



# CAVE OWNERS' NEWSLETTER

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of the  
Department of Conservation and Economic Development  
Commonwealth of Virginia  
for the Cave Owners of Virginia

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## Cave Commissioners Attend National Management Symposium

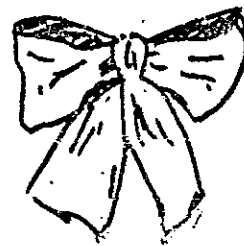
The Cave Commission was well represented at the National Cave Conservation and Management Symposium held October 10-13 in Rolla, Missouri. Lynn Ferguson, Evelyn Bradshaw, and John Wilson of Richmond with wife Mary were all on hand. During two of the four days we attended classroom-type presentations at the Missouri School of Mines; the other two we were able to go on field trips arranged by the organizers.

Participants included a good cross-section of people who work for the state or federal government in the caving field, of scientists in the field of speleology, commercial/show cave staff, and caving conservationists. It was an excellent opportunity to learn and share.

I was interested in the study that had been done by Jerry Vineyard of the Missouri Geological Survey on cave data bases across the country. He sent out a questionnaire to find out how many caves each state had and how the information was maintained. Computers have become very helpful in storing this kind of information and most of the states that are rich in caves have made use of computers to keep up with the information. You might be interested in cave counts that he presented, although he had an incomplete count from Kentucky where there is not one state-wide survey but several independent ones. (Of course, one might suggest that there are fewer distinct caves in Kentucky because they are all part of one tremendous network of underground channels known as Mammoth Cave--which is the longest known cave in the world.) What intrigued me was the fact that together Virginia and West Virginia have more caves than Missouri, which now stands in the Number One position. (See p. 8)

## Holiday

## Greetings



## Commission Gets New Member

Last summer Governor Robb named John Graves of Luray for a four-year term to replace his father, Ted Graves of Luray Caverns, on the Cave Commission. Reappointed were Roy Powers Jr. of Duffield and Philip Lucas of Altavista. At its January 1984 meeting the Commission named officers for this past year: Roy Powers Jr., Evelyn Bradshaw, and Philip Lucas to continue to serve respectively as chairman, secretary, and treasurer. Lynn Ferguson accepted election as vice-chairman. Evelyn Bradshaw is from Fairfax County and Lynn Ferguson from Farmville.

This newsletter is edited for the cave owners of Virginia by the Secretary of the Cave Commission, Evelyn W. Bradshaw, 1732 Byron St., Alexandria VA 22303. Letters to the Editor and articles are welcomed.

**List Virginia Caves Closed to General Visitation**

(This does not include commercial caves)

Allegheny County

Garter's  
Lowmoor  
Perkin's

Augusta County

Barterbrook Spring  
Blue Hole  
Gypsy Hill Park  
Madison Saltpeter  
Staunton Quarry

Bath County

Blowing  
Starr Chapel Saltpeter (only during bat hibernation season)  
Robin's Rift  
Withero's (during bat hibernation season)

Botetourt County

Catawba Murder Hole

Craig County

Carper's  
Sizer's Drop

Frederick County

Bean's

Giles County

Cance  
King's (Dead Horse)  
Percell's  
Tawney's Cave

Highland County

Arbegast Saltpeter

Lee County

Gallohan #1 and #2  
Gibson-Frazier  
Litton #1 (closed during bat maternity season)  
Lucy Beatty  
McClure

Montgomery County

Mill Creek Pit #1 and #2  
Rollston's

Page County

Ruffner #1

Roanoke County

Layman's  
New Dixie

Rockbridge County

Cash's  
Doll House  
Schowalter's  
Swink's  
Cave Spring Cave

Rockingham County

Melrose Caverns

Scott County

Grigsby  
Lane Cave (Red Hill)  
Natural Tunnel Caverns

Shenandoah County

Battlefield-Crystal Caverns  
Shenandoah Wild

Smyth County

Interstate 81

Tazewell County

Cassel Farm Caves  
Fallen Rock  
Higgenbotham's #2  
Hugh Young  
Stonley's (Divides)  
Ward Cove Caves (and others in that vicinity)

Washington County

Wolf Hill

There are a number of caves not listed above with some restrictions as to access. Also some of the above may be opened to some individuals or groups under some circumstances. The caving community maintains a more detailed "Closed Cave List," so that responsible cavers will know which caves not to visit, in deference to the owner's wishes. The Cave Commission would be glad to have information from owners that would aid in keeping the total list up to date.

**Endless Caverns Bought**

After being on the auction block for some time, Endless Caverns was bought by Virgil Berdeaux of Harrisonburg. We understand he and his son will refurbish the property and operate it again as a tourist attraction.

## General Cave Commission News

The Cave Commission has been a part of the Virginia Department of Conservation and Economic Development. As of January 1, 1985, that Department is being split up into two Departments, by action of the General Assembly. The Cave Commission will come under the new Department of Conservation and Natural Resources. This is not expected to cause any changes in the role of the Commission.

The Cave Commission has established liaison with the Virginia Research Center for Archaeology in Yorktown, as they are interested in artifacts in caves and we're interested in data they may have on rockshelters as a part of our mandate to keep track of all of Virginia's underground resources. Thanks to a grant from the Richmond Area Speleological Society, it will be possible to pay someone to go to Yorktown and copy all the data they have relating to caves and rock shelters. This information will be maintained by the Virginia Speleological Survey and available for serious research purposes and statistical studies.

The Richmond Area Speleological Society approved a grant to the Commission of \$1,500 to assist with its publication and other programs publicizing the importance of Virginia's cave and karst resources, and related administrative costs.

As you may not have realized, the Commission is not funded by the state. While most citizens serving on state commissions have their costs of participation (travel, etc.) reimbursed, this is not so for the members of the Cave Commission. Luckily, members of the caving community have been very supportive of the role of the Commission. The Robertson Association has regularly made small annual grants to help the Commission with its sign installation work and communications (as, for instance, this newsletter).

Since dumping of radioactive or hazardous waste and disposing of storm and construction runoff in sinkholes could definitely affect caves, the Cave Commission is trying to keep informed about

state plans in these fields, and will be prepared to provide expert advice based on our knowledge of karst topography etc. as needed.

## Virginia Wilderness Bill

While it's not karst land, it is gratifying to learn that the Virginia Wilderness Act of 1984 was passed by Congress and sent to the President for signature. It establishes eleven new wilderness sites totalling some 56,000 acres of forest land. Four other sites totalling 26,000 acres were placed in a study category, with the Forest Service to study the four sites and answer questions regarding the impact of wilderness designation on future economic development nearby.

## Vandals Caught; Rewards Paid

There have been two payments from the reward funds offered by the caving community for information leading to the arrest and conviction of cave vandals. They happen not to have been in Virginia. The offer still stands. The reason there was no payment in the Washington County case is that the cave owner happens to be the chairman of the Vandalism Reward Commission and didn't think it would be appropriate to claim the reward. If you could use an extra \$500, make sure you have a cave protection sign in your cave.

## Literature Available

Did we ever tell you that \$10.95 (or \$9.00 to Sierra Club members) plus \$1.00 postage will get you Hiking the Old Dominion--the Trails of Virginia from Bob Bader, Route 2, Box 78, Brookneal VA 24528? This is stated to be the most comprehensive guide ever published to the state's more than 3,000 miles of hiking trails, with route directions to trailhead, trail length and difficulty, points of interest, botanical and zoological features, and characteristics of the region's terrain.

Fifty cents will get you the 1984 "List of Publications and Maps" from the Virginia Division of Mineral Resources, Box 3667, Charlottesville VA 22903 (804) 293-5121. The Division provides geologic, energy, mineral resource, and topographic map information to a wide variety of clients.

## Conviction under Virginia Cave Law

Last spring down in Washington County there was a conviction under the Virginia Cave Protection Act. One Donnie Mullins got into Perkins Cave (which is gated and kept locked, so he was definitely trespassing). He had a couple of juveniles with him. The judge fined him \$100, which was suspended on condition he instead do ten hours of community service with the Cave Commission. Roy Powers, Commission chairman, planned to have Mr. Mullins install some cave protection signs in Tazewell County.

An earlier case involving Fountain Cave in Augusta County was dismissed with the judge only insisting the defendants publicize the cave protection law at their college, Madison University. He bought the defense allegation that the young men didn't really know it was against the law because there was no cave protection sign in place.

In another case of cave vandalism the wording of the signs proved an excuse for the student involved. In this case the young man entered a cave where the sign was in place. It stated "This cave is protected by Virginia law etc. etc." So he asserts that he left that cave and went down the road and found another without sign and got his formations for a high school science fair project there. We don't know just where he got the formations because we got wind of this through the science teacher when the exhibit turned up. Plans are being made to clarify that the cave protection act applies to all caves in Virginia!

## Varner's Cave Surveyed

The District of Columbia Grotto for a while was using as a field headquarters an old farm house near McDowell. They did some cave exploration in that vicinity and completed an up to date survey of Varner's Cave in Highland County. Maps of the cave were given to the owner, to the Virginia Speleological Survey, and were published in the Grotto newsletter last June. On a May trip, a couple of Virginia big-eared bats (an endangered species) were sighted. This is a small cave with two pits and quite a bit of water.

## Volunteer Program of Forest Service

We have learned that the U. S. Forest Service has a volunteer program that allows one to get involved in interesting conservation work. There's no pay but sometimes incidental expenses are covered. Some colleges have agreements with the Forest Service so their students can earn college credits while volunteering. If you know someone who'd like to give some time and spend it outdoors, or if you yourself would, contact any Forest Service office in the area where you wish to serve and ask for an application.

## In Defense of Endangered Species

Hopefully the rare amphipod found only in Madison's Saltpeter Cave in Augusta County and nowhere else in the world (and on the endangered species list) has been saved for now. This is one of three caves under Cave Hill, on which the Town of Grottoes was building a water tank. Somehow the contractor went ahead and dumped a whole bunch of dirt and rocks and trees into a sinkhole on top of the caves. This was precisely what the Cave Commission, which knows how surface conditions can impact on caves underneath, had hoped to avoid by negotiations with the Town. A lack of communication somewhere! Since the damage had been done, the question was how to undo it, and we're happy to report that arrangements were made to remove most of the debris from the sinkhole. The Commission continues to monitor the situation but has so far noted no further obvious problems.

It's easy to sniff contemptuously about the importance of saving various endangered critters, such as snail darters, big-eared bats, isopods, and the like. But we we just read where a zoologist up in Maine is researching a way to grow a rare marine worm that is in demand for research into Alzheimer's Disease and for cancer. It has been collected by scuba divers but this is a tedious and expensive method. We mention this because it can happen that saving small rare species may also save human lives.

## Federal Cave Resources Protection Act

The organized caving community is trying to get a Federal Cave Resources Protection Act passed by Congress this year. This legislation will apply only to federally owned caves and lands, primarily those administered by the Fish and Wildlife Service, the Bureau of Land Management, the National Park Service, and the Forest Service (but it would also apply to Defense Department land, a matter of real interest right now in Tennessee). It will not affect state or privately owned property or caves.

These are the goals of the proposed bill:

- \*To give caves and their contents a legal definition, removing the grey areas surrounding their status;
- \*To require that caves be considered in land use planning;
- \*To place a major portion of the burden for management on users by emphasizing the use of volunteer contracts and cooperative management programs;
- \*To allow federal land managers to withhold sensitive cave location information;
- \*To statutorily exempt speleothems from mining claims;
- \*To protect unique cave life and habitat;
- \*To protect taxpayers from expensive liability suits and subsequent settlements against the government arising from recreational use of public wildlands (*this is the old liability question, caves closed because the owner fears liability suits when a cave explorer gets hurt even though the owner was not involved--the Virginia law has protection of the owner from liability*);
- \*To require that money collected for special use fees or civil penalties be returned to the agency for use in administering management programs and for restoration projects (*now it goes back to general funds that may not benefit caves at all*).

Key members of Congress to hear from the caving community include five Senators and

five Representatives, all from other areas than ours except for Virginia Congressman Frederick C. Boucher. We appreciate his support for a bill to provide for protection and management for federally owned wild caves.

## Virginian Elected Officer

of Cave Group

The Virginia Region of the National Speleological Society consists of cavers and caving groups primarily in Virginia, West Virginia, and the D.C. area. While its chairman currently resides in Oxon Hill, Maryland, and the vice-chairman and treasurer are from West Virginia, the secretary, recently re-elected for a third term, is Chris Amundson of Roanoke, Virginia. The Region has business sessions twice a year.

## Tidewater Caving Group Receives Conservation Award

At the national convention of the National Speleological Society in Sheridan, Wyoming, last June, the Tidewater (VA) Grotto was the recipient of the annual Conservation Award given to a chapter that has done outstanding work for conservation during the year. This hard-working group has earned a reputation in Virginia and West Virginia for its many cave clean-ups. Its members have also given presentations about speleology to local groups and it assists youth groups who wish to know more about caving. The award consists of a plaque on which the winner's name is inscribed and a small monetary grant.

## Cave Resource Management Training

The nation's first accredited cave resources management course is being created under Project "We'll Help!" It is sponsored and funded by the Richmond Area Speleological Society of Richmond, Virginia. Two national training seminars are scheduled this winter: one in Salt Lake City, Utah, February 15-17, and the other at Elkins, West Virginia, March 16-17.

The seminars, which include 15 hours of classroom instruction and testing in all phases of wild cave management, will be video taped and used as the basis for a video extension course available through the University of Missouri's School of Forestry, Fisheries, and Wildlife in Columbia, Missouri. Representatives of the U. S. Forest Service, Bureau of Land Management, Fish and Wildlife Service, the National Park Service, along with members of the National Speleological Society, the American Cave Conservation Association, the Cave Research Foundation, and other recognized authorities in various cave management fields are working together in the development of the course curriculum.

\*\*\*\*\*  
Enrollment in the seminars is open to anyone involved in the management of state, federal, or privately owned caves. For more information about details on the West Virginia seminar, contact H. M. "Rocky" Parsons, Route 1, Box 27, Ireland WV 26376.  
\*\*\*\*\*

Long-range plans call for making the video extension course available to state and federal agencies, conservation organizations, and others interested in training both professional and volunteer cave management personnel for a small fee to cover the cost of shipping and handling. Arrangements for both professional and college credit can also be arranged through the University if desired.

This project is an outgrowth of increasing involvement and cooperation of the nation's caving organizations in the management of both publicly and privately owned wild cave

resources. Participants in the project include the Richmond group's parent organization, the National Speleological Society, as well as a number of other local and regional NSS groups, among them the Northwest Caving Association and the Salt Lake City (Utah) Grotto, which will host the first seminar, and the Virginia Region, which will host the second. Jer Thornton of Boise, Idaho, Conservation Chairman of the NSS, was named coordinator of the project by the Richmond group. Dr. George N. Huppert, who teaches geography at the University of Wisconsin, is the project's curriculum director.

### Breathing Incident

It was a cave-related incident but not a cave rescue. Seems a family (father and two sons, age 11 and 13) were exploring Breathing Cave, Bath County VA. All went well until the father fell and decided to send the boys for help. Their idea of how to do this was to try and drive their father's car. With two such immature drivers they got as far as the next ditch and fencepost. Luckily by the time rescue arrived the father had made his way out of the cave.

We learn that the present owner of the cave (Joseph Lockridge, Star Route A, Box 14, Burnsville VA, 24420--Tel. (703) 396-6257) expects cavers to stop for permission at the green house next to the white one where cavers used to sign a waiver before visiting Breathing. He is consulting a lawyer and is considering closing the cave. It would be most unfortunate if this popular tourist and beginner cave were closed. Extreme courtesy is advised at this time.

## Cave Conservancy of Virginia Holds Annual Meeting Gives Awards

The Cave Conservancy of the Virginias held its annual meeting at the Friars Hole Cave Preserve in West Virginia. Their 1984 Conservation Awards were presented by President Linda Baker in a brief evening ceremony in the big room in Snedegar's Cave, which had been lighted for the occasion. The following were the recipients of this year's awards:

### Individuals

John Holsinger, Phil Lucas, Evelyn Bradshaw, and Tom Spina.

### Organizations

The West Virginia Office of The Nature Conservancy  
Richmond Area Speleological Society  
Tidewater Grotto

The following landowners were recognized this year as among our area's outstanding owners:

Everett and Ruth Propst, owners of the Sinnett-Thorn Mountain Cave System  
Dr. Anatol Ryplansky, former owner of Slussers Chapel Cave  
Lyll D. Steger, owner of Madison Saltpetre Cave  
Bradford Cobb, owner of Massanutten Caverns  
Roscoe L. Harper, owner of Hellhole Cave

As outstanding cave conservationist of the year in our area, the awards committee picked Bob Custard, who has served on both the Virginia Cave Commission and the Board of the Cave Conservancy of the Virginias. He helped plan and run ConCave-One last year and was recently managing the Grand Caverns property.

The awards, as has become customary, were mounted photographs of cave pictures. This year they were pictures by Salon Winner Tom Kaye of Falls Church, Virginia.

Linda Baker summarized the year's efforts of the CCV as follows:

1. Fund-raising efforts for cave conservation are going well.
2. CCV sponsored a clean-up and restoration trip in Madison Saltpetre Cave in July 1983.
3. CCV co-sponsored and co-directed CONCAVE-1, the massive clean-up and restoration of Fountain Cave in October 1983.
4. CCV supported board member Bob Custard as he spearheaded efforts to effect the clean-up of a sinkhole in Augusta County, Virginia, which endangered a threatened species of isopod and a rare species of amphipod in Madison Saltpetre Cave.

5. Dr. Anatol Ryplansky donated his cave, Slussers Chapel Cave, to the Cave Conservancy, and in effect through the Management Plan assures the preservation of two threatened species of aquatic invertebrates. The Stewardship Committee, headed by Janet Queisser and composed of cavers and non-cavers, continues to work on the Management Plan. Any help which one would like to volunteer is most welcome.
6. Rocky Parsons, Vice-Chairman, announced plans for the installation of West Virginia Cave Protection Act signs in West Virginia caves. CCV members are asked to assist in placing signs in the caves.

## NON-GAME WILDLIFE PROGRAM ENTERS THIRD YEAR IN VIRGINIA

Virginia is one of a growing number of states with a tax-check-off plan to aid non-game wildlife. Under the plan Virginia taxpayers can designate part or all of their Virginia tax refund to a special fund which finances the Non-Game Wildlife and Endangered Species Program administered by the Commission of Game and Inland Fisheries. Persons not receiving a tax-refund can still contribute by sending their tax-deductible contributions directly to the Game Commission, Box 11104, Richmond VA 23230-1104.

The history of the Virginia program began in 1980 when an environmental activist with the Richmond Audubon Society suggested the idea to her husband who was then serving in the Virginia House of Delegates. In the three tax years of existence, Virginians have contributed \$370,000, \$417,000, and \$460,000 to the program. With tax contributions in hand, in most instances the Game Commission can obtain matching funds from the Federal Endangered Species Program and the Pittman-Robertson Act.

The Program's funds have been divided among three broad categories of projects, with endangered species getting top priority. Money for the study and assistance of Virginia's endangered species came just in time to fill the breach left by a cutback in funding from the U. S. Fish and Wildlife Service. Species under study include the Bald Eagle, Peregrine Falcon, Delmarva Fox Squirrel, Red-cockaded Woodpecker, Big-eared and Indiana Bats, sea turtles, and certain mussels found in southwestern Virginia rivers. A booklet entitled "Virginia's Endangered Species" has been published and is available at no cost to the public.

Other program priorities are wildlife inventories/investigations and public outreach to create a permanent constituency in support of wildlife. Much of this latter is aimed at school children.

## CAVE DATA BASES

- From article by Jerry Vineyard

Response, he reports, was very good for the eastern part of the United States, but other than Texas, there was no response from the western states. This does not necessarily mean that there are no state cave surveys in the West; simply that he had no responses, nor, in most cases, did he know to whom to send a questionnaire to. Perhaps this paper will elicit response from any cave data base custodians who were not included.

### What Is a Cave?

While this paper emphasizes numbers of caves and numbers of cave maps as a way of comparing state-to-state, it is not an exact relationship. There is no universally accepted definition of a cave. Pennsylvania requires that caves be "measurable in feet"; Tennessee has an arbitrary minimum dimension of caves that are 50 feet long or 40 feet deep or have a 30-foot pit. Missouri records "divable springs" because karst springs are simply water-filled caves. And the Missouri files contain maps of springs up to 300 feet deep and over a quarter mile long.

Some cave data managers handle the short/shallow problem by including "for the record only" caves. The problem with this plan, though, is that an arbitrary length limit that may seem reasonable to cavers, who are usually not interested in short caves or shelter caves, may not adequately characterize the cave resource, which may be viewed differently by, say, archaeologists. Until there is a universally accepted definition of what constitutes a cave, it will be difficult to compare cave resources from state to state.

### Characterization of the Resource

The enactment of cave protection acts in at least 17 states, and current efforts to persuade Congress to pass a national cave protection act, indicate a growing awareness that caves are a resource and not a liability. The question, then, is how well the various cave data bases characterize the cave resource in specific areas? The answer would be particularly important, for example, in trying to pass a cave protection act in a state where there was no cave data base to demonstrate what resource required protection.

While a questionnaire survey of sixteen states cannot adequately represent the entire country, some tentative conclusions can be drawn. First, it is readily apparent that there is wide variability in the completeness of resource inventories from state to state. Second, it is

equally apparent that most of the data is closely held and that few decision-making bodies (i.e., government agencies and quasi-governmental planning groups) have access to information that can adequately characterize the quality and extent of cave resources. Third, computerization promises to revolutionize the processing of cave data, but shows little indication of solving the complex sociological problems inherent in building and maintaining cave data bases. Fourth, most cave data bases are developed and maintained on a volunteer basis, with support from governmental agencies in only a few states.

The fifth and perhaps most significant conclusion is that there is little sense of community among the cave data base managers. There are no uniform standards for data reliability, no provisions for data exchange, no mapping standards, not even a uniform definition of a cave. In short, if we were asked to defend our beloved caves against some pervasive threat, we would have a difficult time even saying how many caves there are in this country, and an even more difficult time demonstrating why these caves are worth being saved from whatever threatens.

### A National Cave Resource Data System?

The conclusions I have drawn from a survey of cave data base managers show a resource that is inadequately characterized, and therefore in jeopardy. One way to improve the situation and to offer greater protection to cave resources of this country is to devise a system able to protect the resource from the traditional threats (vandals, quarry operators, rockhounds, biological collectors, teenagers, etc.) while at the same time defining a resource that deserves protection from ultimately greater threats--urbanization, highway construction, acid rain, dams and reservoirs, herbicides and pesticides, groundwater depletion, and many other current and future threats. In a common cause, the cave data bases in the various states can become a powerful tool for management and protection of the resource.

Currently the cave data bases are maintained by a wide variety of mostly volunteer organizations, with little uniformity and communication. What is needed is a system of national standards and definitions, quality control for data collection, and ways of giving a sense of community and/or regionalism in viewing the national cave resource. Whether this can be done under the aegis of any of the current cave-oriented organizations is an unaddressed question, but one that should be asked by the National Speleological Society, for example.



The widespread development and use of microcomputers in managing cave data bases is a significant and highly beneficial trend. If a communication network between cave data bases could be developed, we could mount formidable efforts in, say, support of a national cave protection act, and we could exert pressure in regional situations, as in water resource developments, that may threaten caves.

#### Individual State Summaries

The following state summaries were compiled from responses to the questionnaire and compiled in Table 1.

TABLE 1: State Cave Data Bases, 1984

State	No. of Records	No. of Cave Maps	Computerized?	Availability
Ala.	2338	1600	yes	limited
Ark.	c1800	c100	no	limited
Ba.	318	280	yes	limited
Ill.	c300	30	no	limited
Ky.	744	744	no	limited
La.	5	5	no	open
Mn.	c400	c75	no	MSS mbrs. only
Ms.	52	41	no	limited
Mo.	4513	1712	yes	limited
N.C.	426	410	no	limited
Ohio	10	68	in process	limited
Pa.	862	not filed	yes	limited
Tn.	3950	10001	yes	limited
Tx.	1900	sev. hundreds	in process	limited
Va.	2498	many hundreds	in process	limited
WV	2300	1150	in process	limited

(Follows here a description of each state cave data base and how it's functioning.)

#### Cave Map Files

The difficulty of keeping track of cave maps is apparent when one asks how many caves have been mapped in a given state. Most state cave surveys simply do not know. "Hundreds," "many hundreds," and "we don't know" are typical responses. The hardest part is simply filing the maps, which always seem to come in a wide range of sizes, on anything from drafting linen to graph paper to freezer paper to Mylar. Typically, the maps will be of varying quality, from sketches to transit surveys, and from pencil drafts to computer-plotted outputs to artistically drafted masterpieces.

Once a cave map is completed and filed in the data base, there may not be a convenient and/or economical way to

make copies. Covers tend to like long, wide sheets, showing a lot of passage detail, but copying them may be both expensive and impractical. Few cave surveys have access to machines capable of copying large-format maps, even if they happen to have been drafted on material from which machine copies can be made.

Most cave mapping is done by organized caving groups who usually work independently. For this reason, duplication of effort is a perennial problem, but one that can be minimized through frequent communication through a coordinating group such as is provided by several state cavesurveys.

#### Data Availability

If there is a mindset common to all state cave data base managers, it is surely available and data security. Among the states responding, only Louisiana and Mississippi have no particular concern about who or what agency has access to cave information; no known vandal would be attracted to the caves in those states. The other state cave surveys all share a sort of proprietary feeling that cave data should definitely not be available to the general public. The lack of confidence in the public's ability to use cave data responsibly generally extends to governmental agencies as well. In fact governmental agencies are frequently thought to be more irresponsible than any other entities because of their propensity for publishing specific locations.

Cave listings or catalogs involve a certain amount of risk to the resource. It is widely perceived that such lists have the potential to cause problems if they fall into the wrong hands. To minimize the problem, most data base managers use a system of screening requests for the data, either through a membership screening, deliberations of a governing body, or requiring demonstration of a "need to know." In some cases, simply going through the required procedures to show responsibility to acquire a cave list may be enough to discourage all but the most persistent.

Excessive concern over data security may be extremely counterproductive in cases where two or more groups working in the same area do not trust each other. There may be two or more cave data bases, mutually exclusive, with no way of knowing what each collection contains, and no reliable information on the nature and extent of the cave resource in the state. While it is imperative that caves be protected from vandalism, pollution, and pressures from construction/urbanization, it is difficult to protect a resource that cannot be quantified and adequately described.

While the data are closely held with respect to

availability, few state cave surveys have fail-safe systems in place to make certain that a fire, tornado, flood or other disaster will not destroy the entire data base. Those systems that are computerized are likely to have backup tapes or disks that are stored separately from the primary ones, but not always. Several of the cave file coordinators maintain the entire files in their homes, with no duplicate files. No amount of homeowners insurance could replace a few filing cabinets filled with the results of 20 years of cave reporting and surveying, nor, in any case, could one establish the value of such a file in case there was insurance.

Some data bases are maintained in university and/or government agency facilities, which probably gives an extra measure of security. Nevertheless, a change of administration, transfer of personnel involved, or loss of

funding may threaten the security of even these files.

Missouri has a system whereby the Master Cave Files are kept in a government office, but duplicate files are maintained in two other locations, so that if any one file is destroyed, it theoretically can be rebuilt from the other two. Duplicate tapes of the computerized data are kept in an archival-quality vault so that information, too, is secure. All cave maps are kept in metal map files, and all maps are microfilmed on 35 mm. archival-quality film, so that the map files, too, are protected.

Perhaps the best security of all is provided by publication and wide dissemination of the results of cave studies, but this is practical only in cases like Louisiana, where there are few cave resources and these generally are not threatened in any way.

## SLICK MUD TO DRY POWDER

*(The following is taken from an article by John Heenehan of Falls Church VA, one of the founding members of the National Speleological Society. The article, based on information in a Civil War history by Burke Davis, first appeared in the D. C. Speleograph in December 1983.)*

Gabriel Rains and his younger brother, George Washington, were good ole boys from New Bern, North Carolina. Sons of a cabinet maker, both were appointed to West Point, a fairly unique happening in the South of that day (ed. note: 1861). As cadets both excelled. George led his class in all scientific subjects. Later he was to be Professor of Geology, Chemistry, and Mineralogy. The West Point they attended was a small insular school. Everyone knew each other's talents and characters very well indeed. The Rains brothers were remembered.

The South in 1861 was in trouble! The loud mouths of both sides insisted on going to war, basing their expectations of quick victory on gross misconceptions of each other. But the South's economy was based on agriculture, not manufacturing. Their spirits were high but their powder was low. They scarcely had enough ammunition to supply to gentlemen taking pot shots at each other in affairs of honor. If it came to a serious shooting war their

alternative choices would be plain--cold steel or quick feet.

Virtually no ammunition had been made in the South since the War of 1812. Many of the military leaders, including President Davis, thought of the talented Rains brothers. Gabe was named Major General in charge of the Torpedo Plant to make "infernal" devices. He would invent a wholly new method of making war. He depended on his brother for explosives so that he could make electric naval mines; land mines; anti-personnel mines; mine fields; booby traps; and sabotage items. Gabe was remarkable but our story is about George Washington Rains, the cave explorer.

He had been running an iron works in upper New York. When he returned South, the Chief of Ordnance asked him to set up a gunpowder plant. G. W. had nothing to unlearn--he had never set foot in a powder mill. The only things he had in abundance were shortages and unskilled labor. In Nashville he found an unused mill which he converted for his use. There was no secret about the contents of gunpowder. Then, as now, it consists of 75% saltpeter with the balance made up of charcoal and sulphur. Only charcoal was readily available and even there the

preferred wood was willow, not the most abundant wood in his area. He experimented and found that cottonwood and other native trees were quite acceptable.

The vital ingredient of gunpowder is pure saltpeter. It cost \$3.00 gold per pound from blockade runners but even at this price the supply was very undependable. It had to compete against less bulky higher profit items. So, since importing was not a reliable source, speleology came to the rescue. George knew that the earth in caves was rich in salts. With his organized mind he divided the South into mining districts. In each district crews were organized to investigate caves for mineral earth. He set up a niter and mining bureau as the overseeing authority.

The caves were mined by people short on booklearning but long on common sense and make do. George wrote an instruction booklet to help them carry out all the production steps. Bringing sufficient water to the site was often a major difficulty. Not all caves are suitable sources of saltpeter, but the saltpeter caves were mined intensively using even whittled scrapers so that all the earth could be used. The Niter Bureau set the price of saltpeter high. In those backwoods areas, where cash was scarce the barter common, most miners agreed that saltpeter was better than sex.

The search for the valuable nitrates was much like the public search for uranium in our West in the years after World War II. No likely source was left untouched. Henhouses were moved, as were outhouses. Our speleological genius, G. W. Rains, was such a successful executive that from a zero start in the late spring of 1861, by October he was producing over 3,000 lbs. of good grade powder each day in his Nashville mill. This area was vulnerable so by November a second plant in Richmond was turning out about 50% of this amount. Caves were being worked hard.

Next George, inspired by a booklet describing an ultra-modern British gunpowder factor, built in Augusta, Georgia, a giant complex along the banks of a canal. Some buildings had walls ten feet thick with glass fronts for quick exit into the water. All buildings were isolated. If someone yelled "Fire," the entire crew was soon to be found in the canal. By the end of 1861 George had supplied over 1,000,000 pounds of quality gunpowder to the South in an area that had never produced such except

chiggers and raw corn likker. He made do with unskilled labor by designing simple joboperations. His technological innovations were extremely advanced. He created new designs to increase production by water-cooled evaporator pans using water from the adjacent canal. He designed a system so that boiling niterliquor automatically poured into evaporators as scheduled. In order to make very fine crystals in his saltpeter he invented a vibrating vat that agitated during evaporation. By intelligent system engineering he produced the great bulk of the South's gunpowder using a relatively few workmen. He even designed an explosion-resistant powder box to replace the design used for more than one hundred years. G. W. also developed ways to produce the needed pure sulphur without importing it.

Actually, the Augusta factory had one serious accident. One of the workers, a dedicated smoker, insisted that smoking wasn't bad for his health. He lit up in front of three tons of gunpowder. Thereafter not only had he and five friends given up smoking but so had a small boy and a mule. After this, if anyone coughed, the balance of the workers could be found in the canal doing laundry.

G. W. Rains was a man with a unique mind. In an age when they were not in general use, he used a microscope to study the structure of the powder grain. He saw that the finest carbon particles were pitted with tiny pores. Since saltpeter was the active ingredient of gunpowder, it should be made to fill these pores. This G. W. accomplished by reducing the powder mix to a slurry, with steam. After drying, the cake was reduced to a granular structure by iron rollers. This new process reduced rolling time by 75%. Now the powder was sized.

George Washington Rains was the unknown lever that moved mountains for the Confederacy. Without him the War could not have been sustained so long by the South. The modern powder mill in Augusta was so efficient that never was it used to more than 80% of capacity. During the War it produced almost 4,000,000 lbs. of the finest quality gunpowder. On one occasion they filled an order for 22,000 lbs. of powder in less than 48 hours. Obviously Rains was worth several armies to the Confederacy, yet he is all but unknown. He should be remembered by speleologists because he put cave location and exploration on a systematic basis. Caves--and their saltpeter--were one of the South's greatest resources.