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Laura Lexander

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Laura Lexander, Editor
laura.lexander@cave-research.org
21551 SE 273rd Ct., Maple Valley, WA 98038

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NEWSLETTER STAFF:
Content Editor: Laura Lexander,
laura.lexander@cave-research.org
Layout/Photos: Ralph Earlandson,
ralph.earlandson@gmail.com
Mailing: Bob Hoke, bob@rhoke.net





For information about the CRF contact:
Dave West
3418 University Pl.
Baltimore, MD 21218-2831
d270@bellatlantic.net

Donations to CRF should be sent to:
Bob Hoke, CRF Treasurer
6304 Kaybro St.
Laurel, MD 20707-2621
bob@rhoke.net

# President's Corner

## By: Dave West

Karen and I are really enjoying our retirement. We are able to travel the country and the world to participate in numerous projects, conventions, and symposiums. We just got home (Baltimore, MD) from a week at Carlsbad Caverns National Park, where I had the privilege of mapping the Music Room Section, which consists of ledges along Main Corridor. We then proceeded to Mammoth Cave National Park for four days of mapping in the Frozen Niagara area to produce a map that includes current lighting of the tour route to assist in monitoring algae growth. I should be able to get that drawn up before I go to the Cave Hollow -Arbogast Project in Tucker County, West Virginia next month, after which we will fly out west for a week at Lava Beds National Monument, where I am mapping the Balcony Flow, spend some time sightseeing, and then spending a week at Craters of the Moon National Monument mapping caves there. Our ability to do this did not come about by accident. We both started planning for our retirement decades before it would be available to us. I encourage all of our younger members to start their retirement planning now if they haven't already done so. A little put away now can really add up later on. If your employer offers matching funds of any kind, take full advantage of that. If not, put a little in a retirement IRA from every paycheck even if it is only a small amount. When you can, open a second account of a different nature, perhaps a Roth. Later on you'll be glad you did.

# On the Cover

Stacy Scherman, Jimmy Gore, Julie Terhune, Kayla Sapkota, Hannah Bridgman, and Jeffrey Bridgman return from a busy day of monitoring Buffalo River caves. Photo by Jeffrey Bridgman.

# Evidence for Extreme Floods in New Discovery and Related Passages in Mammoth Cave

**By: Art Palmer, Rick Olson and Peggy Palmer**

Solutional scallops in caves are handy indicators of past water-flow directions and flow rates in caves. Their steep sides face in the original downstream direction, and estimates of the flow velocity can be made from the scallop lengths. The shorter they are, the faster the flow that formed them. During geologic mapping in Mammoth Cave in the early 1970s, the Palmers (CRF) noticed unusual scallop patterns in and around Rose's Pass (Figs. 1 and 2). Scallops 10-20 cm long (~4-8 inches) are oriented toward Boone Avenue, in the normal downstream direction toward Green River. But patches of much smaller scallops, partly removed by the larger ones, have average scallop lengths of only 2 cm. These indicate flow up to 10 times faster, but in the "wrong" direction (away from the river). We interpreted them as relics of significant back-flooding – flow reversal during unusually high water when overflow takes place from lower-level streams.

For many years Rick Olson (NPS, CRF) has also been intrigued by scallop patterns in the cave. Recently he found that scallops in Fossil Avenue indicate high velocity toward Big Avenue, the main passage of New Discovery. Big Avenue is a downstream continuation of Cleaveland Avenue in the main part of Mammoth Cave. Large sandstone cobbles in Fossil Avenue also indicate former rapid flow (Fig. 3). All of these high-velocity indicators occupy Level C in the cave, at an elevation of about 550 feet above sea level. These all lie below Level B, the largest passages in Mammoth Cave, such as Main Cave and Grand Avenue (Kentucky Avenue), at elevations of 600 feet or more (Palmer, 1981). Non-metric units are used here for elevations, to match topographic maps.

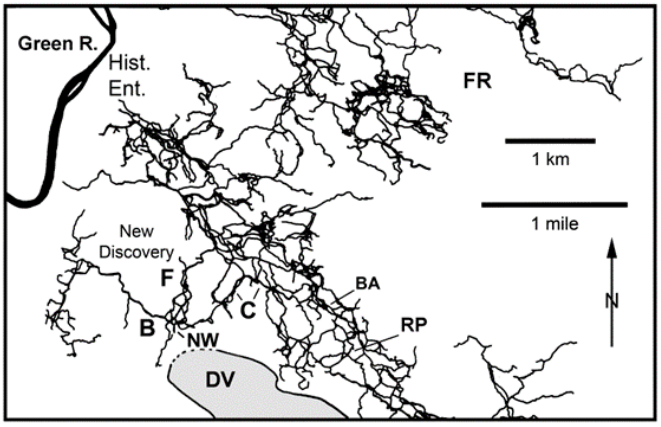



**Fig 1:** *Line map of the western part of Mammoth Cave, showing location of passages described in this article (after CRF surveys). B = Big Ave., F = Fossil Ave., NW = Noah's Way, C = Cleaveland Ave., DV = deep parts of Doyel Valley; C = Cleaveland Ave., BA = Boone Ave., RP = Rose's Pass, FR = southern end of Flint Ridge section.*

Teaming up, we mapped cross sections in a few passages to obtain approximate cross-sectional areas (for example, 20.2 $m^2$ at survey station F37 in Fossil Avenue). Mean scallop lengths were measured at 2 cm, which suggests a water velocity of roughly 2.2 meters/sec. Multiplying by the cross-sectional area gives an estimated discharge of about 44 $m^3$/sec (~1550 cubic feet per second). Velocity estimates from scallops were based on laboratory data by Curl (1974), which include corrections for water temperature, passage shape, and cross-sectional area. Calculation methods are shown in Palmer (2007, p. 148).

In 2016, during a photo session to document New Discovery, we were impressed by the large cobbles, coarse sand, sharply defined dissolution features, and almost total absence of typical silt fill. All of these suggest floodwater flow that was solutionally highly aggressive. Very small scallops down to about 1 cm long cover some of the lower walls and breakdown blocks (Fig. 4). These are interrupted in places by sharp-edged potholes 15-20 cm in diameter near the passage floor, which were apparently produced by pebbles swirled around by turbulent eddies. The scallops show rapid flow toward the

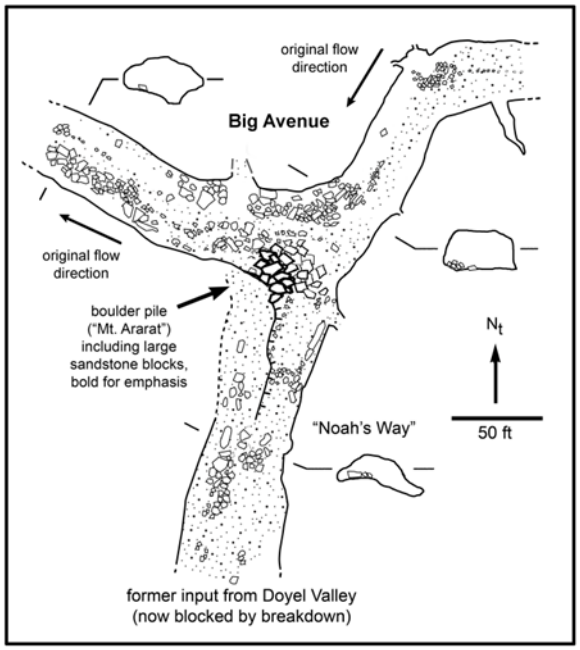



**Fig. 6:** *Simplified map of the junction between Noah's Way and Big Avenue, north of the sink point of Doyel Valley (based on CRF surveys).*

west, in the direction of a former spring along the Green River, via Marshall Avenue (the main passage in Lee Cave).

The most impressive feature in New Discovery is a large pile of what seemed to be breakdown (Fig. 5), located at the junction of Big Avenue with a southern branch. This branch was apparently once fed by the blind, north-trending Doyel Valley (Fig. 6). The pile turned out not to be breakdown at all. It is overlain by a smooth solutional ceiling, and the uppermost blocks (some more than a cubic meter in volume) are composed of Big Clifty Sandstone (Fig. 7). The sandstone lines the upper walls of Doyel Valley, and it appears that blocks of this material, and many of the limestone blocks as well, had been carried into the cave during one or more major floods. The cave passages in this area are located in the Joppa Member of the Ste. Genevieve Limestone, about 180 feet below the sandstone.

The sandstone blocks in the cave had been carried a horizontal distance of at least 1000 feet. The boulder pile in Big Avenue is located where north-flowing water from the valley joined the flow from Big Avenue and made a sharp left-hand bend toward the west. This is the ideal position for an accumulation of boulders – the curvature of the stream flow would have generated transverse eddies strong enough to pile the blocks on the inside of the bend. All passages in the area have clearly been modified by severe floods of exceptionally high velocity and discharge.

We mapped scallop distributions and calculated flow velocities (up to 2 m/sec). If that water had entirely filled Big Avenue it would have had a discharge of roughly 100 cubic meters per second – about 60% of the average flow of today's Green River at Mammoth Cave! This flow would have been impossible to sustain for more than a short time. In fact, in the downstream direction, the scallops enlarge and boulders become sparse, showing that the high flow quickly dissipated downstream.

The size of the sandstone blocks provides an alternate method for estimating peak flow. Velocities required to move them through the cave and up slopes can be estimated from the drag force imparted by the flow. Results were similar to those from the scallop data, but scattered and far less certain because of the uncertainty in calculating hydraulic drag, estimating flow paths, etc. But the great size of the blocks validates the highest velocity estimates, and shows that the scallops are real, rather than odd artifacts designed to lead us astray.

Delicate fossils protruding from some of the scalloped surfaces near floor level indicate a general lack of suspended pebbles and boulders at the time the scallops were forming (Fig. 4) – the opposite of what the boulder piles suggest. The absence of coarse sediment at those times may indicate that sand and pebbles had been carried away by earlier stages of rapid flow, so that only very large immobile rocks remained during later periods of high flow when the delicate solutional sculpturing took place.

In 2017, to determine the scallop sizes over the entire bedrock cross sections, Rick constructed what looked like a giant window-washer, consisting of a telescoping 4.5-meter aluminum pole with a laminated centimeter scale at the top. Telephoto shots allowed us to measure the distribution, orientation, and lengths of scallops without stepping off the established path (Fig. 8). Lighting from alternate sides was used to verify the direction of scallop asymmetry, and thus the direction of flow. A tripod-mounted Leica Disto X2 was used to obtain radial shots at closely spaced angles to provide detailed passage cross sections and distribution of scallop sizes (still in progress).

The floods (undoubtedly not a single flood) reached the ceiling of Big Avenue, as shown by the distribution of scallops. As expected, their asymmetry generally indicates flow to the west, although there is evidence for local flow reversal. Calculated velocities at ceiling level were less than those along the walls, with scallops averaging 3–4 cm long. This fits the expected pattern in conduits, where the flow becomes less efficient and slower as flooding fills the available cross section, while the contact area between water and rock increases rapidly. Retreat of floods from the cave was also rather rapid, as shown by the coarse grain size of the sediments and deep rills extending down the middle and lower walls of the passages from upper-level sediment bodies and solution pockets (Fig. 9). High scallop densities and small size (indicating high velocity) are most notable in the lowest few meters of the passage walls, where they are intermixed with sharp-edged potholes about 15–20 cm in diameter. Meanwhile, the flood story inspired the mappers to assign the names Mt. Ararat and Noah's Way to the sandstone pile and the passage leading northward to it from Doyel Valley (Fig. 6).

The scallops and related features required substantial removal of limestone by dissolution, and it is highly improbable that they could have resulted from a single flood. Experimental limestone dissolution rates suggest a maximum of 2 cm/year of solutional retreat by continuous rapid flow of water with $CO_2$ up to one atmosphere of $CO_2$ partial pressure, and no initial load of dissolved limestone (Rauch and White, 1970; Plummer et al., 1978). These conditions are far beyond the dissolving capacity of typical cave water. A dissolution rate of one millimeter per year is considered extremely high (see examples in Palmer, 2007, p. 124–125 and 227). Abrasion by suspended sediment can increase erosion rate, but even with this boost there is no record of such great enlargement rates in caves; and erosive particles would have streamlined the pattern of limestone removal in the flow direction. The most likely origin was therefore repeated flooding over a fairly short time -– per-

haps hundreds or even thousands of years – still a short time if you're a geologist.

When did these events take place? Big Avenue is at Level C, about 550 ft above sea level (Palmer, 1981). Dating of quartz sediment at that level with cosmogenic radionuclides provides an approximate burial age of 1.5 million years (from Granger et al., 2001, but adjusted for recent recalibration of isotope decay rate). The passage elevation shows that it was younger than the rather flat Pennyroyal Plateau surface (sinkhole plain) to the south (typically ~600 ft above sea level), but older than the sequence of glaciations that greatly modified the landscape to the north during the past million years or so. Abandonment of passages at Level C and origin of Level D (50 feet lower), resulted from entrenchment of the Green River in response to the lowering of sea level (and thus the Mississippi and Ohio Rivers) in the mid-Pleistocene. Cosmogenic sediment dates at Level D suggest that this lowering took place around 0.8–1.2 million years ago (adjusted from Granger et al., 2001). Another possible cause for the sudden base-level drop was the great increase in the Ohio River flow caused by glacial displacement of northerly rivers (Palmer, 1981); but recent field information from Darryl Granger seems to support the former idea.

The series of floods in New Discovery could have been produced by periodic blockage of Doyel Valley, interrupted by sudden releases of water when the blockage was breached. This process is known to have produced severe and repeated surface flooding in western glaciated regions during the last "ice age"; but Mammoth Cave lies more than 50 miles south of the farthest extent of Pleistocene glaciers. There are no known artifacts of glacial activity in the Mammoth Cave region (erratic boulders, streamlining of topographic features, unusual sediment deposits, river diversions, etc.).

In summary, the evidence from New Discovery favors periodic damming of Doyel Valley with sediment and/or vegetal debris, with occasional catastrophic releases of water during severe regional storms. Landslides into dammed lakes in Doyel Valley might have had a similar effect, although that would not explain the severe flooding in other passages, such as Fossil Avenue and Rose's Pass, coming simultaneously from other inlets. It appears that these floods took place roughly a million years ago.

These preliminary results have been presented at the 2016 NSS Convention in Ely, Nevada and the 2017 International Congress of Speleology in Sydney, Australia. A sandstone sample from the flood debris in Big Avenue is being analyzed for date of arrival in the cave by Darryl Granger at Purdue University.

Thanks to Colleen Olson, Mary and Chuck Schubert, and John Andersland for field assistance during this study.

**References**

Curl, R.L., 1974, Deducing flow velocity in cave conduits from scallops: National Speleological Society, NSS Bulletin, v. 7, no. 2, p. 1–9.

Granger, D.E., Fabel, D., and Palmer, A.N., 2001, Pliocene-Pleistocene incision of the Green River, Kentucky, determined from radioactive decay of cosmogenic $^{26}Al$ and $^{10}Be$ in Mammoth Cave sediments: Geological Society of America Bulletin 113, no. 7, p. 825-836.

Palmer, A.N., 1981, A geological guide to Mammoth Cave National Park: Zephyrus Press, Teaneck, N.J. (forerunner of Cave Books), 210 p.

Palmer, A.N., 2007, Cave Geology: Cave Books, Dayton, OH, 454 p.

Plummer, L.N., Wigley, T.M.L., and Parkhurst, D.L., 1978, The kinetics of calcite dissolution in $CO_2$-water systems at 5° to 60°C and 0.0 to 1.0 atm $CO_2$: American Journal of Science, v. 278, p. 179–216.

Rauch, H.W., and White, W.B., 1970, Lithologic controls on the development of solution porosity in carbonate aquifers: Water Resources Research, v. 6, p. 1175–1192.

**Fig. 2:** *Rose's Pass displays two distinct scallop lengths showing high velocities toward the camera and moderate velocities in the opposite direction. The slower flow partly removed the former rapid-flow scallops, but the fast and slow flows appear to have alternated more than once. Richard Zopf pondering. All photos by A.N. Palmer.*

**Fig. 3:** *Rick Olson and Mary Schubert (NPS) examining a streamlined pile of sand and sandstone blocks in Fossil Avenue deposited by floodwaters. The angular blocks are breakdown slabs that were moved to mark the trail.*


**Fig. 4:** *Very small scallops in a breakdown block on the floor of Big Avenue indicate extremely rapid flow. Each major interval on the upper scale indicates one centimeter. Most of these scallops have a length of about 1 cm, with a few that reach 2 cm. Small fossils protruding from the rock surface show the great corrosiveness of the water, but also its low abrasive power, suggesting that suspended rocks were not present in the flow at this point.*

**Fig. 5***: Boulder pile ("Mt. Ararat") at the junction of Noah's Way (in background) with Big Avenue, evidently deposited where the water made a sharp turn into downstream Big Avenue (which continues toward the right). The ceiling over the rock pile is flat and was not the source of the boulders. The top-most boulders are composed of sandstone. Annick Houdeau (guest, Lyon, France) in foreground.*

**Fig. 7**: *Sandstone blocks (Big Clifty Formation) carried into New Discovery by rapid floodwaters from Doyel Valley and deposited atop the boulder pile (Mt. Ararat). John Andersland (WKU) giving scrutiny. It is important to restrict traffic to the established trails when possible, to avoid disturbing evidence of former flow conditions.*

**Fig. 8 (above):** *Rick Olson's telescoping wand for measuring scallops high off the floor in Big Avenue, west of Mt. Ararat. The flow direction at this point is ambiguous.*

**Fig. 9 (left):** *Severe corrosion of the walls of Big Avenue caused by ceiling-high flooding a few hundred meters west of Mt. Ararat. Water injected into fissures and dead-end pockets not only enlarged those features but also formed rills in the walls below as the floodwaters drained back out. (Joppa Member, Ste. Genevieve Limestone.) Consolidated sandy residue on the walls suggests partial filling of the passage prior to the latest flooding.*

# Echo Spring Trip Report

## Mark Wenner, NSS/CDS 54893, Karst Terrain Explorations

**By Rick Toomey, NPS Coordinator:**

**Narrative:** On Feb. 21, 2017, a team of researchers from Mercy Academy in Louisville had two ROVs (Remote Operated Vehicles, cabled submarines with cameras) they were using to explore Echo River Spring get stuck in the spring. Since then, I have been working with some experienced cave divers, NPS dive safety personnel, and Park staff to develop a plan for cave divers to enter the spring and attempt a rescue of the ROVs. This Saturday, April 1, 2017, weather permitting, cave divers Mark Wenner and Marbry Hardin will be attempting to rescue the ROVs.

One of the ROVs is in an estimated 20 meters (based on amount of tether out). It is tangled on a 30+ year old dive line placed back in the spring during exploration in the mid-80's. We suspect it is the historic dive line from the dives that connected the spring to Echo River in the mid-80's. When that ROV got tangled, they used the second ROV to get a look at the situation with the first ROV and potentially rescue it. The second ROV seems to be stuck only a few meters into the spring. The best guess is that it is stuck between some rocks. We estimate that the ROVs are about three meters underwater. Before getting tangled, they did note that the conduit the first ROV was in was very large; they estimated it was at least four meters high.

**By Mark Wenner, Dive Coordinator:**

**Narrative:** In the course of the past four weeks, more than 100 emails have gone back and forth, to as many as 20 people, hoping to secure permission to dive Mammoth National Park for the first time since the mid-1980's. As stated, our main dive objective would be to retrieve the ROVs, and the second objective suggested by representatives of NPS would be to push the adjacent "Accessory Spring". All diving was completely dependent on the available schedule of the dive team, and the ever-present weather events hitting this area during these weeks of concern.

Permission to proceed with the dives was given by national dive coordinator Shelby Moneysmith on February 28, 2017, and from Mammoth's Superintendent Sarah Craighead on March 2, 2017. Between March 2, 2017and the actual dive date of April 1, 2017, (no fooling) the following things were in play:

1. Various photos of the spring were reviewed, showing flooding in the area on March 3, 2017, and on. High water, and low visibility were of great concern.

2. Green River Reservoir was releasing water March 3, 2017, which also negatively compounded our dive conditions.

3. Mark recon's the spring-head with Rick Toomey, (on return to Nashville from Louisville March 10, 2017) Dive worthy, but personnel not in place. Communicate all info to Marbry Hardin.

4. Communicate with CRF's Exploration Leader for lodging and meals on March 18, 2017.

5. Tanks, and dive line prepared throughout two-week period.

6. All medical paperwork and DAN (Diver Assistance Network) info secured ready to present.

7. On March 16, 2017, Dr. Wong shared the video footage captured by the first trapped ROV, for diver review on the cave and conditions in which they were snagged.

8. Dive Team shows up for a CRF weekend, and recons the spring after .9 inches of rain fell on the area. Called the dive off due to high water flow.

9. Conditions still not looking favorable on March 23, 2017, and same on March 30, 2017, with Toomey sending a video clip of conditions.

10. Dive and recover ROVs on April 1, 2017, and push Accessory Spring capturing all on Mark's helmet mounted GoPro.

11. Transferring of all photos and video captured between NPS, and dive team for publishing.

12. Mercy Academy personnel show up at Mammoth on April 19, 2017 to review condition of ROVs and return them home.

13. On April 8, 2017, Marbry sent the three-minute edited video footage to be used for showing NPS and Mercy Academy the recovery process. **https://vimeo.com/212419161**.

The interesting aspects of this project are detailed below. What seemed like a simple task,

*Mercy Academy team working on ROV. Photo by Rick Toomey or Rick Olson.*

to dive a shallow spring on National Park Service's property and retrieve two trapped ROV's, quickly became difficult due to logistics. "What logistics?" you might ask. Some include:

1. Approvals for diving have not been secured in Mammoth for over 30 years, and when they were granted for one of our proposed 2012 projects, it was denied later in 2015 due to cave diver deaths at other National Park properties.

2. Weather at this time of year is close to impossible to time the support, the dive team and National Park agencies.

3. Agreeing on the process for extraction is all based on hypothetical sequence, and once in the cave, the real process is made up on the fly.

4. The actual attempt to push or recon Accessory Spring ended up as a "no mount" (taking tanks off to squeeze through) attempted dive in a breakdown pile.

All objectives were satisfied, and resulted in a piece of beautifully orchestrated public relations between many agencies involved in the project. Within a couple weeks after the date of this recovery, the dive team was asked to return for the approved exploration of Accessory Spring. I had been waiting ten years to don dive gear, and push virgin passage in Mammoth National Park. It would seem to set an interesting precedence in international cave diving politics and policies.

**Clockwise from upper left:** *Discussion, between divers Mark Wenner and Marbry Hardin, how to best repair the severed and historic dive lines; Marbry Harden hands off the ROV to NPS; Spillway Approach; Divers Mark Wenner and Marbry Hardin enter Echo Spring to recover the entangled ROVs. Photos by Rick Toomey or Rick Olson.*

# REGIONAL EXPEDITION REPORTS

## Lower Cave, February 2019, Carlsbad Caverns National Park, New Mexico

**By: Ed Klausner**

Dave West and I had a joint expedition to Carlsbad Cavern from Feb 25th to March 5th, 2019. Dave was working on the Music Room and I hoped to finish Lower Cave. We were joined by Elizabeth Miller, Karen Willmes, Chris Beck, Jeannette Muller, Mark Jones, and Paul McMullen. Survey teams were determined daily by interest and ability. We also wanted to make sure that Paul got to see lots of different parts of the cave as this was his first trip to Carlsbad Caverns.

I started the expedition with 23 leads remaining in Lower Cave. I had high hopes of finishing these leads and producing a final map. Note that this only includes leads that I can actually do. There is also a detailed list of "next generation" leads that are too delicate, too tight, require drones, require bolting, or require digging.

For the first day I needed climbers. Mark, Chris, and Paul joined me to survey some of the nine remaining leads along the route to Mabel's Room. The first was along the climb up to the fixed ropes. At LB9D, there was a hole that was noted in the previous survey. We put in four shots and tied back to the tour trail.

The lead near the bottom of the fixed ropes leading to Mabel's Room was too small to fit through. Along the fixed ropes, there was a lead noted above the station (LB15). We could not safely reach this lead, but Chris climbed to the top of the fixed ropes and then worked his way through surveyed passage to a hole that was the same as this lead. We put in survey from a known station (LB82) to the hole (not surveyed and the passage not listed as a lead). We also continued past the window for three more stations in a nicely decorated section of cave.

The next lead was the boneyard off to the side of the top of the fixed ropes before the climb to Mabel's Room. At LB22 we put in two survey shots, the last was into a tube that was flagged off for bat bones. We found that LB17 was the other side of this small tube and we put in three shots that should line up with the survey done from LB22.

Finally, we put in four survey shots from LB20 and tied into LB35. We had now completed six of the nine leads in the area. The last three would have to wait for the next day.

Day two saw the same team return to the same area to finish the last three leads. The first was too exposed and had a steep slope, so this lead will find its way to the next generation lead list as a bolt or two will be needed.

We then found our way to the last two leads (LB139 and LB140). The route is through complicated boneyard and we were glad to have a line plot with us as this was a confusing area. The first led to six survey shots down two separate tubes. Finally, the lead at LB140 led to five survey shots before it got too small. Fortunately, Chris went around to where he thought the survey was going and saw Paul. He was at LB137 and looking through a small hole.

Finally, after finishing the LB survey, we dropped down to the tour trail and went to the overlook near Nicholson's Pit. Elizabeth,

**Left:** *Ed Klausner keeps book in Lower Cave of Carlsbad Cavern.* **Right:** *Ed Klausner and Chris Beck on book in Carlsbad Cavern. Photos by Mark Jones.*

Chris, William Tucker, and I looked at this lead near a fixed rope on a previous expedition and tied from LC156 to an old CFK survey. Unfortunately, we couldn't locate the CFK survey, so we had to go back during this expedition and put in two more shots until it got too tight to continue.

On day three, the LH survey (PJ's Loft, also called Lower Talcum Passage) was our objective. There were ten leads and we finished them all. Some of the climbing was difficult if you're short. We rigged a handline so I could get up one section. Some of the leads were surveyed and some were put on the next generation lead list. We did find a new lead above LH67, about 12 feet up (3W X 8H) and we attempted to climb up to it. The rock was friable and we broke off what we thought was a good ledge. We left this lead for checking by a drone.

Three of the ten leads were in passage that could be surveyed. On the first, we got 45.7 feet of survey (virgin passage), the second resulted in 86.9 feet of passage (also virgin) and the third 156.9 feet of passage (again, virgin). Near the end we found a tall canyon near LH59 that was about 50 feet up. We could not find a way up. Later that evening, I plotted the data and found it was below the Talcum Passage and the map showed pits there.

On day four, which turned out to be the last day of the Lower Cave survey, Elizabeth, Karen, and Jeanette joined me in a trip to the LG survey near the Lower Cave tour trail. LG2 had a lead noted that required Aqua Socks. We brought them and put in two survey shots into a very pristine alcove.

The last lead was one that was marked as delicate, but I wanted to take a look at it. It's near the Stegosaurus. The route was small and delicate and Karen and I were stopped when the passage got too small for us. Since it was marked as delicate, I don't feel too bad about not being able to check the last remaining lead.

All in all, we got 598.2 feet of new survey with three remaining days of survey. Since Dave had leads on his map sheet, I sketched with the survey team of Chris, Mark, and Paul in an area off the Main Corridor. We were told to resketch the old MA100 series and resurvey if necessary. It turned out that the old survey was inaccurate. They missed significant leads, and had passage dimensions that were often orders of magnitude off. We did come into some very complex boneyard, later named osteoporotic boneyard when described to Elizabeth. We put in 117 feet of new survey and noted additional leads. We also resketched the complex room called Osteoporotic Boneyard as the boneyard seemed to have more holes than typical boneyard.

The following day the same team returned to this area and surveyed some of the new leads and resurveyed some of the old survey. We got 344 feet of new survey and 77 feet of resurvey. None of the passage was spacious.

We were to have a seventh caving day, but had freezing fog and freezing drizzle the night before. Everything was covered with ice, especially the trail to the cave. The Park had a delayed opening and I spent the day entering data and preparing a report for the Park.

## Ozark Operations Activities, December 2018-March 2019

### By: Scott House, with reports by Kayla Sapkota

A series of unavoidable bad weather events and one easily-avoidable government shutdown combined to slow our efforts this winter.

**OZARK NATIONAL SCENIC RIVERWAYS**

*CRF Ozarks works with the Ozark National Scenic Riverways (NPS) under a cooperative cave management agreement. Trips usually originate from the Winona office of the Mark Twain National Forest.*

**December 16, 2018:**

Mark Jones and Krista Bartel canoed to two caves on the upper Current River, checking for wintering bats. One of them had a dozen big browns in residence but no colonial hibernators were noticed.

**December 17, 2018:**

Mark checked gates on four caves on the upper Current, oiling locks as he went. He also monitored one cave for any disturbance.

**January 22, 2019:**

The federal shutdown forced a shortening of the ML King expedition, but renting a cabin at Echo Bluff State Park enabled work to get done anyway. Mick Sutton, Mark Jones, and Missouri Department of Conservation biologist Kathryn Womack monitored Bluff and Little Bluff Caves.

Meanwhile Ed Klausner, Scott House, and Ken Grush helped count bats in Powder Mill Creek Cave (on MDC land within the park) with Sam Daugherty and Jeanette Bailey of the MDC.

Lastly, in the afternoon, the entire crew above plus Dennis Novicky and Brenda Goodnight gathered at Round Spring Cave for a full cave bat survey. The results were very disappointing and sad.

**January 23, 2019:**

In the morning, Ed and Mark accompanied the MDC biologists to Bat Cave (on MDC land within the authorized boundaries of the park) while Scott, Mick, and Ken worked on cave data. Bat Cave needs a new map, the old one being done circa 1960.

In the afternoon, Scott, Ed, and Mark accompanied Kathryn and Sam to Bald Eagle Cave. The hibernating grays were intact and the summer guano deposits continued to grow. Mick and

Ken worked with Jeanette Bailey on the cave database.

**January 24, 2019:**

Continuing to hitch rides with the MDC folks, Scott, Mark, Ken, and Krista Bartel helped with bat surveys in L-A-D Foundation's Cookstove Cave, one of the larger Indiana bat hibernacula in the state. Parts of the group later monitored other nearby caves also on L-A_D lands.

**February 8, 2019:**

The shutdown ended but the awful weather continued. Scott House and Ken Grush worked with Jeanette Bailey and Sam Daugherty of the MDC to monitor two caves on L-A-D Foundation land (a park partner). One of the caves has several hundred Indiana bats, which were first noted by cavers a couple of years ago. The hike in was long, owing to roads being in grim shape.

**February 23, 2019:**

Tony Schmitt, Dan Lamping, Jeff Crews, Isabella Crews, Craig Williams, and Joe Sikorski journeyed to a hollow off of the upper Jacks Fork River to survey a cave Tony and Mary Schmitt had found a couple of years previously. Some, if not most of this area is on land owned by L-A-D Foundation. The group mapped and inventoried the cave and then followed up on another cave lead, finding and mapping it as well. The latter, now a new arch site, was not known before despite its 50 foot wide and 12 foot tall entrance. Yep, they are still out there to be found.

**March 8, 2019:**

Scott and Don Dunham took Jeanette Bailey and Sam Daugherty of MDC and Iwona Kruschynski (US Fish and Wildlife Service) to Martin Cave, Shannon County. Due to the discovery of an additional gray bat colony in the last few years it is now a priority one hibernaculum.

**March 9, 2019:**

The weather being awful again (~2 inches of rain), Scott House, Jeff Crews, Ken Grush, Don Dunham, Dennis Novicky, and Isabella Crews spent the day variously working on cave data, gear maintenance, and other facility work at the Winona Ranger Station.

**March 13, 2019:**

Dennis Novicky and Scott House met with NPS facilities personnel concerning improvements to the office at Winona.

## BUFFALO NATIONAL RIVER

*CRF work at Buffalo National River (NPS) is facilitated through a cooperative cave management, survey, and bat monitoring agreement.*

**December 17, 2018:**

Aaron Thompson, Brandon Van Dalsem, and Kayla Sapkota visited some private land near Eureka Springs and surveyed a 24 feet pit there that led to a terminal room.

**December 18, 2018:**

Mark Jones and Dennis Novicky monitored and surveyed Cake Slice Cave, Tumble Down Cave, and Kickdown Cave.

**December 19, 2018:**

Dennis Novicky and Brandon Van Dalsem surveyed and monitored Let's Make a Deal Cave and Jammed Sink, wrapping up another important series of surveys in the area. Aaron Thompson and Rhett Finley made the very long hike down to Sneed's Creek, surveying Side Crack and monitoring Wise Crack, Tiny Crack, and Sneed's Creek Cave #2. Kayla Sapkota and Corey Maize surveyed Snuff Pit and Nuther Hole, two roughly 60 feet pits. The crew also monitored Misty Mountain Bop. Mark Jones and Roscoe Keathley monitored Right Bank Cave, Rat Cove Shelter, and Two Step Cave and surveyed Force Cave and Basement Cave.

**December 20, 2018:**

12/20/2018: Corey Maize and James Gould searched for but did not located Funnel Cave, but they identified a new cave to the database.

Brandon Van Dalsem and Roscoe Keathley monitored Ice Hole/Smoking Moss Pit, Crevice Pit, Blow Hole and Open Hole.

In a push to survey the many small caves identified in the lower Cliff Hollow areas, several teams crossed the high water at the river utilizing a canoe and ropes as a ferry. Kayla Sapkota, Mark Jones, and Dennis Novicky monitored and surveyed Wraparound Cave, Trickle Shelter, Trickle Cave, Wasp Shelter, Shallow Cave, Slant Cave, Iris Cave, Double Arch Cave, and Root Cave. Dillon Freiburger, Aaron Thompson, Rhett Finley, and Eric Fleck monitored and surveyed Double Decker Cave, Joint Cave, Mosquito Cave, and Crawl Cave.

**December 21, 2018:**

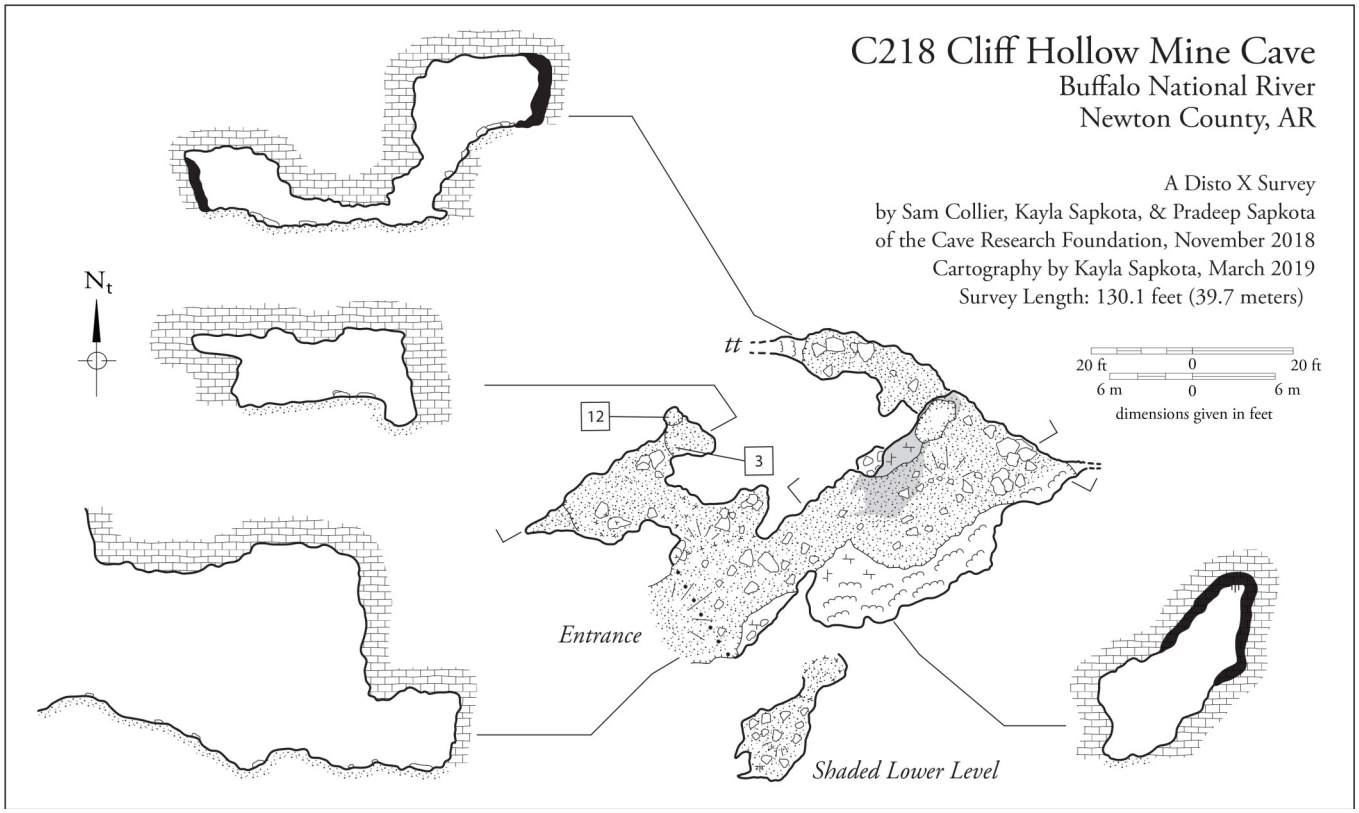
Treavor Bussard, Candace Walden, and Brandon Van Dalsem monitored Winding Staircase Cave #1, Winding Staircase Cave #2, Tunnel Sink, and several small pits near Highway 21. Dillon Freiburger, Aaron Thompson, and Luke Zellner monitored and surveyed Two Story Spring Cave, and Vulture Canyon Cave, with Vulture Canyon Cave being a new cave to the database. Chuck Bitting, Jimmy Gore, and Kayla Sapkota completed the winter bat survey for Corkscrew Cave, confirming the continued presence of a cluster of endangered Indiana bats; afterward, Jimmy and Kayla monitored Broken Bone Pit. Corey Maize and Rhett Finley began the survey of Cliff Hollow Shelter Cave.

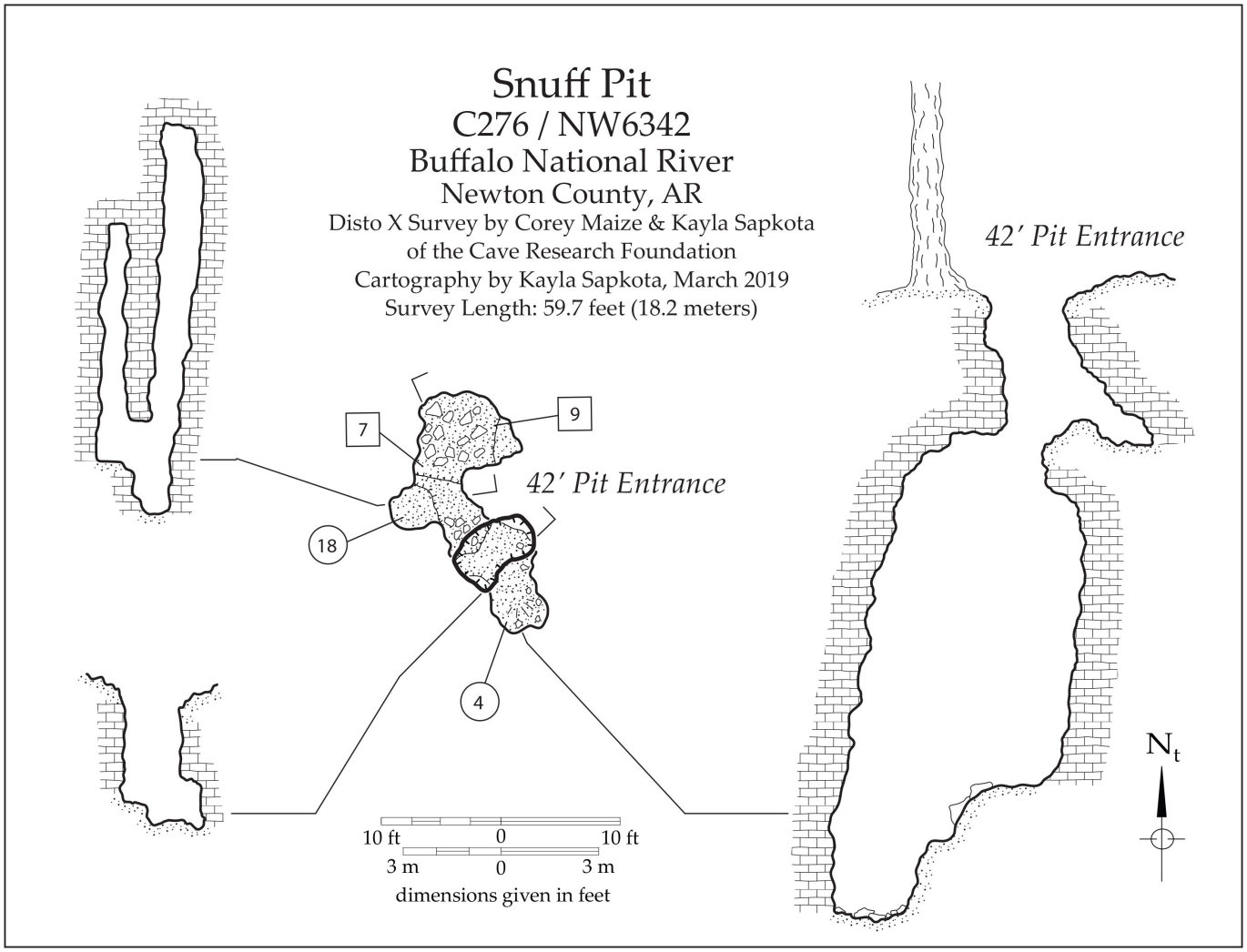
**December 22, 2018:**

Kayla Sapkota, Jessie Bridges, and Aaron Thompson biomonitored Howling Dog Pit and Suspension Pit. Jimmy Gore and Luke Zellner biomonitored Len House Cave.

**January 26, 2019:**

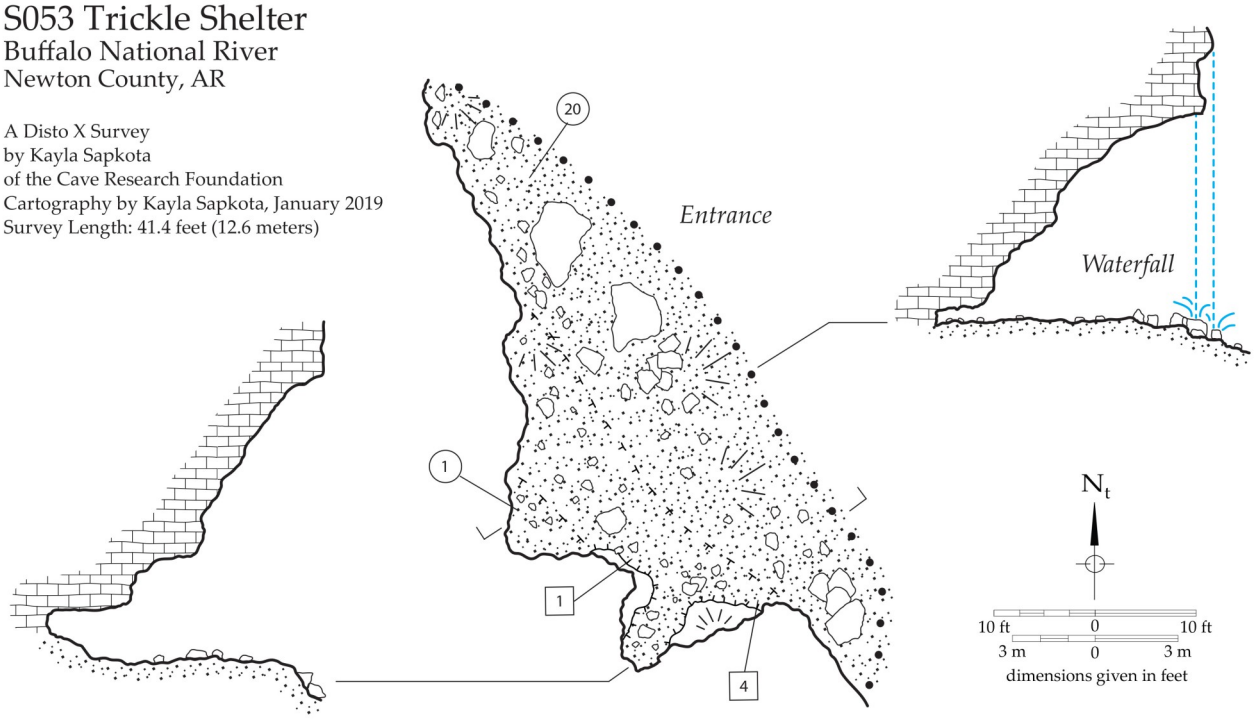
Chuck Bitting, Jimmy Gore, Kayla Sapkota, and Joe Johnson completed winter bat surveys in Fitton Cave and Copperhead Cave.


C218 Cliff Hollow Mine Cave
Buffalo National River
Newton County, AR
A Disto X Survey
by Sam Collier, Kayla Sapkota, & Pradeep Sapkota
of the Cave Research Foundation, November 2018
Cartography by Kayla Sapkota, March 2019
Survey Length: 130.1 feet (39.7 meters)
Nt
tt
12
3
Entrance
Shaded Lower Level
20 ft 0 20 ft
6 m 0 6 m
dimensions given in feet


Snuff Pit
C276 / NW6342
Buffalo National River
Newton County, AR
Disto X Survey by Corey Maize & Kayla Sapkota
of the Cave Research Foundation
Cartography by Kayla Sapkota, March 2019
Survey Length: 59.7 feet (18.2 meters)
42′ Pit Entrance
42′ Pit Entrance
7
9
18
4
Nt
10 ft 0 10 ft
3 m 0 3 m
dimensions given in feet

# S053 Trickle Shelter
Buffalo National River
Newton County, AR

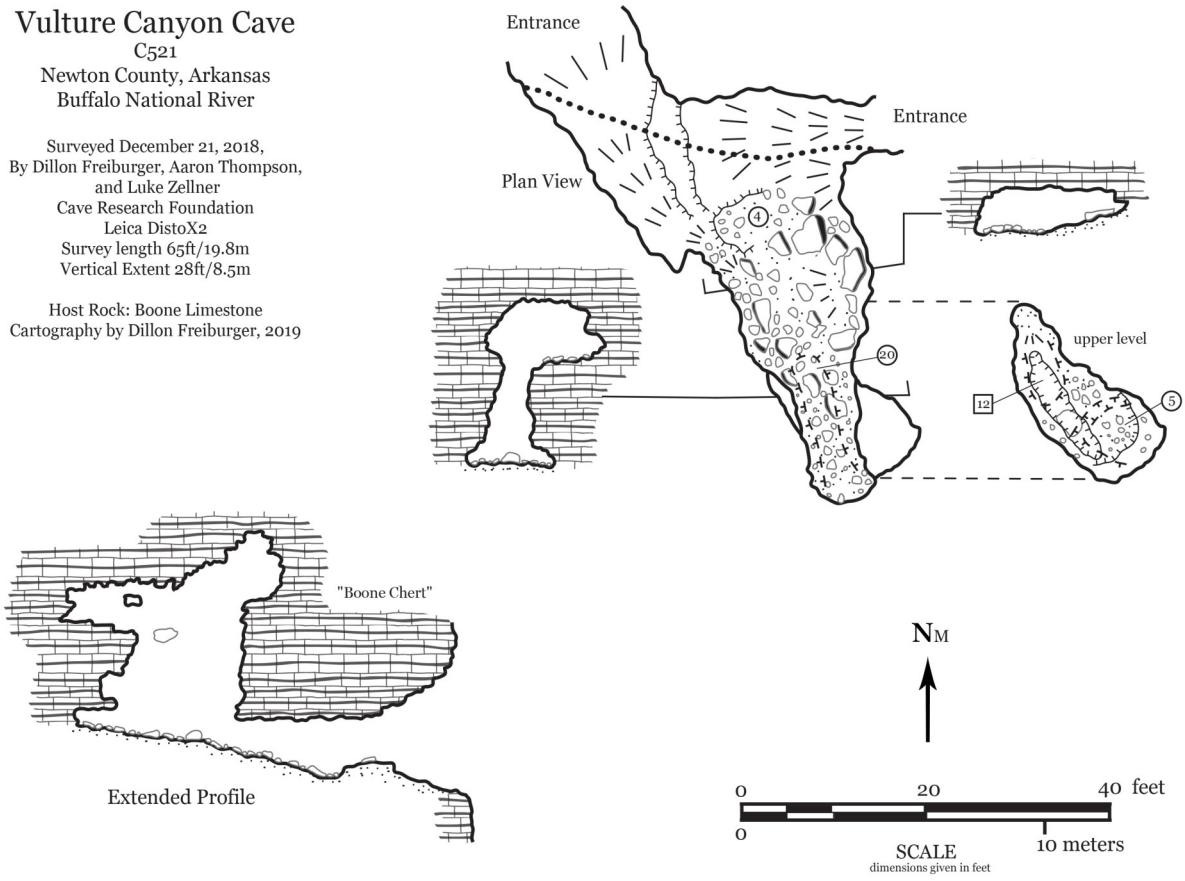
A Disto X Survey
by Kayla Sapkota
of the Cave Research Foundation
Cartography by Kayla Sapkota, January 2019
Survey Length: 41.4 feet (12.6 meters)




# Vulture Canyon Cave
C521
Newton County, Arkansas
Buffalo National River

Surveyed December 21, 2018,
By Dillon Freiburger, Aaron Thompson,
and Luke Zellner
Cave Research Foundation
Leica DistoX2
Survey length 65ft/19.8m
Vertical Extent 28ft/8.5m

Host Rock: Boone Limestone
Cartography by Dillon Freiburger, 2019



**February 3, 2019:**
Mark Brooks, Kayla Sapkota, and Sammy Wentz finished the survey of Summer Cave in advance of the summer bat usage.

**February 16, 2019:**
Dillon Freiburger, Aaron Thompson, Corey Maize, and Ben Damgaard had intended to survey some caves on Arrington Ridge but were thwarted due to a landslide on the road to the parking area; it was reported to the NPS. They traveled to Miner's Crack to check out the rigging needs for the next trip and surveyed two other caves, Portal Cave and Landslide Pit to round out the day. Allen, Candi, Terese, Paxton, Stella, Tommy, and Zellie Irvan monitored Novak Spring Cave. Danny Vann, Miloe Peck, Art Peck, and Gray Turner monitored Earl's Cave. Treavor Bussard, Candace Walden, Mike Nelson, and Donald Payne monitored Chert Cave, Christmas Cave, and checked on the entrance of Horseshoe Cave. Kayla Sapkota, Jimmy Gore, Julie Terhune, Jeffrey Bridgman, Hannah Bridgman, and Stacy Scherman biomonitored Quadra Tree Cave, Back-In Pit, Cecil Be De Karst, Bruin's Bedroom, Creek Crack, Fluted Maze Cave, Skylight Sink, and Swallow Crack; the team also surveyed Back-In Pit.

**March 9, 2019:**
Ben Damgaard, Dillon Freiburger, Corey Maize, and Kayla Sapkota surveyed Miner's Crack, a roughly 130 foot, multi-drop pit. Mark Brooks, Mike Ross, Pradeep Sapkota, Rita Warden, Jesse Yazzetti, and Jamie Yazzetti began the survey of Fluted Maze Cave. Max White, Cheryl Paulsen, Tammy McCoy, Krisit Sherron, Jerry Sherron, Gary McCoy, Dakota Stallworth, and Jayden Montenegro replaced Cave closure signs on several caves in the Erbie/Broadwater Hollow area. Matt Covington and Britt Hardwick brought a group of University of Arkansas students to Copperhead Cave to do some graffiti removal but were thwarted by high water and a chance of more rain.

## MARK TWAIN NATIONAL FOREST

*CRF work on Mark Twain National Forest (U.S. Forest Service) is performed through a pair of cooperative agreements covering inventory, survey, monitoring, and gating. The Mark Twain covers 1.5 million acres, and the bulk of it contains caves. Much recent work has been focused on three forest districts: Ava, Cassville, and Eleven Point. Most trips are based at the Winona office but the Timbers Resort in Shell Knob MO has been home for several remote trips.*

**December 30, 2018:**
Craig Williams, Paul Konrad, Michael Schoeneies, Kirby Schoephoerstar, and Lizzy Bews performed a cultural survey at Estes Cave, Washington County (Potosi District). The cave has been greatly disturbed by visitation and is slated for gating whenever funds are available.

**January 1, 2019:**
Mick Sutton and Sue Hagan spent a few hours looking for an aquatic snail site (a spring or cave) with only a vague location in Iron County. A potential site was noted.

**January 5, 2019:**
Matt and Amanda Beeson relocated and surveyed Grand Fortune Rockshelter in the Cassville district. They also relocated a nearby cave, but it turned out to be on private property. Lastly, they tracked down property owners who gave permission to cross their land to access USFS tracts.

**January 12, 2019:**
Matt Beeson, Dillon Freiburger, Brayden Farris, and Matt Bumgardner surveyed a couple hundred feet in Butler Hollow Mine Cave, Cassville District. Matt is drawing the map of the cave, which is a complex joint-controlled series of canyons. The crew also took time to photodocument the cave.

**January 14, 2019:**
Matt continued the survey in Butler Hollow Mine Cave with Brandon VanDalsem.

**January 16, 2019:**
Just a short distance away, still in Butler Hollow, Aaron Thompson monitored gates on Carter Cave, finding all secure (one artificial entrance had collapsed pointing out the need for gates). He then hiked along a bench and located a new cave.

**January 27, 2019:**
Matt and Amanda Beeson continued the resurvey of Butler Hollow Mine Cave, netting several hundred feet of complex passage. They also monitored the entrance of nearby Butler Hollow Mine (yep, it gets confusing).

**January 30, 2019:**
Aaron Thompson stopped at MacMerry Spring (see below) before examining and measuring Butler Hollow Mine and Onyx Cave for gate repairs.

**February 1, 2019:**
Mick Sutton and Dennis Novicky inventoried and surveyed Bill Dyer Lead Mine in Wright County (Houston District). The cave's story involved a person (yep, Bill Dyer) who reportedly would dig lead out of the cave for his

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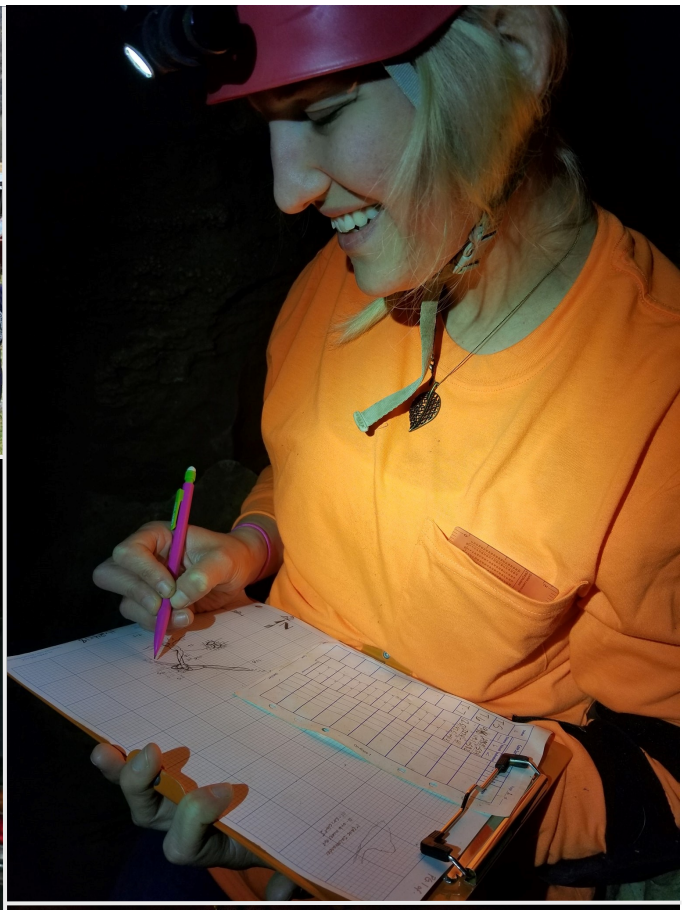
**Next page, clockwise from upper left:** *CRF Ozarks volunteers show off their multicolored CRF shirts. Photo by Kayla Sapkota; Sammy Wentz sketches. Photo by Mark Brooks; Dan Lamping in a Ozark cave. Photo by Derik Holtmann; Sybill Amelon, Sarah Hooper and Jessica Clough use a C.R.F. map to navigate during a bat count in Missouri. Photo by Mark Jones; Aaron Thompson and Dillon Freiburger in a cave in the Ozarks by Garrett Thompson.*



use during the Civil War. The story was impractical and the cave was short and does not need a gate to mitigate any potential mining.

**February 3, 2019:**
In a coordinated trip involving CRF, CAIRN, and USFS, Craig Williams, Michael Schoenewies, Jessi Schoenewies, Paul Konrad, Amanda Konrad, Lizzy Bews, Kirby Schoephoerster, Tony Schmiitt, Gwen Smith, and USFS archaeologist Megan Krietsch performed an archaeological assessment on a cave in the Potosi District while also counting wildlife. The cave is a definite arch site of some importance.

**March 7, 2019:**
At the request of the Forest Service, Scott House monitored the entrance of The Gulf in order to make recommendations for the area's management. The Gulf or Blue Hole is a cave almost completely filled with water which is over 200 feet deep in places (that's nearly halfway to sea level).

**March 10-11, 2019:**
Matt Bumgardner and Jon Beard monitored several caves on the Ava District and mapped one of the caves.

Matt Beeson and Scott House spent the March 11 hiking to six caves on the Cassville District. Some needed additional survey while others simply needed monitoring and photographs. Friendly landowners gave us additional cave leads.

Elsewhere on the Cassville District, Ken Grush, Don Dunham, and Aaron Thompson hiked to and monitored four caves that had maps but had not been fully inventoried. They also located a spring associated with a historic cabin.

And in yet another area of the Cassville, Mick Sutton and Sue Hagan monitored two caves known to have strong faunal elements.

**March 12, 2019:**
Matt and Ken spent much of this rainy day talking to landowners (adjacent to FS lands) about various caves and their history. They got additional directions to missing caves. Later they tried to visit a known cave but a private landowner was not in residence.

**ARKANSAS NATURAL HISTORY COMM.**
*CRF has a permit to map caves on the Devils Eyebrow Natural Area, which is a continuation of the Butler Hollow cave area just across the border.*

**January 27, 2019:**
Aaron Thompson, permit fresh in hand, examined MacMerry Spring in preparation of survey.

**January 30, 2019:**
Stopping at MacMerry, Aaron worked on calibrating his new DistoX before moving on up into Missouri.

**February 1, 2019:**
Aaron and Dillon Freiburger surveyed MacMerry Spring, leaving some of the sketching for another trip.

**February 3, 2019:**
Aaron finished up his sketch of MacMerry Spring Cave.

**March 12, 2019:**
Aaron took Mick Sutton and Sue Hagan to MacMerry for a biological assessment.

**MISSOURI DEPT OF CONSERVATION**
*CRF work on lands administered by the Missouri Department of Conservation is done through a series of special use permits to CRF and the Missouri Speleological Survey. (Please see above for cooperative work with MDC bat biologists on a variety of caves under differing ownerships. This was particularly helpful during the federal shutdown when we did not have access to a federal vehicle.)*

**L-A-D FOUNDATION, MO**
*Look above for trips to LAD caves, including Cookstove, Big Bear, Bee Hollow and others.*

**ELSEWHERE**
Berome Moore System, Perry County, MO
*Owned by the Missouri Caves and Karst Conservancy, this project is headed up by Chad McCain.*

**December 28, 2018:**
A large interstate crew of Chad McCain, Dean Wiseman, Mark Brooks, Cody Brooks, Brian Biggs, Gary Resch, and Matt Bliss surveyed 2,530 feet in Berome Moore Cave. This was down the mainstream in the Maze and the Walker Section. Several hundred feet of this was new survey, the other replacement survey.

Sodalis Nature Preserve, City of Hannibal, MO
*Owned by the City of Hannibal, CRF has long participated in the cartographic and bat survey of this mine.*

**February 20, 2019:**
A large contingent of CRF personnel (Scott House, Ken Grush, Mark Jones, Paul Hauck, Mick Sutton, Sue Hagan, Don Dunham, and Andy Free) helped with the bat count in Lime Kiln Mine (now known as the Sodalis Nature Preserve). CRF's primary role was to guide the parties through the cave (keeping them in the proper areas), while also assisting in counting and recording bat numbers. About 40 other people from several states participated in the survey which was coordinated by the Missouri Department of Conservation and US Fish and Wildlife Service.

**THREE FORKS CAVE PROJECT, ADAIR COUNTY, OK**
*Owned by the Russell family adjacent to the NSS Russell Preserve, CRF is mapping the caves under the leadership of Mark Jones.*

**December 21, 2018:**

Mark Jones and Cynthia Russell took the first day to begin the survey of Sand Cave and returned with almost 350 feet in the righthand branch. Meanwhile Dennis Novicky and Clayton Russell pushed a small crawlway in Three Forks Cave. Dennis wriggled through to find an estimated 400 feet of virgin cave heading into the unknown.

**December 22, 2018:**

The second day Mark and Clayton began the survey of Linda Bearpaw Cave where they garnered 445 feet. There's plenty of cave remaining to be surveyed.

**January 26-27, 2019:**

Jenn Ellis, Mark Jones, Dennis Novicky, Clayton Russell, Cynthia Russell focused on the survey of Linda Bearpaw Cave on Gittin' Down Mountain begun last month. Two days was spent surveying the western extent of the cave since it has two rooms that are important gray bat maternity sites in the summer. The annual Ozark big-eared bat census in Hibernaculum Cave of the Donald R. Russell Cave Preserve was also undertaken per the management plan for the site. An estimated 250 of these beautiful bats were counted, the largest known assemblage of this species.

**January 28, 2019:**

Day three was spent surveying a connection between the western and eastern entrances of Linda Bearpaw. The fifth day several leads were mopped up near the maternity colonies. Over 2,300 feet was surveyed in this fine cave.

**January 29-30, 2019:**

On the fourth and fifth days the final survey added 380 feet to Sand Cave. Combined with the December survey the total cave length is 730 feet.

**February 21, 2019:**

Rhett Finley, Brenda Goodnight, Mark Jones, and Clayton Russell continued the survey of Linda Bearpaw Cave. Several leads were knocked off in two days of survey totaling 720 feet. Less than 50 feet of known cave remains to be inventoried although there are several small leads left to be checked. The total survey length now stands at 3,035 feet. Brenda and Rhett performed a cave faunal count during the survey.

**February 22, 2019:**

Dennis Novicky and Brandon Van Dalsem attempted to survey a new discovery from back in December but were stymied by a bellycrawl unexpectedly filled with water.

## Oklahoma Ozarks

### By: Mark Jones

**December:**

Mark Jones and Cynthia Russell took the first day to begin the survey of Sand Cave and returned with almost 350 feet in the righthand branch. Meanwhile, Dennis Novicky and Clayton Russell pushed a small crawlway in Three Forks Cave. Dennis wriggled through to find an estimated 400 feet of virgin cave heading into the unknown.

The second day Mark and Clayton began the survey of Linda Bearpaw Cave where they garnered 445 feet. There's plenty of cave remaining to be surveyed.

**January:**

Jenn Ellis, Mark Jones, Dennis Novicky, Clayton Russell, and Cynthia Russell focused on the survey of Linda Bearpaw Cave on Gittin Down Mountain began last month. The first two days were spent surveying the western end of the cave since it has two rooms that are important gray bat maternity sites in the summer. Day three was spent surveying a connection between the western and eastern entrances. On the fifth day several leads were mopped up near the maternity colonies. Over 2,300 feet was surveyed in this fine cave.

On the fourth and fifth days the final survey added 380 feet to Sand Cave. Combined with the December survey the total cave length is 730 feet.

The annual Ozark big-eared bat census in Hibernaculum Cave of the Donald R. Russell Cave Preserve was also undertaken per the management plan for the site. An estimated 250 of these beautiful bats were counted, the largest known assemblage of this species.

**February:**

Rhett Finley, Brenda Goodnight, Mark Jones, and Clayton Russell continued the survey of Linda Bearpaw Cave. Several leads were knocked off in two days of survey totaling 720 feet. Less than fifty feet of known cave remains to be inventoried although there are several small leads left to be checked. The total survey length now stands at 3,035 feet. Brenda and Rhett performed a cave faunal count during the survey.

Dennis Novicky and Brandon Van Dalsem attempted to survey a new discovery from back in December but were stymied by a bellycrawl unexpectedly filled with water.

The next expedition is planned for late July.

## Mammoth Cave: Labor Day Expedition, August 31-September 3, 2018

**By: Bob and JoAnne Osburn, Expedition Leaders**

The 2018 Labor Day Expedition was poorly attended with only 15 people total in camp of which 12 caved at least once. Three trips were fielded Saturday and two on Sunday. They accomplished a total of 1,975 feet of resurvey and 105 feet of new survey. Cavers volunteered 160 hours during the expedition. Work was in New Discovery, Colossal Cave, Hidden River Cave, and Ice Cave. A trip was fielded to Roppel Cave but abandoned due to an injured finger.

JoAnne kindly agreed to return as camp manager again this year. I greatly appreciated her efforts.

**Trips:** On Saturday four trips were fielded. Mick Sutton began the official resurvey of New Discovery with a large crew (I was one person short for another trip) consisting of Sue Hagan, Diana Tomchick, Bill Steele, and Elizabeth Winkler. They accomplished 900 feet resurvey of trunk and sorted out a number of tie stations. Dave West with Karen Willmes and Noboru Sakabe began a trip to South Cave to try to finish the survey there but were thwarted by forgotten gear and returned to camp. They changed objective to a profile along Colossal tour trail that had been requested by the Park. They found an unknown belly crawl in the trunk which Mark Brooks had found previously 20 years ago by another route and got it onto the leads list. Bill Koerschner set off into Roppel with Tim Green and Matt Mezydlo on a long trip. Unfortunately Tim jammed his finger about an hour into the trip, and they were forced to abort and leave the cave. Later in the day Bill and Matt went over to Ice Cave to check on a second room found in old trip reports. They found the route, but it has unfortunately been taken over by some amount of cobble fill since the previous trip, and a restoration trip will be necessary before it can be entered.

On Sunday Tom Brucker took Elizabeth Winkler and Diana Tomchick into Colossal Cave where they picked up 300 feet of side leads and discovered more. Bill Koeschner took took Bill Steele and Noboru Sakabe to Hidden River Cave to the end of Whiskey Way where they mapped 125 feet but did not find any way on in the trunk that seems to be blocked there by breakdown.

There were only experienced people at the expedition and no trouble beyond Tim's jammed finger. The Colossal lock gave a bit of trouble, and one was removed by the Saturday crew but cleaned by Rick Toomey and returned by the Sunday crew.

## Mammoth Cave: February Expedition, February 15-18, 2019

**By: Mark Jones, Expedition Leader**

The Cave Research Foundation February Expedition met at the Hamilton Valley facility to support research, surveying, and exploration within as well as without Mammoth Cave National Park. Over fifty people had pre-registered for the expedition. Several cavers arrived early to conduct work related to associated projects that are supported by the CRF.

On Thursday, upon a request from the Park, Dave West and Karen Willmes began a detailed survey of New Entrance passage down the stairs to Grand Central Station to be used for algae monitoring. Friday another team of Ed Klausner, Hannah Lieffring, and Mark Jones joined Dave and Karen in the activity. Also on Friday, Rachel Bosch and Aaron Bird continued collecting data in Cleveland Avenue and Silliman Avenue for Rachel's PhD research.

The expedition kicked off on Friday evening with a fine meal before the annual cartographers meeting hosted by Bob Osburn. This meeting was well-attended with over twenty participants. Mapping assignments were updated and confirmed. A new map cabinet as well as a current index will better organize the various large maps. Several map sheets have been updated and are available. These will soon be incorporated in the master map of Mammoth Cave. Total meeting time was two hours.

Nary a caver was deterred by a three-inch snowfall overnight for the opening of the expedition on Saturday morning. Ten trips were scheduled for the day and ten trips went out with nine of the ten staying within the Park! The one trip out of the Park went to Roppel Cave and included *Jim Borden, Tom Brucker, Jeff Harrison, and Dick Market. The nine trips in the park included:

1. Two survey parties going to New Discovery. Personnel included *Derek Bristol, *Hazel Barton, Katey Bender, Lee-Gray Boze, George Breley, and Rachel Saker.
2. Two survey parties going to Albert's Dome. Personnel included *Ed Klausner, *Holly McClintock, Venkata Damaraju, Heather Levy, Hannah Lieffring, Mark Wenner, Fred Wilkinson, and Elizabeth Winkler.
3. Two survey parties going to Cocklebur Passage. Personnel included *Michael Bradford, *Chad McCain, Matt Bliss, Cody Brooks, Mark Brooks, Craig Buschkoetter, Gary Resch, Jeremy Weih, and Sammy Wentz.

4. A survey party continuing the survey of New Entrance. Personnel included *Dave West, Chelsea Ballard, and Michael Conover.
5. A survey party going to Grund Trail. Personnel included *Spike Crews, John Fioroni, Caleb Schlager, and Brandon Van Dalsem.
6. A survey party going to Salts Cave. Personnel included *Mick Sutton, Ed Jakaitis, and Karen Willmes.

*Trip Leader

Sunday's participants were whittled down to seven trips with six of the seven addressing Park objectives. The other trip went to Roppel Cave and included *Ed Klausner, Michael Conover, and Elizabeth Winkler. The six trips in the Park included:

1. Three survey parties going to New Discovery. Personnel included *Derek Bristol, *Katey Bender, *John Fioroni, Lee-Gray Boze, George Breley, Vankata Damaraju, Rachel Saker, Seth Spoelman, and Fred Wilkinson.
2. A survey party going to Bransford Avenue. Personnel included *Lynn Brucker, Dick Market, and Rick Toomey.
3. A survey party going to ridgewalk small caves in the Park. Personnel included *Michael Bradford, Craig Buschkoetter, Chad McCain, Brandon Van Dalsem, and Jeremy Weih.
4. A party going to collect microbe samples in Miller Avenue. Personnel included *Hazel Barton, Heather Levy, and Mark Jones.

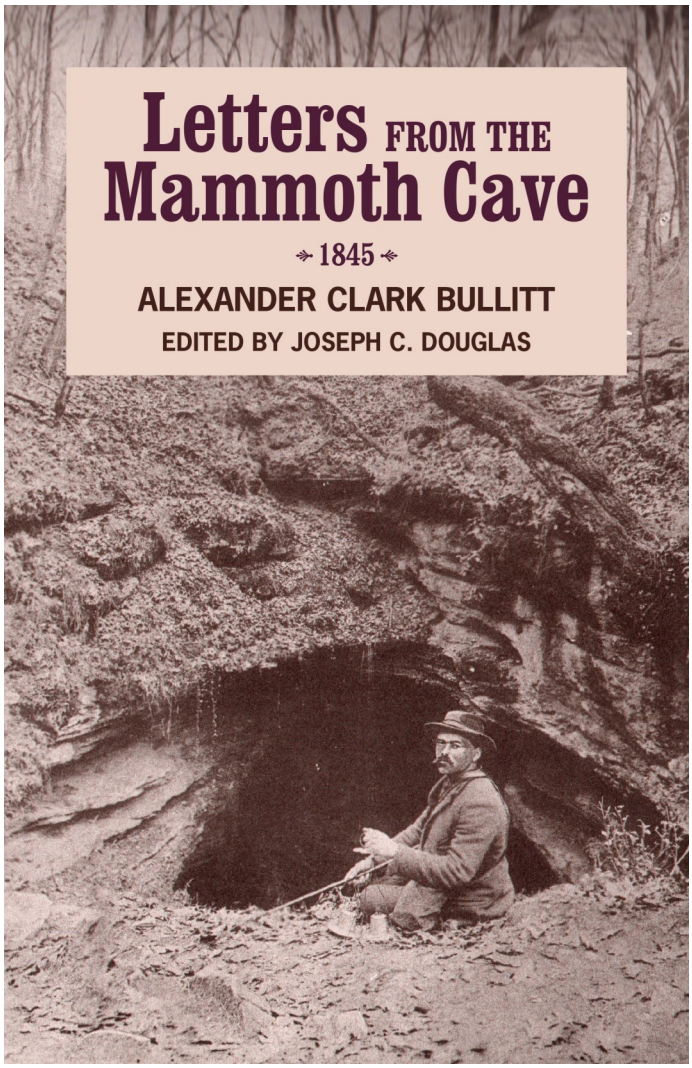
*Trip Leader

This was a very successful expedition with a total of 6,495 feet of survey of which 1,550 feet was new survey. In addition, three scientific activities were supported. We would like to thank those all the staff of Mammoth Cave National Park and the staff in DSRM for helping to facilitate our efforts. Thanks also go out to Joan Jones and Barbara Herrmann for providing baked goods. A big thanks to the excellent camp managers cooks - Pic Walenta and Krista Bartel for preparing wonderful meals. Data management was done by Ed Klausner and Dave West with Karen Willmes managing the computers. Thanks also go out to John Feil for all of the maintenance work he did.

## Just Published by Cave Books: Letters from the Mammoth Cave

*Letters from the Mammoth Cave* provides a fascinating insight into a mid-19th century visit to Mammoth Cave by Alexander Clark Bullitt. Already familiar to many, Bullitt published one of the earliest, illustrated guides to Mammoth Cave in 1845 based on a visit in 1844. But his return in the second half of 1845 is less well-known. Joseph Douglas' collection of Bullitt's letters, published in the New Orleans Picayune in September and October 1845, provide a fresh and engrossing look at one of the early narratives of the "Settlers," as Bullitt described his party. Aside from detailed descriptions of the passages through which his party travelled, cave visitors and enthusiasts will be especially taken by Bullitt's description of his party's encounter with Rigg's and Blackman's Domes—the first Europeans to do so, and the first people to leave a record of the exploration. Taken individually Bullitt's letters are engrossing. As a whole they serve as an important account of 19th century exploration, the early Mammoth Cave and regional tourism industry, and ideas about what would become known as karst science.

Andrew McMichael
Professor of History
Western Kentucky University



# 2019 EXPEDITION CALENDAR

Before attending any expedition, you must contact the expedition leader as trip sizes may be limited. Failure to contact the leader may prevent you from attending the expedition as the trip may be full.

**Eastern Operations - Mammoth Cave Schedule**
**Memorial Day**, May 24-27. Heather Levy, levy_h@yahoo.com, and Seth Spoelman, sethspoel@hotmail.com.
**Independence Day**, June 28-July 7. Dave West, d270@bellatlantic.net, and Karen Willmes, kver@bellatlantic.net.
**Mammoth Ridge, Limited Expedition**, July 17-21. Scott House, scott_house@hotmail.com.
**Kid's Caving**, August 1-5. Aaron Bird, ajbird72@gmail.com, and Rachel Bosch, rachel.bosch@gmail.com.
**Labor Day**, August 30-September 2. Bob Osburn, osburn@levee.wustl.edu.
**Columbus Day**, October 11-14. Rick Olson, rickardolson16@gmail.com.
**Thanksgiving**, November 27-December 1. John DeLong, mcthanksgiving@yahoo.com.
**New Year's**, December 27-30. Ed Klausner, klausnere@gmail.com and Elizabeth Miller, elizabeth.batwoman@gmail.com.

All Eastern Operations CRF JVs who have not attended an expedition safety orientation must do so before participating in expedition activities. The safety orientation is scheduled at the beginning of each expedition after the morning meeting. Those who have attended a safety orientation are not required to participate in another. New JVs should arrange to be at the expedition early enough to attend the orientation. Those who do not attend will not be allowed to participate in expedition activities. Contact expedition leader for more details on the orientation.

**Ozarks**
Ozarks Operations trips and expeditions take place on a variety of government and private lands; the trips are based in a variety of locales and may include staying in NPS buildings, campgrounds, or even motels. Ozarks trips are held year round, but are often scheduled (or cancelled) on short notice due to the vagaries of the weather. If interested in attending an Ozarks expedition your first stop is the operations manager. However, contact any of the following for information on upcoming trips or check the CRF website.

**Buffalo National River**, May 17-19. Kayla Sapkota, kayla_sapkota@gmail.com.
**Ozark Riverways**, May 30-June 9. Mark Jones, speleok9@gmail.com.
**Buffalo National River**, May 30-June 2. Kayla Sapkota, kayla_sapkota@gmail.com.
**Mark Twain NF**, June 1-2. Mick Sutton, haganandsutton@gmail.com.
**Ozark Riverways**, June 10-15. Scott House, scott_house@hotmail.com.
**Ozark Riverways**, June 16-22. Tony Schmitt, tonymary2601@yahoo.com.
**Berome Moore**, July 6-7. Jim Sherrell, jimsherrell@sbcglobal.net.
**Buffalo National River**, July 12-15. Kayla Sapkota, kayla_sapkota@gmail.com.
**Ozark Riverways**, July 19-22. Tony Schmitt, tonymary2601@yahoo.com.
**Buffalo National River**, August 2-4. Kayla Sapkota, kayla_sapkota@gmail.com.
**Ozark Riverways**, August 22-28. Scott House, scott_house@hotmail.com.

**These individuals also lead expeditions, trips or projects:**
Kayla Sapkota (Buffalo National River survey and bio-inventory), kayla.sapkota@gmail.com.
Dan Lamping (Pioneer Forest and Ozark Riverways surveys), daniellamping@att.net.
Tony Schmitt (Pioneer Forest and Ozark Riverways surveys), tonymary2601@yahoo.com.
Jon Beard (Mark Twain NF in SW MO) , mokanman@att.net.
Matt Bumgardner (Mark Twain NF in SW MO), shaw95@gmail.com.
Jim Cooley (Cave gating and Mark Twain NF Irish Wilderness), coolstoi@kc.rr.com.
Craig Williams (Mark Twain NF archaeology) , cwilliams@cairnstl.org.
Jeff Crews (Mark Twain NF Rolla/Houston area), cavespyque@gmail.com.

**California – Lava Beds**
**Contact:** John Tinsley, jtinsley@usgs.gov.
Before participating on any of these expeditions, please contact the Operations Area Manager, John Tinsley, at least two weeks before the expedition. Please do not just show up as there may be limits on the number of participants we can accommodate.

**California – Lilburn**
Some basic rules of engagement for California expeditions: Contact the expedition leader preferably two weeks ahead of time; please don't spontaneously show up. We have to deal with head count limits, particularly on our Lilburn trips, so we need to know who is planning to attend. Contact John Tinsley; 650-329-4928, jtinsley@usgs.gov.

**HSS/CRF Hawai'i Caving - Big Island**
Contact Pat Kambesis, 309-762-3860, pnkambesis@juno.com.

**Carlsbad Caverns**
**Contact for all expeditions:**
William and Tammy Tucker, william.tucker@att.net.

**ADDRESS CORRECTIONS**
**If you have changed phone number or e-mail , or have moved, please send your information to:**
**Phil DiBlasi**
**110 S. Campbell St., Unit 204**
**Louisville, KY 40206-1863**
**pjdiblasi@gmail.com**

**THE CRF WEBSITE**
**www.cave-research.org**
**Contact your operations manager for the user id and password for the members-only section**