August 1994

Cave Research Foundation Newsletter, Volume 22, No. 3, August 1994

Sue Hagan

Mick Sutton

AUGUST 1994 VOLUME 22, NUMBER 3

CRF Newsletter

CAVE RESEARCH FOUNDATION

Hamilton Valley

Roger McClure and Richard Zopf

Exciting things have been happening on our Hamilton Valley property. Since the last newsletter, we have had numerous work sessions. One weekend, over three tons of trash were removed from the valley and added to the ton or so at our holding area. All of this trash, over four tons, has now been removed to the local landfill—a great job by all those who helped.

Considerable work has been done on the old tenant house, both inside and outside. The plastic outhouse from down in the valley has been overhauled and installed nearby. The house serves as a good place to crash (dry floor space) while at Hamilton Valley. We will be installing some of our old bunk beds there later this summer.

Thanks to the efforts of Eastern Operations Manager Jim Borden, we now have some of our own—JVs John and Nancy Korabik and their son—living on the property. We have rented them a portion of land just off the Hamilton Valley Road on which they have installed their trailer. Their presence will aid in controlling use of the property by unauthorized individuals as well as providing security when our construction gets underway. They are also getting to know the neighbors, and are helping to bridge the gap between the local community and our project. We are delighted to have John and Nancy on board.

We encourage every one to visit the property, stay there a while (in the tenant house or tent camp). It's your property. We do ask that while at Hamilton Valley you respect the privacy of the Korabiks; the trailer and the lot on which it is located is their home.

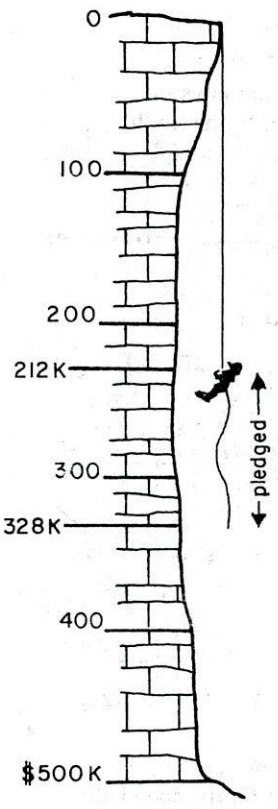
Roger requested that the Kentucky Division of Forestry survey our property and assist us in developing a forestry plan. In May Roger spent a day on the property with the Chief Forester from the Central District, who will provide us with a description of our woods, a list of recommendations, and a forest map. We will be developing a land management plan when we gather all the necessary information. If you have any ideas or inputs, please provide them to us.

We have cut and bailed some hay on the property this year and hope to make a few dollars from its sale. We will be having a gravel road put in back to the building site this summer; construction of the road commenced during the July expedition.

Continued p. 4...

Building Fund Update

Here is the list of contributors to the CRF building fund since the last newsletter:



Help feed us more rope!

Douglas Alderman, Anonymous, Chris Beck, Lee Blazek, Central Kentucky Karst Coalition, Phil DiBlasi and Jan Hemberger, Kip Duchon, Cheryl Early, Dave and Sue Eckland, Joseph Davidson, Bill and Sarah Bishop, Paul Hauck, Mike Lace, Janet Levy, Richard Maxey, Roger McClure, Bob Osburn, Larry Pursell, Paul Rubin, Jenny Sabie, Barb Schomer, Ted Scott, Gregory Sholly, Robert Taylor, Pat and Richard Watson, Dave West, Karen Willmes, Richard Young, and Bruce Zerr.

***

If you have not yet done so, we ask you to please make a contribution to the Fund (or a pledge) as soon as possible. Our goal is to have 100% participation—to date, we have about 33%. We can reach our goal if everyone participates. Unlike most organizations, CRF has no dues. Consider the benefits and publications you receive at no cost, and most certainly consider the opportunities you have had to work in some of the world's greatest caves. We now ask for your financial help in building a home of our own. Send contributions and pledges to: Cave Research Foundation, Roger McClure, Treasurer, 4700 Amberwood Drive, Dayton, OH 45424.

INSIDE:

CRF NEWSLETTER Volume 22, No.3
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BULLETIN BOARD

Address Changes: Please send all address changes to Richard Zopf, 830 Xenia Avenue, Yellow Springs, OH 45387. Tel: 513-767-9222 (before 10 pm eastern). Also, if you have an **E-Mail Address**, please send it to Richard. Future address lists will include e-mail addresses.

Typists needed for Mammoth Cave trip reports: For about ten years the Mammoth Cave operation of CRF has attempted to use computers to store, organize, and access trip reports. Today, most reports are typed directly into a database and we are making slow progress in entering old reports, starting from CRF's birth.

If you have access to a computer and are willing to type in reports, your help could certainly speed the process, while at the same time, you can enjoy some of the history of the exploration of the longest cave. Just contact Richard Zopf, 830 Xenia Avenue, Yellow Springs, OH 45387-1628. Tel: 513-767-9222 (before 10 pm eastern).

A rate increase for Mammoth Cave expeditions has gone into effect. Fees are now $13 per day (on long expeditions the daily fee drops to $10 after three days participation) and includes camp meals, cave food, and lodging, whether utilized or not. The operation manager reminds everyone that fees are used to pay for equipment, and other operational expenses.

Photo credits: We omitted a photo credit in the last issue. The photograph of Claude Charbet on p. 15 was by Red Watson. This issue's photographs are by Roger McClure (p. 4) and Scott House (p. 6)

Deadline for next issue is October 1. Please make sure your submissions for the next issue reach us by the above date. SH/MS

Notes From Here and There

Married in St. Louis April 23, 1994, were Doug Baker and Carrie Christopher. CRF sends their best wishes as well as thanks to the couple who (rumor has it) moved their wedding plans ahead to keep the caving calendar open for the limited bat cave season in September.

Winner in the "Silly Signs" contest of the London *Free Press* was a Canadian, Jack Adamson, who, on a Mammoth Cave Historic Tour, snapped a picture of the sign reading "Bottomless Pit, 105 Feet Deep." (Source: *Mammoth Monthly)*

Reader's Write

A History Lesson in Salts Cave:

I had two rare pleasures during the April Mammoth Cave expedition; one was surveying in Salts Cave, and the other was rubbing elbows with a bit of the history of Mammoth Cave. The history I am talking about is Roger Brucker. Whenever he talked, there was a certain passion about the man, a glow, a fire in his eyes. But when he talked about caving, the fire seemed to gather a new intensity. You could tell the caves were truly his "mistress".

As the trip progressed through Salts, we learned tidbits of history, some real , and some not-so-real. There was mention of "the" secret trip. There was talk of the archeological projects. At one point Roger pointed out the eyeless cave tree, a very rare life form. It had been a while since he had been in Salts Cave, and he pointed out that the tree did have a slow growth; this specimen had grown approximately two feet since he had seen it last!

For those who are worthy, had paid their dues, and seen the light, there was the Ceremony of the Spirit of the Bear. At Mummy Valley, we saw an enactment. The location has a sandy stage, almost as if the original architects of the cave ("the aborigines") had planned for this moment. The stage allowed us to see shadowed on the far wall [the actors backlit by a pair of carbide lamps] two bears crawling, converging together, and engaging in mortal combat.

At the top of one of the climbs, we learned a dance. I am uncertain of the dance's origins, but Roger insisted we learn it and pass it on. Its primary use should be when you find mother nature has not cooperated with your plan, such as finding the entrance of the cave is flooded or some similar situation. It starts with a slow shuffling of the feet, together with a low cry of "phooey, phooey, phooey, phooey". This continues some thirty seconds, and then ends with a small jump forward and shouts of "SHUCKS". I guess it could be applied to other areas of life, and is appropriately named The Disappointment Dance.

A plus to the trip was we added several hundred feet of new survey to to the length of Salts. It seemed like a reward to a very satisfying day.

Steve Irvine

Editors' Note: One of the joys of caving with CRF is the people you get to meet. It's great when someone like Roger Brucker makes a surprise reappearance. Thanks, Steve, for sharing your experience, and thanks, Roger, for being there "then and now".

Open Letter to Researchers Working in and about Mammoth Cave:

Thanksgiving Expedition has traditionally been attended by significant numbers of JVs. It also lasts long enough to accomplish follow up trips on projects. Many JVs have indicated that they would like to become involved in various disciplines of cave research. Couple this with the fact that many of you have research projects that require various levels of support and we have the ingredients for a productive science-oriented expedition.

My vision for Thanksgiving (23-27 November) is to invite researchers to contact me with their requirements for support of their projects. If you have graduate students, I might suggest they be brought to the expedition so we can engage them in data gathering. I would also like to request anyone interested in attending the expedition to give me a list of those sciences that they are interested in learning more about. Using this information, I will be able to put together significant support for those people with projects.

If any researcher would like to put together an informal slide presentation or talk, I would be happy to organize evening discussion sessions.

Philip DiBlasi

Phone: 502-637-2030 (h) / 502-852-6724 (w); INTERNET: pjdiblØ1@ulkyvm.louisville.edu

Mysterious Mail:

About three months ago, we began getting all sorts of correspondence addressed to my other half, Pat Helton...most of which we had no idea why the likes of Red Watson and others would be sending this stuff to us. Finally it occurred to my fevered brain that perhaps I should check and see if there's another Pat Helton in the CRF membership. Hey, hey! What about that? Pat Helton in Lubbock, Texas, who's the Guads Chief Cartographer.

Anyone corresponding with Pat Helton should check if they are sending it to the "correct" Pat Helton, either in Fremont, California, **or** in Lubbock.

Bruce Rogers & Pat [Fremont] Helton

Editors' Note: Pat Helton of Lubbock is also a CRF Director; we're sure Pat Helton of Fremont has had some interesting reading as a result of the confusion.

April Board of Directors Meeting

Mel Park

The Board met on April 23, 1994, at Horse Cave, Kentucky. Dave Foster, Executive Director of the American Cave Conservation Association, was our host and addressed the Board on the goals and purposes of his organization. With CRF establishing a land preserve and a national headquarters near the ACCA headquarters, our two organizations will need to cooperate in new ways. While our missions are distinct, we must avoid competing for the same scarce resources and we must present a solid front to the public in our shared aims of cave conservation and education.

For two years, CRF has been considering entering into a contract with the National Speleological Foundation. The NSF is an independent, non-profit corporation established to provide sound investment management for speleological organizations. They manage, for example, several major accounts for the NSS. Treasurer Roger McClure presented the Board with a draft contract with the NSF which was approved in an amended version.

Roger further reported that the current status of the Hamilton Valley Building Fund is encouraging but there is still a long way to go. To date, we have expended $111,000 for the land acquisition, planning fees and other start-up costs. There is $101,000 cash on hand and $116,000 has been pledged. Some of those pledges, however, will not be coming in before the next three to five years.

The Board approved cooperative agreements in the Missouri and Mammoth Cave areas. These contracts bring government funds to support specific research projects conducted by CRF personnel.

Bob Osburn, Building Committee Chairperson, reported that engineering studies for the Hamilton Valley building site had not yet been completed. Gravitometric and other studies will be done within a month so that the engineering plans, for which we have already contracted, can be finished. The Board approved the lease and financial contracts for the housing of John and Nancy Korabik on the Hamilton Valley property [see p.1].

The present slate of officers, Mel Park as President, John Tinsley as Secretary, and Roger McClure as Treasurer, was re-elected to office. The Board accepted with reluctance and regret the resignation of Mick Sutton as Director.

Mel Park advised the Board of his appointment of Tom Madison as Operations Manager for the Guadalupe Escarpment Area, replacing Dick Venters who had to resign for reasons of health.

The next Board of Directors meeting will be held November 11 to 13, 1994, in Menlo Park, California, and will be hosted by John Tinsley and Janet Sowers.

Hamilton Valley ...*Continued from p.1*

The garbage crew at Hamilton Valley

Work trips took place in April and May. In April, the foundation of the old burnt house was successfully attacked, and the old septic tank finally found—only thirty feet from the shallow well! Trees damaged by the big ice storms were pruned. In May, we moved a load of sandstone from Kay and Stan Sides' property to the building site, then hauled trash with the help of a rented tractor and wagon. The building site was mowed in the rain, and the building outlines were roughly staked out. Soil depth measurements were taken within the main building site.

Again we would like to thank all those who have put in so much work on the property these last few months. We welcome and appreciate all your comments and inputs.

WANTED: Here are a few items that are needed for the on-going work at Hamilton Valley:

All kinds of gardening and yard tools, both hand and power;
Building tools, both for putting together and for taking apart;
Fencing tools and staples;
Wheelbarrow;
Garbage cans.

If you have any of the above in good condition and are willing to make a gift of them, contact Richard Zopf, 830 Xenia Avenue, Yellow Springs Ohio 45387 Tel: 513-767-9222 (before 10 p.m. eastern).

Work Party Participants: *April*—Red Watson, Richard Zopf, Pete Lindsley, and others; *May*—Darlene Anthony, Jim Borden, Alan Canon, Phil DiBlasi, Bob Eggars, Jack Freeman, Jan Hemberger, Nancy and John Korabic, Roger McClure, Rick Olson, Mel Park, Red Watson, Richard Zopf.

Sprucing up the old tenant house.

Management Changes at CRF-Guadalupes

The new manager for CRF's Guadalupes area operations is Tom Madison, of Carlsbad, NM. (1047 Julian Street, Carlsbad, NM; Ph.: 505-885-2810). Tom replaces Dick Venters, who recently retired for health reasons [see May, 1994 *Newsletter*]. Tom notes that a major change in direction is underway, with less emphasis on cartography and more involvement in other research projects. The pared-down cartography program will be leaner but meaner, with a renewed emphasis on quality.

Bryan Holcomb (919 Silver Ave. SW, Albuquerque, NM; 87102; 505-842-5156) is the new Guadalupes Personnel Officer, replacing Dick Des Jardins. Thanks to Dick, who served as Personnel Officer for the past several years.

The November 1994 Annual Meeting Of The Cave Research Foundation

The Annual Meeting of the Cave Research Foundation will be held on November 11-13, 1994, at the U. S. Geological Survey in Menlo Park, CA. Menlo Park is located on the scenic San Francisco Peninsula, half-way between San Francisco and San José, and is an acclaimed tourist Mecca. If you've not been here recently, it's time that you visited us.

We are planning several events, hoping to inject the Annual Meeting with opportunities to learn from one another, share ideas, and meet CRF-ers from around the country. California has been among the more scientifically productive of recent CRF operations, and is home to both the Lava Beds and the Sequoia / Kings Canyon (Redwood Canyon, Lilburn Cave, Mineral King) projects. We are especially excited by an opportunity to share some of our findings with our counterparts from elsewhere in the U.S. and vice-versa.

Highlights planned for the weekend include the **Saturday Afternoon Symposium** featuring 10 to 15 speakers, each delivering a short presentation on his or her research, and the **Sunday Morning Field Trip** across the San Francisco Peninsula to the California Coast to show off our spectacular scenery and active geology, and still enable folks to catch a 2:00 pm or later flight. So come and join in the festivities. Devote a day or two to learning about CRF projects and meet fellow CRF cavers from around the USA.

Call for Presentations: We want you! If you are involved in CRF-sponsored research, either completed or in progress, you are invited to share your work on Saturday afternoon. Contact Janet Sowers to indicate your intentions and topic. You will be allotted 15 minutes and may use slides or overheads.

Logistics: If flying in, use San Francisco, Oakland, or San José airports. San Francisco usually offers the cheapest fares and the most flights. Let Janet Sowers know your arrival date, time, flight number and airport and we can arrange to meet you. Limited bed space and semi-infinite floor space are available chez Tinsley and Sowers and at other local homes.

Location of meetings: The meeting will take place in the USGS building at 345 Middlefield Road in Menlo Park, about 20 minutes south from SF Airport, west of Hwy 101. Use the Willow Road West exit from Hwy 101 and proceed through 5 stoplights to Middlefield Road, then turn right at the Chevron station and then left onto Linfield Ave, opposite Menlo Park Fire Station No. 1. The meeting will be held in the Building 3 Conference Facility. That area is adjacent to a construction zone, and traffic patterns change without notice, so follow the signs indicating "USGS Map Sales" because we will meet in the same building.

Directions and last-minute details will be sent to those who have indicated that they plan to attend.

Janet M. Sowers
6746 Glen Mawr Avenue
El Cerrito, CA 94530
510-236-3009

John C. Tinsley
1040 Oakland Avenue
Menlo Park, CA 94025-2206
(h) 415-327-2368;
(w) 415-329-4928

Draft Agenda:

Saturday

10:00-12:00 am: Open Meeting—President's address, treasurer's report, science committee report, new members, awards, area reports, personnel changes, etc.

12.00-1:15 pm: Lunch—Bring your own, or walk to nearby delicatessen.

1:15-1:30 pm: "A Home For CRF"—Overview of the planned Hamilton Valley, Kentucky field station and CRF Headquarters, featuring photographs of this beautiful karst valley adjacent to Mammoth Cave National Park.

1:30-5:00 pm: Symposium—Research Presentations.

7:00 pm: Banquet; location to be announced. Reserve your spot by sending Tinsley a $20.00 check payable to "Cave Research Foundation" and marked "1994 Banquet". **October 15** is the deadline for reservations.

Sunday

8:00-12.00 am: Field Trip—"Geology of the San Francisco Peninsula" Tinsley and Sowers will lead an auto tour of the region's geology, including the San Andreas Fault and 1989 Earthquake sites; you'll become ex-officio members of the Pacific Crustal Plate, at least for a few hours. We'll get you to your departing flights by 2:00 pm or later. Contact Tinsley to reserve a slot on this nifty trip. Bring a camera!

Proposal to Inventory Less Extensive Caves at MCNP

As reported in the last *Newsletter,* CRF has had discussions with Mammoth Cave staff regarding a proposal to locate the "smaller" caves (i.e., shorter than 340 miles!) in certain watersheds north of the Green River within the park, and to inventory their contents. The proposal has now been completed, and work is expected to begin this summer. Training of JVs for the the recognition of biological, geological, and cultural features will take place at upcoming expeditions. Additional inventory expeditions may also be scheduled. The program will be coordinated by Operations Manager Jim Borden; Jim's co-authors for the proposal are Mick Sutton and Scott House.

EXPEDITIONS

MAMMOTH CAVE

Spring, April 23-24

Leader, Tom Brucker

Mammoth Cave: A Salts Cave team finished 450 ft. of new survey in relatively large passages near the Pike Chapman Collapse. Several passages remain to be surveyed and resurveyed.

One party replaced 1100 ft. of survey in the Cocklebur area. Another mapped 600 ft. of smallish passages between Rhoda's Arcade and Burley's Way (in the "Hooflands Avenue" maze). The rope hanging in Lucy's Dome was inspected and removed. It will be replaced prior to planned work on the extensive passages leading from Lucy's Dome towards Colossal Cave.

Two parties worked in Logsdon-Hawkins River. One group climbed up the Morrison Connection rope, then dropped another pit connecting lower Morrison Cave with the pit complex in the Logsdon T-survey. The second group went to the far end of the T-survey and found flowing water, suggesting that a lower level trunk conduit may lie beneath this passage. The crew completed 220 ft. of trunk cutarounds in waist-high water. We must be persistent and observant in this area; the grubbiest crawl may reveal miles of river passage.

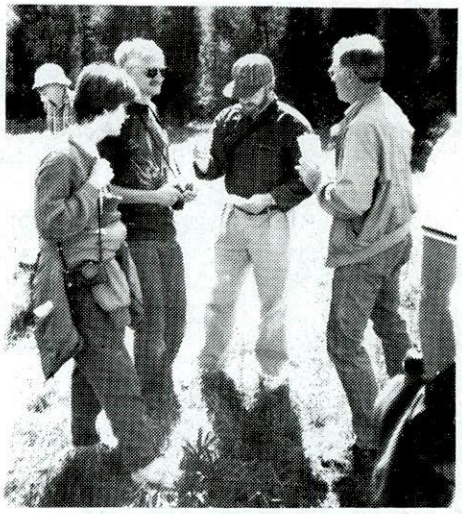
One party went to the Rift in Roppel to attempt a climbing route into a high lead, but a lack of ledges made a planned traverse approach impractical.

History: Two parties systematically recorded names along Sparks Avenue on the Historic Tour to continue the Historic Register project.

Smaller caves: One party surveyed two small caves in the Sal Hollow area north of the Green River for a total of 90 ft., and confirmed some other cave locations This is one of the few areas that can be reached on foot from the Maple Springs headquarters. They also made a preliminary biological inventory of the two caves.

The route to Bluff Cave on Joppa Ridge was confirmed for a future visit by archeologists. Ice blocked the entrance! (Previous visits have also recorded ice in the spring here). A relatively rare fern grows around the entrance area, and care should be exercised not to trample them.

Etc. The expedition hosted a Board of Directors Meeting on Saturday [see p. 3], and two visiting directors from California stayed over for a cave trip the next day. We also had a visit from the Grand Old Men of caving—Red Watson and Roger Brucker! In addition, there was some work on the Hamilton Valley property [see p. 4].



Western Directors Janet Sowers, Pete Lindsley and John Tinsley with Roger McClure at Hamilton Valley.

Survey Crews: *Salts Cave*—Sue Hagan, Kathleen Womack, Roger Brucker, Steve Irvine; *Cocklebur*—Lynn Brucker, Nancy Korabic, Grant Van Hemert, Chris Werner; *Rhoda's Arcade*—Mick Sutton, Sue Hagan, Richard Zopf, John Tinsley; *Morrison Connection*—Neil Hammond, Russell Conner, Kent Wilson, Bill Baus; *River T-Survey*—Dick Maxey, Todd Cramer, Elizabeth Winkler, Terri Hammond; *Roppel, Rift*—Rick Olson, Dick Market, Mike Yocum; *Historic Register*—1) Bob Parrish, Chris Parrish, Kevin Downs; 2) Bob Parrish, Chris Parrish, Janet Sowers; *Sal Hollow*—Cheryl Early, Joyce Hoffmaster, Richard Hand, Sheila Sands; *Bluff Cave* (surface)—Tom Brucker, Richard Zopf;

Thanks to Maggie Tucker and Jan Marie Hemberger for helping out on the surface.

Memorial Day, May 28-29

Leader, Phil Bodanza

On this beautiful spring weekend, 47 JVs mapped a total of 8,200 ft. (including 5,500 ft. of new survey) and worked on various other projects.

History: Two parties went on wide-ranging trips for the Mammoth Cave Register of signatures. Photos were taken of significant name clusters for presentation at the Mammoth Cave Science Symposium in July. Meanwhile, the "Names Without Faces" photography crew shot ten rolls of film in Gratz Avenue.

Flint Ridge and Historic Mammoth: Three parties went to the upper levels of Unknown Cave, completing 660 ft. of new survey and 300 ft. of resurvey in the intricate canyon and breakdown maze above the Unknown Pit and along Ball Trail. Another party went to the Salts-Unknown link and used a cable ladder to enter a new area of small stream passages which seem to carry all the water from the Link area.

The Historic area survey progressed with a trip to resurvey Calypso Avenue, the Bottomless Pit bypass (off Blacksnake Avenue). They completed the 500 ft. main line of the passage, despite one party member accidentaly setting various pieces of gear on fire.

River and Roppel: Two parties went in the Doyel Valley Entrance. The first crew completed 2000 ft. of trunk Logsdon River resurvey near the Fritsch Avenue junction. The next day a party finished up another 1000 ft. of trunk resurvey and pushed some leads up the T-Survey. With back-to-back 12+ hour trips, area cartographer Bob Osburn is obviously possessed when it comes to finishing up loose ends.

A party went to Roppel to push the outer edges of the Spallway. Ten years ago, this passage was dry and dusty, but it has since flooded, and there is now ponded water. Not prepared for these conditions, the crew moved on to a drier objective.

Smaller Caves: Six parties went to Ganter Cave on the north side of the Green River (one can tell where the expedition leader's priorities were). The main passage of Ganter and some of the side leads are now completed and only the many cutarounds, multiple levels, and small leads remain. One of the crews also ran a surface survey from the Ganter entrance to the Mary Parker Cave entrance.

Two parties went into the Buffalo Creek system and managed to push the final upstream crawl into walking-high trunk, with no indication of the cave ending soon.

Two parties went into the Buffalo Creek system and managed to push the final upstream crawl in this wet cave into walking-high trunk alternating with breakdown. They stopped in a room 60 ft. wide and 15 ft. high, with no indication of the cave ending soon. South of the Green River, there was a trip to Smith Valley Cave where a party surveyed 400 ft. in a virgin, twisting canyon, which continues.

Etc.: Rick Olson collected samples from the Historic area for his soil renitrification experiment.

Survey Crews: *Mammoth Cave Register*—1) Larry Pursell, Harry Grover, Bob Parrish, Chris Parrish, Doug Alderman; 2) Bob Parrish, Harry Grover, Ellen Berlin, Steve McLuckie; *Gratz Ave. photodocumentation*—Chuck Swedlund, Steve Taylor; *Unknown Cave*—1) Paul Hauck, Dick Young, Nancy Korabic, Jonathan Zimmerman; 2) Mike Lace, Chris Beck, Dave Prival; 3) Paul Hauck, Dick Young, Jonathan Zimmerman; 4) Mike Lace, Chris Beck, Seamus Decker; *Calypso Ave.*—Scott House, Tim Schafstall, Darrin Fowler; *Logsdon River*—1) Bob Osburn, Paul Rubin, Tom Smith, Joe Levinson; 2) Bob Osburn, Tom Smith, Gail Jackson; *Roppel*—Bill Koerschner, Greg Sholley, Jon Smith; *Ganter Cave*—1) Dave West, Karen Willmes, Roger McClure; 2) Darrin Fowler, Scott House, Ellen Berlin; 3) Seamus Decker, Laura Decker, Alan Glennon; 4) Dave West, Karen Willmes, Dave Prival; 5) Paul Rubin, Joe Levinson, Jane Prendergast; 6) Joyce Hoffmaster, Laura Decker, Tom Grant; *Buffalo Creek*—1) Stan Sides, Steve McLuckie; 2) Joyce Hoffmaster, Tom Brucker, Jane Prendergast; *Smith Valley*—Tim Schafstall, Tom Grant, Gail Jackson; *Nitrification study*—Rick Olson, Phil Bodanza.

Thanks to Patti Porter for doing a great job as camp manager—can she get the food out, or what? Thanks also to Jim Borden for his patience, to Scott House for his lead lists, to Bob Parrish who was always helping without being asked, and to Phil DiBlasi, also for helping in the kitchen without being asked.

MISSOURI

April through June

Report by Mick Sutton

Work continued on the Eleven Point District (US Forest Service) mapping and bioinventory program. There was a trip to White Oak Hollow to inventory three neighboring caves. Two of these are short and simple, lacking a dark zone. The third—Dripping Cave—is not very extensive either, but does include a dark zone and a stream passage, with typical stream fauna. The cave is notable for its large quantities of liquid mud.

There was a return trip to the Bliss Camp system, where a party put in 500 ft. of large trunk survey. The main line appears to end just beyond the survey limit, though there are enough side leads to fill out another survey trip. Last year, we had seen large numbers of surface (spot-handed) crayfish in the downstream pools; this time they were absent, but cave fish, not seen last year, were present. The airspace in the entrance crawl was lower than usual, resulting in a prolonged ear-dip.

A two-day float trip down the Eleven Point River eliminated some small caves from the to-do list. Horseshoe Camp Cave is most notable for its difficult access—on the river bank partway down a fast chute. It consists of a short crawl with two entrances. Ironwood Cave, opposite White's Creek, also has two low entrances but features a fairly large room and more diverse fauna. Nearby along the same bluff, the crew found, mapped, and inventoried another small cave (Sassafras Cave). In addition, there was a supplementary inventory of Buck Bay Shelter, and an assessment of some (so far) inaccessible sites. The Horseshoe Bend Caves have never actually been entered as far as we can determine. One of them looks very promising but will need either a difficult rappel from the bluff top or a 20 ft. extension ladder. The other small entrance, high on the bluff under an overhang, would take considerably more effort than it is probably worth.

The same crew later did a three day float to map National Park Service caves along the Current River

between Powder Mill and Van Buren. The caves mapped were: a small unreported cave in a bluff near Polecat Hollow; a larger unreported cave with three entrances near the Log Yard; Beal Arch Cave, consisting of one very large room with two entrances; and Echo Cave (a large shelter). Finally, two unreported caves on private land within Van Buren were located; the larger one contains about 300 ft. of stream passage. Cardareva Cave, which we've been trying to locate for some time, remained elusive but we later found an old photo showing the entrance and have a good idea of where to look next time.

The first trip of the 1994 Powder Mill Cave season was shortened by threatening weather. Instead of a planned long trip to the Hell Hole series, the party spent some time on clean-up survey at the far end of the Windy Crawl passage.

Finally, there was a short trip to Allens Branch Cave to complete a long-planned clean up by removing inner tubes, a raft, and a tarp left near the entrance by the initial upstream explorers in the mid 1980s [see "The Endless Crawl", February 1992 *Newsletter*]. It was not an easy task, especially the haul from the entrance to the car.

Survey Crews: *White Oak Hollow*—Mick Sutton, Sue Hagan; *Bliss Camp*—Mick Sutton, Sue Hagan, Jeremy Cooper; *Eleven Point and Current River Float Trips*—Scott House, Patti House, Sue Hagan, Mick Sutton; *Powder Mill*—Doug Baker, George Bilbrey, Sue Hagan, Mick Sutton; *Allens Branch*—Steve Irvine, Linda Irvine.

CALIFORNIA

Lava Beds, Feb. 19-21

Leader, Janet Sowers

After discussions with the Monument's Resource Management staff, the five participants continued the (mostly) surface survey of Elmers Trench on the north side of the Monument road. With chilly, overcast weather and 8 inches of snow on the ground, this was not an ideal day for surface survey.

The survey began with a traverse through Liberty Cave. The cave ends in two tiny skylights too small to exit, but we were able to connect to the surface survey here. A reconnaissance cave inventory was also completed for the cave. The surface survey continued northward, tying in Mossy Rock, Monument Road, Bandersnatch, and Hat Caves.

Next day, three cavers left, but Cyndie Walck and Scott Scheibner recruited three visiting cavers from Hayward, and continued the Elmers Trench survey from Hat Cave to Concert Hall Cave. They also mapped the interior of Emerald Star and Concert Hall Caves. There is still some trench to survey farther north.

Participants: Janet Sowers, Bob Martin, Jason Martin, Cyndie Walck, Scott Scheibner.

California Notes, 1993

[Excerpted from SEKI-LABE News]

Lava Beds; Janet Sowers

Lava Beds National Monument has requested our assistance in documenting the locations of caves. This will involve setting a permanent brass marker at each entrance, and will reduce the confusion about which cave is which in a park with over 200 caves! Using a Global Positioning System, we will determine the coordinates of each entrance; this is a superior way to obtain locations in an area where magnetism of the lava makes compass readings unreliable. In addition, a reconnaissance inventory will be completed for each cave. In the 1994 season, we plan to document at least 25 caves.

Projects completed last year include:

- the survey and documentation of Fleener's Chimney Cave;
- further cave survey and inventory concentrating on small, undocumented caves—there are still unmapped caves at Lava Beds! ;
- a survey of fern species at cave entrances;
- development of a Monument-wide cave numbering scheme based on lava tube system;
- development of a database for inventory information.

Sadly, the old CRF field house will be torn down this year. The structure, thought to be a prefabricated building from a local WWII Japanese internment camp, was home to CRF-Lava Beds for five years. It was a rundown shack, but it was home, and all agreed that it had the best view in the Monument. The NPS has given us some work and storage space in the Visitor Center. CRF and NPS hope that a research facility can eventually be built to house the many researchers, including CRF personnel, that frequent the Monument. CRF has indicated its willingness to contribute to such a facility.

We welcome the new Monument Superintendent, Craig Dorman, and the new Chief of Resources Management, Chuck Barat. We look forward to working with them. We continue to enjoy a great working relationship with Resources Management staff member Barney Stoffel, who has shown his continued dedication to cave research and management, and to working with CRF.

Lava Beds National Monument is located in northeastern California, just across the border from Klamath Falls, Oregon. It is on the north flank of the Medicine Lake volcano. Beautiful country—we hope to see you there!

Participants: Bill Devereaux (survey & inventory), Chris Richard (ferns), [?] Strassburg (survey & inventory, database development) Bruce Rogers (survey & inventory), Chris Roundtree (survey & inventory, database development), Mike Sims (ice monitoring, survey & inventory),

Janet Sowers (survey & inventory), Cyndie Walck (survey).

Lilburn Sediments; John Tinsley:

The Pebble Pile sinkhole, responsible for most of the recent aggradation in Lilburn Cave appears to have stabilized temporarily, and is not dumping large volumes of sediment into the cave. It is, however, continuing to fill up with sediment washed down Pebble Pile Creek, and from sloughing of the over-steepened slope that bounds one side of the sink. The bank collapse is threatening the old road (the Redwood Canyon Trail), which will probably have to be relocated in a few years. The sediment in the sinkhole has risen more than 20 ft. since it was first measured.

Within the cave, the 30-ft. high Z-Room sediment sampler was overtopped with 35 ft. of water, according to the piezometer monitoring equipment installed there. The sediment wave accompanying the flood pulse was 25 ft. high, showing that a large volume of sediment is still moving through the system independent of the Pebble Pile Sink. This was verified in two ways. First, Redwood Creek terrace deposits that were not even inundated in the low runoff of 1991-1992 were eroded and replaced by a new suite of deposits sculpted into low terraces by a waning Redwood Creek during the winter of 1992-1993. Second, a reconnaissance dive into Big Spring by Bill Farr found the spring still nearly choked with fine sand at about 70 ft. depth. A likely cause for the high sediment load is drought-induced collapse of sinkholes. The cave has demonstrated once again that the problem of studying the sediment budget is not a simple one.

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The Z-Room sediment sampler was relocated to points in the Hex Room and Lake Room, to check on flooding and sediment amplitudes in the central portion of the cave. A series of ledges that trap sediment were located in the Z-Room; inspection of these natural traps should take the place of the old static sampling device and enable us to determine when peak discharges cease to be associated with large volumes of sediment—then there will be a greater likelihood of finding the Big Spring orifice unoccluded, as it was during the late 1960s and early 1970s.

Lilburn Exploration; Peter Bosted.

The six cartography expeditions of 1993 saw 2400 ft. of new passage and 500 ft. of resurvey added to the Lilburn maps. Over half the new survey came from an extensive area above the Hex Room that was reached by an airy traverse. Interesting deposits in this area included charcoal and malachite. An extension of the Attic-Attic region showed promise of heading towards Mays Cave, but became too tight.

Bill Farr redove the upstream rise; he reached the same point as on his last dive, but this time was able to survey the 250 ft. of penetration. His survey may help to identify good locations to search for the hypothetical northern extension of Lilburn.

In the middle part of the cave, some extensions were made to Pandora's Passage. No trips were made to the south end, partly due to the unusually wet conditions after five years of drought. At the end of 1993, the length of Lilburn Cave was a little over 14 miles.

Two trips were made into May's Cave, resulting in 570 ft. of survey. The cave is more extensive and complex than previously thought, and hard pushing may eventually reveal a connection to Lilburn.

Lilburn Hydrology; Mike Spiess

During 1993, Linda Urzendowski completed her Master's Thesis, *Spectral analysis of the flow behavior of Big Spring, King's Canyon National Park.* Linda describes two distinct high-flow behaviors: 1) ebb and flow (flushing) at Big Spring that is 180° out of phase with the stage at the Z-Room; 2) in-phase response between the Z-Room and Big Spring when flows are 1-2 times base flow. Linda built a physical model that supports the sediment plug theory for the ebb and flow behavior. She has since moved on—her good humor and caving prowess will be missed.

Cave Inventory; Carol Vesely

This new project will establish a cave inventory protocol that can be used to assess cave resources and recommend management options for limestone caves. A pristine alpine cave, Panorama Cave, was chosen as the initial site of evaluation of the protocol. Two trips were made before early winter storms made access to the Mineral King area impossible. On the first trip in mid August, the cave was surveyed for only 100 ft. to a low airspace meltwater pool which blocked progress. A surface survey between the cave and its insurgence was completed.

The survey resumed in mid-September. After a couple of hundred feet, we were stopped by a sediment plug. We dug away the plug, only to be stopped by another one 30 ft. farther. By the time we removed the second plug, we lacked the time or body heat to continue the survey of this cold, breezy cave. We will return as soon as weather and snow melt permit in late summer. In the meantime, we will survey and inventory Overhang Cave, at a much lower elevation.

Panorama Cave survey crews: 1) Joel Despain, Bill Farr, Cyndie Walck, Carol Vesely; 2) Bill Farr, Jed Mosenfelder, Carol Vesely.

Phone Line: Mike Bettencourt.

To improve in-cave and surface-to-cave communications for researchers, the old phone line is being replaced. By the end of 1993, the new line, which has a higher capacity than the old one, extended from the Meyer Entrance to within 300 ft. of the Impossible Dream.

Mineral King: Glen Malliet

The first year of renewed activities in the Mineral King area consisted of two small expeditions to the scenic glaciated karst of White Chief Canyon during August and October. Because nearly all the participants had little if any prior experience in the area, a day was devoted to locating and identifying karst features in the two marble outcrops in the valley with Joel Despain's guidance.

A resurvey of Cirque Cave was started, and 440 ft. of passage from the main upper entrance (elevation 9,810 ft.) was surveyed. Review of the 1980 Rogers map indicates more than 1000 ft. of passage remain to be surveyed. A 2600 ft. surface traverse from Resurgence Slot down canyon to the Bogaz tied in cave entrances and other prominent features such as sinkholes and White Chief Creek. This extends the 1983 surface survey of Richards *et al.* and establishes a baseline for a planned 1:24,000 base map showing cave locations, areas of carbonates, other karst features, and trails.

Long-Term Ecological Monitoring at Mammoth Cave

Tom Poulson

As the seasonal consulting ecologist at Mammoth Cave National Park, one of my accomplishments has been the development of a proposal to fund a five-year start-up on long term ecological monitoring. Our proposal was judged best of those submitted to the NPS southeast region. It is second in line for funding, and is scheduled for fiscal year 1995. If all goes well we will have 2.7 million dollars within the year!

Philosophical Foundations: Ecologists have replaced the old equilibrium view of nature with a more realistic non-equilibrium model in which episodic natural disturbances are central to maintaining species diversity. NPS management philosophy has likewise changed from preserving the status quo to allowing natural processes to take their course. Unchanged is the NPS mandate for resource protection—hence, resource managers need long-term ecological studies to distinguish natural from man-made changes in ecosystems. To do this requires a coordinated approach to inventory, monitoring, and research that is driven by a conceptual framework. Hypotheses about the impact of different environmental stresses are developed by looking at both pristine areas and areas known to be adversely impacted. The monitoring of systems recovering from different degrees of man-made stress will provide further insights.

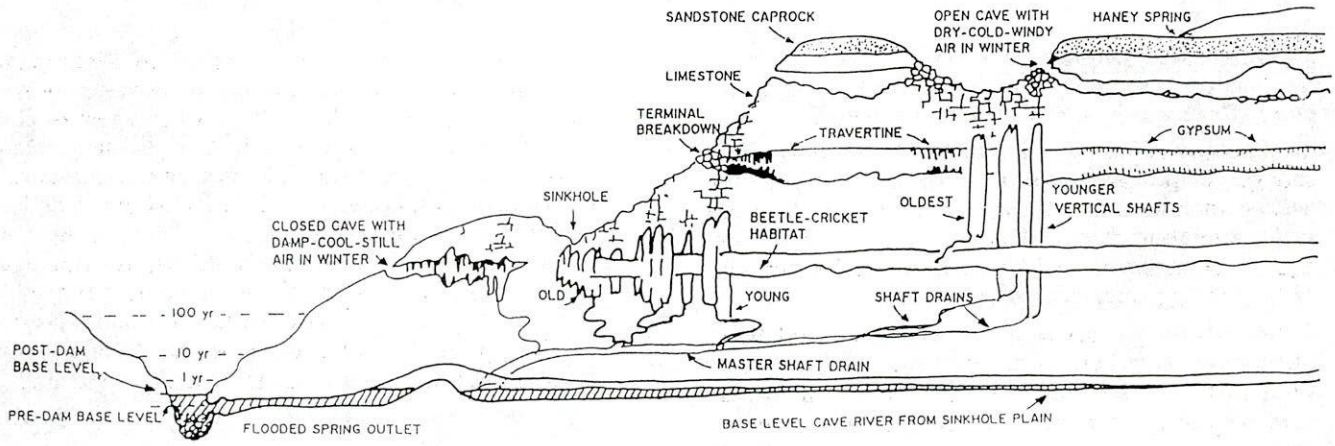
Scope: Global climate change is a potential threat, and continental change in air quality is a demonstrated threat, but we cannot affect changes occurring on continental and global scales. We therefore focus on the karst landscape and the caves within it because it is at these regional and local scales that the threats are greatest and our chances for protection and mitigation are greatest. With Mammoth Cave the centerpiece of an expanding International Biosphere Reserve, and with NPS membership on local and regional advisory boards, we will argue that sustainable economic systems depend on quality tourism and adequate supplies of quality groundwater and that these in turn depend on the integrity of cave systems.

Cave ecosystems are the main emphasis of the proposal, but all events which take place on the surface affect the subsurface. For example, we need data on how land use affects cave ecosystems, but we also need data on how dams affect the Green and Nolin River ecosystems. If the river systems are adversely affected by dams it will strengthen our argument for mitigating the effects of siltation on cave ecosystems by removal of Lock and Dam #6, and by changing water release patterns from the Green and Nolin River dams to more closely mimic natural floods.

...we will argue that sustainable economic systems depend on quality tourism and adequate supplies of quality groundwater and that these in turn depend on the integrity of cave systems.

Where, When, What and How to Monitor: Earlier hypothesis-driven studies have put us in a position to do the most effective monitoring using a combination of physical, chemical, and biological parameters. At a regional scale we are concerned with how patterns of land-use correlate with groundwater quality and ecosystem integrity in base-level streams. At a local level, under the Mammoth Cave Plateau, we are concerned with both aquatic and terrestrial ecosystems.

Regional Monitoring: Our groundwater monitoring plan depends on an evolving understanding of regional karst hydrology. Park hydrologists have built on Quinlan and Ray's delineation of multiple groundwater basins and their assertion that pollution



Zonation of habitats in Mammoth Cave

might be detectable only during floods. Thus Joe Meiman and Marty Ryan have used continuous monitoring to show that the major volume of pollutants enters cave streams at the beginning of flood pulses and that the kinds of pollutants are correlated with land use patterns. For example, non-point sources of contaminants can be identified by flood pulse tagging. By introducing different dyes into different sink points the relative contributions to the contaminant load from different sources can be identified by an in-phase relationship between dye recovery curves and contaminant pulses.

In addition to flood pulse sampling there will be synoptic sampling every month on the same date regardless of flow conditions. The sampling regimes will be carried out in groundwater basins with different land-use patterns. The parameters to be sampled include physical (turbidity, specific conductance, etc.), chemical (dissolved oxygen, nitrates, etc.) and biological traits.

If there are anomalies in the data, then topical studies will help to narrow the range of possibilities. For example, if high chlorides and sulfates are found without high bacterial counts then oil brine contamination is suspected; on the other hand, high chlorides with low sulfates may indicate contamination by road salt. A topical survey would then examine additional parameters, including bromide, and examine additional sites to identify the source(s).

We have hypothesized biological community signatures for different classes of pollutants—for example, we would expect that increasing levels of organic enrichment (e.g by sewage) would lead to a decrease in the proportion of troglobites and an increase in bacterial films, whereas chronic, low levels of toxins (e.g. from agricultural herbicide runoff) should lead to decreases in the larger predators and increases in short-lived prey species. The signatures dictate what to monitor within the broad categories of macroscopic organisms, microbial biofilms, and sediments. No one species can be used as an indicator for all types of pollution. Community measures, such as ratios of troglobites to troglophiles, are often more useful than the presence or absence of particular species.

Of course the biological, chemical and physical indices complement one another. The great advantage of biological indices is that they give an integrated response to past, ongoing, or episodic pollution that might not be detected by chemical analyses. And the advantage of chemical analyses is that they can be used at spring mouths to detect pollution even when the cave stream is not accessible for biological studies.

Local Monitoring: On the Mammoth Cave Plateau, horizontal (distance from entrance) and vertical zonations define biological processes and resource types. Upper level passages under the caprock are usually dry and sterile (the "Great Kentucky Desert"). Dry to damp upper level passages nearer the caprock edge harbor cave cricket/ beetle communities; upper level streams have a characteristic fauna, quite different from the fauna of periodically or permanently flooded base-level streams. The zones determine the kinds of threats and what to monitor to detect problems early enough to allow for mitigation.

Entrance communities depend largely on winter microclimates (e.g., cold, dry and windy conditions favor bats; cold, wet and still conditions favor cave rat and cave cricket communities). The most serious impacts to these communities have resulted from entrance modifications. This is of particular concern since the communities include several rare or endangered species such as gray and Indiana bats (both federally listed as endangered) and eastern woodrats. These species are also key trogloxenes, supporting characteristic invertebrate cave communities. Several entrances (including Frozen Niagara, Austin, and Great Onyx) will be monitored for climatic and biological parameters.

Beyond the entrance zone, anthropogenic disturbances include insidious types of damage such as lint accumulation, (only recently recognized as having

important effects on terrestrial invertebrate communities and speleothem development), inadvertent trampling of substrates, and deliberate vandalism.

Photo-monitoring stations will monitor gross changes in passage condition, while lint deposition will be measured by setting out dishes and periodically weighing them. Deep-cave terrestrial and aquatic communities will be monitored by periodically counting organisms at representative sites.

Conclusion: We argue for a coordinated relationship among research, monitoring, and management. We must consider much longer time scales than those typically of concern to NPS Superintendents and University scientists in order to distinguish between natural and anthropogenic changes. When changes are detected, they will provide a test of past hypotheses, and we will be able to evaluate possible causes, and suggest possible mitigation measures. Continued monitoring will then show whether management actions have been effective. But all monitoring will be for naught if we do not also mitigate the base causes of the ecological threats—unchecked population growth and uncontrolled economic growth. We need to show that a sustainable economy depends on the health of the ecosystems.

NPS/CRF Science Conference at Mammoth Cave

The Third Mammoth Cave Science Conference, sponsored by Mammoth Cave National Park and the Cave Research Foundation, was held July 5 to 6. Specialists in a variety of fields outlined on-going research projects, providing those attending (park employees, scientists, and JVs) a cross-discipline opportunity to raise questions, share viewpoints, and engage in thought-provoking dialogue.

As the week-long July expedition was already three day's underway, a number of JVs took time out from their caving to attend at least part of the conference. For some, this was the first time they had an opportunity to hear an in-depth discussion of the project(s) for which they have provided support. And for some researchers, this was an opportunity to meet those JVs who have been providing research support in a variety of ways.

The Conference also provided a forum for the discussion of NPS management issues. The artistic and historic value of a name painstakingly carved into a wall was debated against the need to preserve the natural resource. Bob Ward (NPS) argued that from a historical perspective all that is required is good documentation. Photographer Charles Swedlund made an impassioned counter argument that the signatures have intrinsic value as works of art. Swedlund and Larry Pursell gave fascinating presentations showing their different approaches to recording signatures. How best to market the park provoked remarks about the need for a park museum. The importance of long-term data-collection was underscored by a number of presenters.

The Conference was the first open forum for presenting CRF's proposed three-year small cave inventory. The presentation by Scott House centered on the scope and expected outcomes of obtaining and organizing baseline information on a large number of caves within the park. Among the many other presentations involving JVs were Paul Rubin's detailed reconstruction of the sedimentary history of Kaemper Avenue, and a discussion by Richard Zopf on the conservation aspect of management actions.

Rick Olson, both as a Resource Management staff member and as a very active JV, is credited with special thanks for coordinating the Conference. The NPS staff are to be commended for making the proceedings available before the end of the first day's meetings. Finally, many thanks to all the presenters who made the Conference the success it was.

The papers presented (reprints are available by contacting the NPS) were:

Archeological Coring at Adwell Springs, K. Carstens
Prehistoric Shell Mound Dwellers and Cavers of the Green River Valley, C. Hensley
MCNP Expedition into America 1993, M. Kennedy, G. Crothers, R. Ward and P. Watson
Mammoth Cave Register; A Qualitative Study of Signatures in Mammoth Cave, L. Pursell
Names Without Faces: The Photographic Documentation of the Names in Mammoth Cave, C. Swedlund
Marketing Recreation Use at MCNP, J. Burde, J. Martins, J. Peine, M. Fly
Long-Term Ecological Monitoring at MCNP, T. Poulson, R. Olson, J. Meiman, A. Gareau, J. Bradybaugh
Distribution and Ecology of the Aquatic Troglobitic Snail Antroselates spiralis, J. Lewis
Effects of Weather on Cave Crickets and Cricket Guano Communities T. Poulson, K. Lavoie, Kurt Helf
Resources Inventory of Less Extensive Caves within MCNP, M. Sutton, R. House, J. Borden
The Benthic Macroinvertebrate Inventory and Development of an Aquatic Biological Program for the Green River within MCNP, G. Schuster, G. Pond, E. Kimsey
The Natural Vegetation Types in Hart County with Notes on the Best Remnants and Rare Plant Species, J. Campbell
GIS Assisted Vegetation Classification and Mapping of the Big Woods, MCNP, K. Badger, M. Shell, J. Taylor
Surface and Subsurface Trunk Flow: MC Region, J. Ray
Lulamart Cave and the Hydrogeology of the Chester Uplands, M. Ryan, J. Meiman
Flooding of Sinking Creek, Garretts Spring Basin, Jessamine and Woodford Counties, KY, J. Currens, C. Graham

The Fundamentals of Limestone Dissolution in Natural Karst Waters, C. Groves, J. Slunder
Changes in Stage and the Affects of a Conduit-Adjacent Karst Aquifer, Mill Hole. D. Johnson, J. Meiman
Nonpoint-Source Pollutants in a Conduit-Flow-Dominated Karst Aquifer Underlying an Intensive-Use Agricultural Region, KY, J. Currens
Paleohydrology of Kaemper Avenue; MCNP, P. Rubin
The Development of a Karst Groundwater Hazardous Spill Map within the Drainage Basins of MC, J. Fry, J. Meiman
Cave Resources Management and Conservation, R. Zopf

MCNP Resources Staff honored by NPS

Attending the Third Mammoth Cave Science Conference was Southeast Regional Chief Scientist, Suzette Kimball, who presented awards to MCNP staff members Jeff Bradyhaugh and Joe Meiman. Resource Management Chief Bradyhaugh earned the Region's Natural Resource Management Award. While accepting the audience's congratulations, Jeff pointed out that the award reflected the hard work and dedication of the entire Resource Management staff. Joe Meiman was the Region's winner in the research category for his sterling work in advancing our knowledge of the regional hydrology.

In addition, past Superintendent Dave Mihalic, who recently left Mammoth Cave, was named Superintendent of the Year for Natural Resource Management, in recognition of his efforts to protect and manage the aquatic ecosystem. This has necessarily involved the building of political bridges with local communities, including working towards improving the local rural economy.

Hungarian Cavers at MCNP

Four Hungarians visiting the United States caving community made there way to Mammoth Cave where they participated in several days of the July expedition. László Kardos, Ester Varga, Tamas Kutas and Julia Szekeres got a taste of CRF surveying techniques under a variety of conditions. They contributed to two days of survey and ended their visit with a guided walk down major tour routes.

Kardos is President and Cofounder of the Pannonia Foundation, an organization devoted to cave exploration, research, conservation and rescue. Prior to coming to Mammoth Cave, the visitors toured Carlsbad Cavern, courtesy of the National Park Service, and attended the NSS Convention in Texas. where they demonstrated rescue techniques using the European vertical system.

CRF President Mel Park presented the group with an assortment of books and maps. Julia Szekeres, one of the group's two interpreters, did her first caving on the trip in Carlsbad and proudly boasted "just two weeks later I got to cave in the world's longest".

A Close Brush with Xibalba*

Bruce Rogers and Pat Helton

Eight of us, including Diana Northup and Ken Ingham, went down to the Yucatan on #6 of our whirlwind trips, promising a great deal of adventure to all—boy, was it ever. Besides ruining ourselves on more Maya cities than Carter has Little Liver Pills, we visited three caves. Grutas de Balancanché (Jaguar Priest Cave) at Chichén Itzá and Actún Loltún (Stone Flower Cave) are well-known. At Actún Loltún, the guide presented Pat (my other half) with a small, clear calcite crystal from the depths of the cave. He stilled our protests by launching into two rather chilling stories which took place in the late 1960's in nearby Campeché State. Both had a common thread: should one pot hunt in the sacred Maya places for personal gain, one may well unleash powers terminal to one's life. With a smile he pressed the crystal into Pat's hand—a token of power from a shaman and healer of an ancient culture to a healer of a more recent culture.

The third cave was near the Classic and Post-Classic city of Ek Balam (Black Tiger) north of Chichén Itzá. As I sat in tick-infested jungle doing water colors of the remaining buildings, the balance of the troops were apprised of "the trail that went out to the cave." Pat queried if that was LaCueva de Leoncillos (Little Lions Cave), that we had been trying to find for the last three trips. Well, the ranger didn't know, but seeing that this was our third trip to Ek Balam, he figured we were trustworthy (little did he know!) and asked if we'd be interested in taking a look at it? Would we! We eventually found out that the INAH (equivalent to our NPS) folks had made a quick look-see and found a very complex, "endless" cave with a goodly quantity of intact pottery and other cultural materials.

We met the ranger several days later at Ek Balam, unlimbered machétes and swung out past the milpás. We got to the cave after a half-hour jungle trek in the stifling heat and, after burning out the wasp nests in the entrance, went into a large room who's floor was covered with hundreds of potsherds about 1,400 years old. We took bug pictures for Diana, looked for carved glyphs, and waved to the bats. Not prepared for the squeeze into the balance of the several kms of cave, we called it a day. As we headed for French fries and guacamolé beside the pool at our secret hotel (hey, just because you're in the jungle you don't have to eat grubs and such...), we decided to return in '95 and map the place. The INAH has even less $$$ than the NPS so we figured that a nice BCRG grade 5.13 map might repay their always gracious manner toward the slightly crazed gringos who descend on them every year.

**Xibalba: the Mayan underworld*

Continued over...

Well, to make the story shorter, we all came down with histoplasmosis. Within three days of our return, everyone had fever to 101°, chest pain, coughing, aching joints, mouth ulcers, malaise, and general debilitation. Several of us were bed-ridden for up to a week, and everyone missed work up to two weeks. At the outset, I suggested histo might be the cause, but it took two weeks for the doctors to take the suggestion seriously. After oceans of tests and general thumping and poking, the consensus was, "Well, the tests don't positively show that what you have is histoplasmosis...but that doesn't mean you don't have it."

Apparently the most advanced medical testing for histo is at the 1880's level of sophistication. As one associate volunteered, "most confirmations of histo are done during autopsies!" On the good side, the doctors finally advanced histo from possible to probable cause. Pat wished that the calcite crystal had come with an owner's manual. In retrospect it seems the judicious application of the crystal, along with concurrent ingestion of chicken soup, could probably have brought about a miracle cure within a month or two.

We will have to make a better assessment as to the desirability of spending two or three days in the cave surveying it for the INAH based on how severe everyone's sensitivity turns out with the 1.5 hours of exposure we had this last trip. Perhaps a day or two at poolside at the Hotel Dolores Alba munching French fries and drinking Montejo Dark might be a better use of the time.

Elementary Cave Location

Walter Johnson

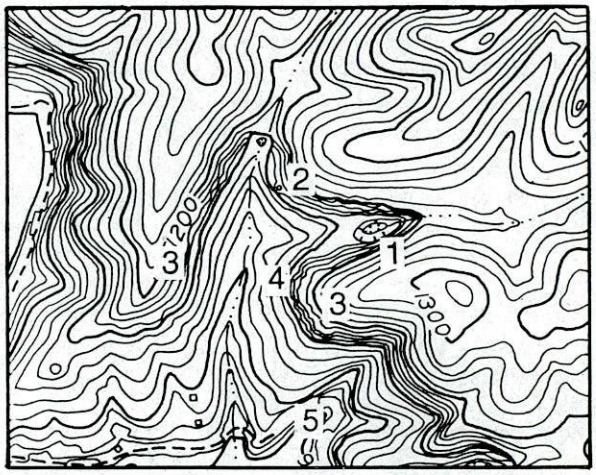
[As interest in the smaller caves of Mammoth Cave National Park intensifies, techniques for locating unrecorded karst features are likely to become increasingly important. Walter Johnson has field-checked large areas of the park and has documented many "new" caves, sinks, etc.—Eds.]

Using topographic maps should be the first step in locating karst features. A map can not be a substitute for getting out and walking, but lots of time (and energy) can be saved by finding likely areas before heading out into the woods. The following points have been gleaned from ridge walking in the Mississippian Plateau and Chester Escarpment regions of Indiana and Kentucky, and from the Cumberland plateau of Tennessee (Link, 1956; found after I had to figure most of it out by myself the hard way!). These are areas of relatively low structural dip and fairly thick, widespread limestones. These hints may not work in areas with different conditions.

The map shows a fairly typical area in eastern Kentucky. Some features, such as the sinkhole at #1, are very conspicuous and draw immediate interest. Others, like the sinkhole at #2 (that tiny little dot in the bent contour line) take a little more effort to see. A majority of karst features, if shown at all, are hidden in the contour lines. Most of these can be perceived only by slightly bent contour lines, or a slight flattening of the slope on a hillside, as at #3.

A possible spring just to the right of #5 is indicated by the unusually flat area just above the 920 ft. contour. A cliff is shown just north of here by the converging of several contour lines. Possibly there are old resurgences, definitely a good place to look.

Small gullies are frequently good places to look for karst features, especially when they end on the hillside (e.g. #4). Also of interest here is the outward-bent contour indicating a flattening of the slope just below where the gully ends. This can be an indication of an old swallow hole for the gully. Gullies are often shown as going all the way to the valley bottom when they don't. One short "valley" shown reaching the Ohio River on an Indiana topo. map is really a series of sinks on the hill top following an old stream course that drops over a 150 ft. cliff!



My favorite way to start searching a map is to find the elevations of sinkhole saddles (the point where water would flow out if you filled a sink up) and ridge saddles (the lowest point on a ridge crest). These points can indicate former base-level elevations (at least locally), elevations where karst features are likely to be found. Another obvious place to look is to follow the elevations of known karst features.

These few tips are not the only ways to armchair ridge walk, but they are a start. The only real way to find anything is to look at everything; so get out there are start looking!

Reference: Link, Cord H., Jr., 1956, *Prospecting for Caves,* N.S.S. Bulletin, No. 18, p. 30-32.

The Underground Reader

44th Field Conference Guidebook, Carlsbad Region.

New Mexico Geological Society, 1993. 357 pp, soft-bound, $55, available from NMGS, Campus Station, Socorro, NM 87801.

Reviewed by Jeffrey Forbes

In 1993, for the first time since 1954, the New Mexico Geological Society returned to the Carlsbad, New Mexico area for their annual field conference. The conference guidebooks have become legendary as the most comprehensive and definitive sources of information pertaining to a particular region of New Mexico. The 44th *Field Conference Guidebook to the Carlsbad Region* is no exception.

Although intended primarily for geologists, this year's *Guidebook* contains a wealth of information of interest to Guadalupe cavers. The *Guidebook* is divided into two parts: the first third consists of geologic road logs, while the remainder contains a series of 26 detailed articles on the geology, hydrology, mineral resources, and history of the Carlsbad area.

As most cavers familiar with "the Guads" are probably already aware, the world-famous caves of the region are developed in limestones that were deposited during the Permian Period, approximately 250 m. years ago. These limestones were deposited around the margins of a huge inland sea, areas now referred to by geologists as the "Permian Basin" and the "Delaware Basin".

The caves of the Guadalupe Mountains developed long after the close of the Permian Period, probably within the last 15 million years or so. None of the caves have the usual "epigenic" origin, whereby infiltrating surface waters dissolve the limestone. It is now nearly universally accepted that the Guadalupe caves are of "hypogenic" origin, having developed when ascending hydrogen sulfide derived from deep petroleum reservoirs was oxidized to sulfuric acid, which in turn dissolved out huge chambers at approximately the level of the ancient water table.

The road logs in the Guidebook provide mile-by-mile descriptions of the rocks and surface features along approximately 600 miles of highways and back roads in the Carlsbad area. Here you can read about the origin of "tepee structures", or obtain directions to see a single 18-foot long selenite crystal that apparently crystallized in an ancient sinkhole. You'll even learn how Last Chance Canyon and Sitting Bull Falls acquired their names.

Interspersed with the road logs are "mini-papers" that describe particularly interesting features along the routes. Written by some of the living legends of Guadalupe geology, some of the mini-papers are real gems, containing fascinating tidbits of the local history, along with the geologic story. Fascinating black and white photographs make the history come alive, such as the 1907 photo of a day in the life of four guano miners in Carlsbad Cavern.

For cavers, the highlights of the Guidebook would have to be a pair of cave-related articles: "Geologic Walking Tours of Carlsbad Cavern" by Carol Hill and "Elemental Sulfur in Caves of the Guadalupe Mountains" by Kim Cunningham, Harvey DuChene, and Charles Spirakis. These two papers are significant new additions to the literature on Guadalupe caves.

Carol Hill's paper leads one on a self-guided geologic tour of the main tourist trails in Carlsbad, with 34 stops along the way describing many of the important features in detail. A nice cave map accompanies the text, showing the locations of each stop. The tour leads one from the Tansill Formation with its enigmatic tepee structures at the cave entrance, into the underlying Yates Formation near the bottom of the entrance passage, and finally into the massive (non-bedded) Capitan reef itself. Cavers may be interested to learn that radiometric dates obtained on tilted and untilted stalactites attached to Iceberg Rock bracket the fall of the huge quarter-million ton boulder at somewhere between 200,000 and 500,000 years before present.

The article by Cunningham et. al. provides details regarding the distribution and morphology of elemental sulfur deposits in Cottonwood, Carlsbad, and Lechuguilla caves. The sulfur generally occurs as canary-yellow, finely crystalline deposits that are believed to have precipitated upon oxidation of ascending hydrogen sulfide, either beneath or above the water table. By far the largest sulfur deposits discovered to date are in Lechuguilla Cave. Here the cumulative mass of sulfur is estimated to be several tens of tons, and the authors suggest that this cave may contain more elemental sulfur than all other known caves in the world combined! Given the size of these deposits and their unique status, one can see why concerns regarding the potentially catastrophic consequences of a sulfur fire in Lechuguilla were partly responsible for the decision to ban carbide lamps from the cave.

In addition to the caves, numerous other geological wonders occur in the vicinity of Carlsbad, and many are described in the *Guidebook*.. For example, few are aware that the 2300 miles of "borehole" within the IMC underground potash mine southeast of Carlsbad constitutes the longest "cave" in the region, and that the Waste Isolation Pilot Plant repository qualifies as the deepest (2150 feet below surface), though Lechuguilla is not far behind. These and other mysteries await with the *NMGS 44th Field Conference Guidebook.*

[This review is is excerpted from the April, 1994, *Guadalupe Hooter*, newsletter of CRF's Guadalupe operations]

CALENDAR

CRF Annual Meeting, November 11-13.
The meeting will take place in Menlo Park, California. Details are on p.5 Plan to attend.!

MAMMOTH CAVE

Summer, Aug. 12-15. Mick Sutton & Sue Hagan, 314-546-2864.
Labor Day, Sept. 2-5. Bob Osburn, 314-772-5813.
Columbus Day, October 7-10. Neil & Terri Hammond, 317-786-2092.
Thanksgiving, Nov. 23-27. Jan Hemberger & Phil DiBlasi, 502-637-2030 (H); 502-852-6724 (PD, W)
New Year, Dec. 29-Jan 1, 1995. Dave West & Karen Willmes, 301-460-4299 (DW) or 301-366-5038 (KW).

First and last dates are arrival and departure dates. Notify the expedition leader or Operations Manager, Jim Borden, 606-223-2677 two weeks in advance. Some of the one-day expeditions may be extended to a second day at the discretion of the expedition leader.

CALIFORNIA

Lava Beds, Sept. 3-5. Janet Sowers, 510-528-6515..
Mineral King, Sept. 3-5. Mike Spiess, 209-434-3321.
Lilburn, Oct. 8-10. Carol Vesely & Bill Farr, 818-792-7619.
Mineral King, Oct.22-23. Glen Malliet, 209-754-6674 (w) & Joel Despain, 209-565-3341 (w).
Nov. 5-6. Dry Cave; Pat Helton.
Lilburn, Nov. 11-13. Stan Ulfeldt, 510-820-2063.
Lava Beds, Nov. 24-27. Bill Devereaux, 503-363-3831.
Annual Meeting, Fresno, Jan. 28, 1995. Mike Spiess, 209-434-3321. (field schedule, project review, and planning).

To ensure a spot on an expedition, JVs must call the expedition leader, who will have current information on projects and conditions, in advance.

MISSOURI

Powder Mill Trip: August 27.
Other trips: dates to be announced.

For Powder Mill Cave trips, call Doug Baker, 314-878-8831 (H) or 314-233-6618 (W). Other trips will usually be based from Van Buren in the Ozark National Scenic Riverways. Survey and inventory trips take place at frequent intervals, and scheduling is usually flexible enough to accommodate the schedule of out-of-state JVs who wish to sample some Ozark caving. Please call Scott House (314-282-3246), or Mick Sutton (314-546-2864).

FITTON CAVE, ARKANSAS

Six expeditions are being planned for 1994, including one three-day expedition in August—dates to be announced. For information and to sign-up for an expedition, call Pete Lindsley, 214-727-2497 or Danny Vann, 501-848-3308.

GUADALUPES

Aug. 13-14. Dry Cave; Pat Helton.
Labor Day, Sept. 3-5. Carlsbad Caverns NP.
Oct. 8-9. Dry Cave; Pat Helton.
Columbus Day Oct. 10-14. Lincoln NF; Dick Venters.
Nov. 5-6. Dry Cave; Pat Helton.
Thanksgiving, Nov. 24-27. Carlsbad Caverns NP.
Pre-Christmas, Dec. 17-18. Carlsbad Caverns NP.

Note: The October Dry Cave expedition date was given incorrectly in previous announcements.

To sign up for an expedition, notify the Personnel Officer Bryan Holcomb, 919 Silver Ave. SW, Albuquerque, NM 87102; 505-842-5156, at least one week in advance. For Dry Cave Expeditions, write to Pat Helton, 3517 77th Drive, Lubbock, TX 79423.

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