

CaveDiggers.com

The End is Our Beginning

2nd Edition -
June-August 2002

Missouri Karst Update

DigCon 2002

The Quality Dig

Bowden Cave Collapse
by Aaron Bird

Dye Tracing in
Raders Valley

Conservation

Finding New
Cave by Mark Pisserby

Interview with
Tom Barton

*Micro-Shaving
Methods
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Hand Tools
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The saga continues...

This is the Second Edition of CaveDiggers.com The Magazine. While it's appearance is slightly different from the First Edition, with a new layout and printing, it is still loaded with great articles, and we hope you get a blast from reading it.

There have been some interesting recent events in the caving and cave-digging world, such as the major collapse in Bowden Cave and the continued use and development of micro-shaving techniques. In addition, there is an interview with one of the most prolific diggers in the East, Tom Barton, an article on a threatened ice cave in Slovenia, and a reprint of a famous article, entitled, "The Quality Dig" that was first seen in the May 1977 issue of the D.C. Grotto Speleograph.

This issue of CaveDiggers.com The Magazine hopefully has something for everyone. Enjoy!

Aaron, Rachel, and Mark

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We welcome photo, article, and letters submissions. We will consider all for publication.

Advertising

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DigCon 2002

DigCon 2002 will be held in Greenbrier County, West Virginia this summer.

Depending on the turnout, it will be an informal gathering where we'll discuss issues pertinent to cave digging and we'll go digging, too. The location will be at the West Virginia Association for Cave Studies Fieldhouse near Renick, WV. Cost for attendance will be \$3 per night and \$1 for showers. Pre-registration is encouraged but not necessary. Bring your own food and beverages (WVACS has two kitchens!) and bring your equipment for camping or sleeping in one of the bunk rooms. Again, depending on turnout, we may go to dinner at one of the local restaurants, as well. Contact Aaron, Rachel, or Mark for more information.

Pre-register online at:

www.cavediggers.com/member



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Think again.

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Front cover photo— Andy Whitney's award winning photo of caver in scalloped streamway. Visit his site at: <http://homepages.enterprise.net/flash/>

Back cover photo— Clockwise from top: (1) Chris Anderson photo of caver in a water drain.... amazing where cavers will go for a good time, eh? (2) Micro-shaving technique in action. Photo by Erika Hoffman (3) Mike Corbett and Lee Passerby observe at the top of the Caves.com Cave Dig. Photo by Mark Passerby. (4) Rigging for the drop to the lower part of the Stojna Ice Cave. Photo by Peter Gedei.

Cavediggers,

June 2002

Caves, cavers, and caving. I think that's the title of a book I've read somewhere, sometime. It was a book about us. Digs, diggers, and digging. Maybe that's the title of a book yet to be written, also about us. Perhaps it's being written, right now, by some digger somewhere on Earth who's passion for finding new caves has lead her to digging for them.

By "Us," I mean all of us. You, me, and everyone who participates in this sport. I mean those whose passion for finding new cave is so great we'll go to any lengths (reasonably) to work toward it.

I think I read somewhere, that we'll conceive of something less than 10% of all caves. That is "conceive of," not explore. So let's say we find 50% of that 10% of conceived caves, and that means we'll find 5% of the caves. Pretty small number, right?

Not the way I look at it. What it means to me is that there are 95% of the caves left to be found. In the United States, where we have well over 1000 miles of caves, it means we should still be able to find another 19000 miles of cave... 19000 miles! Granted we have to realize the full potential. Is it outrageous to think we will? Of course. But, we're sure to find some of it.

We're humans, and our species has always found a way. I've seen what we can do, and I believe we're going to continue finding big caves. And we'll do this by doing what we're doing now.

Seems pretty simple, huh? Yep, it is. We just need to keep at it. One bucket full at a time. That's how we're going to find the next big one... one bucket full at a time.

I hope you enjoy this Edition of CaveDiggers.com the Mag. Let us know how you like it.

Sincerely,
Aaron Bird

Tom Barton “Digs as Hard as He Caves”

The Exclusive Interview

Over the past decade, **Tom Barton** has become one of the most prolific diggers in the Northeastern United States. His reputation as a thorough project manager for digs in Upstate New York, as well as West Virginia, has become solid. The work done by Tom and those who accompany him has been chronicled in his website found at the following URL:

<http://www.galaxy.net/~trbarton/cavenews/>.

Digging in the Northeast is an education no matter how one looks at it. The glaciers that covered the region some eight to ten thousand years ago left few natural entrances. Now, those who wish to explore new caves must somehow get through the "till" left by the glaciers. Tom Barton is the digger who gets through the till, and we were lucky enough to catch him between trips to Hellhole for this **EXCLUSIVE INTERVIEW...**

Aaron Bird: What got you interested in caving and specifically digging open caves?

Tom Barton: I was out rock climbing around 1991, in late November, and had an ice storm move in. My partner and I decided to call it a day, and he suggested visiting a small cave at the bottom of the mountain instead. We went to the entrance and poked around, but got caught by the landowner. He referred us to the NSS and local grotto. That led to my introduction to Bob Zimmerman, then chairman of MET Grotto, and the first real caver I'd ever met. I still have that little slip of paper filed under "spelologists" in my phone book.

It only took 2 years for me to tire of "sport" caving. In that time I had visited many of the usual caves in upstate N.Y., and a few (Organ and others) in W.Va. By then, I'd met and caved/climbed a good bit with Al DeMaria, who got me interested in looking for a back door entrance to Skull Cave, N.Y.

We spent several weekends ridge walking the farm over the back of Skull, and did wind up digging open a really nice cave on the property - now known as Ken's Kave. Not the back door entrance that we were looking for, but my first taste of digging, and it got me hooked. Ever since, I've been much more of a project caver rather than a sport/tourist. Embarrassing as it may seem, there are a good number of well known, popular caves, that I've not been to, as the projects always seem to dominate my time.

Interview with Tom Barton continued...

Aaron: What special techniques have you found useful in your digging experience?

Tom: One of my favorite aspects of digging is the engineering challenge. I'm always looking for creative new and better ways to get the job done.

Over the years, my group has perfected the use of wire rope zip lines and pulleys to get dig buckets up and out of sink holes, settled in on using Rubbermaid brand small dish pans for mud tube digs, designed & constructed several tripods from electrical conduit to hoist out buckets, and trashed several kiddie sleds.

I worked with Carroll Bassett (BMS) to build a gas powered hoist/winch for one project. Like all good diggers, I frequent the home centers looking for the perfect digging tools. I'm very particular about having the right tools; the right sized crow bar- 22", the perfect caving sledge - 5 pound head with a 15" ribbed yellow fiberglass handle. (Tony Hopkins buys the sledges in Brooklyn, NY; Rick Royer looses them in deep joints in Germany Valley).

The absolutely most successful technique, perfected over the past 7 years, has been the use of Hilti drills and custom-made rock breakers. This surgical passage enlargement technique has been the single most important breakthrough in recent years for diggers to gain access to otherwise un-enterable passages. It has been passed on to others and resulted in the discovery of many other caves in several states.

Aaron: What are the three or four most significant caves you've dug into?



Tom Barton at the Akwa Slot in Germany Valley. 2002. Copyrighted photo used with permission of Devin Kouts.

Tom: Ken's Kave, Cross Bones Cave, Peggy Hole, and other lesser known holes & pits in New York; Kahn (Convention 2000) and Memorial Day in W. Va.

Aaron: What are some characteristics of New York State digs that require special digging techniques?

Tom: We do lots of sinkhole digs, and have one major enlarged joint passage dig - Thunder Hole Cave - ongoing. These all require some degree of engineering to stabilize the entrance areas, from the placing of a simple small piece of 30" culvert pipe to an entire up-ended oil tank, to keep the dig from collapsing.

Most digs require some sort of hoist arrangement, for which I build a tripod out of electrical conduit, and use a construction "wheel" pulley with 1" rope. Buckets are 5-gallon plastic pails,

Continued on next page...



<http://www.galaxy.net/~trbarton/cavenews/>

Tom Barton bagging dirt at the dig in the entrance of Memorial Day Cave. Copyrighted photo used with permission of Devin Kouts.

modified with 1/8" wire-rope handles.

In most cases we are dealing with narrow joints, and the Hilti drills get a workout. Wherever possible, we use a TE-14 or TE-15 AC powered drill, generator, and long cords. Several digs are "permanently" rigged with extension cords.

My TE-14 drill has been caving with me for years, has drilled thousands of holes, and been rebuilt a few times. It will run in extremely wet conditions, under falling water and in sloppy mud. In fact, some weekends the mud is so bad that the drill gets hosed out and hung up to dry. It's even got one successful rescue to it's credit.

Aaron: In what other areas, outside of New York, have you dug for caves?

Tom: Mostly W. Va., and a bit in Highland County, Va. A few years ago, I worked on some

pits nears WVACS, opened a few, and helped survey other new projects in that area.

I got interested in Germany Valley, W. Va. at the 2000 [NSS] Convention, got hooked on the GVKS projects, and have spent considerable time there ever since. I was involved in the opening of Kahn Cave, Memorial Day Cave, and have helped out on others.

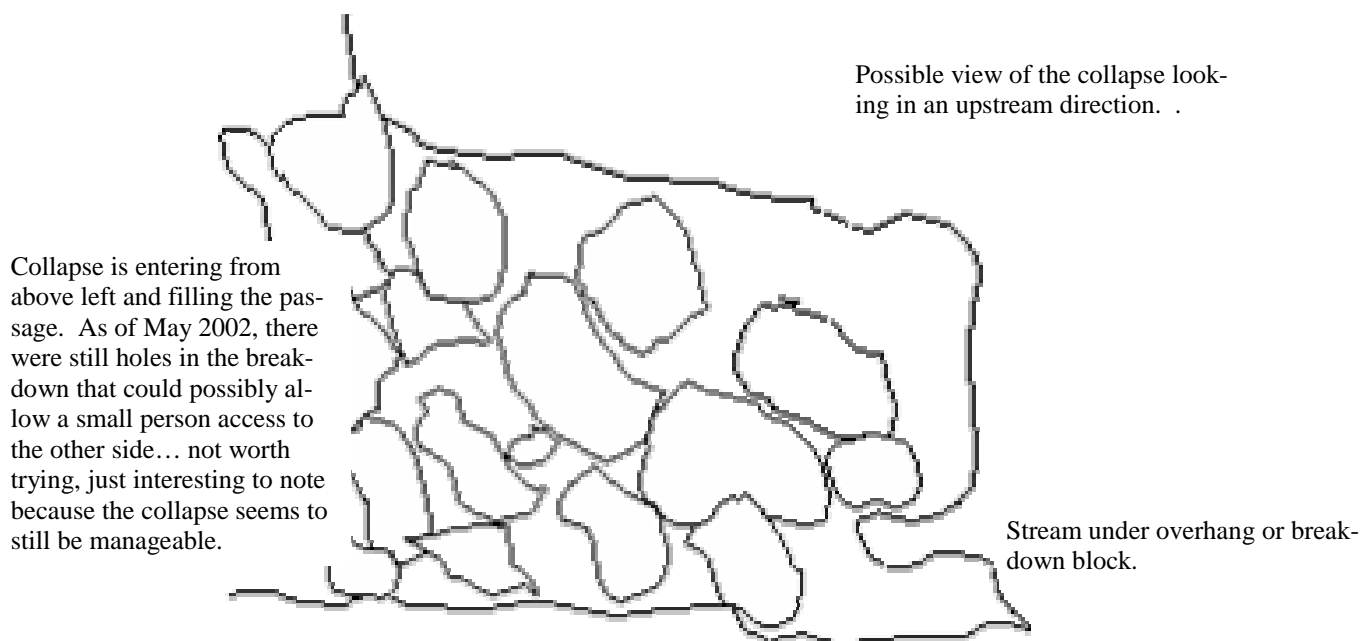
Aaron: What level of success have you found in these places?

Tom: All of the dig efforts that I have been involved with in both Va. and W.Va. have resulted in caves. I guess it's much easier to get into caves in those areas than in New York, although I must say that the record for our group in N.Y., The Rock Eaters, has also been very good, considering the area that we have to work with.



Bowden Cave Collapse... A plan to dig through!

by Aaron Bird



By now most of you have heard of the major collapse in Bowden Cave. When it was first found, there were a number of visits to check it out. Among those who saw it, Doug Moore and Marshall Holmes have said the collapse is very unstable and consists of a lot of mud and large rock.

It was likely caused by the very large amount of precipitation we had this spring that simply “lubed” the mud and rock as well as possibly washed out supporting mud or chockstones. Though very unlikely, there has been speculation that the collapse was man-made.

Whatever the cause, Bowden is now essentially two caves. What should we do about it? Open it? Leave it alone? My vote is to leave it alone. However, I can’t help but plan for the digging project anyway.

To assist in the process, I’ve created an artistic rendition, above, from the anecdote of those who have seen the collapse pile. Labels are

included to make the planning process easier.

Generally the collapse is coming into the passage from above left to right, as is indicated in the rendition. The ceiling is solid in the stream passage before reaching the collapse area, so there is a safe approach.

Chuck Hempel has mentioned that shoring maybe necessary for digging to be effective. Perhaps shoring and digging could begin along the left wall. A digging bar, or some other long-handled scaling tool, would be used to bang at the rock in the wall and ceiling to bring down the loosest rocks.

After this bit of dare-devil work, rocks could be pulled out and stacked neatly out of the way. Solid floor and wall needs to be found on which to begin the shoring. Supporting this kind of dig must done so that hundreds of people will be able to

Continued on next page...

pass by the shoring once it is completed and the collapse has been opened.

Once the rocks at the edge of the collapse have been removed and/or stabilized (assuming this even occurs), then the next layer of rocks will need to be worked on. By this point, a rock too large to move safely will surely be encountered. This rock (or rocks) will have to be dealt with using remote rock cracking tools. Those who will be involved with this operation will know exactly which type of rock cracking tool and methodology to apply, so I won't go into detail.

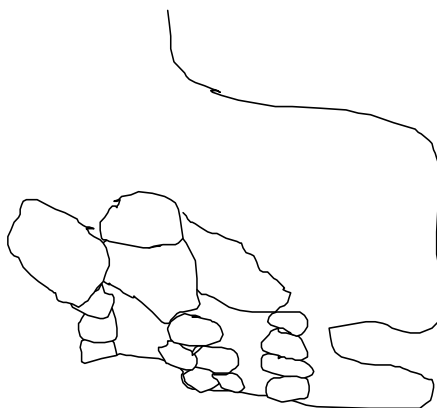
At some point, unmovable rocks will be encountered. A decision will have to be made about which ones will need to be made smaller and which ones will have to be shored. The pile will have to be analyzed to decide which to leave and subsequently shore up.

Shoring of these rocks should be a natural progression in the dig because time will have already been taken to remove material down to a solid floor and solid wall. A reinforced, concrete wall is obviously the best choice if a properly supported and shored dig is planned. However, this is on the unrealistic side. An alternative would be to use the rocks that have already been taken from the pile and use cement to hold them together.

A completely different alternative would be to use sand bags filled with mud to begin the shoring. A wall of sand bags could be built on the solid floor and against the solid wall up about five bags and two bags wide, in an interconnected manner like a brick-layer does with when building a brick wall.

As the sandbag wall gets closer into the pile, rocks can be selectively shored using more sandbags. In this way, problem rocks can be removed one by one while supportive rocks can be left in place and supported with sandbags.. Granted this method would take a lot of bags, but those of us who have been involved with large-scale dig projects know that all it takes is time; each move must be right and after

a lot of them have been done right, then the dig is finished!



Sandbags can be used to support large rocks as digging progresses through the pile.

As large rocks are supported and the smaller rocks are safely removed, an effort must be made to begin planning for the permanent shoring of the large rocks. One method may be to begin replacing the sandbags with rocks that are "glued" together with concrete.

While it would be time consuming, it would result in a long-lasting solution. It might also be possible to use treated posts and beams as part of the support structure. Whatever is chosen it will certainly be dependent on the conditions of the pile and the knowledge, skills, and abilities of the diggers.

Speculation is easy to do. But for the dig to be successful, actual planning must take place by visiting the pile and viewing it from a safe distance. A plan must be developed with the input of the Forest Service, local cavers, the main entrance owners, and diggers.

As I've already mentioned, my vote is to leave it alone. Why waste months of time on this dig, when we can spend our time on digs that might lead to VIRGIN passage?

The Quality Dig

By Keith Ortiz

(Reprinted with permission from D.C. Speleograph 33 (5), 1977)

We are now in the era of the quality dig. Whereas our progenitors of the Collins/Handley era have been known to dig even during their time of plenty (scoop city), it was only in the most obviously rewarding situations or in pursuit of commercialization.

Today's diggers are different. As trunk passage becomes harder to find, modern explorers have become more aggressive in their search. The modern trend is to squeeze known caves for all they've got; to insure that the mere removal of a few tons of rock is not all that stands between the caver and his scoop.

However, recent years have led to an even greater degree of professionalism in the dig. There's a pride, a mystique in the dig itself: the era of the quality dig. Although a promising hydrologic setting is still the main criteria for starting a dig, they are no longer limited by a time factor. Like a survey in a promising cave, a quality dig attracts its followers.

There are many reasons for wanting a quality dig, but the caver selecting the site should always keep in mind what I call the three Ps: planning, promotion, and psychology (a fourth P, placement, will be covered later).

Planning is mostly important in its close relation to the other Ps. Although I have initiated various absolutely worthless digs, I have found no support for them due to an inability to promote them. There's just too much grumbling among the personnel about

A quality dig must have some relevance: it must be promotable! And of course, promotion is best effected by publication. What caver doesn't beam when he sees his name in print as one of the hard-ass, die-hard pushers at the frontiers of WYZ cave? Much more subtle is a passing comment like, "Who would have thought that people would keep going back to that rockfall when I first saw it!" Of course promotion is just one of the various techniques in the psychology of the quality dig.

How does a dig become "quality" and not merely an unpromising lead on the final cave map? There's a psychology to the quality dig; a psychology, closely related to the technique itself. Who, after reading Nevin Davis Jr.'s account of how he was radio-metrically plotting the progress of his Breathing Cave dig on a surface topo, would not be compelled to join the effort? (After four years, he was still enthusiastically inviting diggers!)-certainly Lou Simpson's railroad in Humongous Cave is a tremendous inducement to professional and novice alike.

However, a quality dig doesn't require a gargantuan effort. Technique could be as easy as lining a passage with candles to supply a homelike atmosphere or even as innocent as the proper naming of the dig passage, like in Persistence Passage in Crump's Cave, Kentucky. The proper method of starting a quality dig is in the psychology. The aura of "here's a dig which will go down in the annals of speleology" must be nurtured and maintained.

In this respect, it is seen that developing the mystique of a quality dig is similar to the familiar suck-in technique of caving. As an enticement, the

Continued on next page...

dig can offer fame and glory, the *equipmetus maximus* syndrome exaggeration of potential or the various other techniques. However, the dig is different in one respect. The personnel of a quality dig must not be seekers of a quick glory; they must be patient for a slow victory over the obstacle: persistence is the pertinent virtue.

A quality dig often spans years and sometimes yields progress at a rate of 0 feet/trip; success can be measured in ounces or inches instead of tons or miles. Therefore, diggers must be of a breed that believes a rock pounded 600 times to no avail can possibly break to crumbs on the 601st pound. Proper persuasion psychology can achieve this quality of dedication.

Perhaps the best way to learn the proper methods of a quality dig is to initiate one yourself. Experience is the greatest asset for the digger wanting to motivate others. The first step is to find the promising lead. Since the quality dig is still a recent phenomenon, almost any existing "project cave" can yield various candidates. One fruitful technique I've found is to pick a passage with a possibility of running off the mylar of the existing cave map. Cavers seem to delight in such mischief.

The next step is to create a sense of excitement over the passage. This can be done by showing the terminus of the passage was only explored by relative nerds, or by a more sophisticated technique such as the geologic-hydrologic Harryological" suck-in. After excitement is generated, the initial "exploration" trip is taken.

Care should be taken on this trip that none of the participants become de-psyched (after all, a passage never ends, it just gets too small!) and a careful estimate of equipment needed should be made. All positive aspects of the terminus should be carefully noted! These include airflow opening up around the corner, relative ease of the dig or

technical challenge of the dig, and passage trends. Stories of breezes strong enough to put out carbide and resounding echoes are obvious plusses even if they don't mention that the lamp was full of nearly spent carbide and that most dead ends echo. Success now depends on the expertise of the caver in persuading others that this is indeed a quality dig.

If the terminus warrants a quality dig, the best method of persuasion is a mass-publicity campaign. Obviously, if the passage just "doesn't go", the suck-in artist will be risking self-discredit by pursuing it. In this case it's best to merely label the lead as a low-priority, never a hopeless dig. The first step in promoting a truly worthy dig is to start mass mailing post-cards. A future article mentioning that cavers from five states participated in your dig is certainly good copy.

Glowing, enthusiastic stories of the potential of the dig should be given at the grotto meetings with definite plans for future visits to the dig given (these can always be cancelled if no one takes the bait.) Of course, praise should be lavishly heaped upon the heroic efforts of the involved participants. Later this praise should be more subtle as your reputation for suck-in techniques increases. If successful the techniques can be the beginnings long term quality dig, with future reports of progress as conditions require.

Once the suck-in artist/quality digger has gotten the dirt under his nails, so to speak, he is ready to plan some really relevant digs. These can range from starting his own project cave to furthering progress in an existing projects' cave. Perhaps the digger feels that a particular ridge has great potential if only some of those rat holes could be opened up, or a spring alcove is situated down-river from another

The Quality Dig continued...

spring alcove with a ten-mile cave behind it. It could be that an otherwise hopeless blowing hole is located next to where the farmer's daughter lives; or he just wants to dig because it's his cave. It's reported that an entire grotto was sucked into excavating a mine-shaft-like entrance by a SW Virginia landowner with intimate knowledge of the hydrologic-geologic technique.

Whatever the reason, the compulsion is so great that a truly dedicated digger will return to his dig no matter how far the drive or what the consequences. We have seen that a quality digger is indeed a special breed of person, but what exactly are some of his traits? What is the profile of this man? This *Homosapiens excavatus*, which causes him to return time after time to the same excruciating dig?

Most likely he's a middle-class lab technician, office worker, or a college student with a few summers of construction experience, anxious for a few calluses and some dirt under the nails to brag about during weekdays. He's the unconventional link-in-the-beltloop breed, look in life, a distinguishing pastime and is always seen carrying a beer can or three-pound, short-handled sledge to display his scarred knuckle. Sort of the D.C. Grotto type, for a deep-seated attachment to one project - to prove he's not just the tourist he really is.

This is the type who'll spend all his free time in an otherwise obscure Arizona cave to the extent of losing wife and job; who'll bribe the landowner into continuing the dig so he can publish in prestigious journals; who'll drive 700 miles to pound on the same rock he pounded on during the last 700-mile drive. You'll find him drowning his sorrows in a small Wisconsin tavern, plugging the jukebox for every Mel Tillis song it's got; climbing Cleveland smokestacks to take the edge off

of city life; scouring the Cincinnati libraries for woodlouse and butterfly recipes which he considers entomologic delights.

He's his own man, intimate in his contact with nature, brutal in his quest for glory. However, each has all the attributes necessary for the quality dig: persistence, determination, motivation.

Tools and Techniques

All we have left is a five-gallon yellow lard bucket with its makeshift handle, dented and rusted from over-use, still partially filled with the guano and rubble with which it was probably filled thousands of times: a legacy from the man and the dig which may have been the first "quality dig".

Three by five feet, extending into the fill for over fifty feet, it's a dig prominent enough to be surveyed fifty years later as an integral part of the cavern. A slow, methodical dig, square cornered and even floored straight as an arrow along its length. You can feel the pride, the professionalism, which the original excavator must have felt as he worked his way in by pick and shovel. We sit in the damp coolness of the dig, the only truly pitch-dark portion of the entire cavern, and contemplate.

What was he like? It was certainly commercialism that motivated him; could Floyd himself have participated? Seven hundred and fifty cubic feet, carried out two-thirds of a cubic foot at a time deposited in the awesome talus slope outside the entrance. The first quality dig: Marshall Collins Cavern, Hart County, Kentucky.

Since that time, there have been numerous quality digs and the technique still remains the same.

Continued on next page...

Don't view it as a tedious task required for further cave exploration; rather it's a pastime of its own. Like the simmering Thanksgiving turkey filling the house with pleasant expectation, the quality dig is a slow process to be savored. It's something to be looked back on when the job is finished, a point of interest for future cavers, an Olduvai Gorge of the caving world.

Unlike trunk passage cavers who race through the underworld and just can't get enough, the quality digger is slower, more contented, intimately knowledgeable about his environment: the texture of the rock, the smell of the air. He always knows his position in the stratigraphic hierarchy and his relationship to other caving environments. The legacy of the dig is a job well done, an eternal monument to a dedicated, gung-ho effort: a place on the map.

These are important points to remember. Not just any dig can be considered quality, regardless of its success. The dig itself must be noteworthy. Since this usually involves numerous trips back to the same site, a technique which will show some success for nearly every trip must be devised. In addition some measure of comfort must be provided for the participants: a back-on-the-ceiling, belly-in-the-stream dig is likely to be just too much without the proper technique. As far as crawlway excavations are concerned, I have found two useful techniques: the bathtub method and stream diversion. Dig working room. One of the most common mistakes cavers make when starting a dig is to push themselves so far into the constriction that they complain there's no room to work. They can't swing a hammer properly and their own diggings get in the way. Take the view of a commercial excavator: dig to your dig. Back up a little and dig yourself some working room. In flat-out belly crawls, I like to dig a bathtub-sized area, enough to turn over to rest on my back. This is a real psychological boost to participants when they

inch back and find they can almost sit up to eat their snacks. Line it with candles and it's a home away from home. Pretend you're working with a good woman or man: take your time, put in that extra effort, and success is assured.

My first trip in Persistence Passage, Crump's Cave, was with a veteran who had been stopped on two previous trips by the same rock. I brought up the rear for the entire 200 feet of belly crawl to the dig, seeing only the Vibram label on the boots ahead of me. Of course, the main complaint at the dig was about the problem of getting a good swing at the rock.

So while the veteran pounded fruitlessly, I began the quality dig: a five-foot-long bathtub-sized area, more than enough for two people to pass. I was positive this would assure success. However when it came my turn to pound, I passed completely over the rock without even noticing it! Always carefully assess the situation before starting a dig. (A true quality dig is now in progress fifty feet beyond that initial dig.) At least I take comfort in having constructed one of the few turnarounds in the entire 250 feet of Persistence.

To deal with streams: There are two techniques which I have found are useful in dealing with streams in a quality dig: the prophylactic technique and dam building. The prophylactic technique, which may be less familiar to non-diggers, consists of diverting the entire stream into a long plastic tube so that the stream flows harmlessly by the dig site. I feel this technique is far superior to placing individual diggers in plastic tubes (or wetsuits as some cavers call them) because it also helps to keep the dig from filling up with water. One method of

tube construction is to use heavyweight plastic garbage bags opened at both ends and taped together for whatever length is needed. If properly folded, the digger can even let the stream itself unroll the tubing far into the dig.

Now I know almost every caver has built a dam in a wide stream in order to divert the water to one side. You use rocks and mud, maybe a few leaves to plug some holes if you're near the entrance. But you find there's just no way to completely divert all the water. So you slosh through the little water that remains and feel content at not being totally soaked. But did you ever try building two, maybe three dams in a row so that when you go down stream each dam has less and less water to divert? It's an obvious technique, but so rarely used. Once, on a surface stream with 2 cfs flow, ten feet wide, I managed to divert the entire stream into a channel one foot wide, leaving the remaining nine feet entirely dry. It was great fun! And it serves to illustrate the point that all the water can be diverted in a crawlway dig using available materials. Any quality dig can be made comfortable.

Conservation considerations. Before I get into the hammers, chisels, blasting caps and other tools of the trade, perhaps it is a good time to mention conservation and the quality dig. I've heard many complaints from hard ass cavers about quality diggers turning the caving environment into veritable tourist paths.

There's a worry that these large-volume digs will attract increased traffic; that the natural gates of the cave are being indiscriminately torn down; that Sunday quality diggers have no right to take the rigor and bite out of a passage. To these criticisms, I make one promise:

should any quality dig prove to be a detriment to the fragile ecosystem of the passage due to increased traffic, I personally will buy the yellow paint for the center line. I feel safe in making this promise. In fact, I know one case where a quality dig has actually been beneficial to the cave ecosystem. It's been observed that as a result of the Harry S. Truman Memorial Dig, Crump's Cave, the bats are now able to fly through the passage instead of having to crawl. As far as esthetics, I can only justify the dig as a necessary evil; like a hemorrhoidectomy, its vital for further progress. However, this does bring out the point that a quality dig is not warranted in every case.

Tools: There's nothing special about a quality dig tool kit that you wouldn't find at any well-managed excavation project: sledges, chisels, dynamite, shovels, even backhoes. However, being a professional, the quality digger does have his traditions. There's the traditional nine-pound sledge; a three-pound short-handled sledge with a loop of shock cord tied through the handle end; a gardener's trowel and claw set; Sears Best six-inch cold chisel. Anything and everything for removing earth is, of course, permissible.

I recently visited an otherwise ordinary sinkhole which was the site of repeated blasting and digging; there was even talk of using a portable mine drill if all else failed. All this the result of sophisticated divinity: perhaps the first resistivity-induced quality dig! Which goes to show that tools and techniques enough can attract a following to any quality dig.

With my tons of experience (literally), I do have a few helpful hints to the novice. When purchasing your first short-handled sledge, look for the style that has a flanged handle end.

Continued on next page...

Recently overheard at the dig site:

“Are you out of your mind?! Trim your self confidence, man!”

I found one in an obscure Western Auto in Pearisburg, Virginia, but it was the last one. These hammers are definitely the best in confined quarters with their superior gripping design. As a partner for your six-inch Sears Best chisel, I recommend a 12-inch Sears Best. I know mine has been the best investment in digging tools I've yet to make. They allow you to work far back from the constriction and usually make it easier to swing your sledge. I've also found that a three-ton short hydraulic jack is extremely useful for moving rocks, though you must be very cautious. One hapless digger nearly brought the ceiling of a southwest Virginia cave down on the heads of himself and his subsequent lover. These quality tools must be used in a professional manner.

The owner of Rebel Cave, a commercial cave in Missouri, has a good explanation for the phenomenon of the quality digger. He spends his off-seasons digging in the back of his own cave, not just for more passage, but to show the tourists: "Here's evidence of my hard labors which will survive long after I'm gone." In these days when people are only leaving behind a Social Security number (and even these are being recycled!), it's no wonder the fascination with the quality dig. A monument to a job well done, a place on the map.

Here we have it: railroad tracks and ties leading to a mudfill; a rusted battery-operated fan on a sand pile; a collapsed hydraulic jack holding back a 30-ton rock; a mineshaft structure in the bottom of a sinkhole; melted wax and scrape marks on a conglomerate floor. What will some caver think when he comes across these landmarks fifty years in the future? Will he sit back and contemplate as we did at the first quality dig? The sweat, pain, the scarred knuckles will no longer show. Will he feel then as we do? Or will he merely extricate the jack as part of a futuristic planter?



D.C. Grotto Online:
[http://www.caves.org/
grotto/dcg/](http://www.caves.org/grotto/dcg/)

Carroll Dig Update

The last dig, June 1, moved the bottom of our 30" shaft down 89.6 feet below the surface. We now have 28.9 feet to go to the ceiling of the cave. We will enter in a large room at the T-Junction.

The T-Junction dig started with drilling a 9-inch hole into the cave. We are now drilling 8 1.5-inch by 3.5 feet deep holes around the 9-inch hole, loading the 1.5-inch holes with explosive and blasting. The debris falls down the 9-inch hole to the cave below. Each blast cycle moves us down about 2.5 feet.

We are working with the cooperation of the landowner at the T-Junction to open a back door to one of Missouri's most significant caves. The owner of the one-and-only natural entrance has denied cavers access since the early 1990s.

We will be working the weekend of June 22 and will try to complete 4 blasts cycles. If you would like to help with the project please visit our web page at www.carrollcave.org and sign up for a dig. Everyone is welcome and no experience is necessary.

Rick Hines
President, Carroll Cave Conservancy, Inc.

Hand Tools...

Even though you use modern techniques, you still need hand tools.

By Nigel Dyson-Hudson

Got Cave?

Well, unless you happen to stumble onto a large enough opening to crawl into, you are going to have to dig to get cave. You might be out mushroom hunting, with a friend, and find a "ground hog hole" that, after some digging, turns out to be a cave.

Included in this article are some of the hand digging tools and techniques that I have learned about. First a word about places to buy or look for digging tools. I am putting the cart before the horse but bear with me. Most of these are oriented for North American readers although some of the places will ship internationally. You can also put a search term like "canvas water bag" into your favorite search engine.

1. Sears Craftsman brand - get only the Craftsman brand because they have a life time guarantee. Handy if you try to use your shovel as a pry bar. And join their tool club, they have discount sales several times a year.
2. For military surplus: Sportsman's Guide, <http://www.sportsmansguide.com/>, and Brigade Quartermasters, www.actiongear.com.
3. For general soft goods - REI Outlet, www.reioutlet.com, and Campmor, www.campmor.com.
4. General lawn and garden centers. You can find some useful hand tools there.
5. For specialized Forestry and Landscapers supplies - A.M. Leonard, www.amleo.com, and Ben Meadows, www.benmeadows.com.
6. For power tools I prefer Tools On Sale/Seven Corners Hardware since they usually have the lowest price and free shipping. <http://www.7cornershdwe.com/>

7. McMaster-Carr is a general industrial supply firm.

<http://www.mcmaster.com/>

8. Keep an eye at yard sales for kids plastic sleds and other useful items.

9. Don't forget Dumpster Diving. I got a number of plastic buckets from a dumpster in Canada while on an above ground tourist trip. They were right behind the motel we were staying in.

In the old days our ancestors had to move dirt by hand to get anything done. Therefore they developed a lot of different types of shovels and picks for different types of earth moving tasks.

Starting from the surface, I like to use a long handled shovel since it saves one's back. Sears and other places also have both short and intermediate length handles for when you get further into the works. I prefer the spade tip since you can work it into cracks and a D handle on the shorter handle lengths for more power.

Soon you get to the point where just tossing the dirt doesn't work or you don't want your secrete project to look like a large, recently dug, rodent burrow. You have to start moving the material out of the dig site. So you need material buckets and something to haul the buckets with.

I learned about using 2", 50 mm, tubular webbing from a friend on a dig in Kentucky. It is much easier to grip and is nicer on the hands than 1", 25mm, webbing or rope. For a material bucket you can use 5 gallon or smaller plastic buckets. If you can't find them from a construction site, you can buy them from a baker, fillings come in them, or hardware store.

Continued on next page...

I use a number of folding camp sinks from REI Outlet in two different sizes, (<http://www.rei.com/>) as well as some canvas water bags. They are collapsible so they are nicer if you have to haul them into a cave. If you are dragging dirt horizontally, plastic sleds are a good choice. I even found one that was for tikes, shaped like a car seat, and made of extremely tough plastic.

When I am digging horizontally, I like to have a sheet of material to pull the mud and rocks onto. I use a plastic roll-up sled that kids use or the plastic sheet sold in the fall for leaf bagging - keeps the plastic bag extended so you can rake the leaves in. This way you don't pull material back only to pound it into the bottom of the dig.

When digging you usually start with small tools then move to bigger tools. My favorite hand tools are the solid aluminum trowels from Sears.

<http://www.sears.com/sr/product/>

Their edging tool is ideal for working cracks to get the dirt out or loosen a rock/mud choked shaft when you are working from the top down.

I have had too many times on a general caving trip when I wished that I had a shovel with me. So I also have a plastic trowel from Campmor if I don't want the weight of a proper trowel or entrenching tool.

The trowel also makes an excellent splint if you sprain, twist, or break something. <http://www.campmor.com/webapp/commerce/>

Weight is not as much of a problem with several hour trips in short Northeast caves but I remember how much my pack weighed with a lightweight entrenching tool at the end of an 8 hour survey trip into Breathing Cave in Virginia. I have been told that these mini shovels are only good in lightweight digs.

The next size up is the classic entrenching tool. I prefer the metal tri fold model since it's a compact package. Some people like the old style with a handle. The Gerber folding shovel has several teeth at the locking end which get gummed up with mud. The military style just have flat spots.

You can find a list of shovels from the Campmor website that include all the types I have been talking about.

I also like to have a proper mini shovel. Again this is available from Sears.

A.M Leonard has a mini shovel with a telescoping handle (also hoe and rake), GT308 \$17.75, and small hand picks. <https://www.amleo.com>

Usually you need some sort of rock pick. When you forgot to bring one is when you will need it the most! Estwing is well known and they have a solid cast pick and a pry bar among other items

<http://www.akmining.com/mine/estwing.htm> also has other useful digging tools (but I would check prices with Tools on Sale first)

Instead of a pick one can also use a long, wide, chisel, a tool that also doubles as a pry bar.

Marshalltown is one manufacture of various mason's chisels

<http://www.marshalltown.com/>

Above the mini shovel and picks you are into full sized shovels and picks which are mostly used on surface digs. The mini shovel with telescoping handle gives one a longer reach which is why long handled full size shovels are often dragged into caves.

There are also hammering tools, chiseling tools, prying tools and hauling tools among other tools. I mention a couple of them briefly at the end.

At the end of the day with the possibility of more cave there is always the dilemma of whether to leave the tools or to take them with you. Some people prefer to leave their tools at the dig site either out of frustration, so you don't have to drag the stuff through the cave again or with the hope that some other fool will finish the dig (Aeolis's Bat Cave in Vermont which had a big breakthrough 2 years ago.)



Bull point cold chisel available from Marshalltown.com and many other suppliers.

Some additional quick notes about tools:

1. Most people don't realize that Bosch sells a chiseling adapter for their SDS drills that disengages the rotary motion so they just have a hammer action. It is listed in the Tools on Sale catalog as well as SDS chisels including wood chisels. Mikita also has a couple of their SDS cordless hammer drills with a hammer only mode.

<http://www.tools-plus.com/bcp1618600010.html>

Just remember that the cordless and small hammer drills are SDS Plus. It is the BIG units that are SDS Maxi.

This set-up as a cordless jack hammer works very well in hard packed mud passages, the kind where you are lying

on your stomach trying to find someway to actually swing a pick into the mud.

2. These SDS chisels can also be used with the Peztl Rock Pecker SDS handle as a compact way to carry a couple of chisels. I also need to find someone to turn down several of these into micro blasting strikers.

3. Although most people think of wire rope come alongs, there are also rope come alongs using rope which have up to a 75' reach. Search for come along at www.mcmaster.com, McMaster-Carr.

4. This company makes a long drop hammer with various chisel adapters
<https://www.hixonmfg.com/shopping/details.asp?itemchoice=H17030> from <https://www.hixonmfg.com/shopping/webitems.asp?category=Tools>

I hope this helps you make better choices about hand tool purchases for your next digging situation!



Aluminum trowel available from Sears.com.



The Ice Cave on Mount Stojna

by Peter Gedei



In the Slovene Karst, the limestone region of Slovenia, there are many ice caves worth visiting, along with many other caves. Ice, evolved by slowly dripping of water balanced by forest and feeble ventilation, which prevents warm air from melting it, usually persists in ice caves throughout the year, including hot summer months. This is due to a very delicate balance between the neighbouring woods and temperatures. But, unfortunately, man has already ruined such systems in some places, mostly by cutting down the forest.

As distinguished from other ice caves, the one on Mount Stojna is interesting because its entrance is facing the southeast. Although it is located high above the Kocevje town, one may find there many axe traces leaving behind irredeemable damage. The

deforestation started already in 1960, but with no particular effects. As a result, a big amount of ice in the Stojna cave melted out, year by year. Since more accurate measurements have been done, the ice plateau in the entrance room has already been lowered for some metres.

When I first heard of the ice cave on Mount Stojna, I was very impressed by the size of ice stopper in the cave. According to a cave plan, the cave should be more than 100 m deep, whereby its lower 60 metres are folded in ice. They were my friends from our caving club who acquainted me with the cave, and it was in around 1990, when I visited it for the first time. It is located in the middle of the mighty forests in the south of Slovenia, on the lengthwise



Entrance of the Stojna Ice Cave.

mountain called Stojna, above Kocevje, at around 1000 metres above the sea level. Actually, it is quite easy to find this cave, because there is a mountain hut in the vicinity, so there are also plenty of waymarks.

The entrance of the cave is on its northern side. When approaching it, you cannot get an accurate idea of how big the entrance pothole would be. Only when standing in front of the sinking area, when the huge chamber is lying there fully extended up to 40 m deep, we may get the right impression of the extent of the cave.

It is quite easy to descend the depression in dry summer time, although it becomes dangerous in winter, when the slope gets frozen, so that it

is almost necessary to use ropes and crampons. The latter are also necessary for reaching the bottom of the cave in summer.

At the beginning, when moving carefully downward to the bottom of the entrance chamber, it is not fully obvious that you are standing on a giant ice stopper which blocks the pothole somewhere in the middle of its entire depth. You do not become aware of that until sinking down the ropes into the side potholes where thousands of years old ice layers may be seen and admired.

When we visited the cave for the first time, we did not realize where we were going. The pothole on the right is around 40 m deep. Since it preponderates into a huge chamber soon after the entrance shaft, we were twice as much amazed with the huge dimensions of the chamber.

Because of its simple access, it is also used for summer trainings of mountaineers – ice cascade climbers. But, unfortunately, their trainings cause serious damage to the ice. Whereas the ice in the mountain area develops and melts each year anew, that in caves remains always the same. According to slow water flow, the renewal of eternal ice is a process of long duration.

More secrets are offered by the left pothole, which we could reach only through a less accessible side shaft at our first visit. Ice melting has caused a formation of a new path to the bottom of the pothole – in the shape of a smaller hole where ice touches the wall. Although the access to the hole is simple, the fitting is quite scary, since one stands at the thin piece of ice with wide and deep pothole opening below. We were very surprised at the quantity of melted ice, since the left pothole is completely changed today. At the bottom, where the balance of the temperature is for the moment still preserved, wonderful ice annual rings have fortunately remained intact.



Since the climate in the cave has changed considerably in last few years, interesting things have begun to occur. Bigger water flow started to cause some beautiful ice formations, but also melting of the upper ice layers. It is estimated that the border between melting and freezing is lower for approximately 40 metres, in the right pothole down to the bottom. In the left one, the balance remains at depth of some 90 metres, whereas higher than that ice starts to melt very quickly. The temperatures of ice and air remain at the same level as in 1960, only the water flow is increasingly bigger. One can easily understand that at such intensive dripping, visit of the pothole has today become quite an adventure. The icicles, formed by running water, are extremely long and quite unstable, that's why caution during descent is highly required.

Although the ice cave on Mount Stojna represents a tiny peace of the world, it confronts us with our failure to redress the consequences of the damage man had done to the nature. More than 50 years have already passed from intensive cut-downs, nevertheless, the ecologists have failed with the later reforestations to prevent or, at least, to reduce ice melting. Moreover, once again we have proved how a thousand years old ecosystem may be destroyed in favour of tiny material goods.



Opposite page— Photos clockwise from top: (1) Measuring the temperature in the very bottom of the cave. (2) Beautiful ice formations, developed by accelerated ice melting, are warning us of fleeting beauty of this wonderful cave. (3) The ice is prolific throughout the lower reaches of the cave.

Above— Summer trainings of mountaineers in the area of the right pothole.

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*****
****          WINKARST VERSION 9.0          ****
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by Gary Petrie

WinKarst 9.0 is available now. The two most important improvement are the program can process multiple Digital Line Graphs (DLG) in an integrated, seamless manner with your cave survey data. Second, WinKarst can place sketches over line plot, either as passage drawing or as background location maps.

WinKarst is "shareware" with a 30-day trial period. WinKarst runs on post Windows '95 operating systems. It is recommended the Pentium class computer has a display resolution of at least 800x600 and set to display more than 256 colors. A fee of \$25 registers a license, previous and subsequent registered users can upgrade for free. The update includes an updated help file and online pdf manual suitable for printing.

View the general description at
<http://www.resurgentsoftware.com/winkarst.html>

and download at
<http://www.resurgentsoftware.com/~gp/software/download.htm>

The major enhancements in Version 9.0 are

- o Sketches and Background Images
 - PNG image format files read has four level grey scale
 - Images registered to two stations in the cave survey.
 - Smaller passage sketches form composite prototype or preliminary cave map.
 - Larger topographical or district maps placed as background locator image for cave system.
- o Digital Line Graphs (DLG)
 - Read free to the public USGS SDTS DLG files.
 - Display "Streams" or "Trails and Road" DLG layers.
 - Automatically merge adjacent DLG files.
 - Read either 24,000 or 100,000 to 1 scales.
- o Bitmap Export
 - Export any sized bitmap, limited by the computers available RAM.
 - Export either PNG or BMP image file formats.
- o Editor
 - SDTS DEM and DLG files specified in the editor and part of the SUR cave survey data format.
 - Sketch Page for previewing and registering Stations in the images.
 - Sketches part of the SUR cave survey data format.
- o User Interface
 - Several new tool bar buttons for DLG and Sketches
 - Label sketches for identification of up to 100 loaded images.

For previous users of WinKarst, version 9.0 can be installed directly over an earlier version and it should assume your existing registration code. But as a precaution, please write down your registration code by running the older version first and accessing the Registration dialog from the Help pull down menu. Then install the new version.

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*****
Detailed descriptions
*****
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o Sketches and Background Images

- WinKarst can only read the PNG image format files. The images can be color, but they are converted to an image with four levels of grey. Images must be less than 4000 by 4000 pixels in size. Only 100 images can be held in memory at one time. Images are bound to individual caves of a system of caves.
- For WinKarst to display the images, two stations in the cave survey must be registered to a pixel location in the image. Once registered, the image can be scaled and rotated to match the line plot of the survey.
- Smaller passage sketches done in the cave are assembled by WinKarst to form composite prototype or preliminary cave map. The background color of the images is drawn transparently so images can overlap at the edges. The line plot can be removed from the drawing.
- A single larger topographical or district maps is placed by WinKarst as a background locator image for a cave system. The maps probably should be converted from color to black and white in a third party image editing program before being loaded by WinKarst. The registered stations can be control points at the intersection of UTM or Lat/Long grid lines.

o Digital Line Graphs (DLG)

- The USGS had moved all of its digital data to the Spatial Data Transfer Standard (SDTS), including elevation and line (roads, rivers, etc) data. The data is currently supplied by the USGS free of charge for the entire United States. WinKarst's help file contains detailed instructions on how to download and unpack the data. For more details visit the www site:
<http://mcmcweb.er.usgs.gov/sdts/>

and download data from:

<http://edcwww.cr.usgs.gov/doc/edchome/ndcddb/ndcddb.html>

Files can also be downloaded from the comerial site:

<http://www.gisdatadepot.com>

- DLG files that are adjacent are merged into larger model. When a DLG file is read that does not touch the existing model, the old model is discarded in favor of the newly read data. DLG and DEM files are handled independently.

Continued on next page...

- WinKarst can read the DLG types for "Streams" or "Trails and Road" layers. Road and streams of different strength are displayed with different line widths.
- SDTS files can be specified in the data file of a cave survey so loading the files occurs automatically. WinKarst can read both 24,000 and 100,000 to 1 scales.

o Bitmap Export

- WinKarst can export any sized bitmap, as specified by the user. The size is practically limited by the computers available RAM (e.g. a 4000 by 4000 pixel requires some 48MB of memory).
- The program can export either PNG or BMP image file formats. The PNG is a compressed format is can save a considerable space on the hard disk compared to a BMP file.

o Editor

- SDTS DEM and DLG files are specified in the editor System Page and are part of the SUR cave survey data format. The files can still be loaded interactively from the menu/toolbar on the main window.
- The Editor has a new Sketch Page for previewing and registering Stations in the images. Stations are registered by selecting a station name and then clicking on the image at the desired location. For best results, the registered stations need to be as far apart as possible. The stations can be either from a shot within a survey or control points.
- Sketches and their registered stations are part of the SUR cave survey data format.

o User Interface

- Version 9.0 has new tool bar buttons for DLG and Sketches. The sketches can be displayed with or without the line plot of the survey. The DLG types streams and roads have separate buttons.
- WinKarst can label sketches for identification on the line plot. Up to 100 loaded images can be displayed at one time (practically limited by the computers available RAM, a single image may take 1BM).
- The Help file and PDF formatted manual are updated to include all of the latest features.



Book Review: Labyrinth!

This new cave fiction, by Mark Sullivan, is an action-packed adventure that takes place in Labyrinth Cave, located in Eastern Kentucky. The following articles are perspectives of the book, one from writing it (by author Mark Sullivan) and the other from cavers who read it (Rachel Bosch and Aaron Bird).

A Cave Book by a Non Caver

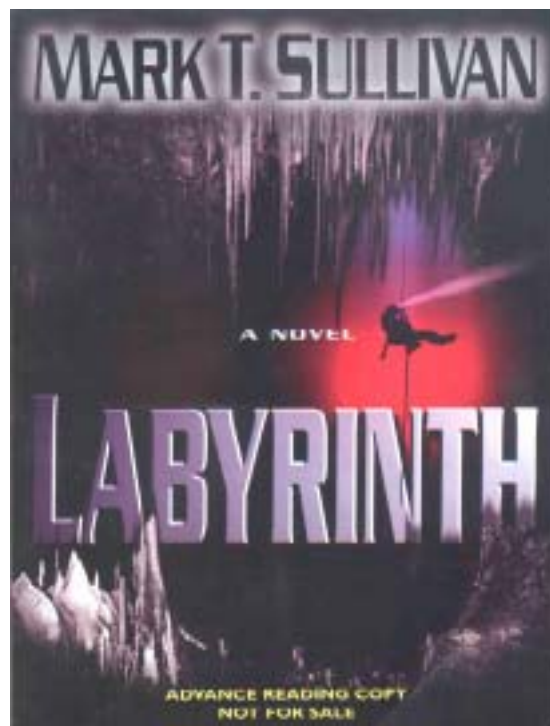
by Rachel Bosch and Aaron Bird

This story, “Labyrinth,” is built around a super, energy-focusing moon rock, an evil physics post-doc with too much time on his hands, and a cave-exploring family who are helping NASA scientists train for mining on the moon.

The father in the family, Tom Burke, and his 14-year old daughter, Cricket, are taken hostage by the psycho, prison-escaped physicist and his posse and forced to lead them to the moon rock that is hidden within the depths of Labyrinth Cave, which, incidentally is the longest cave in the world and located in Eastern Kentucky.

The mother in the family, Whitney Burke, is forced to overcome her debilitating post-traumatic-stress disorder, induced by the caving death of her best friend, so she can get herself together and leads the cave rescuers, in the form of United States Federal Marshals, into Labyrinth Cave to rescue her husband and daughter. Little does she know that the Federal rescuers are in fact after the Moon rock for its super-conducting properties, which are maximized at 57 degrees Fahrenheit, and are helped in their rescue efforts by the President himself.

This novel, obviously written for non-caving, non-scientists will surely entertain them. It is action packed and should satisfy their imaginations, with its bizarre plot twists and far-



etched scientific impossibilities. If you don't mind improbable cave descriptions, incorrect karst geology, and ridiculous caving scenarios, then read this book, and prepare yourself for the movie, which will probably be an underground surrogate for “Vertical Limit.”

Now with all that said, there are parts of the book that are reasonably well written and even though the story is preposterous, it is still entertaining... for a variety of reasons. Read it for yourself and enjoy it in your own way!



The Real Labyrinth

By Mark T. Sullivan

Looked at in cross-section, the cave was a series of stacked hourglasses. We were in the upper-most chamber, backs pressed against one mud-slick wall, feet jammed against another, our butts hanging in space over a chasm that fell away twenty-five feet through jagged limestone teeth to a rushing cataract. As we moved sideways through that treacherous passage, the mud avalanched.

We were twelve hours inside the Mammoth Cave complex, negotiating the connection route between Salts and Unknown. Well, everyone else was negotiating. I was just trying to survive the ordeal, telling myself it was all for the good of the story.

I make my living as a novelist and take pride in the fact that many of my books are based on research in which I immerse myself in an unfamiliar culture. To write “The Fall Line,” I lived and skied with extreme skiers in the Sierras and the Rockies. To put together “Hard News,” I relied on my experiences as an investigative reporter in Southern California. To research “The Purification Ceremony,” I apprenticed under expert deer trackers and spent months traversing the remote forests of Maine, Montana and Alberta.

But nothing I’d ever done prepared me for the unforgiving world of hardcore caving. Indeed, when I set out four years ago to write a thriller set underground, the extent of my caving experience was a two hour tour inside Mammoth when I was ten years old. Somewhere on the tour, I saw a real

caver – filthy, tough, wearing a helmet fitted with an old miner’s lamp – crawling out of what seemed an impossibly narrow passage. That image seared itself in my brain and nagged at me for nearly thirty years. Whenever I thought about that scene, I got nervous and excited.

For a mystery-suspense writer anything that provokes those sensations is fertile ground. So finally, a week before my fortieth birthday, I set out to become a caver.

Luckily, I stumbled onto the fact that Roger Brucker, founding director of the Cave Research Foundation and author of many books, including “The Longest Cave,” teaches a course in subterranean exploration at Mammoth Cave. I signed up.

I arrived at the cave research center one sultry afternoon in early June with a brand new helmet, headlamp, cave suit and pack courtesy of Bob & Bob and, frankly, no idea what I was getting myself into. Eleven others had signed up for the course. All of them professed years of caving experience and were looking to go to the next level.

“I want to go where no man has before,” Marty Brown told me “I want to find my own cave and explore it.”

Brown’s motivation, one I heard again and again among hardcore cavers during my research, became one of the central themes of LABYRINTH. Indeed, I came to think of cave explorers as similar in psyche to astronauts, adventurers willing to take tremendous physical risks to be the first, to walk where no man ever has. They’re also sticklers about the technical aspects of their avocation.

“Too many novels about caves are flawed from a technical point of view,” Brucker said. “The authors just don’t understand how caves and cavers work.”

Of course, I did not understand any of this when I showed up for Brucker’s course. Nor did I understand how intense the experience of deep caving could be. I figured that out the next morning when we entered Unknown Cave through the Austin Entrance.

Brucker was sixty-nine at the time, but once we were underground, he moved like a man in his twenties. I had to struggle to keep up with him. For hours we moved deeper into the cave while Brucker taught us how to read the scalloping on the walls as a guide to how the passages formed and where new ones might be found.

We crawled up a ladder through a hole in the roof to Smith Avenue then climbed the Brucker breakdown pile that led to Turner Avenue. We were miles from the entrance at that point and I was about to get another lesson about the nature of hardcore cavers.

One member of our group, whom I’ll call Sally, had assured everyone that she’d had a great deal of experience caving. But it was soon apparent that she was in over her head physically and mentally. At the bottom of the breakdown, she collapsed and said she could not go on. Brucker sent us back to the Austin Entrance with his wife, Lynn. We came out in the dark after ten hours underground. While Lynn went back in to help Brucker bring Sally out, the rest of the group took a vote not to let her go back in the cave during the rest of the week’s trips. Later, after Sally emerged from the cave virtually delirious, I asked why.

have just gotten herself killed, she could have gotten us all killed. In this type of situation you have to be able to rely on the people you’re caving with.”

The issue of self-reliance would become another major theme of LABYRINTH.

The rest of the week was even more grueling. After spending a day learning about karst topography and the vast sinkhole plain south of Mammoth, we went on a forced march through Colossal Cave connecting to Salts Cave and finally into Unknown again. We were soaking wet most of the time. My body became scrimshawed with bruises.

It was most brutal in the connection routes, which I came to describe as slithering down a sewer pipe lined with barbed wire. We dropped down vertical drains, then waded and crawled through water to get from Colossal to Salts. The three hours it took us to connect from Salts to Unknown is an adventure I’ll never forget as long as I live.

We endured the mud avalanches, then slithered and yanked our way across sharp scallops for nearly three hours before bellying under Guillotine Rock, which, as the name suggests, would have crushed us if we’d dislodged the little rock that held the massive boulder up.

“The vast majority of cavers have never gone through a connection route and now you’ve done two in one day,” Brucker said after we staggered out of Unknown fifteen hours after we’d entered Colossal. “You guys have what it takes. To be a cave explorer you have to be willing to go underground for long, long

Continued on next page...

Digging with a Conscience or Digging Conservation Style

by Pat Seiser

periods with little rest you have to be willing and eager to go down the drains. That's the only way to find big cave."

I would go on to learn dozens of other lessons the other hardcore cavers who took me under their wing while researching LABYRINTH. I would study rope techniques with Bruce Smith and Allen Padgett and drop into pits in TAG. I'd enter ice caves in Vermont and learn about methods of cave rescue. In the end, however, it was the initial awesome experience of following Brucker through the largest cave in the world that influenced every moment in the novel.

I hope I got it right, Roger.

Labyrinth is published by Atria Books, a division of Simon & Schuster, Inc. The book will be available soon from all major book suppliers.

It appears that Roger Brucker, a well-published cave author (*The Longest Cave* is one of my absolute favorite stories) was an influential in Mark Sullivan's stab at writing cave fiction. Check out Roger Brucker's website at <http://www.rogerbrucker.com>

I was sitting in the conservation section during the Texas convention, when at the end of a presentation a young man made the comment along the lines of: it didn't make sense, he had just sat in a session based on changing and modifying cave passages and now was listening to a session based on protecting and restoring cave passages; what kind of message was the NSS trying to send when it had digging and conservation sections each giving what are apparently opposite messages during their respective sessions?

It did and does seem odd that cavers who consider themselves very conservation oriented, particularly when it comes to protecting caves, seem to have little problem with opening up caves or cave passageways.

Few cavers have not at some point in their career been into a cave whose entrance or passages within have had modification to one degree or another to either ease passage or allow access. Digging has been an integral part of the history of cave exploration. Digging goes beyond removal of fill (soil, rocks, etc.), it also includes passage/entrance modifications achieved by removal of rock from the walls.

Diggers are a different type of treasure hunter searching for the elusive virgin cave, the blank spot on the map or the connection to known cave. People have dug (and still are digging) to see what lies beneath, what lies beyond. It is the lust for new discovery, that curiosity of the unknown that drives them. But with that desire comes some responsibility and therein lies the answer to the above quandary.

There is a certain amount of forethought that should attend the act of digging, which goes beyond the safety of the diggers. Some of the first questions seem fairly obvious (Why? Is it necessary? What's to be gained?). However, the answers may not be as simple as they first appear.

Opening an entrance to a cave, while gaining access, also introduces change to the cave environment via change in airflow, movement of detritus and other debris, water and critters (micro and macro) into the cave or into a region within a cave. Thus one important consideration is whether the cave entrance should be returned in some manner to its original size to help maintain the original environmental conditions. In most cases this is accomplished through the use of some form of environmental gate.

Modifying an entrance to provide easier access also has its inherent problems – namely making it easier for more people to gain entrance to the cave, who might have otherwise been deterred from going into the cave; thus increasing the amount of impact to the cave. This same concept applies to passages within caves.

Typically one reason for the creation of an additional entrance to a cave is to reduce travel time to a particular section of the cave. This too can apply to digging open connections. Reducing travel time may be convenient, but it may also generate greater visitation, once again increasing impact to the cave.

Additional questions would include: What necessitates passage modification when voice or light connections have been established? What is the potential that alternative routes may be discovered during additional exploration? Can you clearly justify the need for the dig and do the benefits outweigh the negatives?

So you have opened up a new cave or new section of a cave, now what happens (i.e. are you prepared)? Do you have plans to survey once you've recovered from scoop fever (are you really that disciplined to never tread where survey tape has never gone before)? Are you prepared to flag trails, or flag off areas that are fragile or of scientific interest? Will you conduct initial photo monitoring activities? Are you prepared to turn back until you are properly prepared to enter pristine areas, for example areas beyond mud filled passages, may require clean foot gear and perhaps even clean clothing.

There are philosophical considerations too. How have you changed the wild cave experience? Have you've removed the sense of exploring a little visited world? Have you changed it from one of feeling as though you're in a wilderness, to one of feeling as though you are in a popular park, where you are never far from humanity and/or help?

Not all caves are the same and ways to protect one cave does not always work in another cave. But the idea of protection and conservation is the same regardless of where the cave is found.

All this may seem excessive – except that we all know what happens to caves or new cave passages when the news gets out, and while many understand the need to conserve and preserve, few have the strength of will to follow up on it. It is not only a matter of discipline it is also a matter of conscience.

Pat Seiser is a very-experienced caver who has managed large cave surveys, including the Lechugilla Exploration and Research Network. She also has years of training and experience in cave rescue, surveying, and sport caving. Currently, Pat is pursuing her Doctoral Degree in Cave Stewardship at West Virginia University where she has researched the concept of caves as wilderness areas.

Dye Tracing in Rader's Valley

The Drainage is Revealed

By Aaron Bird



Mark Passerby pours Rhodamine wt into the stream entering a swallet in central Rader's Valley. Photo by Don Ferguson.

Rader's Valley has captured the attention of cavers for decades. Few were successful in finding caves there, however, until Mark Passerby came onto the scene in the late 1980's. His description of the history of exploration from the late 1980's until 2001 is chronicled in the First Edition of the CaveDiggers.com Magazine.

Even now, the history of the valley continues to be written. Since the last report, dye tracing has been conducted, with the assistance of Doug Boyer, who provided dye, traps, and the analysis. The dye tracing was conducted on March 24th, the Sunday of Young Timer's Reunion, held at WVACS. Trap changing continued for four weeks thereafter at three major springs, a spot in the Greenbrier River, and at another place in Mill Creek, downstream from two probable resurgences. The following is the specific report that describes what was done and what was found.

Fluorescein Summary:

Fluorescein was dumped into a sinking stream about 1/2 mile north of I-64 in Rader's Valley on Sunday March 24th at about 10 A.M. The dye "reappeared" in the lower Rader's Valley Spring on or before noon on Wednesday, March 27th. The straight-line travel distance between injection point and resurgence where the trap was located is five miles.

Rhodamine Summary:

Rhodamine was dumped into a stream about 1/2 mile south of I-64 in Rader's Valley on Sunday March 24th at about 11 A.M. The dye reached the trap in the lower Rader's Valley Spring on or before noon on Wednesday, March 27th. Straight-line travel distance is 4 miles.

Optical Summary:

Optical Brightener was dumped into Deel's Hole on Sunday March 24th, at about noon. The dye trap indicates that it reappeared at the upper Rader's Valley Spring on or about 11 A.M. on Wednesday, March 27th, AND also at the lower Rader's Valley Spring sometime between March 27th and March 31.

Straight-line travel distance between injection and trap was about 1 mile for upper spring and 2 miles for lower spring. However, Doug Boyer has questioned the results of the optical brightener trace. I also doubt these results for the following reason: the lower Rader's Valley system receives "grey water," which could include laundry detergent, one component of which is optical brightener. I definitely believe Deel's Hole water goes to the upper spring, but I am not convinced that it goes to the lower spring... unless additional dye tracing, using Rhodamine and Fluorescein, is conducted and proves it to be the case.

Conclusion:

What we know as "Rader's Valley", which is visible from Interstate 64 is underdrained by a conduit system in the "lower limestones", i.e. below the Taggard and Patton, probably limited to the Sinks

Grove and Hillsdale Limestones. Travel times for water during high water flow periods is less than or equal to 1.6 miles per day for the most northern injection point and less than or equal to 1.3 miles per day for a point one mile south. Drainage is to the "lower" spring in Rader's Valley. Results from the Deel's Hollow Trace are not completely conclusive, though it is probable that the Deel's Hole water comes out in the upper spring.

Speculation:

The Western Rader's Valley system is an open-conduit karst system in limestones older than the Patton and Taggard formations following the strike of the limestone in a northeasterly/southwesterly direction until it encounters the Deel's Hollow fault, at which point its orientation changes to north/south. This system is relatively young, since the lower limestones have been above base level as well as exposed to erosion for much less time than the upper stones. There is currently one known cave in the system(see Caves.com Cave article this issue).

The Eastern Rader's Valley system is comprised of new encroachments on an ancient, now mostly dry, karst system, which may at some time in the past been related to the flow of Culverson Creek. This system is in the upper limestones, i.e. Union and Pickaway and consists of Deel's Hole, Zigafoose, and Freeland's Well.

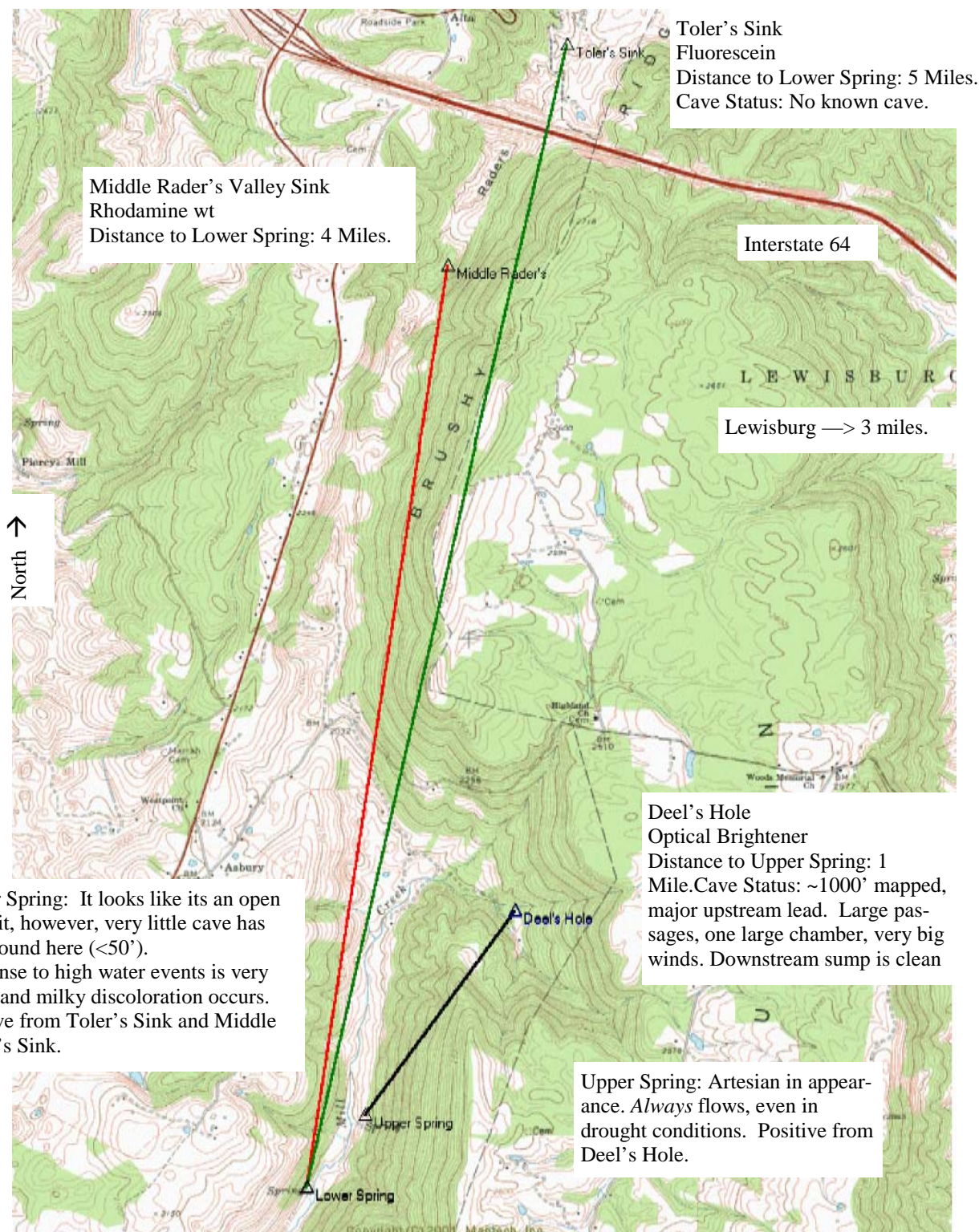
Though unlikely, the two systems may be in some way related, but only time will tell...

The Rader's Valley Cave Survey Project would not be possible without great contributions from so many people. For the dye tracing, plotting, photography, and geological descriptions that allow us greater understanding of the valley, special thanks go to Bill Balfour, Don Ferguson, and Doug Boyer.





Clockwise from top: (1) Fluorescein is poured into a swallet north of Interstate 64. (2) Optical brightener makes a nice sheen on the surface the Deel's Hole stream. (3) The author poses in classic digger form beside the fluorescein-tainted water.



Dye tracing results in Rader's Valley, WV conducted March 2002.

Internet Sources for Digital - Raster Topographic Map, Aerial Photo and General Map Data

by Morris Hall

There are several data sources for topographic, aerial photo and general map data, which can be downloaded for free over the Internet. A few data sources will be mentioned here and some examples of what can be done with the data will be shown. As the example area, I'll use Hahatonka State Park, in Camden County, south-central Missouri.

General Maps

www.mapquest.com

I hesitate to mention it because everyone already uses it, but for generally getting from point a to point b, MAPQUEST is about as good as it gets for route mapping.



Street Map Locator for Hahatonka

Aerial photos of certain areas are also available and can be toggled back and forth with the street line maps.



Aerial Photo of Hahatonka Area

Raster Topographic Maps

www.topozone.com

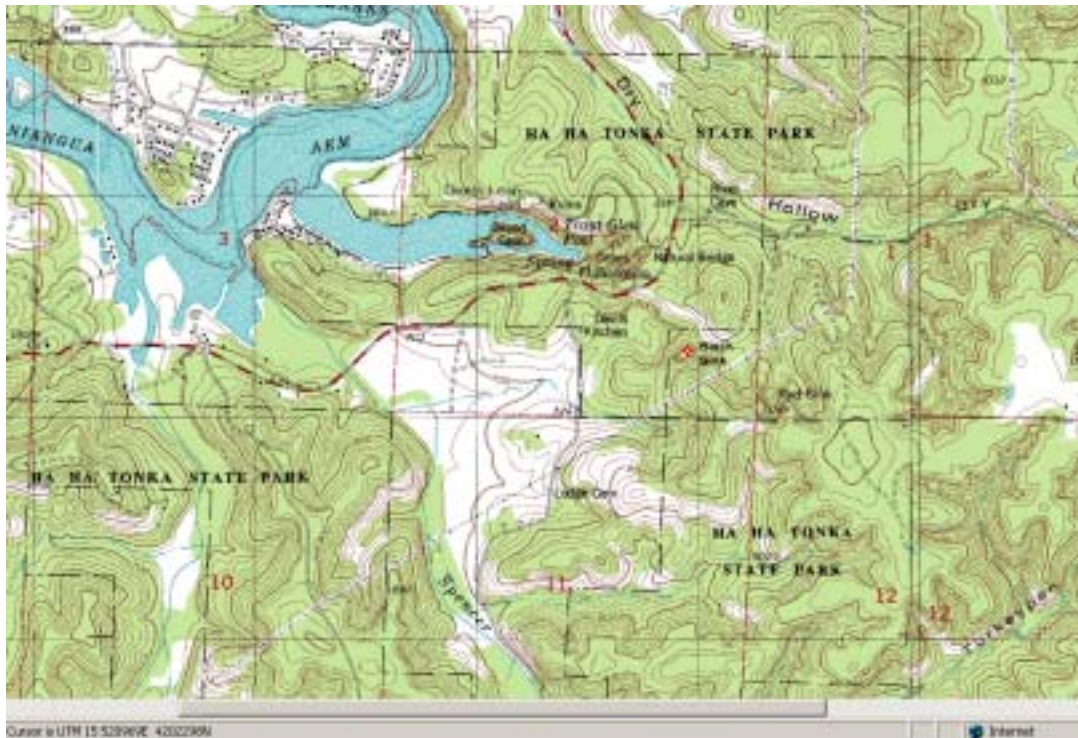
Topographic maps can be purchased or acquired in either raster or digital formats. A raster can be thought of as a picture, while a digital map is digital topographic data tied to geographic coordinates, either in UTM coordinates or longitude and latitude.

Both map types have their own advantages.

Raster maps look like the paper topographic maps we all know and love. They can be copied and used in the field like a conventional topo or they can be used on a computer to tie coordinates accurately to an object like a cave entrance. In conjunction with a handheld GPS, they are helpful in properly locating that sink-hole or spring you are interested in. I just typed in the keyword HAHATONKA and selected the topomap displayed. You can choose from several different map scales, but the most useful is the 1:25000 or 1"=2083' (Note the scale variation from 1:24000 standard topos).

Continued on next page...

Note that the UTM coordinates for Black Sink is located in the extreme left corner of the screen associated with the crosshairs that can be moved along the screen.



Raster Topographic Map of Hahatonka State Park Area, Camden Co., MO

Aerial Photos

www.terraserver.com

Terraserver is a great place to get detail raster topos and aerial photos. Much of their data is in urban areas, so you have to go to the USGS area of their site to get most of your data. Raster images can be enlarged and aerial photos can be downloaded and enlarged with any number of image enhancing software. Relief maps can be handy to highlight the local geology (faults, outcrops).



Detailed Topographic Map of Devils Kitchen Area of Hahatonka C.I.= 20'



Detailed Aerial Photo of Devils Kitchen Area of Hahatonka

Digital Elevation Models (DEM's)

www.gisdatadepot.com

DEM's are digital topographic maps at a 30m x 30m grid across the United States.

After entering the site at "download gis data here", pick U for USA, then United States and then state-wide data. Select the state of interest and then countywide data. In our example, I'll pick Camden County, Missouri. When the screen comes back, you'll be given a choice of several different types of maps with the Digital Elevation Models (DEM) as one of the choices. Select HAHATONKA for normal download. You'll be given a link to download. The TAR.GZ file is what you need to save. Be sure you have plenty of room on your hard drive because these files can be fairly large. Write down the file name of your file you download and be sure you know which directory it is going to before you download it.



Click on the 30 meter SDTS.TAR.GZ file to begin download.

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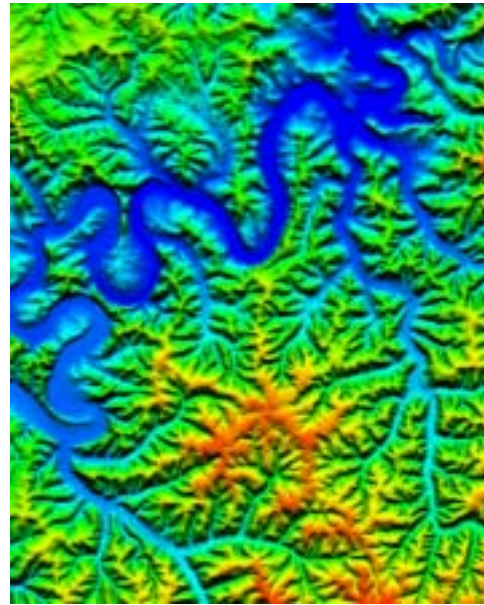
After you download the data, you will need a data viewer.

www.globalmapper.com

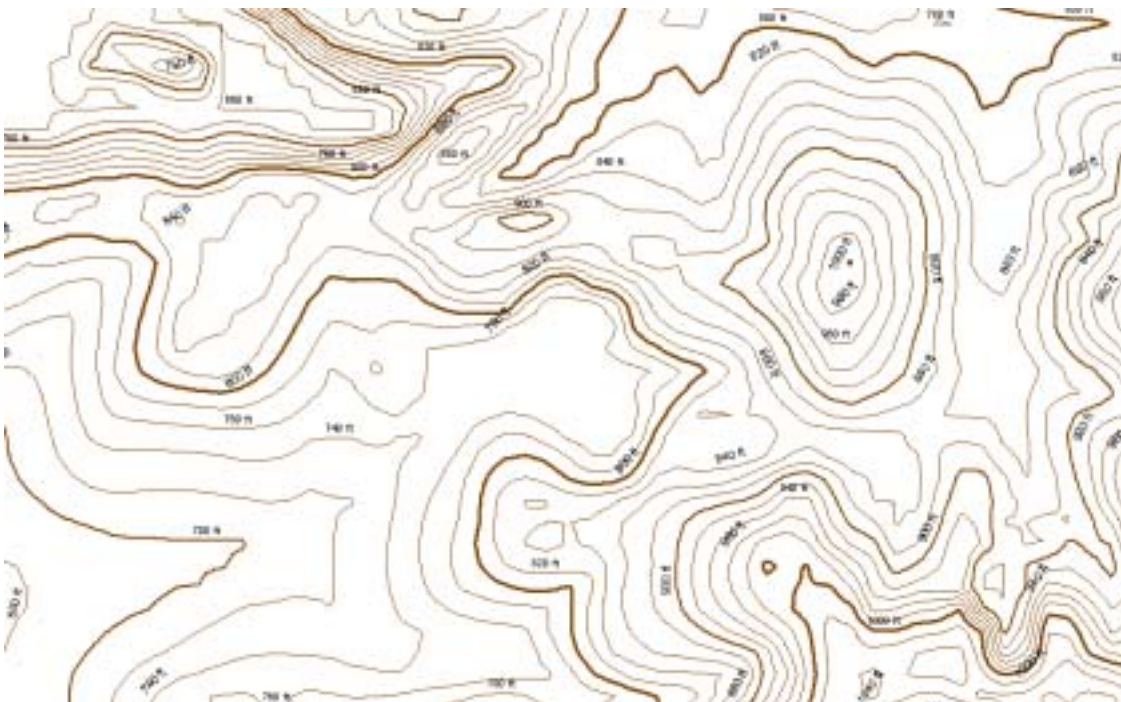
GLOBALMAPPER is a commercial digital topo viewer that has a free limited view available. Go to their website and click on download/purchase. Click on the download button and save the file into its own directory.

Once downloaded, launch GLOBALMAPPER and open the digital map file as a new file.

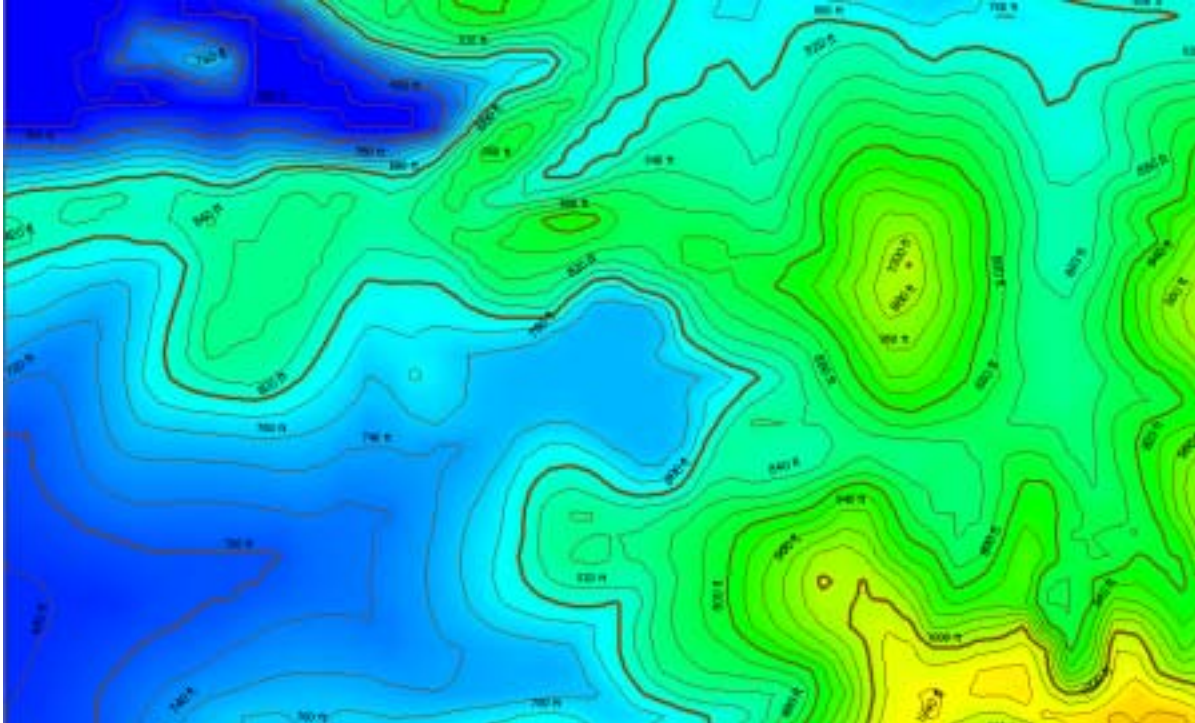
Although the manipulation of the data and number of datasets that can be viewed is limited in the free version, the ability to directly read SDTS.Tar format is worth a lot. You can display data in either line contour, color, shaded or in combination.



Hahatonka Digital Topographic Map
(DEM) 1:24000 scale

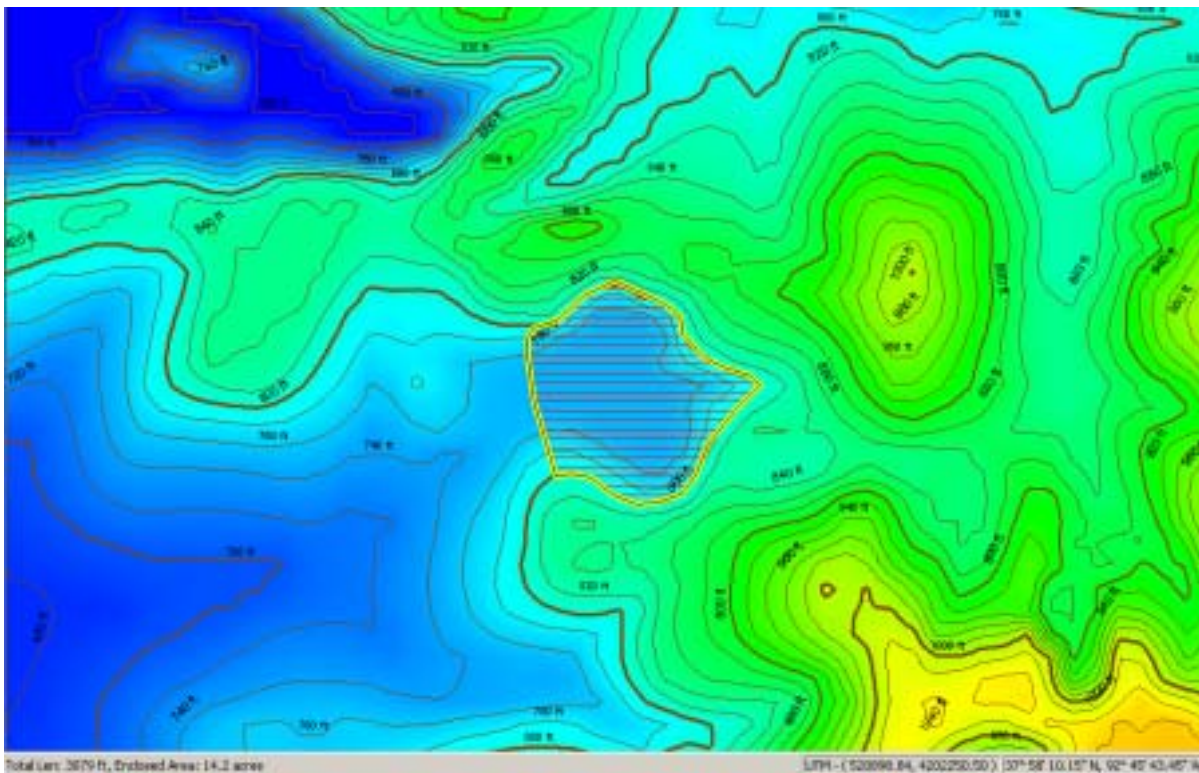


Line Contour Digital Elevation Model of Devils Kitchen Area of Hahatonka C.I.=20'



Color and Line Contour Digital Elevation Model of Devils Kitchen Area of Hahatonka C.I.=20'

The software also has a planimeter for calculating areas of drainage.

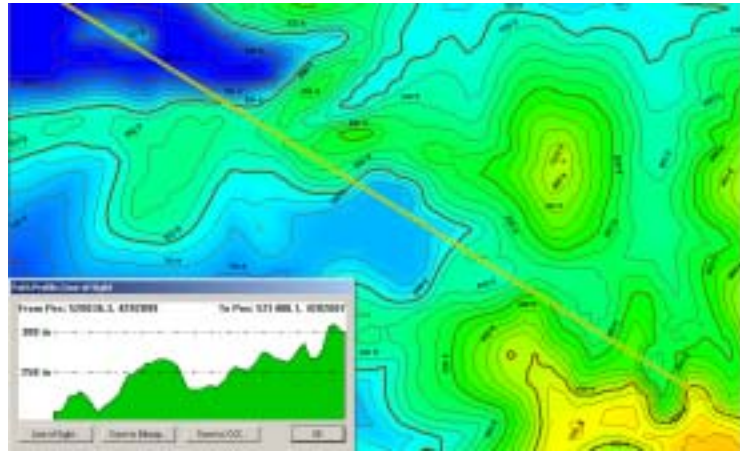


Devils Kitchen Sinkhole Drainage Area Calculated = 14.2 acres

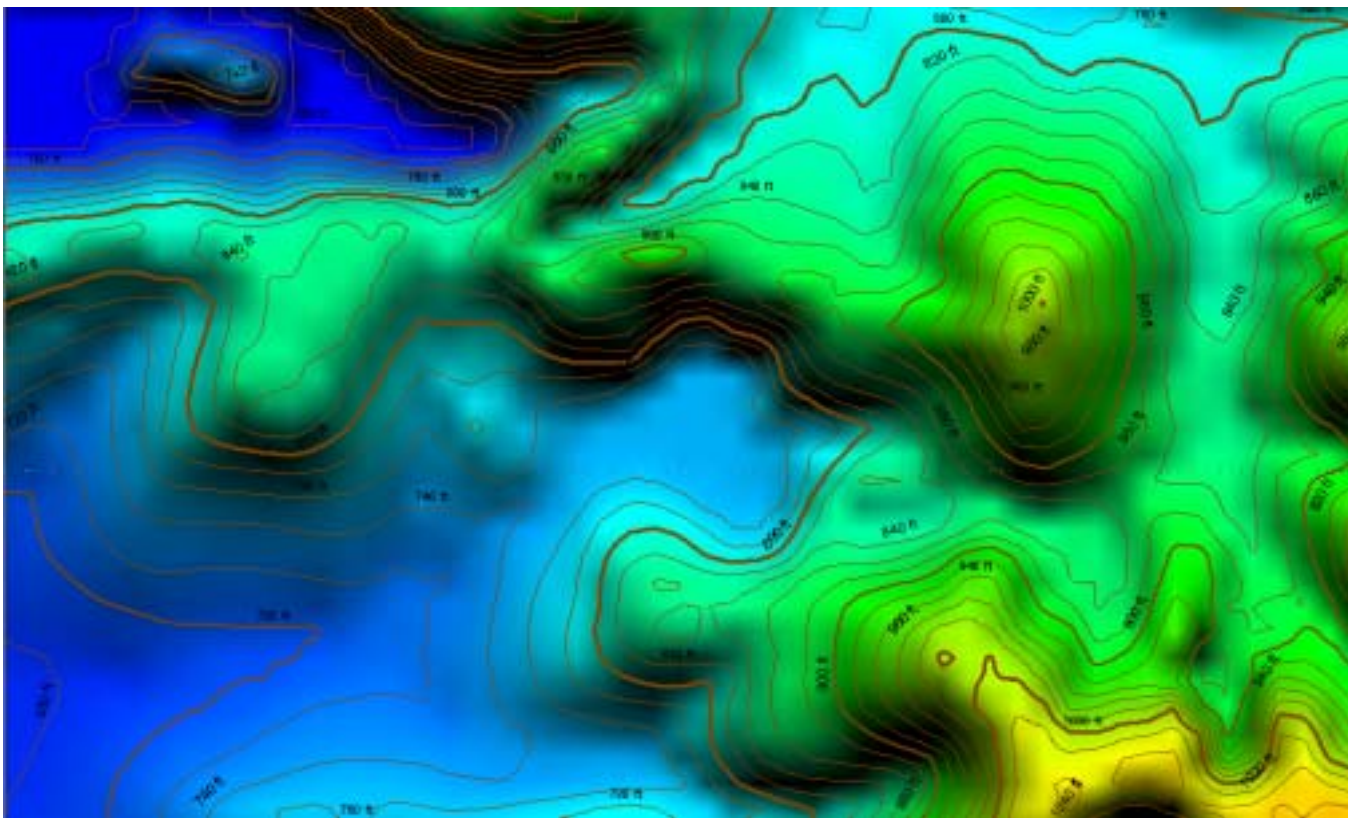
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It also has a line of profile tool that allows the generation of topographic profiles. This is perhaps the best feature of the software as then the topography over a cave can be compared to cave ceiling elevations at the same coordinates in order to estimate the depth to a cave and the probable location of new entrances to a cave.

Different shading options are available to enhance the map appearance.



Topography Profile - Island Cave, Devils Kitchen, Black Sink to Red Sink



Color And Line Contour with Hillside Shading Digital Elevation Model of Devils Kitchen Area of Hahatonka C.I. =20'

Limitations of Digital Elevation Models

In many ways, the raster tops have an advantage over the digital maps. Many of the raster maps were field checked and have some detailed information that the digital elevation models don't. The limitations of the digital data are based on the 30 meter grid spacing that the data was gridded to. Sinkholes less than 100' x 100' will be difficult for the digital data to detect. Many smaller sinkholes will not appear at all on either the digital or raster images.

To learn more about digital elevation models, terrain modeling and other image related items, I suggest going to www.terrainmap.com



The End of The “Golden Age” of Caving

Editorial by Lloyd Swartz

This article is meant as a wake up call to cavers across the country about the threat to the future of caving and cave exploration. What I write is meant as a general introduction to a major issue that cavers are facing today: closure of caves to all, forever. My primary goal is to share my concern, and hopefully generate interest in a completely new cave protection agenda.

Over the last 10+ years of caving I have witnessed some extraordinary changes in caving, almost wholly revolving around conservation practices. Many good ideas, practices and attitudes were the result. These include designating trails through heavily traveled areas and delicate areas, better resource inventory and study, improved methods for handling delicate areas, better and increased cave gating, permit systems as well as increased cave protection laws, to name a few.

At some point, things began to go horribly wrong in the world of cave conservation ideals. Entrance permits over time became more, and more difficult to get, and either eliminated for “overly sensitive” caves or caves with “important resources”. Even if “important resources” were studied by qualified scientists, the cave simply remained permanently closed. Dig permits were made nearly impossible or impossible to get, with red tape involved to simply move rock and dirt. Most new discoveries were closed immediately and future exploration placed in doubt. The most spectacular and some of the largest caves in New Mexico are limited to a few permits a year, to only those with the political power to procure them.

What exactly are the root causes of this shift to the extreme preservation? A good start is the conflict between preservation and conservation. Those ideals are coming to a major collision. It is my opinion that most modern environmental groups advocate

preservation, which is restoring environments to pre-man conditions and no longer allowing humans in the area, a concept that can be traced back many decades.

The reality is, those that enjoy the outdoors, including active cavers generally fall under the conservation oriented umbrella. We use, enjoy, respect, and at the same time conserve and protect public lands. Caves are no different. Are cave gating, permit restrictions, and qualifications for some caves responsible management? Absolutely! Are there any caves for which 0-5 permits a year are reasonable? Should access be tied to politics, work party only trips, restoration only trips, science only trips, etc.? Should recreational caving trips not be allowed, or unreasonably restricted? Should some caves with limited cave formations or resources not be allowed for more open, unrestricted caving and digging than other more delicate, decorated caves? These are just a few of the questions cavers need to start asking themselves about the management of their caves on public lands.

Other subtle hints of the future exist. Everyone is aware of the famous old “Leave nothing but footprints, take nothing but pictures” motto we all adhere to when recreational caving. But how many noticed its change to “Leave nothing but CAREFULLY placed footprints, take nothing but pictures”? Seemed perfectly reasonable, though a little obvious to me. But, now what is it? Something like “Leave no Foot Prints, take carefully set up photos”?

One has to be reasonable. For a bat, cricket, or man to pass, some sort of impact has to occur. The question is, what is reasonable, and what truly is an unacceptable impact? How much impact is environmental, and how much is really just visual or perceived? I don’t think these questions are being answered via

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common sense, nor science, and the current tendency is to lean toward the extreme.

Most recently, I experienced events so disturbing, and begun to recognize the dire future of caving on public lands, that I have hung up my helmet, at least for now, after 15 years of caving. I consider myself a well-seasoned cave digger, capable of exceptional production.

Alarm bells have been blaring for years, with all recent cave discoveries locked up and no one allowed in. I thought, "...well that is just ridiculous... surely my group working closely with the BLM (not FS or NPS) under a supervised dig permit that took years to obtain, and contains specific conditions won't have any trouble... Heck, we are the CRF!"

However, on Labor Day Weekend of last year (2001) we had a breakthrough under one of the authorized dig sites in a known cave. After a short, 1200 ft survey we encountered a discovery of epic proportions, with booming borehole going in multiple directions. I average multiple breakthroughs year, but this was a life discovery. However as the cave required special gear to safely pass formations as well as consideration of the requirement of consultation with BLM required under permit, we left the cave.

Understand also this dig was started in the 70s, dug hundreds of feet through breakdown over a decade, then a river came up making access impossible. The water went down and I fell in love with the airflow. Such a daunting, extreme, long dig resulted in 2 trips by myself, 2 on one trip, 3 on one, 4 on one, 5 on one, and finally 4 on one. There was no other help. Within 3 days the nightmare began. The local head of the CRF who had no involvement in the cave, or project, showed up knocking on the BLM door with all kinds of ideas.

Question: Should all caves in Carlsbad National Park be closed to all cavers? Folks, this is not a joke! At the next trip to the cave the local CRF head showed up with BLM in tow, and buddies and changed and locked the cave up. We were told not to go back. Then a major meeting took place shortly thereafter, with an obvious agenda to **COMPLETELY CLOSE THE CAVE FOREVER!** I nearly fainted, and drove home depressed and upset.

At Thanksgiving the discovery team had a private, last ditch meeting with the Resource Specialist to change the ugly direction of things to come, and revert back to the Dig Permit requirements instead. Later we were to hear another EA was going to be done, with of course primary input from my 2 little friends. Its now anticipated it will be done in the next year or so and one science trip allowed in. The cave was **THE LAST CAVE IN NEW MEXICO** most cavers could reasonably get a permit for... now there are none.

I am left feeling somewhat ashamed, and plenty of cavers think I am partly responsible for locking up the last open cave. This is truly disgusting, mismanagement, and misguided management of a valuable public land recreational resource. Unfortunately there seem to be no laws protecting the recreational value of caves, i.e. to keep them open for recreational purposes.

I am a land use advocate in the Western US and I am sickened by these events, and am working hard as ever to keep surface public lands open to multi-use, and responsible conservation. My warning is this: while this is obviously a Public Land Issue, and most of you cave on private land (lucky dogs) you must be aware that this **WILL** come to your public lands one day, in your area. **THEY EVEN** discussed that at the BLM meeting I went to!!! This is **TERRIFYING FOLKS!**

The first rule of having a problem is recognizing the problem, and understanding it. This can be a real struggle at first, bucking the trend, shattering illusions and bringing people back toward the middle of the road, then getting them involved. Just like most groups persecuted by the modern preservation movement, they never thought they would be next. OHVs, Fourwheelers, Snow Mobiles, Mountain Bikes, Horse Back Riders, Hang Gliders, Fisherman.....AND, the scary part is the large numbers of misguided Cavers devastating their OWN SPORT! That simply does not happen nearly as much in other outdoor sports/hobbies.

I have considered starting an activist organization to promote and protect cave access, because I believe the caving community is ready. After posting a single post, on the CaveDiggers.Com forum, I was pleasantly surprised to receive several e-mails from cavers across the country, including New Mexico, and including some well-known, and respected cavers. And, although it's obvious New Mexico is one of the greatest cave states in the US, and the access situation here is coming to a head, it was interesting to hear the beginnings of these problems in a number of other states, and some, while different stories from mine, were truly shocking.

Some ideas I have are:

1. Consider private land issues as well as public lands, and involve more cavers in the discussions.
2. Get involved in management plan development, on all levels.
3. Involve qualified, and concerned scientists, and conduct scientific studies related to cave management, exploration and "Real World" impact of cavers.
4. Work on new, more fair permit systems and develop alternate plans, with definable, and credible, as well as, more reasonable numbers and requirements.
5. Look at laws that might help protect access to caves.
6. Advocate a return to responsible cave conservation.

7. Address surface access issues as they specifically relate to cave access.
8. Advocate landowner education and partnership.

I sincerely hope this is an eye-opening article to some, and gets the juices pumping for others. I hope to publish similar articles as opportunities present themselves, and promote these ideas. Since my early, vocal advocacy will mean little or no caving in the near future, I volunteer to start the ball rolling, collect names, and begin early organization, and minimize others' exposure for now. I can be contacted at rs2477ut@mindspring.com, and I will automatically add you to an interested-parties list. Eventual involvement in numbers is critical to precipitate change. Remember, the cave you save may be your own!

Lloyd Swartz



Editor's Note: You may feel Lloyd's article is not pertinent to you. I would urge you to consider otherwise. While preservation is a wonderful and beautiful thing, your freedom to recreate in your chosen manner may be greatly impacted if you don't do something about it now. Consider rock climbing. Twenty years ago, there were many popular cliffs where rock climbers had worn out their welcome and the result was too many closed recreational areas. Climbers recognized this, and started the Access Fund to regain access to these climbing areas by purchasing them or developing land-use agreements with owners. Has it been successful? Absolutely. In fact, the Access Fund has been so successful in gaining (and regaining) access to rock climbing areas, that its effective mission has now become education of climbers so they minimally impact the land, while recreating on it. Can this happen with caves, too? I believe it can. However, as Lloyd has suggested, let's research it rather than just closing caves because we think we are adversely impacting them. Let's start today. Call up your local grotto chairperson and begin discussions at your next grotto (or digging) meeting about the use and access of caves. "Cave Access" can be just as successful as the Climber's Access Fund has been. However, it will require all of us to working together, with the common goal of protecting caves for our recreation, for our future, and for our Earth, in order for it to happen.

Use of Smoke Testing in the Detection of Cave to Surface Connections

by Morris Hall

As the vice-president of our municipal utility district, I've had a chance to see several technologies used in the maintenance and repair of our water and sewer system here in Spring, Texas (outside Houston).

One of the technologies we use in the maintenance and repair of our sewers is smoke testing. We place large, industrial strength smoke canisters in our sewer systems to periodically check for connections with the surface.

Over time, the Houston area soils shift, and crack open, occasionally cracking a sewer pipe and will allow stormwater to enter into the sewer system. This is not a good thing, as the cost of treating the sewer effluent is based on volume, and if storm water enters the system, our cost to treat the effluent rises as this artificial source of water enters the system. Smoke testing is an efficient and cost effective way of finding those connections between the sewer and the surface...hey why not try it in a cave to establish whether there may be an unknown connection with the surface?!

So, I purchased several small canisters and set off to my friend's, Steve Wilson, farm in Virginia to try out the smoke testing idea. Steve has a small, 75' long cave, which is an enlarged joint. He thought it might go through the hillside, but he could never find the opening on the other side...so off we went...luckily air was blowing into the cave, so the smoke would readily enter the cave. I set off the canisters while Steve looked for the smoke at the surface....after a couple of minutes, smoke came out of a small "rabbit hole" about 50' away from the end of the known cave...this was no major discovery, but it did indicate that the technique had merit.

Several tips:

Don't try and test a whole cave system. While the smoke is non-toxic, it can be irritating. Pick out a lead in a cave- one passage- to start with.

Only do on days when air is entering the cave. You'll be wasting your money if the smoke is blown out of the known entrance.

Estimate the volume of smoke you need...I know, I know I'm asking the impossible, but you do have to have an idea of what you need as the canisters are made to produce a certain volume of smoke (i.e., 10,000 cu. ft, 100,000 cu. ft, etc.).

Once you have purchased the canister(s), use them: they degrade quickly with moisture and become unusable in 1-2 years.

Have plenty of people at the surface who can look for the smoke. Smoke will appear in places you don't expect, so be prepared.

Don't do after a rain. The soil needs to dry.

Probably fall is best, when some of the leaves have fallen enough to allow for better visibility of the smoke.

Don't do this on a windy day or you may never see anything.

Have survey markers available for your spotters, so they can mark the location of the smoke.

Most local utility districts have operators who can supply you contacts or sources for the smoke canisters.

Let me and others know if you have success or failure using this technique.



Cave Mapping Software

Caps

<http://www.earthlink.net/~hubertcrowell/>

Compass

<http://fountainware.com/compass>

OnStation

<http://members.home.net/tacovan>

To find more, see:

<http://www.resurgentsoftware.com/winkarst.htm>

Whats New

****NEW NAME**—The next issue of Cavediggers.com The Magazine will be named Caves.com The Magazine. Same great content! Our goal is to grow the magazine to a level that will make it feasible to have commercially printed. We hope to reach a level of 500 subscribers by years end and continue to grow internationally as well. If you like the magazine let others know about it!

****An Action Caving Calendar for 2003** is in the initial stages of planning and any action photos i.e. digging, etc. would greatly be appreciated. Email mark@cavediggers.com if interested in contributing.

Finding New Cave

by Mark Passerby

Growing up in Greenbrier County certainly has its advantages when it comes to finding new cave but with a little luck and more importantly, preparation, anyone can find new cave!

Some caves can be found by digging while others can simply be walked up on and entered with perhaps only minor movement of materials. For example the following caves: Hide-A-Bed, Bedspring(100 feet away from the old Organ Cave fieldhouse), Bullet, Helix, Zigafoose Blowhole, Upper Frazier, Lower Frazier, Deels Hole, Freelanders Well, Caves.com Cave, Burnt Toilet Paper Pit and several others all have a variety of different geologic characteristics that at the time made them seem like good digs.

They now represent miles and miles of explored cave and as I look back at the history I can recollect that a very little % of our time was spent on useless digging at sites that would most likely not yield cave. Far more time was spent studying the topo maps and the geology i.e. contacts, drainage areas, blind valleys etc. then followed up with days and days of fieldwalking and getting to know the area....the

springs....the insurgences.....and karst features. Once all this is done a “best” location is chosen and an all out assault is made. Unless the dig is seriously easy, we never dig if “air” movement at some level is not present. Another keen note we observed in digs such as Blue Sulphur Pit and Freelanders Well is that if it blows in winter and does nothing in summer the cave most likely won’t be big or long.... at least this seems to be the rule in West Virginia.

Fieldwalking is by far the most useful way to survey an entire area and commonly takes months to complete. For instance Raders Valley has limestone in the bottom of the valley and a good ways up the side of the mountain. The distances and area is huge when considering an effort to cover it meticulously on foot, but once complete, then quick decisions can be made on where to dig and where the big breakthroughs most likely will happen.

Look for the Air —You can greatly increase your chances of success by walking past potential digs that have no air and walking till you find one with air. Don’t settle for what could be a lifelong never-ending dig; instead opt to walk and cover some more area till you find that crack or insurgence with the air sucking in or blowing out. Not only is it more likely to yield cave it also is a prime

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The Caves.com Cave & Dig

Greenbrier County #1215

by Mark Passerby

The Caves.com Cave has the distinction of being the most labor intensive of all the digs I have ever engaged upon. It required hundreds of man hours and tons of material was removed. Ending with a huge hole lined with solid clean walls the dig now appears quite elegant and is certainly looked on with pride by all of those who participated in making the eventual breakthrough on July 6, 2002.

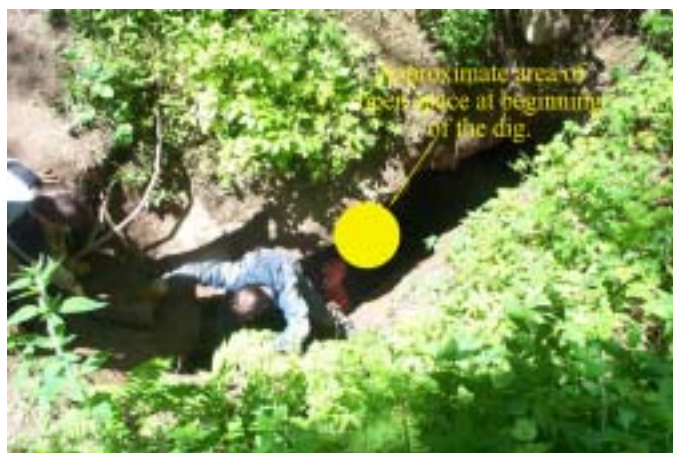


Initially we began by doing a dye trace of the water entering the front area to see which of the two springs the cave drained to. The results were somewhat unexpected and the travel time far less than we had anticipated, so we geared up to begin a dig project. The first decision was whether to dig where the water was entering which appeared to be the most obvious route to take, however after a bit of back and forth we decided to dig at the back area of the valley/sink in what was only a very small hole with a bit of air. Our theory was that the water going in the entrance up front was bound to flow down the dip and back along the strike so digging at the back right area would intersect the passage just as it went into

solid rock. Wow looking at it now we couldn't have been any more on target! In fact digging where the water enters would have proved futile.

Beginning the Dig

The beginning saw us trying to work a modest width hole down in hopes that a breakthrough would come early, but as time wore on the reality began to sink in. We were going to have to clean the entire slot out because the dig was going to go deep and the rounded boulders simply weren't going to stay put. As we progressed down the crevice it began to widen and a joint heading into the hillside revealed itself. Still though we would have to remove the entire width of debris in order to continue downward so the progress was slow and laborious. Many times stairs would be carved in the slope leading into the crevice only to collapse moments later. In the photo below Bob Kirk can be seen about 1/2 way down the dig passing buckets to Vladimir who passes to the next in line. The yellow dot represents the approximate size of the opening when we started and was perhaps 3 feet deep.



Making the Turn

We finally reached a depth and had the hole cleaned out to a point where we were ready to begin movement into the joint and into the hillside. Much of the debris at this point could be placed in areas at the bottom that were clear and out of the way so movement was quickened and progress somewhat easier.

The joint at this point was really shaping up quite nicely and we now were between two solid walls with a solid roof. Still we felt we needed to progress a bit further back into the hill before dropping down. Aaron who has spent the most time at the front of the dig continued to dig and fill buckets at a feverish pace. He finally stopped at a silt pile.

The Breakthrough

Josh DeHaven and I at this point decided to give it a shot. This was Josh's first cave digging experience and probably one he won't forget too soon. After looking at where we were in the dig I decided that the time had come to go down a bit more. Quickly we hit a back solid wall.....a real good sign that the passage we were after was to our left and back along the strike. We began digging a bit down and to the left and within 5 minutes were peering into blackness with monster air plowing us in the face. Looking back at the dig it is clear that the water for the most part sinks in the front of the sink and rapidly descends down along the strike till it intersects the joint, then taking the joint to its end, the water pushes a silt and debris pile against the back wall before making the turn back along the strike and into open cave under the hillside.

Where we are now

The first trip into the cave saw about 150' of passage mapped with massive air in a side lead that will be pushed on 7/13/02. The main passage steeply dipped and temporarily ended in a deep pool which appears to be *perhaps* a short duckunder. It will require a wetsuit to explore beyond and may end up with us pumping the deep pool dry. There was evidence however that the pool/sump is short so we will see.

Caves.com Cave also is the only cave in the Raders Valley Drainage South of Route 60 in the lower level limestone. Other caves with this distinction are for example: McClungs, The Hole, Benedicts, and even Organ Cave so if we can find a route on it certainly holds promise to be a big and quite extensive cave system. Participants: Aaron Bird, Rachel

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motivator to bring in other diggers who can be part of a team that makes the breakthrough possible. The Caves.com Cave described in this issue was perhaps the biggest movement of material we have ever done, but the air in our face served as a constant reminder that a breakthrough was imminent if we just worked on. That moment when the final rock is moved to reveal blackness followed by an even larger puff of big air is something you won't soon forget!



Digging up a slope into a passage above to find new cave...
photo contributed by Phil Lucas

New Passage in Existing Caves

Miles and miles of cave exist in areas even commonly traveled by the most experienced cavers. A prime example of this is a lead spotted on a trip with Danny Gillespie in Organ Cave at the bottom of the Bowen Drop. It was a somewhat difficult to perceive lead in the wall about 15 feet from the floor and wide open. A later trip I was on with Bob Handley was attempting to get into another lead very near this lead so a few of us used a rope to play circus toss and finally caught a rock and Todd Handley was able to get into the lead. He quickly disappeared into going virgin cave and as I recall over a mile of new cave was found! Are there more spots like this even in a cave as heavily traveled as Organ Cave.....you bet they are all over the place and in less traveled systems the opportunities are multiplied even more times. The next marvelous gallery is just around the bend.



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