the mining industry to be concerned with the protection and enhancement of bats, have an amazingly small amount of guidance available to them.

The work of this symposium is vitally important to all of those associated with it. If we can come up with a nuts and bolts of a scientifically based program of recommendations to enhance bat conservation associated with America's mining, then we will have taken a giant step forward.

### **Stream Buffer Zones**

The first concern of the coal industry, when we begin a discussion concerning the protection of bats, has to begin with some rational assessment of the term "stream buffer zone."

The first problem is that we have no accurate maps to equip those in industry, or those regulating industry, as they seek a rational basis for protecting the water supply and the food supply for those bats which might inhabit a specific area. Kentucky has currently in place the most comprehensive topographical mapping program in the nation. We have an annual program that is addressed in both the Federal and State budget to revise this mapping on a county-by-county basis in a systematic way. But, as we all know, those "blue line" streams that are portrayed on a topographical sheet do not accurately portray anything more than the fact that a particular hollow is the lowest point in elevation in the surrounding mountainside. By the very nature of our mountain topography in Appalachia, and I'm also speaking of the relatively flat, horizontal nature of the geology beneath our mountains, there is, generally speaking, little or nothing which lies on the surface of these mountainsides, or within the strata lying beneath, that will act as a sufficient reservoir to feed and to sustain a free-flowing stream that would exist for any significant part of the year. The huge majority of the upper stretches of the drainage basins which form the sides of our mountains in Southern Appalachia have nothing more than ephemeral streams that serve to drain off rainfall downward, but which in no true sense, biologically speaking, act as a stream that would serve any animal species as either a water source or food supply on an ongoing basis.

We urgently need a program in our State geological survey agencies that would actually systematically assess each drainage basin overlying significant coal reserves to assess their potential for a perennial stream. For those anomalies which we can document to sustain a perennial stream, perhaps we need to formulate strict barriers of protection, but to the best of my knowledge, none of the mist-netting conducted in the coal fields of Southern Appalachia has produced a bat of any kind, let alone an endangered Indiana bat, over an ephemeral stream.

There is relatively little known about the diet of the Indiana bat, though what we do know seems to point to the idea that bat tends to take advantage of whatever is available in the area where he finds himself at any particular time of the year. There seems to be nothing in the literature to suggest that the Indiana bat requires any stream-born source of food, let alone that any of these sources might be found in any of the ephemeral draws that form the upper, coal bearing hillsides in the mountains of Appalachia.

What we have found, in the mist-netting that has been conducted over the last five years in large areas of Eastern Kentucky and Southwest Virginia, is that a variety of different bat species seem to frequent the old logging roads with their shallow tire depressions that criss-cross the mountains. These roads form an open fly-way which serve as a thoroughfare for the bats, generally too small to serve as a foraging area for the owls that might prey upon the bats.

Beyond the “stream buffer zone issue” all of the other ideas and suggestions for permitting restrictions on the coal industry that are circulating among the Fish and Wildlife agencies, and the various State and Federal regulatory proposals proposed as guidelines are really secondary, and I would simply urge common sense.

### **Bat Habitat Assessments by Mine Operators**

There needs to be some rational approach for determining whether mine permittees ought to even be required to assess for the bat’s potential. It doesn’t make any sense to draw these lines along State or county boundaries, because bats certainly aren’t any respecter of political boundaries. The only solid data we have about a firm, consistent location for Indiana bats, is that limestone deposits with a free-flowing volume of air that maintains a temperature above freezing, may serve as a hibernacula for the bats in winter. Conducting the bat surveys that biologists deem appropriate can be a relatively expensive operation. By their very nature, bat surveys are restricted to a narrow, short portion of the calendar year. Common sense and all of the scientific knowledge we can muster needs to be applied to the decisions made in determining the scope of the geographical area in which the surveys will be required relative to the known habitat to the bats.

### **Permit Conditions to Protect Bat Habitat**

None of the companies that I’m familiar with would have any problem with following the timbering practices which are under discussion for the protection of bat habitat. However, thus far, the land companies, which generally serve as lessors for the coal industry, seem to have been left out of the discussion.

None of the mining companies I’m familiar with would have any problem with leaving shallow, wading depth depressions in cleared areas, where permitting agencies will agree that they will be allowed, and where land holders will consent. Many mines are already installing bat boxes where mist-netting has indicated potential bat habitat.

### **The Mine Safety & Health Administration (MSHA)**

There is one regulatory agency that is being completely omitted from these proceedings, as best I can tell. The Mine Safety & Health Administration needs to be involved in addressing the need for the protection of old mine portals. The hillsides of Appalachia are literally speckled with old, abandoned deep mine portals, or adits. Miners simply walked away from, or deliberately abandoned these portal at a time when there was no regulatory requirement for a “closure” that would protect the human population. Most of these have probably fallen in to the point that they present no problem to anyone but the inquisitive child. However, many of them remain accessible to bats frequenting the area, and a few have been documented as providing bat habitat.

It should be born in mind that these old abandoned mine shafts are extremely dangerous. Hardly a year goes by, that someone, somewhere in Appalachia doesn’t die when entering them even though the use of them, for any purpose, is strictly prohibited by both State and Federal law. Whatever measures we may end up suggesting, as a means of protecting these old portals, needs

to be done with the involvement and the advice of the MSHA. We certainly do not need to even suggest (as does some of the literature currently in circulation) that engineers preparing permits, or that regulatory officials go about entering old underground mine works in search of bat populations! While discussing these deep mine works, I should also point out again that topographical maps currently in use do not reflect all of these old mine adits that may be found in a prospective site. Care needs to be taken when prospecting these areas prior to permitting. Then, any examination of these portals needs to be undertaken only with the advice and permission of underground mine inspectors.

### **Conclusion**

Finally, I would suggest that when a regulatory scheme is devised and settled upon, one agency be designated as the prime enforcement agency for the application of the endangered species act with respect to prospective miners in each given State. This would avoid requiring the mining industry to shop a permit application with more than one agency.

Thank you for the opportunity of addressing some of the concerns of the coal industry. We look forward to working with you in the future.

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Stephen P. Cawood is an attorney with McBrayer, McGinnis, Leslie & Kirkland PLLC in Lexington, Kentucky concentrating on natural resources law. He holds a B.S. and Juris Doctorate from Eastern Kentucky University. He has served as a Kentucky State Representative and served as Chair of the Special Committee on Surface Mining and the Natural Resources Committee.

# **THE U. S. FISH AND WILDLIFE SERVICE'S PERSPECTIVE ON BATS AND MINING**

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## **Abstract**

The Fish and Wildlife Service (Service) has a vital interest in the Office of Surface Mining's (OSM) mining and abandoned mined land reclamation programs. We are charged, under the Endangered Species Act of 1973, as amended (ESA), and other legislative mandates, such as Surface Mining Control and Reclamation Act (SMCRA), Fish and Wildlife Coordination Act (FWCA), Clean Water Act (CWA), and National Environmental Policy Act (NEPA), to protect endangered species and other trust resources (migratory birds and anadromous fish). To successfully meet this challenge, the Service must work cooperatively with OSM, other Federal agencies, State agencies that implement mining and mined land reclamation programs, and the private sector. About 40 percent of the bats of the U.S. are either listed as endangered or are of Federal concern. Bats are an integral part of naturally functioning ecosystems and their protection, conservation, and recovery must become a high priority. Most of the bats of Federal concern (listed species and species of special concern) are now dependent to some degree upon abandoned mines. New mining, renewed mining, and reclamation all have the potential to directly impact this unique group of mammals. If carefully planned and executed, these impacts can be positive or their negative effects minimized. The Service looks forward to a successful Forum on the bats and mines issue and to future cooperative efforts to protect these vulnerable species. If we are successful, the currently listed species will benefit and the threats to bats of Federal concern may be reduced to the point that adding them to the Federal list of Endangered and Threatened Species is unnecessary.

## **Introduction, Background, and Past Experiences**

The Fish and Wildlife Service (Service) has recognized the importance of mining and mine reclamation issues to natural resource conservation for many years. One of the early efforts to deal with the subject was a Symposium, similar to this one, held in West Virginia in 1978. That Symposium was conducted in response to the 1977 passage of the Surface Mining Control and Reclamation Act of 1977 (PL 95-87). Lynn Greenwalt, the Director of the Service at that time, noted in the preface to the Symposium proceedings that "While surface mining coal is important in meeting the Nation's energy needs, mine reclamation plans that consider fish and wildlife habitat as either a primary or secondary land use are important for the Nation's living resources." This is as true today as it was then. It is also true for mineral resources other than coal, we need these minerals, but we must not neglect our other natural resources as we extract them.

In addition to the traditional game and non-game species that were the focus of the 1978 Symposium, we must now recognize that mining and the reclamation of abandoned mines have

the potential to affect many of the species that are now protected under the ESA. These species include a large number of endangered and threatened fish and freshwater mussels as well as the currently listed bats and those that are of Federal concern and may be listed in the future.

Soon after the ESA was passed, the Service learned that abandoned mines provided important roosting habitat for a few populations of the endangered Indiana bat. Two abandoned hard rock mines, the Blackball Mine in Illinois and Pilot Knob Mine in Missouri, were designated as Indiana bat Critical Habitat. Since then, this severely declining species has been found to depend upon abandoned mines in Ohio, New York, New Jersey, Pennsylvania, West Virginia, Virginia, Kentucky, and Tennessee. Not only has the number of mines known to support the species increased, the types of mines it uses is now known to include abandoned coal mines as well as hard rock mines.

Research in both eastern and western States has revealed that most of the six Federally listed bats and most of the bats of Federal concern are dependent, to some extent, upon abandoned mines as maternity and hibernation sites. An example of the significance of mines to some of our Federal concern bats was the discovery of the largest known hibernation and maternity colonies of the Southeastern big-eared bat (*Corynorhinus rafinesquii*) in a series of abandoned mines in the Great Smoky Mountains National Park.

We learned of the potential of abandoned coal mines to support hibernating Indiana bats in the early 1980's. One of the first systematic efforts to determine the potential impacts of abandoned underground coal mine reclamation on bats was made by our Cookeville, Tennessee, Field Office. They conducted a bat inventory of many of the old mines within the Big South Fork National River and Recreation Area. This inventory was used to assist the agencies establishing the Recreation Area in addressing the numerous abandoned mines found on the site. Since that time we have, primarily through Section 7 of the ESA, worked with Federal land management agencies, the Natural Resource Conservation Service, OSM, and the State abandoned mined land reclamation programs to insure that reclamation activities address the Federally listed bats that could potentially depend upon these mines.

The potential effects of mining and mined land reclamation on underground bat roosts are clearly understood. However, there are additional mine related impacts that are more subtle, but can have equally significant impacts. Acid mine drainage, spoil area soils that are poor in plant nutrients or are contaminated with toxic chemicals and the loss of trees used as day roosts can adversely affect bats by contaminating their food and water supplies and altering or removing their foraging and roosting habitat. If projects are properly planned and conducted, these adverse impacts can be avoided, at least when viewed in the long term. Proper planning for the protection and restoration of natural resources must be incorporated into the site management and restoration plans or significant long-term losses can result.

### **Trends**

The Service believes that in the future abandoned mines can play an increasingly significant role in bat conservation in the U.S. As natural roosts are lost to development or have such high levels

of human disturbance that they are no longer suitable for bat use, mines may provide essential alternative roosts for these vulnerable species. Pressure to abate the hazards associated with abandoned underground mines will increase as the human population continues to expand and to move into areas containing abandoned mines. We must all work together to eliminate the dangers inherent to abandoned mines while maintaining those sites that are significant bat roosts. The adverse impacts associated with new mining and re-mining of old underground mines will increase with time. Therefore, as mining continues, we must also ensure that these bats continue to exist. This will best be accomplished through the minimization of adverse impacts and by supplying necessary foraging and roosting habitat for the recovery of bats. As the public becomes more involved in bat conservation and mining issues, we will all be challenged to insure that the extraction of essential mineral resources is undertaken in a manner that does not affect the long-term survival of bats and other natural resources.

### **Constraints**

Our abilities to successfully meet the challenges posed by bats in mines is only constrained by the limited amount of money available and the hazardous nature of many of the underground mines. These hazards make inventory and protection activities more difficult than when dealing with natural roosts such as caves.

### **Needs**

We have identified two major needs for continued successful interactions dealing with listed bats and mining activities.

The first need is the continued education of the mining industry. All involved in the mining and mine reclamation industry must gain and maintain a better understanding and appreciation for the fragile natural resources that can be affected by their activities. We need to consider the protection, conservation, and recovery of both listed and Federal concern bats in future mining and mine reclamation activities. This includes providing the habitat that is needed to meet the long-term bat foraging and roosting needs in our reclamation efforts. In many cases, we may need to reestablish a forest cover rather than just the grass, forb, and shrub habitats that have been used in the past. This may be more difficult, but may be more beneficial in meeting the long-term needs of the many forest dependent bats.

Our second need is for increased education of the public. In 1993, Bat Conservation International, the Bureau of Land Management, and the Service, working with other Federal agencies, began a National effort to increase public and private sector awareness of the importance of abandoned mines to bats. In that year, we began our participation in a series of workshops addressing this issue. These workshops have been held on a regular basis throughout the U.S. and will continue as long as they are needed. The Service provided funding, through a grant to BCI, for the development of the informative booklet *Bats and Mines*. This booklet, in conjunction with the Bats and Mines Workshops, has been an effective tool in increasing awareness and appreciation of the importance of abandoned mines to bats. This Forum provides an opportunity for us to share information on this topic with a larger audience.

## Summary

We recognize that if we are to safe-guard the public from the hazards of abandoned mines while protecting and enhancing the natural resources that have become dependent upon them, we have to work together. In addition to working together, we must all be involved as early in the process as possible and utilize our collective resources and expertise to assure the continuation of both listed species and mining.

I thank you for the opportunity to speak to you today, and look forward to a successful forum on bats and mining issues. I believe that our continued cooperative efforts to protect this vulnerable group of species is of vital interest to all.

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David P. Flemming is a 21 year career employee of the U. S. Fish and Wildlife Service. He currently serves as one of the Ecological Service Supervisors in the Atlanta Regional Office with oversight of 8 field offices in the southeast region dealing with endangered and threatened species, wetlands, and environmental contaminants. He received his B.S. in biology from Grove City College in 1975 and his M.S. in biology from Bowling Green State University in 1977. Mr. Flemming's interest in bats and mining, begin in high school as part of a class project monitoring a surface mine and continued in course work in pursuit of his degrees and in work with the Service, primarily through recovery implementation actions for listed bats and activities associated with Section 7 consultations under the Endangered Species Act of 1973, as amended.

# **BAT-COMPATIBLE CLOSURES OF ABANDONED UNDERGROUND MINES IN NATIONAL PARK SYSTEM UNITS<sup>1</sup>**

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## **Abstract**

Because increased urban development, deforestation, and exploitation of caves have significantly impacted bat habitat, abandoned mines have become critical to the survival of numerous bat species. To date, the National Park Service (NPS) has placed 102 bat-compatible mine closures in 16 parks. Habitat surveys for bats and other species are an integral part of the abandoned mine inventory process. When surveys outside mines slated for closure reveal potential habitat, qualified wildlife biologists accompanied by experienced abandoned mine safety personnel conduct internal surveys. Several internal surveys are often useful to determine various species using a mine for different purposes through the seasons of the year. Once the determination is made that a mine slated for closure merits habitat preservation, gates are designed to suit the specific needs of resident species. Construction takes place in a season when the mine is uninhabited, or at a time and in a manner that will cause the least disturbance. The NPS recently developed an interpretive warning sign through its partnership with and Bat Conservation International that attempts to prevent vandalism of bat gates by educating the public on the potential hazards inside the mine, the value of bats in ecosystems, and the importance of bat conservation efforts. These signs are available through Bat Conservation International.

## **Introduction**

Many bat species rely on abandoned mines for habitat. The current effort to close and reclaim abandoned mine sites is therefore a potential threat to bat populations. Where abandoned underground mines slated for closure provide significant habitat, bat-compatible closures can be designed and constructed to meet closure objectives while preserving the valuable habitat these mines provide.

### **Bat Conservation as it Relates to the Mission of the National Park Service**

The mission of the National Park Service (NPS) is articulated in the Organic Act of 1916 (16 USC §1), which charges the Service to “promote and regulate the use of the Federal areas known as national parks, monuments, and reservations, ... by such means and measures as conform to the fundamental purpose of the said parks, monuments, and reservations, which purpose is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the

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<sup>1</sup> This paper will soon be posted on the National Park Service Geologic Resource Division website at <http://www.aqd.nps.gov/grd/distland/amlindex.htm#technicalreports>.

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enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.” In keeping with this charge, the National Park Service entered into a Memorandum of Understanding with Bat Conservation International in 1995. The stated purpose of the MOU is to encourage “the conservation, inventory, management planning, scientific study, and protection of bats, bat roosts, and bat habitats located on lands administered by the National Park Service....” The NPS manages its Abandoned Mineral Lands (AML) Program in accordance with these principles.

### **NPS Abandoned Mineral Lands Program**

The NPS Geologic Resources Division established an AML program in 1984 to address the adverse effects of past mineral development on NPS lands. This program includes: abandoned mine and ore processing facilities, abandoned oil and gas wells, pipelines, and processing facilities, and abandoned geothermal steam wells. The AML program is now included as part of the broader Disturbed Land Restoration Program, which encompasses restoration of all human-caused disturbances to landscapes within the National Park System.

The goals of the NPS AML program are to inventory and prioritize sites for closure, eliminate safety hazards, mitigate impacts to NPS resources, preserve and interpret historically and culturally significant sites, and to manage sites for wildlife habitat. To date, largely through the efforts of park staffs with follow-up site assessments by the Geologic Resources Division, the NPS has amassed an inventory of 3,200 mine sites with 10,000 individual mine openings, encompassing all 7 regions of the NPS and 132 park units. This inventory is currently being entered into an automated database designed to record detailed site information, track status and cost of reclamation, and to prioritize sites for closure. This database will be fully compatible with databases of other Federal and State land management agencies throughout the country.

A major aspect of the AML program is the closure of abandoned underground mine openings that present a hazard to park visitors and staff. Mine closures have most often been contracted, and in some cases, funded through the Office of Surface Mining Reclamation and Enforcement (OSM) and its various State programs. Before a mine closure can proceed, the NPS, as with any other land management agency, is required to obtain a variety of clearances to ensure that the action taken will have minimal adverse effect on the resources involved. Compliance with the statutory provisions of the Endangered Species Act and the National Environmental Policy Act must be demonstrated. This typically involves writing an Environmental Assessment, which in part, addresses the impacts of various closure alternatives on resident wildlife species identified in the mine inventory process.

The NPS realizes that abandoned underground mines have become critical to the survival of numerous bat species because a great deal of their natural habitat has been lost to urban development, deforestation, and recreational exploitation of caves. To date the NPS has placed 102 bat-compatible underground mine closures in 16 parks. Habitat surveys for bats and other species are integral to the abandoned mine inventory process. When external surveys reveal potential habitat in a mine, qualified wildlife biologists accompanied by experienced abandoned mine safety personnel conduct internal surveys. Several surveys are often necessary to determine various species using a mine for different purposes through the seasons of the year. Once the determination is made that a mine merits habitat preservation, gates are designed to suit the

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specific needs of resident species. Construction takes place in a season when the mine is uninhabited or at a time and in a manner that will cause the least disturbance. Throughout this process the NPS is in close collaboration with Bat Conservation International, U. S. Fish and Wildlife Service, State wildlife agencies, and locally-recognized bat biologists.

The Geologic Resources Division began receiving base funding for mine reclamation in 1998 with the establishment of its broader Disturbed Land Restoration Program. With this funding and ongoing commitment to visitor safety and biodiversity, the NPS continues to preserve significant bat habitat in abandoned mines throughout the National Park System.

### **Bats and Their Association with Abandoned Mines**

Abandoned underground mines often provide significant, sometimes critical wildlife habitat. The most common species of concern are bats. Obviously, closure by backfilling, plugging, or constructing a solid bulkhead eliminates a mine's potential to provide useful bat habitat. Closures such as chain link fence or steel grate bulkheads may also cause bats to abandon a site. Although some closure designs may leave adequate room for bat access, they may restrict airflow or divert water drainage in ways that change the underground environment significantly, rendering once-desirable habitat useless after the closure is installed. In a few very unfortunate instances, mines have been closed when bats were hibernating and entire colonies were entombed (Tuttle 1998).

Bats are among the world's most beneficial, yet vulnerable mammals (Kunz 1982, Altringham 1996). They play prominent roles in temperate and tropical ecosystems. Most North American bats eat insects, many which are crop pests that could cost farmers billions of dollars every year. A bat may consume thousands of insects in one night. Other bats feed on nectar from flowers, and consequently, by getting covered with pollen while feeding, these bats are the primary pollinators of many desert plants such as the columnar cacti and agave. In tropical climates, fruit-eating bats rank among nature's primary agents in dispersing seeds. Contrary to common belief, bats are no more prone to carrying diseases such as rabies than most other wild animals and they are passive toward humans. Of the 45 species of North American bats, the U. S. Fish and Wildlife Service and most State wildlife agencies consider 6 wholly or partially endangered of extinction throughout a significant portion of their range (Harvey 1999). Additionally, 20 species and subspecies are considered to be of special concern and may be proposed for listing as threatened or endangered in the future. Other bat species, particularly cave dwellers, are also believed to be in decline. The decline of bat populations throughout the U. S. is largely attributed to loss of natural habitat due to increased urban development, deforestation, and exploitation of caves.<sup>2</sup> Habitat provided by abandoned mines is therefore becoming critical to the survival of numerous bat species. For this reason consideration of bat gates should not be limited to endangered or special concern bat species.

Depending upon location, airflow, temperature, humidity, and other factors, bats may use different portions of a mine for a day roost, night roost (temporary roost other than the day roost used for rest and digestion during foraging), maternity roost (a day roost to give birth and raise young), a

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<sup>2</sup> Other human impacts include direct killing, vandalism, disturbance of hibernating and maternity colonies, use of pesticides (on their food – insects), and other chemical toxicants. Predation by other wildlife species such as owls, hawks, raccoons, skunks, and snakes is part of nature's balance and has a relatively insignificant affect on regional bat populations (Harvey 1999).

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stopover site during migration, or as a hibernaculum (a place to hibernate in winter). People entering an occupied mine could cause the bats to abandon their home, threatening bat survival particularly during hibernation and maternity seasons.

It is essential to properly assess an underground mine's utility as bat habitat prior to designing and constructing closures for its openings. Initial external surveys can be conducted from late spring to early fall by making visual observations at dusk as bats exit the mines to forage through the night. External surveys are greatly aided by the use of a bat detector: an instrument that can be as small as a transistor radio, which transforms the bats' inaudible calls in the frequency range of 20-120 kHz (Thomas 1987, Nowak 1994) into the audible range for humans.<sup>3</sup> When bats are known to inhabit a mine, special traps and nets are used in capture surveys to determine bat species, sex, reproductive status, and health. Hibernation is more difficult to detect without entering a mine, although bats often display a characteristic swarming behavior at a mine entrance in fall just prior to hibernation. Timing field research to witness pre-hibernation swarming is difficult, however.

The most complete and useful information on hibernacula and summer roosts is gathered by conducting underground surveys. Several internal surveys are useful to determine various species using a mine for different purposes through the seasons of the year. Underground surveys have become a significant part of bat researchers' duties. Underground survey safety is of particular concern, since most wildlife biologists have no underground mining experience. Although the NPS does not currently have an official policy on abandoned underground mine entry, the NPS Geologic Resources Division policy is to have a qualified abandoned mine specialist accompany all underground survey participants to ensure their safety. Since there is currently no formal NPS process to certify such an expert, this person is typically a geologist or mining engineer with extensive training and experience in abandoned mines, rock mechanics, and mine atmospheres.<sup>4</sup> The designated safety specialist instructs survey participants on potential underground hazards and ensures that they have appropriate personal safety gear. The safety specialist has instrumentation to monitor air quality, uses a scaling bar to test rock stability and remove loose rock, and has authority to abort the survey if he or she deems conditions to be too dangerous.

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<sup>3</sup> A variety of bat detectors are available, from basic models at a cost of about \$150, to larger, very sophisticated models costing thousands of dollars. The more sophisticated units produce diagnostic graphic images of an individual bat's echolocation signature, which is useful in species identification of bats in flight.

<sup>4</sup> The author has been an instructor in an abandoned mine safety courses offered by U.S. Forest Service and the Bureau of Land Management that are available to Federal employees and other organizations. These courses emphasize that caving experience is no substitute for abandoned underground mine expertise. Abandoned underground mines have many unique safety concerns that distinguish them from caves. Caves are generally formed by gradual, stable processes, and typically have better airflow than mines except where portions of the cave have collapsed or been buried. By contrast, mines are often located along fault structures that are inherently unstable. The blasting used to develop a mine further destabilizes the overlying rock. Timbers, rock bolts, and other means of roof support, originally placed to stabilize "incompetent ground," tend to deteriorate and lose their effectiveness after the mine has been abandoned. Ventilation systems used to evacuate toxic gasses are no longer operational in abandoned mines, so there is a strong likelihood of encountering oxygen-deficient or toxic atmospheres. Abandoned explosives and hazardous substances are commonly encountered. Heavy equipment, deteriorating structures, and flooded areas present numerous hazards. Underground surveys should only be conducted under the direction of a fully experienced and properly equipped abandoned mine specialist whose sole duty is the safety of the survey team. For more information consult <http://www.aqd.nps.gov/grd/distland/amindex.htm#technicalreports>.

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Most underground mines are closed by means that are not bat-friendly such as backfilling, installation of polyurethane foam plugs or other bulkheads, or blasting. This can be for a number of reasons. A mine may provide only marginal or occasional bat habitat where alternative habitat that is less dangerous is readily available nearby. Sometimes, regrettably, a mine that provides good bat habitat must be plugged or sealed for overriding safety considerations such as unstable rock or high levels of radiation. In active mining areas, old underground mine workings are sometimes reworked or incorporated into larger open pit mines and valuable habitat is sacrificed. Whatever the reason, when potential or known bat habitat in underground mines must be destroyed, bats, that may be inside should first be excluded. For mines that might have bat activity throughout the year, exclusion should be done in spring or fall with particular care to avoid maternity colonies and hibernacula, where the most harm could be done to non-volant young or hibernating bats that cannot escape (Tuttle 1998). Exclusion is accomplished by placing 1-inch chicken wire over all openings of the mine after the bats have exited for night foraging on a warm evening. Details of proper exclusion techniques and protocols are described in Brown 1997 and Tuttle 1998. It is most important to consult a bat biologist with extensive experience and equipment when a large bat colony is at risk.

### **Bat Gate Designs**

Bat gates are designed to keep people out of mines while minimizing airflow restriction and allowing bats relatively uninhibited access. Preventing human access and maintaining natural airflow minimizes disturbance of the bats' home. After the mine entrance is cleaned of loose rock and stabilized as needed, gates are fitted just inside adit portals and anchored into the surrounding rock. Vertical shafts are more difficult to close, since laying a bat gate on the ground over a shaft would create a hazard that could cause people and wildlife to fall and possibly break a leg. Research also indicates that bats prefer to fly horizontally through vertically-oriented gates, rather than flying vertically through horizontally-oriented gates.<sup>5</sup> Numerous shafts have been closed by installing an I-beam frame anchored to bedrock or in cement and covered in steel grating, with a hole cut out of the grating to receive a "bat cupola." A cupola is typically a box-like structure placed over the vertical opening. Researchers are experimenting with variations on the basic cupola design.

Bat gate designs typically call for openings between bars of 5¾ inches high by a minimum of 24 inches wide. Concern has been raised that this spacing may be too large to preclude very small children, so some gates are now being installed with 4-inch vertical bar spacing in the lower portion of the gate in compliance with local building codes for railings.

A number of different materials have been used in gate fabrication. Earlier designs called for simple webs of rebar cut and welded to fit each opening. Other designs use angle iron and the stainless steel bar such as that used in jail cell construction. Recent NPS gates use a popular gate design developed by professional engineer and conservationist Roy Powers in cooperation with the American Cave Conservation Association (Tuttle 1998, pp. 34-46). The Powers design uses L4"x4"x?" angle steel for structural members and cross member supports with two L1½"x1½"x¼"

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<sup>5</sup> Personal communication, Dr. J. Scott Altenbach.

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angle steel "stiffeners" welded inside each horizontal cross member. These stiffeners provide integrity to allow cross member spans of up to 10 feet between the uprights, making the gates much more accessible for bats and less restrictive to airflow. Additionally, the massiveness of the reinforced cross members effectively discourages vandalism, which is a major concern for any gate closure. The Utah AML Reclamation Program now uses Manganal steel bars for its bat gates. Manganal steel cannot be cut with a hack saw, and Manganal bar gates require less welding than Powers gates, thereby reducing the difficulty and cost of fabrication. Through a Memorandum of Understanding, the NPS and Utah AMLRP have recently installed 5 Manganal gates in Canyonlands National Park. New materials and designs will undoubtedly be developed through time.

Gates must often be designed with a secured means of human access into the mine. Many designs for lockable hatches have been used, but these often take up a significant portion of the gate and inhibit bat access in small openings. Most current designs incorporate one or more removable bars for this purpose. These bars are often secured with locks. Since the lock itself is often the weakest part of the closure, a great deal of thought has gone into designing "lock boxes" which prevent vandals from tampering with locks. More recently the favored technology is to secure the removable bars with special vandal-proof bolts that require a unique, custom tool for removal.

Vandalism is a problem with any closure short of total backfill. Perhaps the most formidable threat to a well-constructed bat gate is a portable cutting torch, but it is unlikely that this type of equipment would be carried to many of the remote settings where NPS gates have been installed. The primary means of thwarting properly installed NPS gates has been to mine a new passage in the rock around them, but this is a rare occurrence. This is a good reason for situating gates well inside the portal in competent rock if at all possible.

Gates are not necessarily a panacea for protection of all bat species. Two well-intended bat gate installations in Arizona recently caused colonies of Lesser long-nosed bats and Western big-eared bats to abandon their roosts, for reasons yet to be understood. Qualified bat biologists should be consulted prior to gate installation to identify all species present and to recommend appropriate gate designs. In some cases, inexpensive and easily removable test gates constructed of plastic or other materials are installed and closely monitored. Pending the results of these test gates, they are replaced with permanent steel gates that optimize the potential for bat acceptance. Gates can also be installed in stages, enabling bats to adjust gradually to the new structure. Timing of gate installations is very important. Construction should take place when the mine is uninhabited, or at a time and in a manner that will cause the least disturbance.

The importance of monitoring bats' acceptance of a gate after installation cannot be overemphasized. Technical papers reviewing the success of various gate designs for different bat species are invaluable to future gating efforts.<sup>6</sup> Aside from technical journals and conference presentations, Bat Conservation International, which has full-time staff dedicated solely to bats and abandoned mines, serves as an effective clearinghouse for such information and should be given a copy of all such papers. Bat Conservation International can be reached by mail at P.O. Box 162603, Austin, TX 78716, or by phone at (512) 327-9721 or through their website at

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<sup>6</sup> Post-installation monitoring is also necessary to ensure that the gates have not been vandalized.

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<http://www.batcon.org>. Another emerging group to consult is the Coalition of North American Bat Working Groups at <http://www.batworkinggroups.org>.

### **Bat Gate Installations in the National Parks**

To date, 102 bat-compatible closures have been installed in 16 NPS units and 33 additional gates at 6 NPS units are planned for the near-future (Tables 1 and 2). The NPS AML Program has greatly benefited from partnerships with a number of different agencies. In most cases, NPS mine closure projects would not have been possible without the generous assistance gained from partners such as OSM, the National Association of Abandoned Mine Land Programs (under the direction of OSM), other State AML agencies, and Bat Conservation International.

OSM financed and contracted a major coal reclamation project from 1987 to 1992 at New River Gorge National River and, Big South Fork National River and Recreation Area, and Friendship Hill National Historic Site. Included in this million-dollar project were 25 bat gates installed in coal mines at New River and Big South Fork (Figure 1, page 14). These earlier gates were mostly constructed of L3"x3"x¼" angle steel and are much less substantial than the more recent Powers gates, but have seen minimal vandalism. One gate in New River was damaged due to roof collapse and was replaced recently with a Powers gate that has aided in stabilizing the mine entrance. The rock in most of these mines is highly unstable. For that reason and due to problems with bad air generally inherent to coal mines in general, current park policies forbid any underground access to these mines. Most of the original bat survey work in these parks was conducted using external monitoring methods.

In 1988, a bat gate was installed by the park at the Sugar Fork Copper Mine in Great Smoky Mountains National Park in collaboration with the U.S. Fish and Wildlife Service. A large, adjoining open stope was also fenced off and posted with warning signs at that time. This mine serves primarily as a hibernaculum for Rafinesque's big-eared bats. To date the fence has not been vandalized, most likely due to the foreboding nature of the open stope. The Eagle Creek (a.k.a. "Fontana") Copper Mine is the second deepest abandoned mine in the National Park System, with massive workings to a depth in excess of 3,000 feet that are now totally flooded except for the uppermost 100 feet. The mine is in highly incompetent weathered schist bedrock that could easily excavated around even the most perfectly fabricated gate. A maternity colony of several hundred Rafinesque's big-eared bats and numerous hibernating bats of the same species have been studied at this mine since 1986. To date, counts of hibernating Rafinesque's big-eared bats in Sugar Fork and Eagle Creek Mines have been documented as high as 570 and 228, respectively, making these the largest known hibernacula of this species (Currie 1986). A survey conducted in September 2000 revealed a previously unknown maternity chamber at Eagle Creek Mine that undoubtedly hosts many more bats than previously known at the site, as attested by numerous guano piles up to 2 feet in height. Participants in this survey agreed that fencing is the best closure for the Eagle Creek Mine due to its huge openings that would require gates as wide as 30 feet and as high as 20 feet, and because of the weak bedrock through which gates could easily be compromised. The current fence around 4 of the openings is 6 feet tall. Although it shows little sign of vandalism, it could stand some improvements. In the course of the recent survey, 3 additional interconnected openings were found, and others may open up through time due to subsidence. A new fence 8 feet tall encompassing all 7 openings and the subsidence area is planned for installation in 2001.

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In 1992, one adit was gated in Curecanti National Recreation Area with the contracting assistance of the Colorado Division of Mines and Geology. Bat presence had been confirmed at this site, although not thoroughly studied. The bat gate closure was selected to protect the known bat population and because it was an economical closure for the site, given its remote location.

At Chesapeake and Ohio Canal National Historic Park, 3 adits of the historic Round Top Limestone Mine were closed with bat gates in 1993 for protection of the public, cave fauna, and historic resources. Cases of vandalism, pilfering of historic artifacts, and one case where bats were shot off the mine walls were documented. All three adits were closed under the direction of Roy Powers, with the aid of park staff and local volunteers from the American Cave Conservation Association.

A popular hiking and interpretive trail near a well-used boat ramp winds through the Historic Rush Zinc Mining District at Buffalo National River. More than 50 mine openings have been inventoried along this trail and across the river where canoeists typically stop and explore. Since 1993, the park has closed 14 of these openings using 13 bat gates, with partial funding assistance from Bat Conservation International (Figure 2, page 15). Bat gating efforts at Rush will continue at a pace of 3 or 4 gates per year until all mines known to provide significant habitat have been closed with state-of-the-art bat gates.

In 1993, the Utah Division of Oil, Gas, and Mining contracted Powers bat gate closures of five adits of the historic Oyler Radium Mine in Capitol Reef National Park. These mines are situated along the park's main scenic drive about one mile from park headquarters. The previous closures of scrap steel pipe and chain link fence were frequently vandalized and ineffective at excluding park visitors. Radiation levels at the mine were monitored to ensure that park visitors would not be irradiated when standing at the gated portals. Radiation levels inside the mines are also quite low, so are thought to have minimal impact on roosting bats.<sup>7</sup>

An abandoned mine safety crew was stationed at Death Valley National Park in the 1980s to close many of the park's estimated 4,800 abandoned mine openings and to assist with closures in several other southwestern parks. Funding shortages terminated this program in 1990. This crew

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<sup>7</sup> To date there has been little study on the effects of radiation on bats. This is a potential problem in many mines and caves. Being long-lived mammal species like humans (life spans of 30 years have been documented through bat banding studies, as cited by Harvey 1999), it is reasonable to speculate that high levels of radiation would be similarly deleterious to bats. Some researchers believe that the chronic effects of radiation may be offset by the advantages gained from the habitat provided by abandoned uranium mines, for instance, in longevity and reduced infant mortality realized through otherwise favorable habitat. No somatic effects from radiation have been documented in bats. Current studies on the effects of radiation on other wildlife being conducted at Los Alamos National Laboratory, New Mexico might be helpful in understanding the effects on bats. Bat researchers are hopeful that more work will be done on this issue, and it is suggested as an excellent topic for post-graduate study. In the meantime, the NPS has a policy not to gate a site that might expose park visitors to excessive levels of radiation, rather excluding wildlife from such sites, then backfilling to reduce radiation levels to acceptable levels. For a discussion of this issue, consult a paper entitled, *Effective Management of Radiological Hazards at Abandoned Radioactive Mine and Mill Sites*, on the NPS Geologic Resources Division's website at <http://www.aqd.nps.gov/grd/distland/amindex.htm#technicalreports>.

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developed an economical 6-inch by 6-inch stainless steel cable nets closure. Time has proven cable nets to be more prone to vandalism than more expensive steel gates, but they have been very useful at numerous sites, particularly in closing large vertical openings. Since a bat cannot fly freely through these nets, they are generally not recommended on mine openings with significant bat activity. However, cable nets appear to be used by some hibernating bats since these bats do not require nightly access in and out of the mine. In an attempt to make cable nets more bat-friendly, 11 of the cable nets at Death Valley were modified by removing one or more vertical cable segments to produce 12 inch wide by 6 inch wide openings near the top of the nets. Indications are that the bats are using these mines. In addition, the Death Valley has constructed 7 more conventional bat gates of varying designs. After a conventional bat gate was installed at the Leadfield Mine in Death Valley, a maternity roost population dropped from 200 to 20. This radical reduction may have been in response to the gate, but was more likely in response to vandalism. Individuals annoyed by being excluded from the mine and aware of the bat colony threw burning sticks through the gate directly under the roost. The resulting smoke most likely caused most of the maternity colony to abandon the site.

Two bat gates have been installed at Lake Mead National Recreation Area using the assistance of staff from Death Valley staff. The gate installed at Dumont Mine in 1997 was prefabricated in the shop before transporting it to the site. When exact measurements can be taken and a gate can be transported to the site, prefabrication in the shop greatly reduces the difficulties and expense encountered with field installations, reducing on-site work to anchoring the gate into the mine opening. In 1999 and 2000, Joshua installed 3 additional gates on isolated precious metal mines. For reasons similar to those at Eagle Creek Mine in Great Smoky Mountain National Park, a large fence was erected around three shafts and a subsidence-prone area to protect a Yuma myotis bat colony at Katherine gold mine.

In 1995, the Railroad Commission of Texas financed and contracted closure of 18 abandoned mine openings in Big Bend National Park. Seventeen of the openings were located at Mariscal Mercury Mine, a National Register Historic District. Included in this project were 7 conventional bat gates, 1 corrugated steel pipe / bat gate closure in an adit portal prone to subsidence, and 2 grated shaft closures with bat cupolas (Figures 3 and 4, page 16). Most of the openings at Mariscal Mine were closed previously with aircraft cable and chain link fence, but visitors had bypassed several of these to gain entry into the mine's intricate maze spanning seven levels to a depth of 426 feet. These closures also excluded most of the bats that had been roosting in the mine. Excluded from Mariscal Mine, these bats apparently displaced a colony of federally endangered Greater long-nosed bats in nearby Emory Cave. The new gates at Mariscal should, in time, restore roosting conditions at both sites. The cooperative closure project with the Railroad Commission won the 1996 National Park Foundation's Partnership Award in the category for Protection and Visitor Services "for correcting health and safety hazards posed by abandoned mine openings as well as for preserving bat habitat and historic resources."

The Railroad Commission of Texas also financed and contracted the closure of 10 openings at the Texas-Calumet Mine in 1996 in Guadalupe Mountains National Park. Four bat-compatible closures were included in this project. Mobilization of equipment and materials for the project was accomplished by helicopter to limit impacts in this designated wilderness area.

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One of the primary experimental gating sites in the NPS is the State of Texas Mine at Coronado National Memorial in southeast Arizona. Dr. Yar Petryszyn from the Department of Ecology and Evolutionary Biology, University of Arizona, Tucson, is the principle researcher for this project. The mine currently serves as a transient roost for as many as 30,000 endangered Lesser long-nosed bats, despite installation of was 6-inch-mesh cable net closures in 1986. These bats inhabit the mine from late July through early September each year as they migrate north from Mexico following the bloom of the agave plant. As noted above, cable nets are generally not conducive to bat access. Although the current bat colony seems to have adjusted to the cable nets, researchers believe that the colony was once much larger, and there is an additional concern since these and other cable nets installed in the area have been vandalized for access by park visitors. For this reason, the park initiated a study in 1997 to find a means of closure that would be more effective at excluding people and less restrictive for bat access. Little is known about Lesser long-nosed bats' acceptance of gates, although there have been two cases reported in southern Arizona where this species rejected gates and abandoned former roost sites. Dr. Petryszyn removed the cable net over the bats' secondary access to the mine, which is used by a small percentage of the bat population, and constructed a cupola in its place in April 1997. Interchangeable side panels measuring 72 inches wide by 36 inches high were constructed of 6 different materials to see how the bats react to each. The panels were constructed from ½-inch rebar, ½-inch square tube, 1 ½-inch ID pipe, 2-inch square tubing, 2-inch angle iron, and 4-inch angle iron, all with 5 ¾-inch vertical spacing. These panels fit into the south and east sides of the cupola structure, the rest of which has stationary panels that are covered in chicken wire for the experiment to force the bats through the experimental panels. The results of bats using the experimental panels, as monitored by visual counts using a night vision camera and an infrared light source, are scheduled for publication early in 2001. Pending these results, permanent steel panels of the optimum materials will be placed in the existing cupola and the cable net at the main entrance to the mine will be replaced with a bat gate of the same optimized materials.

The Utah AML Reclamation Program helped the NPS again in 1998 by contracting and managing closure of 5 uranium mines along the popular White Rim Road in Canyonlands National Park. This time Utah used Manganal steel gates (Figure 5, page 17). Due to concerns of preserving the fragile desert environment between the White Rim Road and the mines, materials and equipment were carried by hand to the site using prison labor that was otherwise occupied in constructing native rock backfill closures in mines where bat habitat was not an issue. The reduced materials needed for Manganal gates over much heavier L4"x4"x?" angle steel gates saved greatly on time, effort, and expense, yet yielded competent closures that will withstand vandalism at these remote sites.

Joshua Tree National Park has begun an aggressive 5-year program to mitigate most of its 289 AML sites. Each year staff from the Geologic Resources Division, Bat Conservation International, and the park team up to conduct winter surveys of sites thought to have potential bat use. Closure recommendations are developed for each opening depending upon bat use, logistics, and safety considerations. Summer follow-up surveys are being considered for sites where further study may be needed. To date, one bat gate has been installed at Sullivan Mine (Figure 6, page 18), where supplies and equipment were mobilized to the site by a mule pack team borrowed from Sequoia and Kings Canyon National Parks. Other sites may require helicopter support, which may be arranged

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in cooperation with the nearby Twenty-Nine Palms Marine Base. As a result of the cooperative survey program, 17 additional bat gate closures are planned at Joshua Tree in the near future.

Fort Bowie National Historic Site and Bureau of Land Management's (BLM) Safford District entered into a cooperative project on their common boundary to close a number of openings at Quillin Mine, located along the historic Butterfield Overland Trail. Four of these openings, all actually on BLM land, are known to host significant bat populations, most notably Mine BOT #1, situated 100 feet from the park boundary. The primary roosting chamber is a stope measuring approximately 15 feet wide by 30 feet long by 15 feet high, situated midway between adit and shaft entrances to the mine. The original survey of the mine was conducted in April 1996, at which time 20 Western big-eared bats were found emerging from hibernation, but guano approximately 6 feet deep attested to the heavy summer use (Burghardt, 1996). Subsequent summer surveys confirmed a maternity colony of 4,000 Cave bats and several hundred Fringed bats (Altenbach 1996). A bat gate was constructed on the adit in stages during 1998 as the bats' acceptance was tested, then an innovative cupola design was constructed in early 2000 over the shaft. The colony has been receptive of the closures.

Another experimental closure project was initiated in 2000 at the Wildhorse gold mine in the Tucson Mountains at Saguaro National Park. As many as 8,000 bachelor Cave bats have been documented at this naturally, geothermally heated site. Due to the importance of this roost site and some uncertainty of how the bats would react to a bat gate, a mock gate designed to mimic the Powers gate design was constructed of fiberglass fence posts. A system of wooden wedges and strapping tape was used to construct the gate rather than using glues that would produce toxic fumes. Initially the bats took longer to emerge from the mine once the gate was placed, but they soon seemed to accept the gate and the outflight returned to normal. The park will replace the test gate with a permanent steel gate in 2001.

### **Bat Gate Interpretive Sign**

The National Park Service and Bat Conservation International have jointly developed a bat gate interpretive sign (Figure 7) which is placed behind each gate to explain the gate's design and purpose. The sign informs the public of the potential hazards at abandoned mine sites, the beneficial aspects of bats, and the importance of preserving bat habitat. Hopefully this information will minimize the temptation to vandalize the gate. The bat gate signs are designed so that the NPS logo can be replaced with that of any other agency. Signs are available through Bat Conservation International.

### **Conclusion**

The National Park Service has expended considerable effort to protect the public and preserve significant bat habitat by installing bat-compatible closures on abandoned underground mine openings. Preliminary results indicate that these closures have been effective at protecting humans and bats, alike. In the broader AML community, the future success of bat-compatible closures will hinge on funding, the quality of pre- and post-gate monitoring, and on agencies' ability to network information learned from individual bat gating projects.

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specialized expertise in abandoned mine safety and closures and bats and preservation of their habitat in abandoned mines. He serves as the NPS representative for the Colorado Advisory Board of the Western States Bat Working Group. He holds a B.S. in geology from Colorado State University and has supplemented his education with post-graduate courses in engineering.

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Figure 1. Bat gate installed at Kaymoor coal mine, New River Gorge, West Virginia. (1988)

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Figure 2. Bat gate installed at Monte Cristo zinc mine, Buffalo National River, Arkansas. (1993)

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Figures 3 and 4. Culvert-mounted bat gate installed to preserve unstable mine entrance, and bat cupola installed on shaft, Mariscal mercury mine, Big Bend National Park, Texas. (1995)





Figure 5. Manganal steel bar bat gate installed at Shafer uranium mine, Canyonlands National Park, Utah. (1998) Several perfectly-preserved wooden dynamite boxes dated 1953 were found in the mine, and left within view of the gated entrance as part of the park's effort to interpret the mining history of the park.

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Figure 6. Inspecting bat gate at Sullivan gold mine, Joshua Tree National Park, California. (1999)  
(middle bar removed for access)

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## PROTECTED HABITAT

**T**his gate was installed for your safety and for the protection of important bat habitat. Your cooperation is greatly appreciated in helping to preserve this environment by not attempting to bypass or vandalize this gate. If you manage to get inside, you could place yourself in great danger from oxygen-deficient air, toxic gases, unstable rock, and vertical drop-offs, and you might harm the bats within by disturbing their habitat.

Bats play vital roles in ecosystems worldwide. Most North American bats eat insects, many of which are crop pests that cost farmers billions of dollars every year. A single bat may consume thousands of insects in one night. Other bats feed on flower nectar and are primary pollinators of desert plants such as the saguaro cactus and the agave. In tropical climates, fruit-eating bats are primary agents in dispersing seeds and thus maintaining forest ecosystems. Contrary to common belief, bats are passive toward humans and are no more prone to carrying diseases such as rabies than most other wild animals. However, any bat or other wild animal that can easily be caught is more likely than others to be sick, and should never be handled.

Because bat habitat is threatened by increased urban development, deforestation, and exploitation of caves, abandoned mines have become critical to the survival of numerous bat species. Depending upon specific factors such as location, airflow, and temperature, bats may use portions of a cave or mine to hibernate in winter, to give birth and raise young, or to stop over during migration or nightly foraging. People entering this mine could cause the bats to abandon their home and could threaten their survival—particularly during hibernation and maternity seasons.

Bats are among the world's most beneficial, yet vulnerable, mammals.  
Please help us to protect them.



For more information on bats and their protection, contact:

*Bat Conservation International, Inc.*  
P.O. Box 162603 Austin, TX 78716  
(512) 327-9721



Figure 7. Bat gate sign.

**TABLE 1: BAT-COMPATIBLE CLOSURES OF ABANDONED MINES IN NATIONAL PARK SYSTEM UNITS  
CLOSURES PLACED TO DATE (November 2000)**

PARK	STATE	MINE	COMMODITY	DATES	#	BAT SPECIES PROTECTED	STATUS
New River Gorge	WV	Kaymoor Brooklyn Bench others	Coal	1987- 1998	18	Eastern pipistrelle bat ( <i>Pipistrellus subflavus</i> ) Little brown bat ( <i>Myotis lucifugus</i> ) Big brown bat ( <i>Eptesicus fuscus</i> ) Indiana bat ( <i>Myotis sodalis</i> )* Virginia big-eared bat ( <i>Corynorhinus townsendii virginianus</i> )* Northern long-eared bat ( <i>Myotis septentrionalis</i> )*	- - - Endangered Endangered -
Great Smoky Mountains *	NC	Sugar Fork Eagle Creek	Copper	1988	6	Rafinesque's (Eastern) big-eared bat ( <i>Corynorhinus rafinesquii</i> )	Special Concern
Big South Fork	KY	Blue Heron Others	Coal	1988- 1992	7	Eastern pipistrelle bat ( <i>Pipistrellus subflavus</i> ) Little brown bat ( <i>Myotis lucifugus</i> ) Big brown bat ( <i>Eptesicus fuscus</i> ) Indiana bat ( <i>Myotis sodalis</i> )* Virginia big-eared bat ( <i>Corynorhinus townsendii virginianus</i> )* Northern long-eared bat ( <i>Myotis septentrionalis</i> )*	- - - Endangered Endangered -
Curecanti	CO	Gateview	Precious metals	1992	1	(not determined)	-
Capitol Reef	UT	Oyler	Radium	1993	5	Western big-eared bat ( <i>Corynorhinus townsendii pallescens</i> ) Western pipistrelle ( <i>Pipistrellus hesperus</i> )	Special Concern -
C & O Canal	MD	Round Top	Limestone	1994	3	Eastern pipistrelle bat ( <i>Pipistrellus subflavus</i> ) Little brown bat ( <i>Myotis lucifugus</i> ) Big brown bat ( <i>Eptesicus fuscus</i> ) Indiana bat ( <i>Myotis sodalis</i> )* Eastern small-footed bat ( <i>Myotis leibii</i> )* Northern long-eared bat ( <i>Myotis septentrionalis</i> )*	- - - Endangered Special Concern -

† (Harvey 1999)

\* Species known to inhabit the area and suspected of using mines, but not confirmed. Some species suspected due to guano found in underground surveys when bats were not present.

\* Includes one bat gate in an adit that connects to a large open stope that has been fenced and signed at Sugar Fork Mine. At Eagle Creek Mine a large fence encloses an area with 4 massive incline openings in very unstable and incompetent rock. Conventional bat gates are not practical in the fenced openings at Great Smoky due to the size of the openings, and because it would take little effort to excavate around gates at Eagle Creek mine in the weathered schist bedrock. A new fence enclosing the original 4 openings and 3 additional openings is planned.

**TABLE 1(cont'd.): BAT-COMPATIBLE CLOSURES OF ABANDONED MINES IN NATIONAL PARK SYSTEM UNITS  
CLOSURES PLACED TO DATE (November 2000)**

PARK	STATE	MINE	COMMODITY	DATES	#	BAT SPECIES PROTECTED	STATUS
Buffalo National River	AR	Monte Cristo White Eagle McIntosh	Zinc	1993- 2000	13	Gray bat ( <i>Myotis grisescens</i> )	Endangered
						Eastern pipistrelle bat ( <i>Pipistrellus subflavus</i> )	-
						Big brown bat ( <i>Eptesicus fuscus</i> )	-
						Ozark big-eared bat ( <i>Corynorhinus townsendii ingens</i> )	Endangered
						Indiana bat ( <i>Myotis sodalis</i> )*	Endangered
Lake Mead	CA	Reid Dupont	Precious metals	1994	1	California leaf-nosed bat ( <i>Macrotus californicus</i> )	Special Concern
				1997	1	Yuma myotis bat ( <i>Myotis yumanensis</i> )	Special Concern
		Katherine ★		2000	3	Yuma myotis bat ( <i>Myotis yumanensis</i> )	Special Concern
		Eldorado Jeep Trail Dupont ES		1999	1	California leaf-nosed bat ( <i>Macrotus californicus</i> )	Special Concern
					1	California leaf-nosed bat ( <i>Macrotus californicus</i> ) Yuma myotis bat ( <i>Myotis yumanensis</i> )	Special Concern Special Concern
		Golden Gate Golden Mile		2000	1	Western big-eared bat ( <i>Corynorhinus townsendii pallescens</i> )	Special Concern
Big Bend	TX	Mariscal Rio Grande Village	Mercury	1995	10	Western big-eared bat ( <i>Corynorhinus townsendii pallescens</i> )	Special Concern
						Big brown bat ( <i>Eptesicus fuscus</i> )	-
						Cave bat ( <i>Myotis velifer</i> )	Special Concern
						Greater long-nosed bat ( <i>Leptonycteris nivalis</i> )*	Endangered
Death Valley ‡	CA	misc.	Talc, lead, precious metals	1987- 1995	18	Western big-eared bat ( <i>Corynorhinus townsendii pallescens</i> ) Miscellaneous myotis species*	Special Concern -
Coronado	AZ	State of Texas	Precious metals	1997	1	Lesser long-nosed bat ( <i>Leptonycteris curasoae</i> )	Endangered
Guadalupe Mountains	TX	Texas-Calumet	Copper	1996	4	Western big-eared bat ( <i>Corynorhinus townsendii pallescens</i> )	Special Concern
						Cave bat ( <i>Myotis velifer</i> )	Special Concern
						Western small-footed bat ( <i>Myotis ciliolabrum</i> )*	Special Concern
						Big brown bat ( <i>Eptesicus fuscus</i> )*	-

† (Harvey 1999)

\* Species known to inhabit the area and suspected of using mines, but not confirmed. Some species suspected due to guano found in underground surveys when bats were not present.

★ A large fence encloses 3 openings and an unstable subsidence-prone area at this site.

‡ Includes 11 cable nets modified in 1987 with 6"h x 12"w openings to accommodate Western big-eared bat hibernacula.

**TABLE 1 (cont'd.): BAT-COMPATIBLE CLOSURES OF ABANDONED MINES IN NATIONAL PARK SYSTEM UNITS  
CLOSURES PLACED TO DATE (November 2000)**

PARK	STATE	MINE	COMMODITY	DATES	#	BAT SPECIES PROTECTED	STATUS
Canyonlands	UT	Shafer, Lathrop, Musselman, Airport Tower	Uranium	1998	5	Western big-eared bat ( <i>Corynorhinus townsendii pallescens</i> )	Special Concern
						Big brown bat ( <i>Eptesicus fuscus</i> )*	-
						Western pipistrelle bat ( <i>Pipistrellus hesperus</i> )*	-
						miscellaneous myotis species*	-
Joshua Tree	CA	Sullivan	Precious metals	1999	1	California leaf-nosed bat ( <i>Macrotus californicus</i> )	Special Concern
						Western big-eared bat ( <i>Corynorhinus townsendii pallescens</i> )	Special Concern
						Big brown bat ( <i>Eptesicus fuscus</i> )	-
						miscellaneous myotis species*	-
Fort Bowie / BLM Safford District *	AZ	Quillin	Precious metals	1998	1	Western big-eared bat ( <i>Corynorhinus townsendii pallescens</i> )	Special Concern
				2000	1	Cave bat ( <i>Myotis velifer</i> )	Special Concern
						Fringed bat ( <i>Myotis thysanodes</i> )	Special Concern
Wrangell St-Elias	AK	Bremner	Precious metals	1999	1	Little brown bat ( <i>Myotis lucifugus</i> )	-
<b>TOTAL</b>	<b>16</b>	<b>12</b>			<b>102</b>	<b>18 Species</b>	

† (Harvey 1999)

\* Species known to inhabit the area and suspected of using mines, but not confirmed. Some species suspected due to guano found in underground surveys when bats were not present.

\* This was a cooperative project between the NPS and BLM. Quillin Mine straddles the BLM/NPS boundary. The bat gate and cupola are actually on BLM land 100 yards from the NPS boundary. Since these closures were financed by the BLM they are not counted in the totals column for NPS bat-compatible closures.

**TABLE 2: BAT-COMPATIBLE CLOSURES OF ABANDONED MINES IN NATIONAL PARK SYSTEM UNITS  
CURRENT PROJECTS (November 2000)**

PARK	STATE	MINE	COMMODITY	#	BAT SPECIES PROTECTED	STATUS
Buffalo National River	AR	Capps	Zinc	3	Gray bat ( <i>Myotis grisescens</i> )	Endangered
					Indiana bat ( <i>Myotis sodalis</i> )*	Endangered
Great Smoky Mountains ★	NC	Eagle Creek Sugar Fork	Copper	4	Rafinesque's (Eastern) big-eared bat ( <i>Corynorhinus rafinesquii</i> )	Special Concern
Joshua Tree	CA	Hexahedron Johnny Lang Sunrise #7 Eagle Cliff Golden Bell Standard Load Desert Queen	Precious metals Base metals	1	California leaf-nosed bat ( <i>Macrotus californicus</i> )	Special Concern
				1	Western big-eared bat ( <i>Corynorhinus townsendii pallescens</i> )	Special Concern
				1	Big brown bat ( <i>Eptesicus fuscus</i> )	-
				3	miscellaneous myotis species*	-
				5		
				5		
				1		
Saguaro ☐	AZ	Wildhorse	Precious metals	1	Cave bat ( <i>Myotis velifer</i> )	Special Concern
Lake Mead	AZ	Joker Copper Mountain Katherine's Landing	Precious metals	1	California leaf-nosed bat ( <i>Macrotus californicus</i> )	Special Concern
				3	Yuma myotis bat ( <i>Myotis yumanensis</i> )	Special Concern
				2	Western big-eared bat ( <i>Corynorhinus townsendii pallescens</i> )	Special Concern
Organ Pipe [	CA	Copper Mountain	Copper	2	Lesser long-nosed bat ( <i>Leptonycteris curasoae</i> )	Endangered
					California leaf-nosed bat ( <i>Macrotus californicus</i> )	Special Concern
TOTAL	6	4		33	9 <sup>†</sup> species	

† (Harvey 1999)

\* Species known to inhabit the area and suspected of using mines, but not confirmed. Some species suspected due to guano found in underground surveys when bats were not present.

★ The existing gate at Sugar Fork Mine has been corroded by acid rock drainage and will be replaced by a gate designed to divert the drainage. A better fence that will enclose 3 additional openings will replace the existing fence around 4 openings at the Eagle Creek Mine.

☐ An experimental plastic gate has already installed to test the bats' acceptance. A long-term steel gate will be installed pending results of the experimental gate.

[ This mine receives minimal human disturbance. Gates will not be installed until results from the Coronado experimental gate for Lesser long-nosed bats are determined.

# **SEX, LIES, AND VIDEOTAPE: MY VIEW OF THE EVOLUTION OF FEDERAL POLICY AND PRACTICE TO CONSERVE BATS ON LANDS MANAGED BY THE FOREST SERVICE**

Laurie Fenwood  
U.S. Forest Service  
Vallejo, California

## **Abstract**

Focusing only where we can best comply with our goals for maintaining species viability through habitat protection and restoration is not always enough. We must take opportunities and develop partnerships that make use of unconventional locations and methods to meet bat conservation goals. Additionally, we must use all agency authorities and programs to meet these and other conservation goals including conservation education, outreach to private landowners, and international assistance. A key challenge will be coordination of all these efforts to evaluate their success and maintain accountability for publicly funded programs.

## **Introduction**

The Forest Service is the habitat manager on about 192 million acres of public land across the U.S. and is very concerned about habitat management. The Forest Service has been in the conservation business for about the last 100 years. Our first approach in the forest planning process in the early to mid 80s was don't violate the Endangered Species Act and do good things for fish and wildlife. The start up involved thinking about leaving a few trees for fish and wildlife and as a seed source and thinking about leaving a buffer around streams.

The Forest Service has had to learn that conservation is more than just saving rare species. We are also looking at keeping common species common and trying to prevent a species from becoming so rare that it must be listed under the Endangered Species Act. Abandoned mine lands have been viewed as a problem that needed to be solved and now we are starting to look at them as a resource.

## **Sex**

The Forest Service is concerned about the viability of bat species on public land including factors influencing reproduction, food, and shelter. The Forest Service has had to become a complete manager of the habitat of species that live on Forest Service land.

## **Lies**

Historically bats have been given a bad reputation. The focus of conservation and species protection has been elsewhere. Most of the conservation efforts have been on species listed under the Endangered Species Act. The Forest Service has had to learn that conservation is more

than constraints on other programs, planning, and saving rare species.

### **Videotape**

On the positive side, people do care now about the natural environment . We also have a number of bat evangelists that have been very effective at getting the word out about protecting bats and their habitats. Litigation has also helped the Forest Service focus on doing what they are supposed to do. Committed agency personnel also help to maintain a focus on important but common non game species. The Forest Service has also developed a partnership with Bat Conservation International that has helped to provide education and training about bat conservation.

### **Challenges**

The Forest Service has committed to the concept of ecosystem management, however I feel that we are still going to have to focus on individual species management in order to be effective. We are going to have a crisis in the next 10 years because of the loss of Forest Service personnel. Meetings with the Forest Service are starting to look like God's waiting room. This is not good because that wealth of experience will leave when the people leave. This will also effect our partnerships and the Forest Service will have to develop more partnerships with associated organizations in the future. The new Forest plan will focus us on a larger scale assessment. It will have a much better collaboration with the science and the public. The new roadless policy will also change the focus to conservation for several million acres of public land. The new focus and funding on fire fighting will require additional staff time and effort.

### **Opportunities**

The Forest Service must look to appropriate partnerships with State and private forest owners and State and Federal agencies. It must place a high priority on education of its own staff and the people and agencies we work with. Part of that education must emphasize that conservation is good business due to the revenues resulting from tourism and land uses dependent upon a healthy environment. The Forest Service must explore new partnerships with organizations like Bat Conservation International that can assist in this education process.

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Laurie Fenwood is the Director of Ecosystem Conservation for the Pacific Southwest Region of the USDA Forest Service. The regional office provides technical support to the national forests in California as well as program direction, oversight, budget formulation, policy interpretation, and accountability. She has served as Threatened, Endangered, and Sensitive Species Program Manager and Assistant Director for Wildlife and Terrestrial Ecology where she developed a successful partnership with Bat Conservation International. She holds a a Master of Science in Wildlife Management and a Bachelor of Science in Biology.

# **THE ROLE OF THE BUREAU OF LAND MANAGEMENT IN BAT CONSERVATION**

Fred Stabler  
Bureau of Land Management  
Washington D.C.  
and  
Michael Herder  
Bureau of Land Management  
St. George, Utah

## **Abstract**

The Bureau of Land Management (BLM) and Bat Conservation International (BCI) have been in a productive bat conservation partnership since 1993. In 1994, BLM and BCI entered into a cooperative agreement to fund the first position ever to completely devoted to the issue of protecting bat habitat in mines. The associated "Bats and Mines Project" has been extremely productive resulting in millions of bats being saved and the program has become international in scope. The Bats and Mines coordinator position is now completely funded by BCI supporters. As part of this project, BLM cooperatively funded the publication "Bats and Mines" which is currently in its second printing. This year the BLM assisted in the printing of the first edition in Spanish. For the last two years, BLM and BCI have developed educational materials on bats in Western U.S. forests. BLM has also been active in supporting the development of the new, tri-national North American Bat Management Partnership between Canada, the U.S. and Mexico. BLM and BCI invite financial participation in a proposed new Federal position to coordinate land-managing agency activities with BCI and the bat conservation community.

## **Introduction**

The Bureau of Land Management (BLM) manages 264 million acres of Federal lands, primarily in the Western U.S. The BLM has a multiple use mandate in managing public lands that was set forth in the Federal Land Policy and Management Act (FLPMA). As an agency, BLM strives to provide for a wide spectrum of uses, opportunities, and activities on public lands.

Mineral production from BLM lands is important for the nation and the economy. There are many thousands of abandoned mines on BLM public lands. Abandoned underground mine workings pose serious threats to human safety. In recent years, there has been substantial pressure to close these mines, primarily to mitigate public health and safety concerns, but also to restore and rehabilitate sites to a more natural and healthy condition. In an effort to protect the public from the hazards of abandoned mines, public land managers have implemented large-scale closure efforts, often at significant expense. Unfortunately, many mines on BLM had already been closed prior to agency recognition of their importance as habitat for bats and other wildlife species.

## **Bat Habitat on BLM Land**

The most economically feasible mine closure methods include blasting, plugging, backfilling, and other permanent solutions. Recent studies have shown that numerous wildlife species use these artificially created habitats including bats, mice, woodrats, skunks, ringtail cats, mountain lions, and a variety of bird and reptile species. As much as 80 percent of the mines in the Western U.S. show some evidence of bat activity. Permanent abandoned mine closure methods have not only resulted in destruction of roosting habitat, but have also caused direct mortality of bats by entombing them within the sealed mine.

In an effort to change this, the BLM was one of the first Federal agencies to actively and voluntarily pursue the protection of bats in mines. Initial efforts began in the early 1990s with the goal of managing abandoned mines for the protection of sensitive and ecologically important species, while allowing for the safe and orderly reclamation of mines. New policy was implemented by the agency to inventory all mines for bat use prior to closure. Current BLM policy is to utilize all means possible to protect bat habitat in mines by avoiding permanent closure methods in mines occupied by bats. This policy allows for protection of human health and safety while allowing continued access to important wildlife habitat.

These efforts have not come about without problems or conflicts. The most prominent of these include: lack of funds for non-permanent closures such as gates; vandalism of facilities and protective structures for bats; conflicts between the need to determine presence of bats versus the danger of entering abandoned mines for internal surveys; lack of understanding of the need for such protective actions on the part of the public, other agencies, and BLM managers; lack of trained biologists to conduct pre-closure surveys and implement necessary protective actions; and lack of gating design technology.

Many other agencies and private groups were also involved in this effort to protect bats and their habitat in abandoned mines. BLM recognized early on that this effort would be best accomplished by partnering with these groups. In 1993, BLM entered into a productive partnership with Bat Conservation International (BCI) by signing a memorandum of understanding (MOU). This MOU commits the partners to taking a variety of proactive measures to conserve bats and their habitats on BLM administered public lands. In 1994, BLM and BCI entered into a cooperative agreement to fund the first position ever to be completely devoted to the issue of protecting bat habitat in mines. BLM provided \$50,000 per year for three years to fund a Bats and Mines Project Coordinator at BCI. The Bats and Mines Project has been extremely productive, resulting in protection of habitat for millions of bats on public lands. The project has grown and is now international in scope. The Bats and Mines coordinator position is now completely funded by BCI supporters.

As part of this project, BLM cooperatively funded the publication "Bats and Mines," currently in its second printing. This 50 page color booklet was written by BCI founder Dr. Merlin Tuttle and Bats and Mines Project Coordinator Daniel Taylor. Many of the foremost bat biologists in the U.S. contributed to the development of this book. The second edition has an updated section on gate designs representing substantial increases in our knowledge. The booklet continues to be

one of the best references available on managing mines as habitat for bats. This year the BLM assisted in the printing of the first edition in Spanish.

The BLM has also funded many projects to benefit bats on public lands. These include on-the-ground projects, such as internal and external bat surveys at abandoned mines, installation of bat-compatible gates and grates to prevent human entry, and extensive monitoring efforts to determine the effectiveness of these protective structures. Successful gating projects have been completed in most States with BLM-administered lands. The agency has also sponsored habitat studies in an effort to better understand the habitat requirements of bats and provide for their needs. Many of these studies were funded by grants from BCI and the National Fish and Wildlife Foundation (NFWF) and through cooperative cost-sharing agreements with State wildlife agencies.

BLM has been actively involved with numerous partners in developing and implementing studies to monitor bat use of mine gates and evaluate the effectiveness of the bat-compatible closures. These studies have shown that bat-compatible gates are an important tool in conservation of wildlife habitat within underground mine workings. For the most part, gates have been effective in protecting the public from the dangers of abandoned underground mine workings, though vandalism continues to be a problem. Unfortunately, many early gate designs impeded bats in flight, allowing predators to take them easily. In some areas, bats have abandoned historic roosting areas despite the addition of bat compatible gates. BLM sponsored studies are currently assessing the effects of gates on bats in underground mine workings using infrared counters and video equipment. Preliminary results from these studies are providing important insights into bat behavior and habitat use.

Recognizing a critical need for specialized training in working with bats and conducting mine pre-closure surveys, BLM, BCI and the U.S. Forest Service have co-sponsored over twenty sessions of the Bats and Abandoned Mines workshop. The curricula for this course was developed by the partnership and presented by leading bat biologists. The workshops have been taught all over the U.S. and have raised the awareness of the plight of bats among resource specialists and land managers from a wide variety of State and Federal agencies and private organizations. Other training courses have evolved from these initial workshops including cave and mine gating seminars, bat capture and handling techniques, and methods for acoustic surveys. The BLM National Training Center has recently developed an Underground Mine Safety Training that alerts resource specialists conducting inventories in abandoned mines about the dangers and hazardous conditions there. This course and a similar one taught by the U.S. Forest Service, while highly controversial, provide the only available safety training for conducting surveys in abandoned underground mine workings.

BLM and BCI are seeking to unite many bat conservation efforts by establishing a multi-agency Federal Bat Coordinator position. This position would be tasked with the responsibility to coordinate land-management agency activities with BCI and the bat conservation community. BLM invites other Federal agencies to discuss the role of this coordinator and assist in cooperatively funding the effort.

Finally, BLM has been active in supporting the development of the new, tri-national North American Bat Management Partnership between Canada, the U.S. and Mexico. This partnership is now fully functional and participation is invited and encouraged from all interested parties. As a part of this effort, a network of four Regional and numerous State Bat Working Groups have developed to focus bat conservation efforts where they are most needed. BLM biologists were heavily involved in the inception of this effort and continue to work toward development of State Bat Conservation Plans.

The idea that bats and their habitats are in desperate need of protection, range-wide in some cases, is far from a universally-held concept among land managers. The majority of work that has gone forward in protecting bat habitats on public lands has been accomplished by individual wildlife biologists with a vision for the conservation of these ecologically important species. These individuals have sought out partnerships and funding to make projects happen. Only through partnerships that focus efforts to educate and inform the public about bats, through projects, training, and workshops can we make real progress in protecting bats and their habitats.

# **INTERNATIONAL ASSOCIATION OF FISH AND WILDLIFE AGENCIES AND STATE CONSERVATION EFFORTS FOR BATS**

Terry Johnson  
Arizona Department of Game and Fish  
Phoenix, Arizona

## **Abstract**

The International Association of Fish and Wildlife Agencies (the Association) was founded in 1902 as a quasi-governmental organization of public agencies charged with the protection and management of North America's fish and wildlife resources. The association's governmental members include the fish and wildlife agencies of the States, Provinces, and Federal governments of the United States, Canada, and Mexico. A wide variety of sportsman, conservation, and environmental non-governmental organizations are affiliate members of the Association. The International Association is a key organization in promoting sound resource management and strengthening Federal, State, and private cooperation in protecting and managing fish and wildlife and their habitats in the public interest. The Association's twice annual meetings (March-April and September) are attended by several hundred representatives from member agencies and organizations and affiliate members. Issues are addressed through a variety of committees, many of which have working groups or task forces that meet and work throughout the year. In the 1990s, one of the primary focal points for the Association and its members has been establishing a stable funding base for State conservation efforts for non-game wildlife. In the past few years, this Teaming With Wildlife initiative has evolved into the Conservation and Reinvestment Act (CARA). CARA would provide as much as \$3 billion annually for a variety of coastal and inland programs revolving around protection and enhancement of cultural, historical, recreation, and natural resources and opportunities. Title III of the proposed CARA legislation would provide as much as \$35 million annually to State wildlife agencies for wildlife conservation, education, and recreation programs. Among the Top Ten suggested wildlife programs for the States to implement with CARA funding is the North American Bat Conservation Partnership, which has grown from Bat Conservation International's innovative bat conservation concept, "Masters of the Night Sky Universe." Meanwhile, as we await Congressional action in Fall 2000 on CARA, the States are engaged in a wide variety of bat conservation efforts. This presentation will provide an update on CARA, how its funds could be used to benefit bat conservation by the States, and a representative sampling of current State bat conservation efforts in the North American Bat Conservation Partnership.

## **Funding Issues**

One of the issues the Association has been involved with over the last several years has been to develop additional funding for non game species called Teaming with Wildlife. This initiative began in 1977 and became law in 1980 and was called the national non game Act. It has received since its enactment \$0 in funding from Congress. The Teaming with Wildlife initiative has evolved into the Conservation and Reinvestment Act which is little more than the Teaming

with Wildlife Act revisited. CARA has actually made its way into the Congressional budget process and over the next year the U.S. Fish and Wildlife Service will be spending as much as \$50 million to invest in non-game species. In order to insure that this money is not spent on charismatic megafauna, you need to be communicating the need to protect bats to you local fish and wildlife agency. There is another \$50 million in funding available for bat protection through the U.S. Fish and Wildlife Service through the expansion of the Endangered Species Act under Section 6. Most of this money will be going into habitat conservation planning efforts and the conservation of native species for listed species.

One of the problems of funding for wildlife is there is no funding for common species because the Endangered Species Act drives our funding priorities. An analogy would be that most people are willing to spend the money to buy a new car. These same people, however, are very unwilling to spend the money to maintain that car. The same problem exists within the Fish and Wildlife agencies, people who make the budget decisions rarely are willing to spend money unless they have to because of pressures due to litigation or an important constituency. People who care about non game species like bats are not very experienced in how to work this process and as a result little money is spent on bats.

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