

## APPENDIX 1: RECORDED DISCUSSIONS

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The following are the edited discussions that took place at the end of each speaker presentation and at the end of each topic session. The actual comments have been edited to translate the verbal discussion into a format that more effectively and efficiently communicates the information exchange into a written format. The organization of the discussion follows the same progression as that which took place at the forum. A topical outline has been developed to aid in accessing the information brought out in the discussions.

The topic of each question is shown in alphabetical order in **bold**. The individual speaker questions are listed in outline format under the appropriate topic session and presentation title. Questions during the twenty minute interactive discussion are listed at the end of the session in the following format:

### SESSION # AND TOPIC AREA

1. Presentation Title  
\$ **Subject of Question or Comment**

### SESSION # INTERACTIVE DISCUSSION

#### **Subject of Question or Comment**

## OUTLINE OF DISCUSSION TOPICS

### SESSION 1: WHY DO WE PROTECT MINES AND CAVES?

1. Importance of Protecting Caves
2. Importance of Protecting Mines  
\$ **Importance of Mines to Bats in Eastern U.S.**  
\$ **Injuries in Mines**  
\$ **Other Biological Resources in Mines**
3. History of Protection Efforts
4. Legal Issues Associated with Bat Gate Construction  
\$ **Electronic Surveillance**  
\$ **Looting of Archeologic Resources**
5. Management and Protection Issues on Private Land
6. Consequences of Not Protecting the Resource  
\$ **Accidents and Education**

### SESSION 1 INTERACTIVE DISCUSSION

#### **Cave Ownership**

**Federal Cave Resources Protection Act**  
**Mines as Unnatural Habitat**  
**Need for New Federal Mine Protection Law**  
**Other Biological Resources in Mines**  
**Protection of Cultural/Historical Resources**  
**Rate of Mine Closure**  
**State Laws for Protection of Caves**  
**Tools for Electronic Surveillance**

## SESSION 2: PROJECT PLANNING

1. Performing a Needs Assessment
2. Developing a Project Strategy
  - \$ **Bat Response to Gating**
  - \$ **Depth of Mine Shafts**
  - \$ **Mine Use by Big Horn Sheep**
3. Bio-assessment - Determining the Suitability of Mines and Caves for Bats
  - \$ **Cost of thermal and infra red cameras**
4. Developing a Cave or Mine Management Plan
5. National Environmental Policy Act (NEPA) Compliance
  - \$ **Categorical Exclusions**
  - \$ **Categorical Exclusion Documentation**
  - \$ **Environmental Assessments for Ongoing Projects**
6. Funding a Bat Gate Project
7. Cave Gating Partnerships: Success through Careful Planning and Coordination
8. Training Opportunities for Cave and Mine Gaters

## SESSION 2 INTERACTIVE DISCUSSION

**Habitat Value of Underground Resource**  
**Importance of Developing Relationships that will Protect Habitat**  
**Importance of Hands on Workshops**  
**Importance of Monitoring for the Biological Assessment**  
**Revegetation around Gated Closures**  
**Seasonal Windows for Work without Monitoring**  
**Species Specific Tolerance of Bat Gates**  
**Temporary Closures**

## SESSION 3: CLOSURE DESIGN: PART 1

1. Overview of Closure Strategies
2. Bat Roost Protection: Closure Design using Soft Closures
  - \$ **Fake Surveillance Equipment**
  - \$ **Radiation Hazard Signs**

**\$ Real Security Systems**

3. Cable Nets for Bat Habitat Preservation
  - \$ Barn Own Response to Cable Nets**
  - \$ Commercial Availability of Cable Nets**
  - \$ Corrosion of Cable Nets**
  - \$ Maternity Colony Avoidance of Cable Nets**
  - \$ Welding Cable Nets**
4. Solid and Invertebrate Door Gate Option
  - \$ Paint Effectiveness**
  - \$ Tourist Gate 800 Feet into Cave**
4. Culvert Closure Design and Construction
  - \$ Benefit of Bat Gate Inside a Culvert**
  - \$ Merit of Using a Cupola at the end of a Culvert**
6. Flyover Barriers as a Method for Cave Bat Protection
  - \$ Alternative to Chain Link Fence**
  - \$ Rope Access at Cave Entrance**

**SESSION 3 INTERACTIVE DISCUSSION**

**Air Flow Data**

**Concrete versus Steel Culverts**

**Life Expectancy of Culverts**

**Manganal Steel Comparison**

**Windows in Cable Nets**

**SESSION 4: CLOSURE DESIGN: PART 2**

1. Ladder Gate Design
2. Bat Gate Option Overview
3. Angle Iron Gate
  - \$ Benefits of Angle Iron in Time Savings**
  - \$ Removable Bar**
4. Rectangular Tube Gate
  - \$ Length of Welding Leads**
  - \$ Pin Spacing**
  - \$ Stretcher Access with Removable Bars**
  - \$ Type of Steel**
5. Round Bar Manganal Steel AJail Bar@Bat Gate
  - \$ Bat Response to Manganal Gates**
  - \$ Cost of Manganal Gates**
  - \$ Suitability of Manganal Gate for Large Openings**
6. Bat Cupola Design Considerations

7. Material Selection
  - \$ **Finish & Paint to Extend the Life of Steel**
  - \$ **Stainless Steel Recommendations**
  
8. The Problem of Bat Population and its Relation to Gate Area.
  - \$ ***Bat Behavior based on Memory***
  - \$ **Bat Mortality due to a Bat Gate**

#### SESSION 4 INTERACTIVE DISCUSSION

##### **Bar Spacing in Gate**

#### SESSION 5: CONSTRUCTION MANAGEMENT

1. Contract Management
  - \$ **Unnecessary Insurance Costs**
2. Eastern Consultant Perspective
3. Western Consultant Perspective
  - \$ **ACAA Copyrighted Bat Gate Design**
  - \$ **Cost of Dummy Video Cameras**
  - \$ **MSHA Applicability**
4. Partner and Volunteer Logistics
  - \$ **Administrative Fee**
  - \$ **Bat Gates at Mines with No Bats**
  - \$ **Determining Project Cost**
  - \$ **Estimated Cost Exceeded**
  - \$ **Types of Mines**
5. Safety Issues
  - \$ **Prying Rocks at Mine Entrance**
6. On-Site Coordination and Work
7. Personnel and Qualifications

#### SESSION 5 INTERACTIVE DISCUSSION

##### **Chicken Wire Exclusions**

##### **Large Contractor Bidding**

##### **Mines where a gate should not be installed**

##### **Transportation of Steel & Equipment**

#### SESSION 6: MONITORING AND MAINTENANCE

1. Bat Response to Gates
2. Pre- & Post-Gate Biological Monitoring
  - \$ **Bullet Camera Range**

- \$ **Counting Software Development**
- 6. Pre- & Post-Gate Microclimate Monitoring
  - \$ **Climate and Temperature Changes in Missouri Caves**
  
- 4. Closure Repair and Maintenance
  - \$ **Funding for Post Gate Monitoring**
  - \$ **High Carbon Dioxide Levels in Mines**
  - \$ **Identification of Closures in the Field**
  - \$ **Public Notification on Closure Damage**
- 5. Human Access: Policies, Management, & Monitoring
  - \$ **Applicability of the Federal Cave Resource Protection Act**
  - \$ **Limiting Visits to Hibernation Colonies**
  - \$ **Monitoring Recreational Use of Caves**
- 6. Demonstration of Gate Monitoring Database
  - \$ **Data Analysis**
  - \$ **Import and Export of Data**
  - \$ **Limiting Access to the Public**
  - \$ **Public Availability of Data**

SESSION 6 INTERACTIVE DISCUSSION  
**Conflict over Release of Locations to Public**  
**Modification of Mines to Improve Bat Habitat**  
**Power of GIS to Link Related Geographic Data**  
**Vandalism by Fire**

## DISCUSSION BY SESSION

### SESSION 1: WHY DO WE PROTECT MINES AND CAVES?

1. Importance of Protecting Caves Ronal Kerbo, National Park Service, Denver, Colorado

No Questions

2. Importance of Protecting Mines Rick Sherwin/Scott Altenbach, University of New Mexico, Albuquerque, New Mexico

*Comment: (Importance of Mines to Bats in Eastern U.S.)* In Eastern North America where we can document dramatic losses of bats from caves, loss of mines can be very important. For example, 10s of millions of bats once lived in Mammoth Cave and Wyondot Cave and migrated from as much as 500 kilometers away. Although bats only require a small number of cave, they require 100 percent of the caves that cave explorers like. This is because the big hibernating sites need a very large volume and complexity in order to meet the bat needs which also makes them interesting to people. This has resulted in the commercialization of most of the caves of any size in Eastern North America and may never again be available to bats. Currently the only option we have to protect these bats is to protect key mine resources. It is not that unusual in Eastern North America to have large populations of bats in the 10s of thousands to be threatened with being buried during mine closure. One of the best examples of a recovering Indiana Bat colony is in a mine recently protected in Illinois. It has miles of the most ideal temperature regimes for bat colonies in North America and one day may become the equivalent of Mammoth Cave in terms of housing large bat populations.

*Question: (Injuries in Mines)* Are people who explore mines being rescued, injured, killed?

*Answer:* Yes. It is surprising that it does not happen more. Every year there are deaths and injuries from mine exploration that we know of and I am sure many more that we aren't reported. Most of the people getting into the mines are trespassing or entering without permission. I have been in situations where it was extremely difficult for me to gain access to a mine and I was completely equipped with all of the appropriate climbing and safety gear and find an empty six pack of beer and other evidence of inappropriate use.

*Question: (Other Biological Resources in Mines)* We have heard about biological resources other than bats in caves. Are there other biological resources besides bats in mines?

*Answer:* Virtually anything that you will find in caves you will find in mines. The problem is the time scale. You will get turkey vultures, bobcats, big horn sheep, desert tortoises, and mountain lions. Currently, the only inventories being done on mines are for bats. You should be designing the gates, however, for the types of wildlife that are using the mine. We haven't developed a good gate for big horn sheep.

3. History of Protection Efforts Robert Currie, U.S. DOI Fish & Wildlife Service, Asheville, North Carolina

No questions

4. Legal Issues Associated with Bat Gate Construction Jim Nieland, U.S. Forest Service, Amboy, Washington and Len Meier, Office of Surface Mining, Alton, Illinois

*Question: (Electronic Surveillance)* We are investigating electronic surveillance as a way to decrease looting. We had to have a three day stake out by agents of a cave where looting went on prior to catching the looters. Have other had experience with different types of surveillance?

*Answer:* I use a passive low tech way to detect human activity at a site. I place a new dollar bill in a area that pack rats are not likely to bother (pack rats may be attracted to salt in used dollar bills). If it is still there on my next trip I assume no human activity.

*Answer:* Video cameras with motion sensors have been used to video tape intruders so that you have actual evidence and because alarms may require such lengthy response times that the intruder is gone by the time agents arrive on the scene.

*Comment: (Looting of Archeologic Resources)* We build a lot of bat gates in Missouri and have a problem with archeologic looting in the larger cave entrances. We find a significant connection between the archeologic looting and disturbance of bats. Because of recent cave gates that were installed to prohibit looting there has been increased use of these caves by gray bats.

5. Management and Protection Issues on Private Land Heather Garland, The Nature Conservancy-Tennessee, Nashville, Tennessee

No questions

6. Consequences of Not Protecting the Resource Mark Mesch, Utah Division of Oil, Gas, and Mining, Salt Lake City, Utah

*Question: (Accidents and Education)* In the case of the boy on the ATV who fell down the shaft, do you think having a fence around the shaft would have prevented the accident?

*Answer:* I think that for the accidental injury where someone does not see a mine opening and accidentally drive into it that fences can prevent that type of injury. If, however, someone is interested in looking at the mine feature they will attempt to get as close to the mine opening as they can and they will crawl under a fence or climb over it to get close to the mine opening. I can not stress enough the positive role that education plays in being able to prevent accidental injuries associated with mine openings. This education may involve etiquette in caves, safety around abandoned mines, or the value of the wildlife that inhabit caves and mines. The State of Utah sends out a work booklet on an annual basis to every fourth grade child in the State that talks about the cultural and biological values of mines and caves and the importance of safety issues related to them.

#### SESSION 1 INTERACTIVE DISCUSSION

*Comment: (Cave Ownership)* Concerning cave ownership, we need better information on management when there are multiple entrances, effects to water quality from agriculture, and multiple ownership of different cave components. A State may own an entrance yet not own the watershed or all of the cave passages or other openings and yet they are permitting people to enter a cave they don't have complete control.

*Question: (Federal Cave Resources Protection Act)* If an abandoned mine intersects a cave and the cave does not open to the surface, does that cave warrant protection under the national cave act.

*Answer:* The Federal Cave Resources Protection Act exempts AVUGS from consideration. The question then is the definition of a AVUG. VUG is a Cornish word meaning a cave or cavern. If it is an active mine it would not be protected. The same applies to drilling an oil or gas well. So the answer is no it is not protected especially if it is on Federal lands. This act only applies to lands owned by the Department of Agriculture and the Department of Interior. The act is concerned with making sure that mining is not inhibited by interference with underground voids or caves.

*Question:* Is there any size limit to AVUGs?

*Answer:* There is no size limit. It could be 50 miles long and it is still a AVUG.

*Comment: (Mines as Unnatural Habitat)* As a public lands manager, I would find it difficult to promote the protection of bat habitat in mines because they are not natural bat habitat.

*Comment:* I think the statement that mines are an unnatural habitat is not a valid statement. If an animal uses a habitat it is habitat. Habitat may be man made but it is not unnatural any more than a reservoir is unnatural habitat for birds, fish, and other wildlife. The idea that a man made habitat is unnatural and we should make the animals go back to where they came from is not valid because we need to protect the wildlife species and the resources they use for habitat.



*Question: (Need for New Federal Mine Protection Law)* Is there a need for Federal laws that protect abandoned mines like we have laws for the protection of caves?

*Comment:* Concerning the need for additional Federal mine laws, even though Fish and Wildlife handles habitat issues, and State SHPOs for cultural resources, ultimately in all of the coal mining States the Office of Surface Mining has oversight. It is my opinion that if big law suits are ever filled in this area they will be brought against OSM because they are the funding source for mine closures.

*Answer:* Many of the State programs are using Federal Coal dollars to protect abandoned mines and as such must go through the National Environmental Protection Act process that requires a lot of background information including biological and archeological evidence. Because most of the mine dwelling bat species in Utah are not Federally protected, there is no legal requirement at either the State or Federal level that requires us to protect the bats in the process of closing mines for public safety.

*Comment: (Other Biological Resources in Mines)* In eastern Nevada in the winter, thousands of rosy finches roost in abandoned mines particularly in shafts. People need to be careful about closures of these shafts as you may destroy the entire population from adjacent mountain areas. I know of cases where we have lost thousands of these birds in mine expansion projects.

*Comment: (Protection of Cultural/Historical Resources)* You might be able to protect the mines from a cultural perspective of the historic value of the mine with the added benefit of protecting the bats while you protect the historic value it would make a much more defensible position. The historic values could include examples of different mining methods, the people or mining companies involved, different mining eras, different regional or mineralogical values. This may make them eligible for listing on the National Historic Registry.

*Answer:* There is an important disconnect between the historical value of surface features and underground features. I have surveyed over 7,000 individual abandoned mines prior to closure and I have never been asked about historical or cultural resources underground. Two weeks ago I was at the 1,000 foot level of an abandoned mine and all of the carbide lamps were still hanging there including personal items and equipment. I can't touch this stuff or bring it out because it is protected but no one wants to house it and now the mine is closed and the resources gone. Once I took a carbide lamp to the historical preservation office and they sent their archeologist with me back to the mine to replace it and close the mine. They did not want to deal with the issue.

*Comment:* Concerning underground cultural resources, I have heard the Office of Historic Preservation say that leaving artifacts underground or even intentionally burying them is actually preserving them in place and are not lost.

*Comment:* One problem you have is that as soon as you close a mine the humidity rises and you start to lose things through decay. In addition, without even a brief documentation or inventory of these resources prior to closure, the chances of anyone ever coming back to recover and interpret the artifacts when the mine is only one of hundreds of thousands of abandoned mines makes that possibility

from remote to impossible. It is my recommendation that who every is surveying the biological resources make some sort of record of any cultural or historical evidence that they find. I make it a point to video tape every mine I survey. At least with this record anyone who might want to come back would know which mine they wanted to reopen and investigate.

*Question: (Rate of Mine Closure)* Concerning the rate of mine closures, how can we take more time and do a better job?

*Answer:* If the underground survey is being conducted because of a possible mine expansion, then time is money. If there is not a legal constraint like the presence of an endangered species they the economics will dictate that the closure take place quickly.

*Answer:* Concerning the Abandoned Mine Program, it is important to place these closures in perspective with the amount of abandoned mines that need to be closed in order to protect the public. In Utah there are 20,000 mines, in Nevada 200,000, Arizona 100,000, Colorado 25,000, New Mexico 70,000. There are hundreds of thousands of these mines. In Utah we have been working night and day for 20 years trying to close these mines and have only closed about 25 percent of them. The reason it takes so long is that there is a lot more involved than filling holes with dirt. The amount of time and work it takes to conduct investigations, evaluate the evidence, and design a mine closure. The actual construction takes place very quickly by comparison. There are years of time spent prior to construction evaluating a closure. At our current rate of closure in Utah of 5,000 closures in 20 years, we won't finish mine closures for a long time. If you look at States that don't have funded mine closure programs like Idaho, California, Nevada, and Arizona they are not able to do even a fraction of the closures that are possible in the coal mining States.

*Comment: (State Laws for Protection of Caves)* In Virginia, we have had two incidents where an oil or gas well drilled through a heavily trafficked cave and it was cased and abandoned. We were able to enforce the Virginia Cave law and make them go back and open up the cave and reseal the holes. Many of the States have State Cave protection laws.

*Comment: (Tools for Electronic Surveillance)* People interested in available electronic surveillance tools can go to the Department of Defense and go through the DRMO who have a lot of electronic sensors developed for war time surveillance. They can be obtained fairly cheaply. Some of them with battery packs have a range of 20 miles. If you can build a tower, they can be reach to your office and be down loaded into your computer. You can inspect this type of surveillance all along our border with Mexico operated by the border patrol.

## SESSION 2: PROJECT PLANNING

1. Performing a Needs Assessment Rick Olson, National Park Service, Mammoth Cave, Kentucky

No Questions

2. Developing a Project Strategy Susanna Henry, Kofa National Wildlife Refuge, Yuma, Arizona

*Comment: (Bat Response to Gating)* Just three weeks ago we surveyed the 3C mine at the Refuge and recorded an out-flight of 3,100 leaf nosed bats. By installing the bat gate, the numbers of bats using the mine have steadily increased.

*Question: (Depth of Mine Shafts)* How deep are these mines?

*Answer:* In 1996, we investigated 16 shaft mines on the Refuge and several reached depths of several hundred to a thousand feet deep. The depth depends entirely upon the type of ore being mined and the economics of recovery. The mining was very active around the turn of the century.

*Question: (Mine Use by Big Horn Sheep)* Concerning Big Horn Sheep, how far into the mine do we need to install the gate?

*Answer:* I would look for the sheep beds and for other evidence such as droppings on how far back the sheep are going. You may not be able to include all of the area they are using as I have found evidence of sheep up to 400 feet inside the mine in what appears to be total darkness. You also have to consider many other factors but an effort should be made to accommodate the sheep.

3. Bio-assessment - Determining the Suitability of Mines and Caves for Bats Dr. Patricia Brown, University of California at Los Angeles, Bishop, California

*Question: (Cost of thermal and infra red cameras)* How expensive are the thermal imaging and infra red cameras?

*Answer:* I do know that Rick Sherwin just purchased a thermal image camera for \$40,000. The cheap thermal imaging cameras start around \$12,000 (these allow you to record and do subjective differentiation on color) and they go up to \$100,000 and more. Cameras starting at around \$35,000 are necessary if you are going to do any analysis of temperatures after the event. We pay around \$600 for an infra red camera with an additional \$50 to \$100 for a light source.

4. Developing a Cave or Mine Management Plan Amy Fesnock, Pinnacles National Monument, National Park Service, Paicines, California

No Questions

5. National Environmental Policy Act (NEPA) Compliance Fred Sherfy, Office of Surface Mining, Harrisburg, Pennsylvania

*Question: (Categorical Exclusions)* On my forest there is a district that is going to close 25 mine sites and the ranger wants to do a Categorical Exclusion from NEPA. What do you think?

*Answer:* You need to document that decision. The standard answer is, if your agency has a process for

a Categorical Exclusion that would extend to those 25 sites, then the agency has already made the decision and published that this would not have significant impacts to the environment. I know that in the Department of Interior we could not do that. The Department of Interior does not allow categorical exclusions when a project would have a high degree of public controversy. I don't know what the situation is in the Forest Service.

*Comment:* I have closed mines at BLM using Categorical Exclusions because the two Exclusions used by BLM include threats to human safety and wildlife roosts. I always check with the area miners and if there is no interest in the mine opening then I determine that there is a low degree of public interest. I think that a Categorical Exclusion is very appropriate for our situation in the BLM.

*Comment:* We have done almost 100 closures on our forests with Categorical Exclusions.

*Question: (Categorical Exclusion Documentation)* Do you have a documentation process in the Forest Service to arrive at a categorical exclusion?

*Answer:* We have been very inconsistent. Some districts have not documented anything and others have a fairly formal process and in some cases we have done Environmental Assessments.

*Question: (Environmental Assessments for Ongoing Projects)* Concerning Environmental Assessments where an agency has an ongoing activity like OSM's EIS 11 that is now 20 years old, does that ever get re-authorized or amended?

*Answer:* Yes it does, but it is a matter of priorities. After 20 years, the EA on abandoned mine lands project is working so well that OSM is not really inclined to devote the resources just to do another programmatic EIS. But I am not saying it would not have value.

6. Funding a Bat Gate Project Joseph Kath, Illinois DNR, Division of Natural Heritage, Springfield, Illinois

No Questions

7. Cave Gating Partnerships: Success through Careful Planning and Coordination Steve Walker, Bat Conservation International, Austin, Texas

No Questions

8. Training Opportunities for Cave and Mine Gaters Jim Kennedy, Bat Conservation International, Austin, Texas

No Questions

SESSION 2 INTERACTIVE DISCUSSION

*Comment: (Habitat Value of Underground Resource)* Let me point out that the mine Joe Kath talked about in Illinois, where he has a very rapidly growing population of Indiana Bats, had almost no bats when the project began. You need to be able to recognize what makes good bat habitat. I know of caves that we have protected that had no bats at the beginning of the project and now have 300,000 bats. Many times we are spending funds on protecting underground resources without knowing the potential for use of those resources by bats.

*Comment: (Importance of Developing Relationships that will Protect Habitat)* I am working on a gating project for a species of bat at BLM where we can not protect the mother lode of the species that is on private land but we are doing what we can on adjacent BLM land. Success is not always measured in increased numbers of bats that use a site, but sometimes it is measured in improved working relationships and partnerships that ultimately result in improved bat protection projects and efforts.

*Comment: (Importance of Hands on Workshops)* Concerning workshops on bat gate installation, I think that gating manuals are good, but these hands on workshops are like the laboratory portion of the class. I participated in one in the Great Smokies National Park and it was outstanding. These hands on workshops need to be part of the training for people involved in installation of bat gates.

*Comment:* At the last workshop, one of the participants commented that the most important thing he learned at the workshop was that he did not want to attempt it on his own which is what he was preparing for prior to the workshop.

*Comment:* Concerning the usefulness of gating workshops, a new gate was recently installed at Hubbard's Cave in Tennessee where it took about a week to install a very large bat gate that was similar in size to a gate that had been installed in the early 1980's in about 6 weeks. Roy Powers attributed most of the shorter construction time to the fact that most of the volunteers had been to these gating workshops and had experience working on gate installation on the second installation while very few were experienced on the first installation.

*Question: (Importance of Monitoring for the Biological Assessment)* Is it possible to do a biological assessment without doing monitoring?

*Answer:* It is certainly the most desirable thing to do monitoring so that you will have real information to base your decision on. Although expediency dictates that we do not always have the opportunity to do monitoring it should be our goal to do monitoring in order to have good information guiding our closure decision making process.

*Question:* If the object of our biological assessment is to come to a determination of no significant impact on sensitive species and we are going to install a bat friendly closure, can't we conclude no significant impact without doing monitoring.

*Answer:* If you don't know what species of bat uses the mine, when and how the bats are using the

mine, and the size of the colony, it would be hard to determine how the bats are going to respond to a specific closure.

*Comment:* Since we are not able to always monitor prior to doing a biological assessment, sometimes our biological assessment is just wrong. If we don't do monitoring we will just keep perpetuating our mistakes. We need to keep trying to do as much monitoring as possible.

*Comment:* In my program, I need to compete for funds with other projects. In order to remain competitive, I have to show that my projects are getting results. In order to show results, I need to monitor to show that the installation of bat gates actually results in increased use by bats.

*Comment:* A lot of us who are doing biological assessments for bat friendly closures do not have a primary job assignment of benefitting wildlife. Our primary job is to clear an area for timber sales or mining projects. I think that the greatest good you can do with the funds and time that are available is what you should do.

*Comment:* Concerning monitoring from the perspective of the National Park Service, we are certainly not doing our jobs if we don't monitor for bat activity. I remember a gate at a lava tube with ice in it that was gated because of the sacred nature of the cave to the HOPI tribe and putting ceremonial objects in them that they didn't want stolen. I recommended that they monitor it prior to installation of the gate for at least a year in order to assure that we would not impact the accumulation of ice in the cave. The monitoring was just as important for the protection of cultural features as it is for bats. You need to do it right the first time.

*Question: (Revegetation around Gated Closures)* Does anyone know about the desirability of reestablishing vegetation in arid areas around mine openings that have been reworked and closure devices installed?

*Answer:* In New Mexico we have revegetated around mine openings both with seeded species and with cuttings of Ocotillo.

*Comment:* You need to be careful with what you plant around these openings. I believe that Ocotillo is pretty spiny when it grows up. My experience in Texas is that we have had large spiny plants grown up around cave entrances that eventually became major bat mortality problems when they hit flying bats when the wind would blow and actually cause the abandonment of the site.

*Comment:* In the Mojave desert, we have had the best result with revegetation when we make a moon scape by roughing up the surface as much as possible around the old mine opening. We even bring in some large rocks to add shade to some of the area. We also try to create as many traps for rainfall as possible. With only one or two rainfall events per year we need to collect water. We have also found that in desert areas we need to find seeds from plants that are growing near that site with the same type of microclimate. If you are seeding a south facing slope you need to collect seed from a south facing slope and the same elevation and soil type. The only way we have been able to establish Creosote

plants is to collect seed from the site and take them to the local Junior College Nursery and have them grow small seedlings that we can drill and replant. In our area, it may take 20 years for the vegetation to fully develop like a natural area.

*Question: (Seasonal Windows for Work without Monitoring)* When we don't have the resources for monitoring, and we need to close a mine due to vandalism, is there any guidelines for what time of year we should do our work when we don't know if the bats are using the mine for maternity site or hibernation, or just roosting?

*Answer:* Although you need to know the elevation and latitude of the mine to give you an idea of when a mine is being used, usually there is a window of time in the spring before the maternity season really gets going and a window in the fall. Although some times we find that there is use at some of these sites in the fall for swarming. In general, the bigger and more complex the mine site is in terms of numbers of openings and openings at different elevations the more likely the mine will be useful for bat and for more seasons of the year. If you go to an upper mine entrance on a cold winter day and there is steam coming out of it there has to be another intake entrance. This would also apply if you are at a lower entrance and can detect that there is cold air flowing into it there is a good chance that the mine has another entrance. In the heat of the summer this process should reverse. If you are looking for bats in such a site, they will be closest to the entrance with the warm area during the summer and near the entrance where cold air is coming in during the winter.

*Comment: (Species Specific Tolerance of Bat Gates)* At the Bat Conservation and Mining Forum, there was a short paper with a table that summarizes what we know about which species will tolerate gates and which species will not. There are still a lot of species where we do not know how they will respond.

*Question: (Temporary Closures)* Concerning the use of temporary closure structures, please explain when and why you should do a temporary closure prior to installation of a permanent closure?

*Answer:* When we installed a temporary plastic gate at the 3C mine, we were concerned because of the large number of California Leaf Nosed bats. We were willing to tear it down right away if it had any negative effect on use by the bats the very first night it was installed. We found that on the first night the bats took 90 minutes to exit the gate where it had only take an hour before we installed the plastic gate. In that case, we knew that the bat species would tolerate the gate but we didn't know what the effect would be on a colony of such a large size.

*Comment:* Concerning temporary gates, in a recent bat gate installation where we were concerned about acceptance of the gate by the bats, Scott Altenbach added gate bars over a period of time rather than all at once to allow the bats time to adjust to the gradually smaller spaces available to fly through.

### SESSION 3: CLOSURE DESIGN: PART 1

1. Overview of Closure Strategies Robert Currie, U.S. DOI Fish & Wildlife Service, Ashville,

North Carolina

No Questions

2. Bat Roost Protection: Closure Design using Soft Closures Debbie and Bob Buecher, National Speleological Society, Tucson, Arizona

*Question: (Fake Surveillance Equipment)* Where did you obtain your fake video camera to discourage vandalism?

*Answer:* It was installed by the Fort so they may have obtained it from the Border Patrol. Because of the availability of this type of equipment and the use of cell phones, it may soon be possible to actually have working video monitoring that is affordable. The problem would still be that at remote sites you do not have the many hours it would take just to get to the site in order to catch a vandal.

*Comment:* In Texas, we found that just by leaving some pocket change at the entrance to a cave or mine we can tell if someone has been there.

*Comment:* These systems may be useful when there is a history of vandalism, but I think that signs and alarm systems may actually bring more unwelcome attention to those sites that are not already well known.

*Question: (Radiation Hazard Signs)* Has anyone used radiation signs or biohazard signs as a means to discourage unauthorized use or vandalism?

*Answer:* We have recently discussed this in Illinois and our attorneys have instructed us that we can not legally put up any signs that purposely do not tell the truth.

*Comment:* I know of a place where the radiation sign approach is currently in use. I do not know what the affect of the sign has been because the site did not get much use or attention before the sign. Our biggest concern so far has been that the bats of concern at this site have been flying into the signs.

*Comment: (Real Security Systems)* Concerning real security systems, the price has really been coming down. If you are in an area that has cell phone access, primarily the Eastern U.S., you can get a turn key, off the shelf, remote solar powered system for \$2,000 to \$3,000. If you are in area that has a security system available you can use cell side band system that is even cheaper. Within the next 5 years there should be a lot of technology that be developed so that we will be able to put real alarm systems into more sites where you are close enough to respond.

3. Cable Nets for Bat Habitat Preservation John Kretzmann, New Mexico Abandoned Mine Land Bureau, Sante Fe, New Mexico

*Question: (Barn Own Response to Cable Nets)* Does anyone have information on the response of



Barn Owls to cable nets?

*Answer:* In New Mexico, our research suggests that Barn Owls need at least a 10 inch diameter opening which would be larger than the cable net closures we are using for bats. In most of our mines, we usually have a conventional bat gate opening in addition to the opening that is cable netted. Also the populations of bats in these mines are small (in the neighborhood of a few dozen).

*Comment:* We have found dead Barn Owls, dead tortoises, and dead bob cats under cable netting. Which is another good reason for monitoring prior to installing netting.

*Question: (Commercial Availability of Cable Nets)* Are the cable nets you use custom made or are they commercially available?

*Answer:* There are at least two companies in the U.S. that I have used in the Southwest.

*Comment:* In Colorado, we have contractors that custom make the cable nets on site. This reduces the cost by half to two thirds.

*Comment:* Some of our earlier nets were built on site by contractors but I found that where the cables crossed and where the connectors were placed that unless they were done with a hydraulic ram it was possible to spread the net and make an opening large enough for a person to crawl through. Because of this I have specified that be pressed together hydraulically.

*Question: (Corrosion of Cable Nets)* Do you get any galvanic corrosion at the junctures where the stainless steel and galvanized steel come into contact?

*Answer:* No.

*Comment: (Maternity Colony Avoidance of Cable Nets)* In my experience, I have never seen a maternity colony use a cable net. They are used for hibernation sites and have been widely used in National Parks. The cable nets have excluded maternity colony where they have been used. If cable nets are to be considered, then multiple surveys should be conducted during the warm season before any single entrance site is closed with a cable net.

*Comment:* The site I showed at the large adit opening, Dr. Scott Altenbach said he would be comfortable with placing cable net over the opening for a Townsends Big Eared Bat maternity colony. The entrance was such a large opening he felt that the bats would be able to handle a cable net because of the size of the opening. I was not completely comfortable with that and installed a bat grate as well as the cable net. We have not done any monitoring of bat response at the site.

*Comment:* I am aware of a large Leptonictorus colony of 20,000+ that has had a cable net for some time. It is a post maternity season fall roost and are flying in and out nightly.

*Question: (Welding Cable Nets)* Have you considered welding your bat gates in the cable netting rather than bolting?

*Answer:* I have hesitant to weld to a cable because I think it would be too destructive to the cable itself.

4. Solid and Invertebrate Door Gate Option Mike Warton, Mike Warton & Associates, Cedar Park, Texas.

*Question: (Paint Effectiveness)* Concerning the paint you apply to your gates, how effect has your paint been over time?

*Answer:* We try to design our gates to be low maintenance. We use a rustoleum paint that works well on steel for about 3 years before it begins to show sign of wear. We recommend that our gates be painted regularly, that hinges and locks be lubricated for optimum operation.

*Question: (Tourist Gate 800 Feet into Cave)* Concerning the gate that you installed 800 feet inside the cave, why was it installed that far into the cave?

*Answer:* The Gorman Cave is about 3,500 feet long. When it became a Texas State Park, they were interested in taking people on tours in the cave. I was hired to determine how far back people could venture in the cave with encountering a hazard or becoming a hazard to the bats. We determined that people could safely travel 810 feet into the cave. At this point, the cave was about 16 feet in diameter. We were able to drill a hole down 110 feet from the surface at this point and used this hole to lower in all the steel and equipment we needed to install the bat gate.

5. Culvert Closure Design and Construction Jim Langdon, Idaho Panhandle National Forest, Couer d=Alene, Idaho

*Question: (Benefit of Bat Gate Inside a Culvert)* Are there any benefits to putting the bat gate inside the culvert rather than the entrance to the culvert?

*Answer:* I prefer to put the gate inside the culvert. It is less expensive. In fact the major benefit of installing a culvert as an access into a cave or mine is because it is relatively inexpensive.

*Comment:* I realize that when you have portal creep and unstable portals that culverts may be the only option for installing a bat gate. I would really like to see some pre- and post-gate monitoring to see how the bats are responding to the culverts. I had one bad experience where the bat colony deserted the mine after the culvert was installed. I worry about the reflection of sound by the culvert and how that would effect the ability of the bat to maneuver through the culvert. It would seem that applying a coating of sound absorbing material to the inside surface of the culvert could increase bat use.

*Question: (Merit of Using a Cupola at the end of a Culvert)* Wouldn't it be more bat friendly to bring the culvert out to a cupola rather than install a bat gate within the culvert?

*Answer:* That could be but it would be much more expensive. Most of the situations where I install culverts is in mines that not stable and expected to collapse in from 2 to 15 years.

6. Flyover Barriers as a Method for Cave Bat Protection Blake Sasse, Arkansas Game & Fish, Little Rock, Arkansas

*Comment: (Alternative to Chain Link Fence)* On possible alternative to chain link fence that is more vandal proof is 3/4 inch sharp edged expanded metal which does not reduce air flow and is very difficult to cut or climb.

*Question: (Rope Access at Cave Entrance)* At Bone Cave, would people be able to gain access by just lowering a rope down at the entrance?

*Answer:* That is a consideration, when you are using a fence at an entrance. Someone could gain access with a rope at the top of the cave. In this case, the entire cave is just the entrance so there is not really a big attraction for someone who has the technical climbing skills.

#### SESSION 3 INTERACTIVE DISCUSSION

*Question: (Air Flow Data)* Is there any real data that shows the comparative effects of different types of construction material on air flow (i.e. square bars, angle iron, round bars, etc.).

*Answer:* There is no data that I am aware of. In most situations, we have very slow air flow. To make it easier on the bats we tend to place the gate in an area of the entrance where air flow is least restricted. This reduces the air flow velocity even further. In this type of situation, the type of material you are using really does not effect air flow. So all of this time we have been spending on talk about air flow really may be a red herring.

*Comment:* The one place we may be affecting air flow is with the vertical columns. They present a wide flat surface. This is a problem at the larger entrances. Minimum to no vertical columns seems to be the best alternative.

*Comment:* Anyone thinking about building a bat gate should be contacting BCI and making sure that they have the latest design improvements for construction of gates.

*Question: (Concrete versus Steel Culverts)* How would concrete culverts compare to steel culverts?

*Answer:* Concrete is at least twice the cost of steel and would not work at a remote site unless you have access to an excavator.

*Comment:* In California, we have been using 6 foot diameter concrete sewer pipe because it is easy to work inside in areas where portal was weak or the rock in the mine entrance was weak and we could

not anchor a bat gate effectively. This way we can seal the pipe/portal interface with polyurethane foam and then backfill around it. We place the bat gate either inside the sewer pipe or at the end of the pipe. We have found this to be very cost effective. I am more comfortable with this long term than I would be with steel pipe.

*Comment:* In Colorado we have use a use a high density polyethelene pipe in combination with a precast concrete bulkhead in corrosive environments.

*Question: (Life Expectancy of Culverts)* What would the costs and life expectancies be for 4 to 5 foot diameter culverts?

*Answer:* A typical cost for a 54 inch culvert will be \$3,000 that is installed with an excavator. If a culvert is not sitting in water the life expectance would be 40 to 50 years. If it is in water you have to be very careful about any cuts that would violate the zinc coating. I have used a zinc paint to improve longevity. You could also use a polymer coated pipe that is more expensive but adds significant corrosion resistance.

*Question: (Manganal Steel Comparison)* What is the composition of Manganal Steel, how can it be welded and cut, and what are the relative costs?

*Answer:* It is about 12-14 percent Manganese plus iron. It can be cut with a conventional torch. You must use Manganal welding rod when it is welded.

*Comment:* Stainless steel is about 2.5 - 3 times greater than mild steel. Material cost is about 15 - 30 percent of the total cost of the job. If using stainless steel means you avoid having to rebuild the gate due to vandalism just once you have more than offset the cost of the stainless. I know of one job where the use of stainless steel made the cost of the bat gate double what it would have been with mild steel. Stainless also presents a problem in that it is not easily cut so many of the pieces have to be prefabricated.

*Comment:* The steel yard will charge you between \$4.50 to \$6 for mild steel for 4 by 4 by 3/8 angle per foot. Stainless will cost between \$19 and \$28 per foot.

*Comment:* There is now a product on the market called modified steel with more carbon content that increases the difficulty of cutting with a hack saw by about 3 times. We are getting modified steel for the same price as mild steel.

*Question: (Windows in Cable Nets)* How do you determine how many bat windows to use in a cable net without compromising the strength of the cable net and how well do the bats use them?

*Answer:* If you need to deal with a large number of bats using cable nets, there are some options that I have not used but that I believe are technically feasible. This would include suspending a bat cupola structure from strong cables or beams if the distance is not too long then placing cable netting around it.

Concerning how bats respond to cable nets, we have seen it used effectively for hibernation sites. With *Leptonicotus* and *Mycrotis* these bats are exceedingly agile and a larger colony should be able to handle it. You really have to understand which species you are dealing with and why the bats are using cave or mine. Is it a maternity colony where bats will be in and out several times per night and be vulnerable to predation? Is it a transient colony? That is why you need to do monitoring and have a good biological assessment.

#### SESSION 4: CLOSURE DESIGN: PART 2

1. Ladder Gate Design Kirk Navo, Colorado Division of Wildlife, Monte Vista, Colorado

No questions

2. Horizontal Bat Gate Option Overview Dave Dalton, Gating Consultant, Tucson, Arizona

No questions

3. Angle Iron Gate Roy Powers, American Cave Conservation Association, Duffield, Virginia

*Question: (Benefits of Angle Iron in Time Savings)* What are the benefits of angle iron in terms of time savings and cost of materials?

*Answer:* Material cost is only a fraction of the cost of constructing a bat gate. The cheapest strong material that you can buy is mild steel. It took 10,500 man hours to construct the first Hubbard Cave Gate. It took 475 man hours to complete a gate of similar size. We completed the School House Gate (also similar in size to Hubbard Cave Gate in 4.5 days).

*Comment:* Two years ago we built a angle iron gate that was 51 feet wide and 14 feet high with a small auxillary side gate that was completed in 2.5 days.

*Question: (Removable Bar)* Do these gates have removable bars?

*Answer:* Yes. My experience is that most of the vandalism with these gates has been at the door. By eliminating a door to the gate and using removeable bars you tend to eliminate the problem with vandalism. A removable bar is probably 10 times more vandal proof than a door in the gate.

4. Rectangular Tube Gate Marion Vittetoe, Gating Consultant, Tucson, Arizona

*Question: (Length of Welding Leads)* How far can you extend your welding leads if you can't actually drive to the construction site?

*Answer:* Actually we carry all our equipment to the construction site and the lead length is not an issue. With our leads we could go 300 feet.

*Question: (Pin Spacing)* How far apart where your wall pins?

*Answer:* The pins were placed at every other bar.

*Comment: (Stretcher Access with Removable Bars)* I would like to point out the advantage of putting in more than one removable bar in a gate. If you have at least two removable bars in a gate you can carry an injured person through the opening in a stokes litter.

*Question: (Type of Steel)* What type of steel do you use?

*Answer:* We only use mild steel because you can't get anything else in Tucson Arizona.

5. Round Bar Manganal Steel AJail Bar@Bat Gate Mark Mesch, Utah Division of Oil, Gas, and Mining, Salt Lake City, Utah

*Question: (Bat Response to Manganal Gates)* How are the bats responding to these types of gates?

*Answer:* We are involved in several studies for the last 3 years with Southern Utah University. So far the results are that there are no negative effects on bat use.

*Question: (Cost of Manganal Gates)* What are costs of these gates?

*Answer:* Gates that we build today run around \$75 per square foot installed including everything.

*Question: (Suitability of Manganal Gate for Large Openings)* What is the utility of round bar gates for small openings versus large openings.

*Answer:* A very large Managanal Gate was installed in White Rocks Cave and it has worked fine.

6. Bat Cupola Design Considerations John Kretzmann, New Mexico Mining and Minerals Division, Sante Fe, New Mexico

No Questions

7. Material Selection Jim Werker, National Speleological Society, Hillsboro, New Mexico

*Question: (Finish & Paint to Extend the Life of Steel)* What is your experience with the use of finishes or paint to extend the life of the steel?

*Answer:* It has been my experience that putting a finish coating on a gate is more of a problem than a help. You can get a galvanic reaction with some finishes. Paint can peel off and fall into the mine or cave and add to the contamination of the environment.

*Question: (Stainless Steel Recommendations)* What type of stainless steel would have the least problem with carbide deposits and also be the least expensive?

*Answer:* Probably type 304L. It is low in carbon and does not get carbide precipitation. Type 321 is alloyed with titanium and is more expensive but it is better. If you are going to be doing field welding this is the type you should be using.

8. The Problem of Bat Population and its Relation to Gate Area Roy Powers, Jr., American Cave Conservation Association, Duffield, Virginia

*Question: (Bat Behavior based on Memory)* Has there been any work done on bat memory and could this have any impact to your observations?

*Answer:* John McGreggor in Kentucky has done some work in this area and he feels that in some cases bats fly based on memory. He has recorded bats making flying maneuvers without making any sounds. I think that this may have contributed to what I observed but is not the total answer.

*Comment:* My observations concerning bat memory and acoustic clutter are that many bats, once they learn an area don't seem to ecolocate as much. We also find that once we add a gate or modify a gate that many of the bats will hit the gate until they gain enough experience flying through it. We even have one gate where after 10 years the California Leave Nose bats just keep hitting the gate. In another situation, a fence was placed around a shaft opening. Prior to installation of the fence the bats would just flow out of the shaft at a very low elevation. After the installation they would fly up to the 7-8 foot tall fence and just jump over the fence and then continue flying close to the ground. At this site we find that with the passage of time fewer and fewer bats are using this jumping behavior. It appears that the younger bats who have always had the fence immediately gain altitude upon leaving the shaft and don't drop down near the ground until after they fly over the fence. The older bats that were there prior to the fence installation still exhibit the jumping behavior. So it seems that the bats have definitely learned a certain flying pattern that they remember and repeat.

*Comment:* I have also noticed that bats will fly into gates and signs at the cave or mine entrance. I have not, however, observed mortality because of it.

*Question: (Bat Mortality due to a Bat Gate)* Is the situation that you are describing a situation where we should go back and take down the bat gate and maybe construct a bat cupola out side the entrance that would give the bats more room and time to react?

*Answer:* We have for a temporary solution cut out enough bars in the gate that we are no longer seeing bat mortality. I agree that removal of this gate and construction of something like a cupola outside the

entrance should be a good solution.

*Comment:* This is one of the most perfect Indiana bat hibernacula in existence. The interior temperature is just like a meat locker. It is a perfect refrigerator that once was an old iron mine. Most of it has collapsed. The current entrance could also collapse and kill or entrap 80,000 to 130,000 bats in the winter. Are we going to see a significant proportion of the Midwest Indiana Bat population killed in this mine someday when it collapses?

#### SESSION 4 INTERACTIVE DISCUSSION

*Question: (Bar Spacing in Gate)* Is there any documentation of the effects on bat usage of a gate with bars that are 5 and 1/8 inches apart versus 5 and 3/4 inches apart, and should we still be experimenting with this distance or is this pretty much standard?

*Answer:* The bats would be most happy if there was no gate at all. The distance is based on finding the maximum distance that will keep most of the people out and still allow the bats to use the entrance. The change of spacing to 5 and 3/4 inches was due to the response of Indiana bats and Gray bats to the 5 and 1/8 spacing where there was an immediate negative response by the bats.

#### SESSION 5: CONSTRUCTION MANAGEMENT

1. Contract Management Paul Krabacher, Colorado Division of Minerals & Geology, Grand Junction, Colorado

*Comment: (Unnecessary Insurance Costs)* From the contractor's perspective, you need to understand what the costs are associated with each aspect of the bid. If you specify that the contractor needs \$10 million worth of liability insurance on a bid for one to three gates and I ask my insurance man for \$10 million worth of underground mine insurance. Whenever my insurance man hears the words mine, cave, or underground the cost goes through the roof and it has a term of a minimum of 1 year. I then end up paying \$8,000 for a one year policy that I only need for 4 months. The State of Idaho has eliminated its specifications for automobile insurance and reduced the cost of their gates by 20 percent. We are not working underground. I am working around the entrance to a mine adit. Take the words Underground and Mines out of the bid and talk about safety closures.

2. Eastern Consultant Perspective Kristen Bobo, American Cave Conservation Association, Cookeville, Tennessee

No Questions



3. Western Consultant Perspective Ed Winchester, Frontier Environmental Services, Ridgecrest, California

*Comment: (ACAA Copyrighted Bat Gate Design)* The design plans for the ACAA bat gates in the Bats and Mines publication is copyrighted by ACCA and even though its use is free we ask that the date of construction and ACAA be written on the gate. These gate designs change and you need to check in with BCI or ACAA and make sure they have the most up to date gate design specifications.

*Comment: (Cost of Dummy Video Cameras)* I found that you can get dummy video cameras in Cabelas sale catalog for \$12.99.

*Comment: (MSHA Applicability)* In terms of work at an abandoned mine site like building a bat gate, that would not be considered a mining activity and would not be regulated by MSHA.

*Answer:* That is great until there is a person hurt at the site. If a contractor errs on the side of caution and complies with MSHA from the beginning you will have a much better time when you have an accident and the investigators find that you are MSHA contractor NO. 2 IL. Here is my safety record and here is my IAPP, you will immediately get a lot better cooperation when they learn that you really knew what you were doing from the beginning. Some MSHA districts will be interested in your work and others won't.

*Comment:* At the national level, it has been determined that construction of bat gates is regulated under OSHA.

4. Partner and Volunteer Logistics Mark Stacy, Indiana DNR, Division of Reclamation, Jasonville, Indiana

*Question: (Administrative Fee)* Do you pay Indiana Karst Conservancy an administrative fee?

*Answer:* Yes. We pay them a 5 percent administrative fee per project that we believe to be very reasonable.

*Question: (Bat Gates at Mines with No Bats)* Do you ever install gates at a mine merely because it has the potential to be bat habitat even if there are no bats currently using the mine?

*Answer:* Yes. One in particular was at Turkey Run State Park. It was an old mine where the park had installed a chain link fence over the mine entrance that had been in place for 20 to 30 years. The entrance to the mine was immediately adjacent to a major hiking trail where 750,000 people visit the park on an annual basis. There was a sign at the entrance indicating that it was a coal mine. The chain link fence insured that there was no bat usage but we expected that there could be because of it being immediately adjacent to a stream. We removed the chain link fence and installed a bat gate. Within 6 months, we had bat activity in the mine.

*Question: (Determining Project Cost)* How do you determine what the cost of a closure project is

that is being done by Indiana Karst Conservancy (IKC)?

*Answer:* IKC will assess the project in the field and estimate the amount of man hours necessary to do the project. We will determine the labor cost by multiplying the estimated number of man hours by the hourly minimum wage rate. IKC will then estimate the materials cost. The total of the man hours cost and the materials cost will be the total project cost.

*Question: (Estimated Cost Exceeded)* What happens if IKC goes over the estimate?

*Answer:* We pay based on the estimate. There are no additions to the project cost.

*Question: (Types of Mines)* Are most of the mines where you are installing gates coal mines?

*Answer:* Yes, they are all coal mines.

5. Safety Issues John Burghardt, National Park Service, Mining and Minerals Branch, Denver, Colorado

*Question: (Prying Rocks at Mine Entrance)* I was concerned about the practice of prying down rocks at a mine entrance with a long bar. At Mammoth Cave the prevalent opinion is that you will destabilize everything around it. Is this the case?

*Answer:* Very definitely. For instance, In some place we start barring down and we end being there all day. I find that I can use the bar to sound the rock for stability. If hit the rock with the bar and it makes a low drum sounding noise it is usually hollow behind the rock. Sometimes we find that rocks are barely hanging in place ready to fall. In this case, I will not enter the mine without taking these rocks down. But in general, I bar down as few rocks as possible in order not to disturb the stability of the entrance. When you are going to working in the mine entrance in order to install a bat gate, you will need to clean the ribs and roof. The pry bar is also good for probing in front of you in a wet mine.

6. On-Site Coordination and Work Jim Nieland, U.S. Forest Service, Amboy, Washington

No Questions

7. Personnel and Qualifications Bob Hall, Bureau of Land Management, Kingman, Arizona

No Questions

## SESSION 5 INTERACTIVE DISCUSSION

*Comment: (Chicken Wire Exclusions)* In Colorado, when we choose not do a bat compatible closure we are required to install a fence to exclude use by bats.

*Comment:* Concerning the chicken wire bat exclusion closure, you need to put the chicken wire up

after dark and you have watched the mine opening with night vision equipment and made sure that any owls or bats have had a chance to exit the mine prior to installation of the chicken wire. You should also consider making awnings or what will appear to bats returning to the entrance as a solid barrier but where there is still a gap where animals still inside can see a window to get out. We know that bats will avoid chicken wire initially because of the small size of the opening. We have found however, that if the mine is a highly desirable location for the bats, that single non maternity bats will eventually land near the wire and crawl thru the chicken wire on a daily basis and especially for hibernation. In order to prevent this, you need to do the permanent closure within a two days to a week of the chicken wire closure. This can not be done during hibernation or maternity season. Early spring or early fall is the best time for this procedure.

*Question: (Large Contractor Bidding)* In States that have a large number of mine closures, do you ever have large contractors successfully bid on this work?

*Answer:* In Colorado, we have found that the projects are so competitive that the large contractors never get the bid. We have found that there is just a handful of contractors that get most of the bids.

*Comment:* In central Oregon, we do not have a lot of volunteers that are experienced in metal fabrication. We hire local welders that bring their welding equipment to the site and provide the welding service on site. We have someone to coordinate the project with the volunteers moving the steel and the welder cutting and welding the steel.

*Comment:* The Indiana Karst Conservancy is a very unique organization, we have a lot of members with engineering backgrounds and a membership that is very dedicated to the goals of doing a good job to protect the caves and mines.

*Question: (Mines where a gate should not be installed)* Is there ever a case where you should not build a bat gate in order to enhance the welfare of bats?

*Comment:* This has come up in the West where we are dealing with Uranium mines. I don't think there has been any definitive study of genetic mutations. I think there is great deal we still do not know in this area.

*Answer:* There have been several situations where caves have been protected for bats that were mortality traps for the bats due to flooding and freezing. In some cases large numbers of bats have died as a result.

*Answer:* In some cases, the mine opening was so unstable it would have been better just to exclude the bats.

*Answer:* We have had colonies of bats that were entombed when areas in the back of mines collapsed. If you find mines that are unstable it would be a good idea to consider evicting the bats before the mine collapses.

*Question: (Transportation of Steel & Equipment)* From the contractor's perspective, how do you transport all of this equipment to the site?

*Answer:* We have reduced our equipment to a minimum, taken the back seat out of a Jeep Cherokee and fit in all in the Jeep and do not pull a trailer. We do this for convenience because we are on the road for months at a time. We require the steel to be delivered to the site.

*Answer:* We did a remote job in a wilderness area that was supported by helicopter where the contractor had each load bundled with the weights of each bundle specified for ease of transport by the helicopter.

*Answer:* In Indiana we have never had to do any jobs by helicopter but we have been amazed far and over what terrain four guys can carry a generator and keep their footing. Sometime you have to get very innovative in order to get your equipment to a site.

*Answer:* In Colorado, we have actually used pack horses and mules in some remote locations.

*Answer:* We have used ATVs with trailers at some remote locations.

*Comment:* Keep in mind the one Jeep works for a consultant but not for a contractor. In order to get the steel and material to a site it takes a lot more than one vehicle.

*Comment:* Concerning the use of helicopters for transport, I have found the cost of \$100 per sling load to be very reasonable not counting mobilization cost. If I am close to an airport where there is low mobilization cost, my cost of using a helicopter is very reasonable. This compares very reasonably in the case where you are going to have to pay labor cost for people to carry steel or equipment into a remote site.

*Comment:* In the San Juan area of Colorado, there are very few projects that we don't use helicopters for transport.

## SESSION 6: MONITORING AND MAINTENANCE

1. Bat Response to Gates J. Scott Altenbach and Richard E. Sherwin, Department of Biology, University of New Mexico, Albuquerque, New Mexico and Shauna Haymond, Holistic Wildlife Services, Rio Rancho, New Mexico

No Questions

2. Pre- & Post-Gate Biological Monitoring Mike Herder, Bureau of Land Management, St. George, Utah

*Question: (Bullet Camera Range)* How far can you see with the Bullet Cameras?

*Answer:* They come in a lot of different configurations and different resolutions. It is not necessarily the camera that limits the distance you can see but the supplemental infrared light source that you are using. Many of these cameras have a built in light source but it has been my experience that you still need a supplemental infrared light source. You need to do a lot experimenting to ensure that you will see the area that you want to have illuminated. These cameras are really effective where you are monitoring colony activity inside the cave or mine. A lot of work is necessary to ensure that you will be able to see the area of concern.

*Question: (Counting Software Development)* Can you give us more information on the counting software?

*Answer:* Such a counter would be very valuable in situations such as Bracken Cave where there are millions of bats. Dr. Tom Kuntz at Boston University has been experimenting with developing a counting software package that would track a video and count the number of bats in each frame and determine which bats are the same from one frame to the next so that you could get an accurate count from the video tape. I do not know at what stage they are in the development of this software.

### 3. Pre- & Post-Gate Microclimate Monitoring

*Comment: (Climate and Temperature Changes in Missouri Caves)* Bill Elliot and Rick Clawson published a paper in the 1999 National Cave and Karst Management Symposium titled "Temperature Data Logging in Missouri Bat Caves." This study overlaps with BCI who set up data loggers with us in three of the caves and we set up loggers in an additional five sites that are still set up today. This gives us three years of data. We have also been able to obtain good weather data from the University of Missouri. I have found that over the last 25 years the annual average temperature in Missouri has not shifted noticeably. However, I have noticed that the extreme low temperatures we are experiencing in January now are not nearly as low as they were 20 to 25 years ago. It has been our experience that it takes extremely cold temperatures in order to drive cold air into many of the caves in Missouri. Without these extremely low temperatures during winter driving cold air into the caves, we think that there will be a gradual increase in the temperature of the caves. This could be very important for bats like the Indiana bat that require these cold temperatures during hibernation.

### 4. Closure Repair and Maintenance Dave Bucknam, Colorado DNR, Minerals & Geology Division, Denver, Colorado

*Comment: (Funding for Post Gate Monitoring)* I have heard several times from the State Mining agencies that it is their job to close these mines and that they can't spend this money for any post gate monitoring. This is not true. The Office of Surface Mining has been encouraging the States to come up with a post construction monitoring plan for bat gates because it is very important that we know that the project has actually been successful. This would include beginning and ending dates, frequency of monitoring, and what will be done as a corrective action. There is only a very few States that have such a plan. It sounds like Colorado is moving in this direction.

*Question: (High Carbon Dioxide Levels in Mines)* Are the black damp mines always coal mines?

*Answer:* Although high carbon dioxide levels are usually associated with coal mines you have high carbon dioxide levels in other mines.

*Comment:* In Texas, in certain geologic areas you have bad air caves.

*Question: (Identification of Closures in the Field)* In the Western U.S., how do you identify the hundreds of caves, mines, and gates in the field?

*Answer:* In Colorado, we put a brass cap on the gate that includes the project code and feature code. If it is a back fill we have an ID pipe.

*Question: (Public Notification on Closure Damage)* Is there any way a member of the public that saw a problem with a gate could notify you so that it could be repaired?

*Answer:* No we don't but that is a good idea.

#### 5. Human Access: Policies, Management, & Monitoring

*Question: (Applicability of the Federal Cave Resource Protection Act)* Concerning the Federal Cave Resource Protection Act, does it provide any protection for caves or mines that are not on public land?

*Answer:* Not at all. It is Act is specifically addressed to Federal Lands that administered by the Departments of Interior and Agriculture.

*Comment:* Some States do have their own cave protection laws. All of the cave and bat protection laws have been posted on the National Speleological Society Website.

*Comment: (Limiting Visits to Hibernation Colonies)* Concerning monitoring and hibernation sites, we recommend that even the bat biologists do not enter bat hibernation sites in caves or mines more than once every two to three years. Even then great precautions are necessary to not disturb the bats. It would be better to get an incomplete count than to disturb the bats.

*Comment: (Monitoring Recreational Use of Caves)* Sometimes you have to close part of a cave for recreational purposes. I know that at Carlsbad Caverns they have to really monitor this closely because it is an honors system.

*Comment:* In the Forest Service, many of our caves have a caving access permit system where the permit clearly specifies what can and can not be done. We ask them to report any irregularities they observe in the cave. This way we can use the rules as an educational tool.

6. Demonstration of Gate Monitoring Database

*Question: (Data Analysis)* Can you do any analysis with the data in place in ARCVIEW?

*Answer:* There is a simple statistical, charting, and graphing function in the system.

*Question: (Import and Export of Data)* How could you import and export data with this system?

*Answer:* You could import from a delimited text file. So if you can convert your existing database into a delimited text file you can import it into the system. This should work with most standard databases.

*Question: (Limiting Access to the Public)* What criteria would be used to limit public access?

*Answer:* Locations of important Bat roosts. In some cases, general information can be given that would not show specific sensitive site information. Because of the nature of these GIS systems, any data that would be made available to the public can be strictly limited to that which is not sensitive due to legal or environmental concerns.

*Comment:* Under a recent interpretation of the Freedom of Information Act, you can no longer restrict information about Threatened and Endangered Species. So you can not longer keep specific site information away from people who would use it to illegally collect these species.

*Comment: (Public Availability of Data)* In Wyoming, we have done something similar with ARCVIEW and GIS and in the process of updating our inventory for this system. I would like to see this information available to the public. Many of our land owners are sensitive about making this information available to the public but I would at least like to make it available to out contractors. It would great if the contractors could access this information over the Internet with out having to come into our office.

*Comment:* If cave information was publically available it would immediately be an illegal disclosure of cave location formation.

*Comment:* Most abandoned mine programs have a similar type of inventory. The bat gate data base is an extension of the AML database because we specifically wanted to look at bats, bat surveys, and post gate monitoring and maintenance. I have been told by my computer people that sensitive information can be controlled so that it is not available to the public.

## SESSION 6 INTERACTIVE DISCUSSION

*Comment: (Conflict over Release of Locations to Public)* I would like the panel to comment on what seems to be a conflict between the direction of information accessibility through tools like a GIS system to the desire to keep certain information privileged such that even responsible professionals can not work with it. An example would be that builders and developers need to know where these features are if they are to avoid disturbing them.

*Comment:* In my experience with the Texas Speleological Survey that maintains the State Cave Files and we often get requests from consultants, developers, and State agencies for specific cave data. They want to know exactly what caves are on a specific piece of land or within a specific corridor. This is because something is being planned for that area like a new highway, powerline, subdivision, or development. If we as cavers say that we must protect this data and not let it out and are unwilling to share the data then we are insuring that they will be impacted because decisions will be made to develop these lands without any provisions to protect the cave resources because no one knew they were there.

*Comment:* The Federal Cave Resources Protection Act regulations clearly explain when you can release site specific information. You can release it when that release furthers the purpose of the Act. Certainly, administrative and research functions further that purpose. The Act allows us to keep the information confidential but it does not mandate that we have to keep it confidential.

*Comment:* We need to be cautious and ensure that the information is not made public in a way that we can not control the use of the information. We have learned from sad experience that when cave locations become well know it attracts public use.

*Comment:* In Virginia there are two levels of screening concerning who has access to data of cave locations. There is a board appointed by the Governor that reviews requests for information. The Virginia Cave Association is a private group that is not required to supply information. It is not at all uncommon that we get requests that are disguised as legitimate. About a year ago we had a request from an employee of a State agency that requested information on caves across the State within a specific elevation range. It turns out that it as an illegal personal request and the employee lost his job over it.

*Question: (Modification of Mines to Improve Bat Habitat)* Is there a need for research on how we could artificially improve a mine for use as bat habitat (i.e. air flow, temperature, etc.)?

*Answer:* Certainly in caves there is a reluctance to due any modifications because of the complex ecosystem that had developed over a long period of time. In the case of a mine, abandoned tunnel, or aqueduct there could be some ideal opportunities for experimentation with substrates, artificial crevices, recreating the entrance features, modifying internal temperatures to either increase or decrease its ability to trap coal air, altering humidity levels, etc.

*Comment: (Power of GIS to Link Related Geographic Data)* The power of the GIS based database is that you can link bat data with other geographic base data and have the software integrate the information and provide useful analysis that would not be available any other way. You can add geographic data about towns, highways, rainfall, superfund sites, and then use the system to see if the bat data is in any way related to other geographically available data.

*Comment:* The Utah database is in response to a recognized need for better information related to the management of bats, their habitats, and the response of bats to gates. The database is a tool that could be utilized by scientist to answer questions that could lead to better management of the caves and mines



used by bats as habitat.

*Comment:* Many States have a Natural Heritage database. In Missouri we work with the Missouri Speleological Survey and are adding a lot of the top biological caves and the information is being protected. It is very useful when roads are being built and infrastructures are being constructed. We are very interested in using a database to track cave gates because this information is currently being lost.

*Comment:* In Nevada, we have installed two culvert bat gates with the result that for two of those gates we now know that the bats have quit using those mine entrances after the culvert gates were installed. We would like to be able to share this data in the hopes that we could eventually know enough to be able to determine when and where these types of gates are appropriate and when they are not. I would be in support of a database that would allow us to better protect bats through more knowledgeable decisions on how to design gates.

*Comment:* If we could develop a national database similar to what Utah has developed it has the potential to be a very powerful ecological tool. It could have the ability to allow us to look beyond a local window of knowledge so that we could look at much larger scales that we have not been able to see or think about.

*Comment:* In order for such a database to be useful on a national scale we need to have common data fields.

*Comment:* Concerning the establishment of a national database, it is really not appropriate for a Federal agency or a State to manage the database. It seems most appropriate that a non profit private association could undertake this task so that it could better protect the data that is shared.

*Question: (Swarming Activity of Bats)* Could you give me some more information on the swarming activity of bats?

*Answer:* There is very little scientific data on the swarming behavior of bats. We suspect that some of these swarming sites are very important for some bat species. We still know very little as to the timing of these events and what is actually happening during swarming. There is a great need for more research in this area.

*Comment: (Vandalism by Fire)* I have not heard anyone address the threat of fire as a form of vandalism. In New Mexico we had a situation where the mine timbers in an abandoned mine were set on fire with the result that very nearly destroyed a winter hibernaculum of Townsends Big Eared bats. We need to give more thought to the design of bat friendly closures where the mine involves significant mine timbers on how to minimize the possibility of vandalism by fire.

*Comment:* Colorado has discontinued the use of timbers in its bat closures. Currently we have a closure at a mine with mine timbers where we are going to use a grated culvert in order to minimize the

possibility of setting fire to the timbers.