

INSIDE EARTH



A NEWSLETTER OF THE NATIONAL PARK SERVICE CAVE & KARST PROGRAMS

Edited by Dale L. Pate

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<http://www2.nature.nps.gov/grd/geology/caves/newsletter.htm>

A FEW WORDS ABOUT THE USE AND CONSERVATION OF CAVES

by Ronal Kerbo

Several months ago there was some discussion on an electronic cavers forum called "Cavers Digest" regarding the issue of shooting a portion of a large format film in Lechuguilla Cave in Carlsbad Caverns National Park. This also prompted a general discussion concerning filming in caves and how cave programs for television may affect the popularity of caving. The following is a clarification of National Park Service (NPS) guidelines and mandates and a brief discussion of these filming issues.

A few years ago I was involved, on behalf of the National Park Service (NPS), in a large format (IMAX) film project as proposed by the Cincinnati Museum Center. My involvement included meetings in Washington, D.C. with the NPS Director, the Museum Center and interaction with the current production company. At the

time I was supportive of the project, which seemed to be leaning toward filming primarily in caves on public lands, and would have been heavily slanted toward science and conservation. At this time I am not involved with the IMAX cave film now in production.

Several statements that were made on Cavers Digest did not accurately portray NPS policies and mandates concerning filming in parks. First, the 1916 enabling legislation language states, in part, that the National Park Service in the Department of the Interior is to:

*"promote and regulate the use of Federal areas known as national parks, monuments, and reservations...by such means and measures as to conform to the fundamental purpose of said parks, monuments and reservations, which purpose is to **conserve** the scenery and the natural and historic objects and the wildlife therein, and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."*

As is suggested by this language, our mission is one of conservation and not preservation, and has always been to provide for the "enjoyment of" the public. This seemingly dichotomous mandate has been hotly debated both inside and outside the NPS and I can direct you to no better resource on the NPS System than the excellent landmark book "Preserving Nature in the National Parks, A History" by NPS employee Richard West Sellars. No better primer for an understanding of the NPS, its history, and a clear vision for it's future can be found than this book. A notation on Lechuguilla Cave and cave wilderness can be found on page 273.

NPS policies (not to be confused with guidelines) on caves and cave management from the 1988 revision of the NPS Management Policies state in part that:

"Caves will be managed to perpetuate their atmospheric, geologic, biological, ecological, and cultural resources....No potentially harmful...use will be undertaken in, above, or adjacent to caves until it can be demonstrated that it will not significantly affect natural cave

conditions, including subsurface water movements...Caves, or portions of caves will be closed to public use, or use will be controlled, when such actions are require...for...the protection of cave resources."

On filming in Lechuguilla Cave, I think it is important to understand the parameters of the situation and how decisions on allowing or not allowing filming in any NPS area may be reached. Several questions need to be asked: (1) Will the filming be contrary to the stated mission of the NPS? (2) Will the filming be contrary to NPS policies? (3) Can the filming be accomplished outside of Park Service administered lands? It is important to remember that the NPS is a public agency and, as such, must make sure that activities conducted within the Parks will not have a detrimental impact on park resources. (4) Will the proposed filming be accomplished within NPS filming guidelines (these guidelines exist on both National and Park levels)? (5) Is there already existing film footage that can be obtained from other sources?

Many times people seem to forget or to not understand that the park units managed by the NPS are "public parks" managed for everyone and not managed for just one specific group. This is not an easy concept for river runners, climbers, cavers and other focus groups or individuals to understand. It was Bob Dylan who said in a song that these folks "keep seeing themselves walking around with nobody else!" Dylan followed that up by adding, "I'll let you be in my dream if you'll let me be in yours!" It seems to me that the units administered by the NPS are a shared dream for all Americans, and by extrapolation, for all peoples of the world for all time. For what it is worth, most of the rest of the world seems to have the opinion that our system of public parks is the best in the world.

I would suggest that there are two ways in which a debate over filming a portion of a large format film in Lechuguilla Cave would be better served. First, by gaining an understanding of the mission of the NPS (which has been interpreted in a very convoluted manner in some of the posts to Cavers Digest), and second, by expressing opinions directly to the NPS so that your concerns can be addressed.

I would also suggest that the NPS does not exploit caves, but rather tries to implement a cave and karst program that will provide for: (1) The protection of natural processes in cave ecosystems, within karst landscapes. (2) Scientific studies and researches in or about cave and karst resources and systems to increase the park's scientific knowledge and broaden the understanding of its cave resources. (3) Detailed cartographic survey of caves and cave systems, and a detailed inventory of resources

within cave systems. (4) Educational opportunities for a broad spectrum of park visitors to safely visit, study, and enjoy caves at a variety of levels of interest and abilities. (5) The establishment of regulations, guidelines, and/or permit stipulations that will ensure maximum conservation of cave resources. (6) Direction for cave restoration activities that remove unnatural materials or restore otherwise impacted areas. (7) The establishment of standard operating procedures in the maintenance and upkeep of developed cave passages and monitoring of natural environmental conditions and visitor use impacts. (8) The protection of related cultural resources, and (9) Ensuring the sustainable use of cave resources.

I hope that I have provided some clarification of the NPS mission and mandates. I have noted with some dismay that caves and caving have now come to the attention (without there having been released a large format film about caves) of the so-called "extreme sports" community. Caves and caving are becoming more and more popular. The year 2000 and those that follow will likely produce some of the greatest challenges yet faced by NPS cave managers as we try to integrate caves into the collective NPS conscienceness as viable components of an ecosystem and not as natural curiosities to be used only for extreme sports.

EVENTS

14th National Cave and Karst Management Symposium -Chattanooga, Tennessee

On October 19-22, 1999, Chattanooga, Tennessee was the location for the 14th National Cave and Karst Management Symposium. Hosted by the Southeastern Cave Conservancy, Inc., the Symposium's theme was "Living with Caves and Karst". This well attended



National Park Service Cave specialist's discuss presentations at the National Cave Management Symposium in Chattanooga, Tennessee, held October 19-22, 1999. Left to right: Joel Despain (SEKI), Dale Pate and Jason Richards (CAVE). (NPS Photo by Ron Kerbo)

Symposium drew cave and karst managers, researchers, and cavers from all over the United States including Alaska and international guests from as far away as Australia. With many talks focused on water resources issues, history, education, GIS, cave and karst management and research, this year's symposium was a great success. Keynote address was given by Ronal Kerbo, NPS National Cave Coordinator; banquet speaker was George Veni, a prominent cave and karst consultant; and closing remarks were made by Michael Ray Taylor, author of *Cave Passages* and *Dark Life*.

**NPS CAVE AND KARST
MANAGEMENT WORKSHOP
MAMMOTH CAVE NATIONAL PARK**
by Rick Olson and Mike Adams

Beginning with a pre-workshop paleontological field trip led by Rick Toomey of the Illinois State Museum, a cave and karst management workshop was held at Mammoth Cave National Park from October 25-28, 1999. The meeting was well represented (list appended) by both NPS units with cave/karst resources, and by local private cave operators. Detailed notes on each session were compiled by Teresa Leibfreid (MACA), and distributed to all participants. The following summary touches on highlights.



Participants assemble for the field trip into *Mammoth Cave* prior to the NPS Cave & Karst Management Workshop on October 24, 1999. From left to right: Chuck Bitting (BUFF), Neville Michie (Australia), Dale Pate (CAVE), Rod Horrocks (WICA), Dr. Rick Toomey (Illinois State Museum), Mike Wiles (JECA), and Rick Olson (MACA). (NPS Photo by Ron Kerbo).

Deputy Superintendent Mick Holm welcomed the participants to Mammoth Cave National Park, and Division Chiefs Jerry O'Neal (S&RM) and Mike Adams (I&VS) explained how the workshop would function. Jumping right in, National Cave Management Coordinator Ron Kerbo summarized the evolution of the service-wide cave/karst program. There are now 14 cave

management specialists in the NPS, this position-type is being considered as a career path, and a benchmark description is in progress. Joel Despain, Sequoia - Kings Canyon Cave Specialist, then discussed the utility of the Federal Cave Resources Protection Act in protection of these resources on federal lands. Ensuring confidentiality of cave locations provided by cavers is crucial to building a comprehensive database, and the law has been used in successful prosecutions of violations. Next, Jerry O'Neal provided an overview of the Endangered Species Act, especially Sections 4,7,9,10,11. Bob Currie of the U.S. Fish & Wildlife Service is the national level Threatened & Endangered Species (T&E) coordinator for cave species, and works closely with parks. On private lands, Habitat Conservation Plans are used for T&E species management. Mike Wiles and Joel Despain finished up the morning session with discussion on the value of NPS interagency and international exchanges and cooperation, with many interesting examples cited.

Following lunch, an interpretive operations session provided participants with the elements of programs at NPS units with show caves. This was followed by stimulating discussions comparing and contrasting these operations. Mike Adams next facilitated discussion on a proposed training course on caves and karst. A working group was formed to pursue course development; group members are Mike Adams, Chuck Bitting, Suzanne Flory, Jon Jasper, Rick Olson, Dale Pate, Rene Rogers, Debra Riley, John Roth, and Mike Wiles. On a related topic, Ron Kerbo reported on an NPS Cave and Karst Handbook, and Revisions to NPS 77 and NPS Policy. These documents are crucial to any educational effort within NPS, and guide management overall. The afternoon session concluded with a panel discussion by Mike Adams, Rick Olson, and Mark Rich on managing Visitors for Safety and Resource Protection. A working group on resource protection during tour operations was formed with the following members: Phyllis Cremonini, Mary Laycock, Debra Riley, and Jon Jasper. Following dinner, Mike Adams led an evening tour of Mammoth Cave's Kentucky Avenue.

On Tuesday morning, Sharon Ganci and Joy Lyons spoke on Environmental Education and Program Services at Mammoth Cave National Park respectively. Then, for something totally different, Sven Rundman of Occupational Safety & Health Administration (OSHA) delivered a presentation on confined spaces regulations in cave access policies. Concerns over the potential impact of these regulations were largely allayed. On another OSHA regulatory front, Bob Carson talked about the status of radon monitoring in the NPS, and likely future directions. The advantages of passive solid state detectors were discussed as an economical means to meet our mandate. Joe Meiman finished up the morning session

with a talk on defining and understanding karst watersheds.

Following lunch, Tom Aley gave irreverent advice on connecting the visitor with the karst landscape. The group then took a field trip where Rick Olson explained ecological restoration efforts in the Historic Entrance ecotone, and how new trails (installed by John Fry and crew) help mitigate visitor impact on cave resources. That evening, a tour of the American Cave Museum and *Hidden River Cave* was given by Dave and Debbie Foster.

Wednesday morning's eye opener was "Maintenance and the Resource" delivered by Steve Kovar. Emphasis was on the importance of facility management in cave conservation, both above and below ground. Next Joe McGown spoke on reservations and visitor management, which has important implications for the quality of visitor experience, and our ability to protect park resources. Dale Pate delivered thoughts on successful management strategies. There are many ways to apply knowledge, but the key is to have upper management support for science-based resources management. Without this support, absolutely excellent advice will go unutilized. On a related topic, Jim Nepstad spoke on the development of cave/karst GPRA goals that are compatible with service-wide programs. The key here is that GPRA goals are tied to the Superintendent's evaluation, so one must have convincing arguments for incorporation of cave/karst GPRA goals.

After Wednesday's lunch, Chris Groves explained the Western Kentucky University Pilot Cave Management Graduate Program. David Ek, Chief of Resource Management Fort Clatsop N.M., is the first person to go through the program and is working on a project at Mammoth Cave National Park. On another academic front, Ron Kerbo explained the current status and future of the Cave Research Institute. Perhaps most significantly, the Institute should be a thematic Cooperative Ecosystem Study Unit (CESU) operating on a national scale. Another research management topic covered was bioprospecting in NPS caves, which was covered by Lindsay McClelland. Bioprospecting has far reaching fiscal effects, and collecting permits must address this issue. Mike Adams concluded the day's sessions with a discussion on a nationwide cave and karst public education effort, which will likely be a cooperative effort between NPS and private organizations. After supper, the group was given a complimentary tour of Diamond Caverns by Gary Berdoux.

Thursday was largely devoted to risk management and visitor use issues facilitated by Mark Rich. Excellent advice on how to minimize tort claims against parks was

provided by Richard Dennis and Gerald Thornton in the morning sessions.

After lunch, Rick Olson, and Mike Adams led a discussion on adapting the Visitor Experience and Resource Protection (VERP) process to study operations in developed NPS caves. A working group was established composed of Mike Adams, Joel Despain, Rod Horrocks, Rick Olson, Mark Rich, John Roth, and Mike Wiles. The group then returned to the Historic Section of Mammoth Cave for a review of tort claims, maintenance concerns and OSHA issues led by Mark Rich.

Everyone seemed to depart for his or her places of origin with a sense that this was time well spent. There was some discussion of another workshop to be held after the National Cave Management Symposium in Tucson.

PARTICIPANTS

Michael W. Adams (Mammoth Cave), Chuck Bitting (Buffalo NR), Jim Carroll (Mammoth Cave), Phyllis Cremonini (Oregon Caves), Dave Dahle (Corps of Engineers), Joel Despain (Sequoia & Kings Canyon), Joe Duvall (Mammoth Cave), David A. Ek (Fort Clatsop), Suzanne Flory (Timpanogos Cave), Alan Glennon (Western Kentucky University-Geography & Geology Department), Ed Greene (Carlsbad Caverns), Henry Holman (Mammoth Cave), Rod Horrocks (Wind Cave), Vern Hurt (Midwest Regional Office), Jon Jasper (Great Basin), Ed Kassman (Geologic Resources Division), Ronal Kerbo (Geologic Resources Division), Mary Laycock (Wind Cave), Brice Leech, Jr. (Cumberland Gap), Teresa Leibfreid (Mammoth Cave), Joy Medley Lyons (Mammoth Cave), Curtis Martin (Corps of Engineers), Lindsay McClelland (Washington), Neville Michie (Australia), Janice S. Miracle (Cumberland Gap), Pam Moore (Cumberland Gap), Jim Nepstad (Apostle Islands), Marc Ohms (Wind Cave), Rick Olson (Mammoth Cave), Jerry O'Neal (Mammoth Cave), Dale Pate (Carlsbad Caverns), Bob Pointek (Mammoth Cave), Debra Riley (Jewel Cave), Rene Rogers (Jewel Cave), John Roth (Oregon Caves), Courtney W. Shea (Assistant Field Solicitor-US Department of Interior), Kathy Steichen (Wind Cave), Ron Terry (Wind Cave), Gerald (Jerry) Thornton (Office of Field Solicitor), Mike Wiles (Jewel Cave).

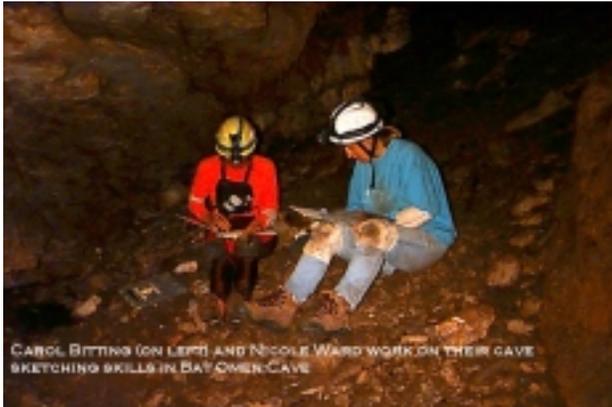
PARK UPDATES

Buffalo National River

by Chuck Bitting

During the summer of 1999, three Student Conservation Association Resource Assistants, Matt Beversdorf, Lawrence Ireland, and Nicole Ward assisted Buffalo National River with cave management activities. Geologic Resources Division provided the funding for Lawrence. Matt and Nicole were funded through our normal granted positions. Their project was the cartographic survey and inventory of several of the smaller caves in the park. They also assisted with numerous other projects such as stream geomorphology studies, mine gate construction, geologic mapping, changing cave databases to FileMaker Pro, entering data and gypsy moth trapping. After the construction of the mine gates we entered a period of training. Matt and Lawrence had previous cave mapping experience.

The training consisted of mapping *Bat Omen Cave*, a cave discovered by Carol Bitting in 1991. Since Carol wanted to improve her cave mapping skills, she came along. Each member of the group had the opportunity to set stations and shoot instruments. Everyone had to sketch the cave during the survey. They entered the survey data into COMPASS® and plotted the stations on gridded vellum. After that each one sketched a working copy, made changes and adjustments as recommended, and inked a final map.

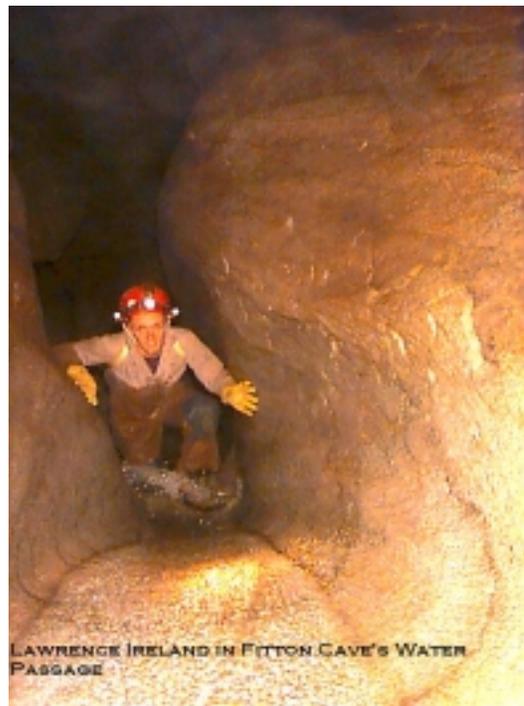


NPS Photo by Chuck Bitting

This training was a rewarding experience for all involved. The students learned or polished their skills as cave mappers, and I improved my skills as an instructor. After the initial training was over, I turned them loose on the priority caves. The result of their work was the cartographic survey and inventory of five caves. They also started mapping and inventory in another cave.

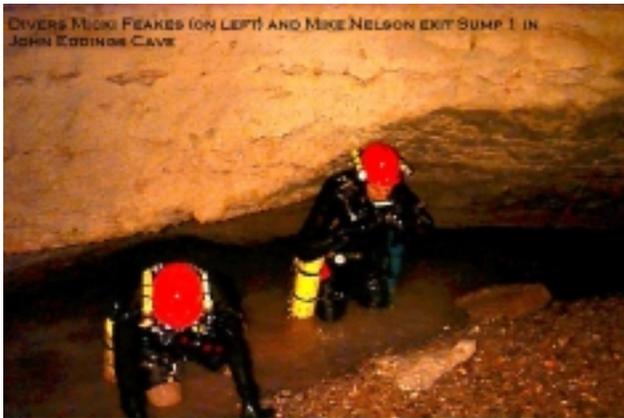


NPS Photo by Lawrence Ireland



NPS Photo by Carol Bitting

Their efforts greatly increased our knowledge of the condition of resources in these caves, and also helped us complete other ongoing projects. In October sump divers Mike Nelson and Micki Feakes came to the park to look at some of our submerged cave passages. They managed to connect two sumps in *John Eddings Cave*, and made cursory evaluations of several other sumps in the cave. Mike plans to return in 2000 to map the connection between the sumps and look at any other sumps we need data from. The sump divers were assisted by Rebecca Holden, Carol and Chuck Bitting.



NPS Photo by Chuck Bitting

Carlsbad Caverns National Park by Dale Pate

Mineral Withdrawal Proposals – In order to better protect caves in the Guadalupe Mountains, the Bureau of Land Management is proposing to withdraw 8,950 acres north of the park from future leasing for mineral or oil and gas development. At the same time, the U.S. Forest Service is proposing to withdraw from within Lincoln National Forest 27,299 acres from the future leasing of these same types of activities, mineral extraction and oil and gas leasing. This acreage is located between Carlsbad Caverns National Park and Guadalupe Mountains National Park. The two agencies held an open house meeting in the town of Carlsbad on December 7 to inform interested parties of the proposals and to solicit comments. An Environmental Assessment is being prepared for each agency's proposal.

Pre-design Plan for Carlsbad Cavern Area – The draft Environmental Assessment (EA) for this plan has moved closer to its release to the public. To help complete the EA, plant and archeological surveys were recently done for the area surrounding *Carlsbad Cavern*. A likely release date for the Draft EA will be February 2000.

SAR Training - Our annual 3-day Vertical Rescue Techniques Training Class was held December 1-3 this year and was a great success. The first day of training was in a classroom setting (the fire cache training room)



With Laura Denny as the litter attendant and Jason Richards at the edge to help maneuver the litter, Garnet Goodrich (as patient) is successfully raised up the 60-foot deep pit in Wen Cave. (NPS Photo by Dale Pate)

where the participants practiced knot tying, anchors, packaging the patient, and other aspects of vertical rescue in a controlled environment. The second day found us on a small vertical cliff practicing the art of raising and lowering a litter. The third day, in order to practice a cave-simulated rescue in a cave, participants rigged a vertical drop in *Wen Cave*, one of the recreational permit caves in the park. This gave the participants real-life cave rescue practice and also helped in preparing our pre-rescue plan for the cave.

Lechuguilla Cave - To help solve a number of problems, the culvert and gate for *Lechuguilla Cave* will be replaced beginning in January. An Environmental Assessment has been completed and a Finding of No Significant Impact statement has been issued. Plans are for the replacement process to begin at the end of January and will continue until the process is completed. We anticipate this to take 3 to 4 months, but may run longer if problems are encountered. The new "culvert" will be a corrugated stainless steel pipe, larger than the present pipe, and installed with a stainless steel airlock system welded into place at the top.

The Lechuguilla Exploration and Research Network (LEARN) had the last survey expedition for 1999 from

October 23-31. This expedition added .86 miles to bring the total length of *Lechuguilla Cave* to 105.79 miles (170.25 kilometers). The surveyed length of the cave increased 5.16 miles (8.30 kilometers) during 1999.

Craters of the Moon National Monument

by John Apel and Anne Tillery

Substantial improvements in the Craters of the Moon cave management program were made in 1999, the 75th anniversary of the monument. Since the early years of the monument, lava-tube caves have been one of its most popular features. Throughout most of the monument's history cave management consisted largely of developing visitor access. Systematic efforts to inventory caves began in the 1980s but lacked continuity.

Largely through the efforts of Anne Tillery, a Geologist-in-the-Park intern sponsored by the Geological Society of America, a comprehensive cave inventory database was created in 1999. Previous inventory efforts had resulted in several overlapping inventories each organized somewhat differently and limited to hard copy files. Once these lists were sorted and compiled, we learned the total number of caves increased from the previously reported figure of "around" 75 to just over 100. All existing information from previous inventories, staff reports and memos, published articles, and maps were organized in separate folders for each cave. A Microsoft Access® database was then created to include basic attribute information. A one-page summary of the database was printed for each cave and this along with a location map was organized in a three-ring binder for quick reference.

Existing cave location information ranged from penciled markings on topographic maps to uncorrected GPS coordinates. Anne used this existing information, along with available descriptive information of the caves to relocate most of the documented caves. Once located and verified the cave entrances were mapped using a Trimble GeoExplorer® II GPS unit. Differentially corrected field coordinates were exported as an ArcView® file for use in the monument GIS. In the process of relocating the "known" caves, Anne and her field assistant, Carolyn Davis, found almost thirty "new" caves, which were not documented in monument records. The monument hopes to complete this first phase of cave inventory next year by relocating and using GPS to map the location of the remaining caves known to exist in the remote southern portion of the monument. The inventory database will also be expanded to include more detailed biological, geological, and cultural resource information.

Another significant cave project was the construction of a "bat friendly" gate in *Arco Tunnel*, the largest lava tube

cave in the monument. Access to *Arco Tunnel* had been controlled since the early 1960s through a permit system and locked gates (not designed with bats in mind). Built in the 1980s, the most recent gate consisted of an 18"X18" square culvert with a sliding bar placed in a low passage 350 feet from the entrance. The monument began to consider a new gate after small numbers of hibernating Townsend's big-eared bats were discovered in the cave in the mid-1990s.



Welding on the gate in *Arco Tunnel*. (NPS Photo)

Alternative designs and locations for a new gate were considered with assistance from the neighboring Bureau of Land Management (BLM) Shoshone Field Office. In recent years their office had built several bat gates using volunteers from the Gem State Grotto. Jim Hathorn with the Gem State Grotto was contacted and agreed to design the gate and organize a crew of volunteers to build it.



An Interesting Transportation System

(NPS Photo)

A contemporary angle iron gate design was proposed for a location just inside the twilight zone of the cave and an environmental assessment was prepared. The Columbia Cascades Cluster provided NPS funding to purchase materials and rent equipment. A significant logistical challenge was overcome when the Shoshone BLM office

offered their fire program's contract helicopter to transport the 1.5 tons of angle iron to the remote site.

BLM staff also welded the gate's prefabricated door assembly and loaned tools for the project. All other equipment, such as welders and generators, were transported by monument staff one mile over a narrow trail using a 6-wheel all-terrain vehicle or on backpacks. Numerous logistical problems and equipment malfunctions were eventually overcome and the Gem State Grotto volunteers completed construction of the gate over the course of one weekend in late August. The project could not have been completed without the very generous assistance of the Gem State Grotto and BLM's Shoshone Field Office.



The Crew with the Finished Product. (NPS Photo)

Great Basin National Park *by Jon Jasper*

Great Basin National Park had its second *Lehman Caves* Lint Camp on October 1-3. Eleven volunteers from Salt Lake City, St. George, Winnemucca, and San Diego attended the camp. The cave cleaning started at the bottom of the Queens Room and was able to reach into Cypress Swamp and the slope leading into Grand Palace. The main effort of the lint cleaning camp was in the Lodge Room and Giants Ear where the lint was so bad that one was actually able to write the word "lint" in it. (see attached photo). Most of the lint was removed using sprayers and paint brushes. A lot of weathered limestone and soot from open flames from the early 1900s were unexpectedly removed from the Lodge Room. Along the way, algae were also removed. In the end, approximately 200 hours of labor were used to remove 45-50 pounds of "lint". Approximately 575 ft of cave floor was restored in respect to "Lint" and algae.



A thick layer of lint awaiting removal. (NPS Photo by Jon Jasper)

SEQUOIA AND KINGS CANYON NATIONAL PARKS *by Joel Despain*

1999 WRAP UP

ADMINISTRATION AND MANAGEMENT

Cave Management Staffing - Seasonal Cave Specialist, Greg Stock, worked in the Parks for 9 weeks during the summer of 1999. His position was funded by money from the Cave Management Program base account, and from the Geologic Resources Division (GRD). The GRD money was project funding tied to completion of survey and inventory work in *Soldier's Cave*. Greg is currently at the University of California at Santa Cruz working on a Masters in geomorphology. He will be studying caves of the Sierra Nevada for his thesis.

Funding for seasonal staffing in 2000 is unlikely. Funding generated through a "Leave Without Pay" vacation that I will be taking most of this winter will not be available to the program. There are also limited funds available this year from the Geologic Resources Division

CAVING PROJECTS

Crystal Cave Restoration - Halloween hosted some spooky restoration activities at *Crystal Cave*. More than 30 people worked on various projects such as removing no-longer used wire from an old surface trail, cleaning rimstone with a wet vac, and hose cleaning rimstone and flowstone. Barb and Steve Ruble designed the Halloween theme t-shirts and a fine group of Adventure Scouts from Southern California joined us. The Scouts managed to make a small dent in the volume of old wire along the

utilities access trail to the cave on Sunday morning. The wire between the generator at the cave parking lot and the cave itself has been replaced several times, but most of the old wire, plus a phone line and a small diameter water pipe were never removed. Hose cleaning focused on the Sugar Cookie Passage near the Dome Room. The area has extensive flowstone and inactive rimstone pools. This passage was used for wild tours until 1993. The rimstone area near Marble Hall was cleaned using the hose, buckets, the wet vac and sponges. The wet vac was donated for the project by Doug Billings and the Desert Dog Troglodytes Grotto, from Orange County. These beautiful intricate pools were dirtied when trail washing moved dirt from where it was placed to hide lighting wires down into the pools. A small cement wall was also constructed next to the trail to prevent further trail washing water from reaching the pools.

Soldier's Cave Mapping - More than twenty mapping trips entered *Soldier's Cave* in the summer and fall of this year. While a few small question marks remain on the notes, most of the cave has probably been mapped. The cave's total surveyed length is now 7889 feet. Survey work focused on the cave's lower levels including the Corridor, Helictite Room, Dry Stream Bed, Fallen Soda Straw Room area, Lake Room and all of the mazes in Ruby's Route. It was fun, interesting and intriguing exploring the far reaches of the cave. Ruby's Route, in particular, was full of surprises and beautiful sights.

Many people helped with the project including Park Service and Sequoia Natural History Association employees Chris Hogan, Dylan Kreis, Harold Werner, Karen Webster, Jason Sevier, Paul Lowry, Kitty Bordon and Erik Oberg. Cavers involved included Peter Bosted, Scott Schmitz, John Woods, Vivian Loftin, Kate Lysaght, Greg Cotterman, Kristen Ankiewicz, Amy Ponsetti, Roger Mortimer, and Rachael Bosch and Lee Florea from Pennsylvania. Thanks to all who participated.

Work on the completed map is progressing steadily. Most of the walls have been drafted, but no detail work has been done. The cave will be represented as three levels. The upper level includes the entrance and first few rooms and passages, the middle level will include the Waiting Room, Contact Room, Starlight Room and Passage, the Aragon Room and Ruby's Route. The bottom level will start at the bottom of the Well and include the Corridor, Chapel, Helictite Room, Dry Stream Bed, and the Lake Room.

Hurricane Survey - Park Staff traveled to the Dusted Canyon area of the cave in August to attempt a lead climb. Greg Stock led up the canyon, but found large patches of extensive helictites blocking his way. A significant hole still exists above the delicate formations.

The climb and two other small areas near Dusted Canyon were surveyed. This includes a passage that leads from Dusted to a sump at base level and a well decorated room at the upstream, north end of the Canyon. The map of the cave has been revised to show these new areas and now includes several smaller adjacent caves, *Weisraum*, *Hobbit Hole*, *Hemp* and *Hammer Cave*.

Cave Research Foundation in Redwood Canyon - It was another successful summer in lower Redwood Canyon as the Cave Research Foundation (CRF) mounted numerous weekend expeditions. Trips this year continued work on many past projects including survey, hydrologic research, maintenance of the canyon's facilities, and restoration in the cave. Several new areas of modest size were mapped in the south end of the cave and the *Lilburn Cave's* current length exceeds 17 miles. Lower, calmer water conditions allowed Bill Farr to return to his diving leads deep within the Upstream Rise. Logistical problems, buried dive lines and other challenges limited the extent of his work, but some progress was made in exploring the water filled passage. Rangers joined a few CRF staff members in a two-day Search and Rescue (SAR) exercise in October. The exercise primarily focused on familiarization and discussion of SAR situations in the Canyon.

Cave Research Foundation in Mineral King - CRF returned to White Chief Canyon on two expeditions in 1999. More work was undertaken on the survey of *White Chief Cave*. This has now largely been completed. CRF cavers also were trained in basic cave inventory using the methods, forms and techniques developed for the Park by Carol Vesely and Greg Stock.

Palmer Cave - An updated map of *Palmer Cave* was started this summer during two trips to this beautiful, spectacular cave. The survey effort revealed one new room with extensive gypsum and many other previously explored rooms that were not included on the original map. Future plans include finishing the mapping and bio inventory work for Palmer.

Park Employee Participation - A concerted effort was made this year to include park research and resource management personnel in caving trips. There are several reasons for this. For one thing, we needed the help, also by having park employees participate in trips we hoped to gain their appreciation for this significant, but little known part of the park. Park employees helped survey for isopods and millipedes in *Crystal Cave* and surveyed in *Soldier's* and *Palmer* caves.

Mining Inventory - The park mine inventory was completed in 1999 through a visit to Triple Divide Peak and the back of Valhalla, both in the headwaters of the

Middle Fork of the Kaweah River. Like most of the park mines, these two sites were small and did not pose a serious risk to people or the environment.

Wind Cave National Park

by Rod Horrocks

On October 9, 1999 at 12:45 PM, two different surveying parties in *Wind Cave* experienced a small earthquake. Marc Ohms, who was surveying in the Lakes Section, named the large room they were surveying in at the time, Seismic Hall. Each person reported hearing either a "thunder-like" rumbling sound or a "low grating" sound for a couple of seconds, but felt nothing. Surveying in a nearby side passage, they also discovered a half dozen new helictite bushes in an overlying passage, some of them two feet high.

The contract has been awarded for the sewer line replacement project, with work beginning in mid-December. This project will remove the old leaking sewer lines above the cave and replace them with dual-contained HDPE lines. The inner, primary line will be surrounded by an outer, secondary line, which will capture and contain any leaks that may arise from the primary line. Visual inspection ports will be built into the system, allowing the park to quickly and easily monitor the line for leaks and fix them before any spillage occurs.

Dr. Moore, from the University of Northern Colorado, is starting a National Science Foundation funded, three-year study in *Wind Cave* to look at functional diversity in the biomass of cave sediments and how humans have impacted the cave. His work will concentrate around the tour routes in the Historic Section of the cave.

On September 27, 1999, it was discovered that the new perched lake, located on the route to the Lakes Section and the deep point in the cave, had risen another four feet in the previous two months. This completely sumps that passage and blocks access to the lakes and 2.5 miles of passage. It is expected that this situation will remain long-term.

The cave management staff recently resurveyed a natural trap cave in the park named, *Salamander Cave*, which is an important Black Hills Pleistocene paleontological site. This cave, investigated by Dr. Jim Mead in 1993, contains horse and camel remains dated to 252,000 years ago. This new survey added more detail, a surface survey, a profile view, and cave inventory data to the data set.

The Park's Cave Management Plan is in the process of being revised. This minor revision mostly updates facts and simplifies and standardizes off trail caving policies.

In an attempt to provide better resource protection and increased safety for visitors on the four-hour long Wild Caving Tours, Interpretation and Cave Management have worked together to add a trail ranger to each tour this year.

Recent survey and inventory work at *Wind Cave* has concentrated in the Historic, Lakes, Club Room, and Southern Comfort sections of the cave. Since the last issue of *Inside Earth*, the current surveyed length of *Wind Cave* has been increased by 1.8 miles, bringing it to 86.52 miles, maintaining its status as the eighth longest cave in the world and the fifth longest in the U.S.

AN EXCHANGE OF PEOPLE AND IDEAS

by Joel Despain

It is easy to find differences in the various caves and karst management programs found in Units of the National Park System across the United States. One program might manage hundreds of small caves, while another park manages a single very large cave. Some parks focus on cave science while others emphasize management issues and concerns. Some of the parks receive few visits from recreational cavers while others are inundated. But our overall goals of protecting Park Service managed caves while providing for scientific research and recreational use within them, unites us in ideas, strategies and techniques for getting the job done.

Shared goals combined with different program emphasis, different management plans, and programs varied in age and size together create an environment well-suited for learning and the sharing of information. While the parks and cave resources might vary, good ideas on volunteer management or data handling could have a universal appeal for cave managers. Ideas created, used and tested at one park may very well prove to also be the best option for another park. At the local level most of us interact with other cave managers infrequently. Our peers are often biologists, ecologists, rangers or interpreters focused on surface issues. Our supervisors are often, rangers, biologists, or resource managers not trained in cave and karst issues. Occasionally this creates feelings of isolation. We often don't have informed people nearby to bounce ideas off of or to discuss important issues with.

The opportunity for learning and the need to share ideas are significant justifications for interactions, exchanges and visits by NPS cave managers to other units of the National Park Service with cave and karst programs. Such visits involve government travel and as such can be expensive. But these visits can also be worthwhile

activities in learning, sharing and the exchange of information.

What situations at your park might warrant a visit to another park? A visit might be most appropriate when your park is going through some changes. Perhaps you are implementing a new volunteer program and need to know more about managing cavers. Perhaps your superintendent wants a major revision to your cave management plan. Answers to questions surrounding these issues might be most easily found at another park. Perhaps the area you manage has some specific issues or concerns that need to be addressed. If you are interested in standards and volunteer management, a visit to *Carlsbad Caverns* might be in order. Or, if you want to know the latest in cave camping techniques, *Jewel Cave* might be the place to visit. Visits can also generate more spontaneous ideas and problem solving, which could make almost any visit valuable

Here at Sequoia and Kings Canyon National Parks we have had a long-standing concern involving safety at *Lilburn Cave*. *Lilburn* has 17 miles of very mazy passages. Hundreds of junctions and many levels conspire to make this cold, wet cave very confusing. Trips to the cave are conducted for research purposes by the Cave Research Foundation (CRF). A few key people in CRF know the cave well, but learning routes can take years in *Lilburn*. What if a trip leader was hurt? How could a person unfamiliar with the cave have a hope of finding their way to an entrance? In South Dakota, at *Jewel* and *Wind Caves* a trail marking system that uses flagging has been developed over the years. I first saw this system in use in both caves in 1995 and I learned that:

- flagging tape could be secured and be expected to stay in place along trail routes
- there are easy ways to mark or cut flagging tape to indicate the direction out of the cave
- flagging tape can include small notes such as the distance to a first aid kit
- different colors of flagging tape can effectively denote different routes through the cave
- flagging tape can hold up and be visible for at least a few years in dirty, muddy cave environment.

My experiences at *Wind Cave* led me to introduce flagged routes in *Lilburn Cave* in 1997. Today these routes lead between the cave's two entrances and into the cave's southern reaches. If a lost, or injured caver can find their way to these main routes, which are not too far from most areas of the cave, then they should be able to find their way out.

Visiting another park to see their management techniques and strategies first hand can be a valuable and rewarding

experience. Next time your park is faced with a need for new ideas or strategies, or faces a change in policy that sets a course for uncharted waters consider a visit to another cave and karst park. It may be just what is needed to set your park on the right course to quality and effective management of-caves and karst.

A CAVE MANAGEMENT EXCHANGE PROGRAM

by Mike Wiles

Compared to other areas of resource management, cave expertise is relatively sparse. Many of the problems are fairly unique (how do you treat algae 40 feet above the floor, for instance?) and adequate solutions are not readily found in most areas of surface management. It is therefore to our benefit as cave managers to interact with each other as much as possible. Certainly we do that at conventions and symposia, but the advantages are greatly multiplied when we each visit the other in his/her home-working environment – and especially when we have an opportunity to work together.

In July 1998, I was able to spend a few days at *Mammoth Cave* to visit with their staff about cave management, *Mammoth Cave* agreeing to free up most of three days for Rick Olson, the park ecologist, to spend time discussing the issues with me. By prior arrangement, Rick had prepared a detailed agenda and I agreed to submit a trip report. These formalities set the stage for a truly valuable learning experience.

This kind of visit was more beneficial than most training sessions I had previously attended, and I highly recommend something similar to everyone else in cave management. There is a good possibility that I will be able to offer the assistance of my cave management assistant for one or two weeks this coming year. So if anyone is interested in helping jump-start an exchange program, please send a short proposal and detailed agenda for a visit that would include orientation to cave management at your park and/or assistance with non-routine cave management projects. Budget permitting, we would cover all travel expenses (as we would with any training class), but of course any assistance by the host park could provide would be greatly appreciated.

Additionally, if you see any upcoming opportunities to send or host cave management people, let me know via e-mail. I will compile an interest list and forward to NPS cave managers next month, to assist you with getting in contact with each other.

The following is a synopsis of my visit to Mammoth Cave National Park:

DAY 1

Rick Olson gave me (Mike Wiles) a brief history of Mammoth Cave National Park, and described the major ecosystems of the park: cave, river, forest, and prairie.

Floyd Collins' Crystal Cave: I accompanied Rick as he detailed to Jim and Val Werker the vandalism that had been done in 1995. Mammoth Cave paid the Werkers' travel expenses to see if they could repair some of the damage, and to make an estimate of the effort that would be required for more complete restoration. We discussed methods of putting a dollar amount on natural resource, local attitudes toward resource values, the effectiveness of cave laws, and practices and procedures that could minimize vandalism.

Visited with Jerry O'Neal, Chief of Science and RM. His broad goals are to determine environmental health, and to restore fire management and biodiversity

Long Cave: From the 1960's until 1994, the Indiana bat population dwindled from 50,000 to 1200, at least partly because of a poorly designed gate. The numbers continued to drop to around 900 after an American Cave Conservation Association bat-friendly gate was installed in 1994. This population decline has occurred regionally, except in Indiana. I noted that **Jewel Cave** records also indicate significantly higher numbers of bats in the 1960's. We discussed several possible causes and the difficulties of distinguishing between real declines and natural variability.

Discussed catchment basin requirements for I-65, outside park. Rick has worked closely with the Kentucky Transportation Cabinet to ensure protection of the aquatic cave ecosystem. The discussion provided many new ideas that I plan to implement in dealing with a highway realignment at **Jewel Cave**.

Discussed regional hydrologic drainage map, roughly comparable to the product of our geologic mapping efforts. Toured the sinkhole plain, discussing the regional hydrology, oil wells, agricultural uses, and the problem of sinkhole dumps.

DAY 2

Floyd Collins' Crystal Cave: Accompanied Rick, Jerry, and Bob Ward to see and discuss the restoration Jim and Val had accomplished. We were all impressed with what they had accomplished in just a day. I was particularly struck by the thought that even tasks that look impossible really can be done if we give them due consideration and are committed to their accomplishment.

Crump's Cave: Accompanied Rick as he visited with the owner of this commercial cave, discussing some possibilities for mitigating flooding problems. This was an excellent example of good relations between the park and nearby land owners -- the kind of relationship I hope to foster here in the Black Hills.

Owl Cave : This is an archaeological site. Rick and I took measurements for a future cave gate. One discussion on recent human activities reinforced earlier observations that both science and social behavior are important considerations in cave management.

Mammoth Cave, Frozen Niagara entrance: Rick and I discussed the revolving-door airlock system, natural versus artificial entrances, restoration efforts, and how effectively those efforts keep up with ongoing impact.

Attended Jim and Val Werker's presentation on cave restoration. Some amazing before and after pictures persuasively demonstrated that restoration (even reconstruction) is worthwhile, and more feasible than commonly believed. I had met the Werkers previously, but really got to know them personally during this visit. We shared many thoughts regarding restoration and preventive practices that will be of benefit at **Jewel Cave**.

DAY 3

Met with John Fry and discussed the hazard spill map (HazMap) they had compiled to outline drainage basins and sinkholes along I-65, the Cumberland Parkway, and the CSX Railroad, which cross the Sinkhole Plain. The map was given to local emergency response people to help them prevent/reduce contamination of the cave and aquifer, when toxic spills occur.

Visited portions of the Historic Tour route. Discussed microclimate, the effects of changes to the entrance, monitoring and modification efforts; present and historical bat populations, and distribution; archaeological concerns; and tour size and type. Rick described the purpose of a boardwalk: The Cypress and recycled plastic lumber used in its construction have high resistance to deterioration, even in a humid environment; the boardwalk keeps visitors from damaging cultural resources and is itself constructed to have minimum impact, be repairable for extended lifetime, and be relatively easy to replace when the time comes. Visited site of Earthwatch cultural inventory project, which is creating an incredible spatially linked database of prehistoric and historic cultural resources.

DAY 4

Annual Science Conference: This was attended by cavers, researchers, and park people. The presentations covered many topics including:

1. History
2. Vertebrate Paleontology
3. Changes in Land Use
4. Changes in Forest Vegetation
5. Cave Fauna
6. Altered Entrance Structures
7. The Mammoth Cave Area Biosphere Reserve

I presented a talk emphasizing the value of exploration as a baseline for other activities, including resource management.

Visited with Teresa Leibfreid regarding survey and inventory data issues. She introduced me to an ArcView add-on called Cave Tools. It was written to allow direct import of data from a popular cave-survey program called Compass.

DAY 5

CRF Expedition: Participated in a 14-hour Cave Research Foundation caving trip to Fritch Avenue to re-survey over 1000 feet of known cave. This protects against unauthorized entry as well as contamination of the cave environment. The trip involved walking over a mile through a stream passage that is rich in cave life, varied in depth from ankle to chest deep, and had a temperature of 57°-58°F. This first-hand experience helped me understand some of the differing practices of cavers in different regions regarding such matters as: travel speed, pack size and contents, type of clothing, and camping (not often done in *Mammoth Cave*). Such considerations are as well thought-out as at *Jewel Cave*. The conclusions are different, however, because of nature of the cave itself, as well as the attitudes of the surrounding community.

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