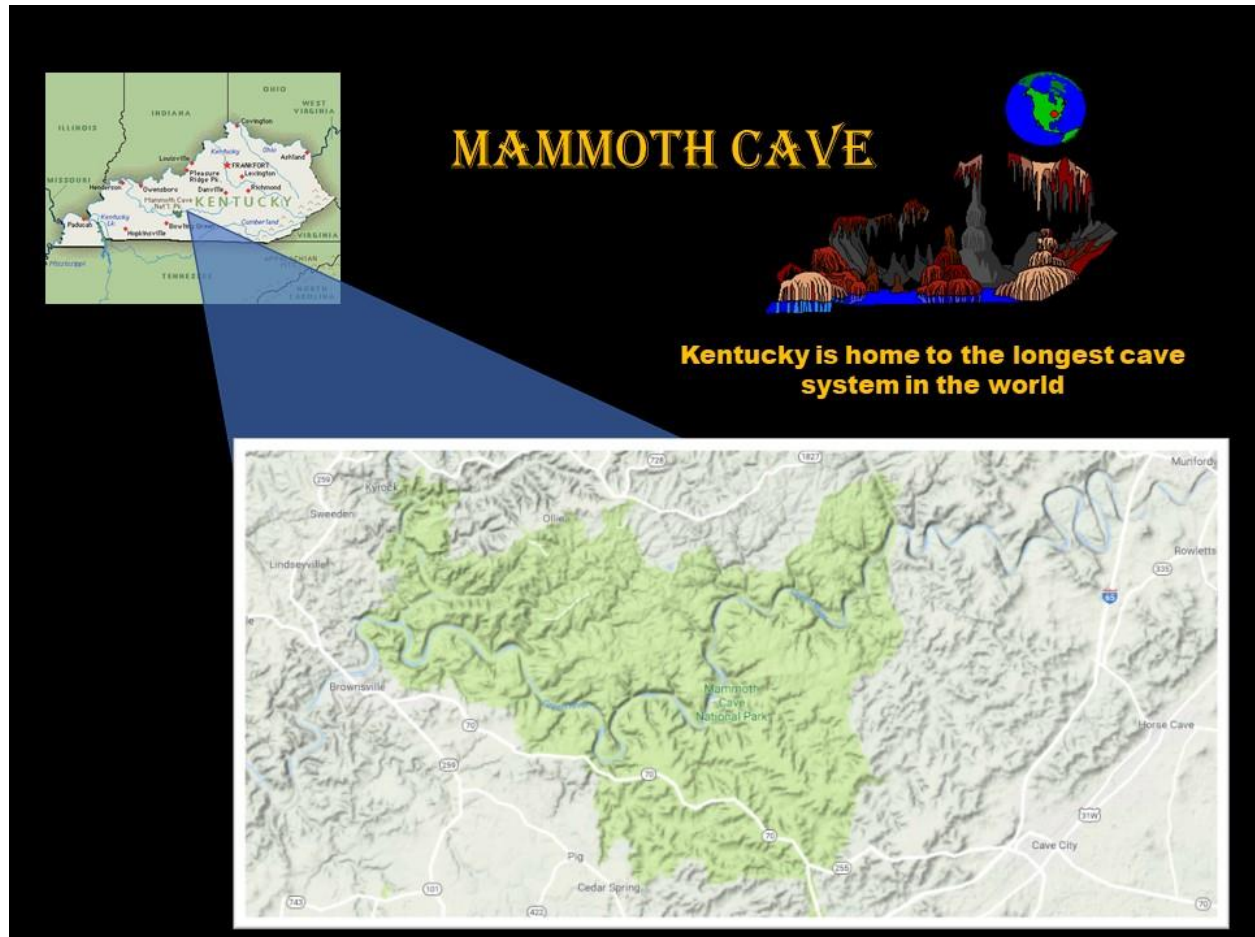


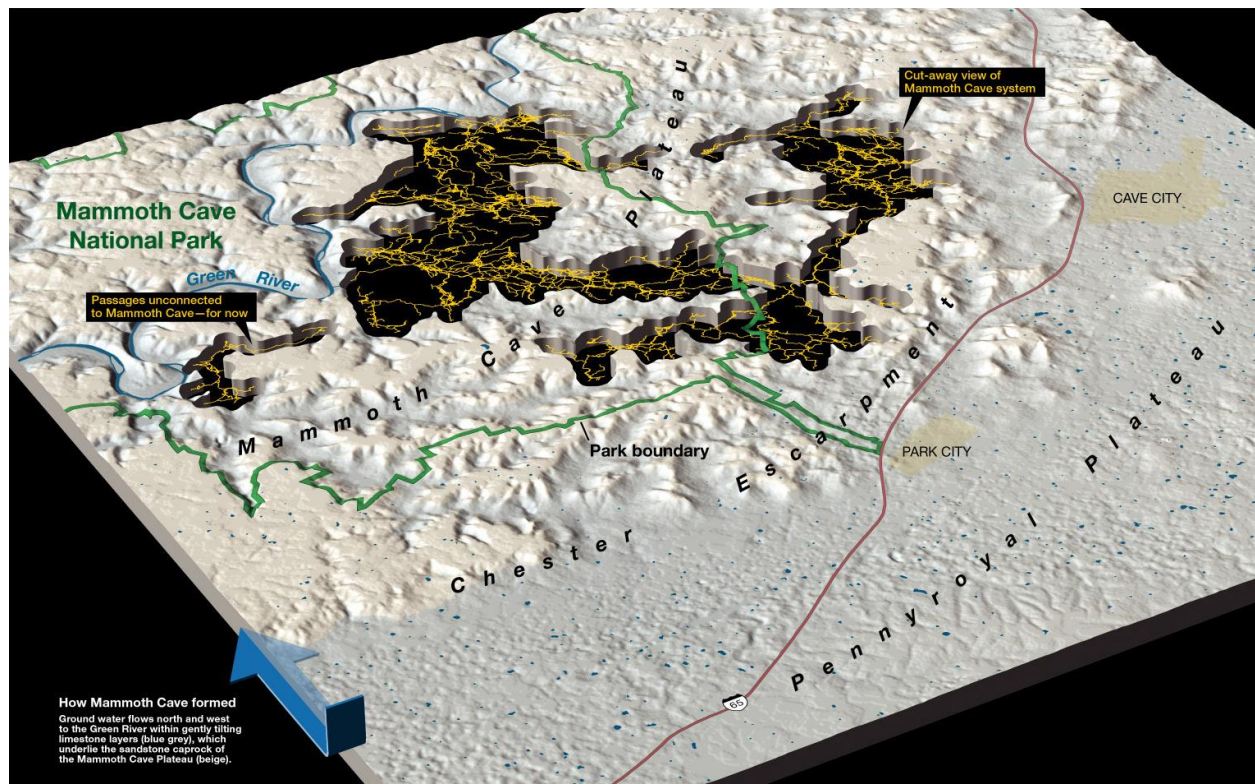
Exploration in the World's Longest Cave

On December 2nd, 2017, the world's longest cave got a little bit longer. The Roppel 2017 Sump Exploration Team discovered and surveyed new passage, extending under South Toohey Ridge through the Logsdon River Sump. This achievement was made possible through the efforts of a host of cavers and scientist working on this sump exploration project started over 30 years ago.

Mammoth Cave National Preserve is a World Heritage site near Bowling Green Kentucky with evidence of use by man dating back 4000 years. World renowned for many aspects of its geology and history but without a doubt it is best known for the distinction of the longest mapped cave in the entire world. Its longer by half than its next closet competitor. To date, as announced at the Cave Research Foundation's annual meeting in October, the length of surveyed passage in Mammoth is over 430 miles. To put that into perspective, the second longest mapped cave system in the world is Sistema Sac Actun (Nohoch Nah Chich) in Quintana Roo, Mexico. At 208 miles, Sac Actun is mostly all underwater. The second longest dry cave is Jewel Cave in Custer South Dakota at 182 miles and the longest dry cave outside the USA, Optymistychna, in the Ukraine is number 6 on the list at 147 miles.



The state of Kentucky is underpinned with karst (limestone) and driving across the plateau the sinkhole karst plain is evident in the many depressions and swales. While Tennessee has the most “dry” caves, Kentucky has some of the longest and at one time, 14 of the longest caves in the world were found in KY. Another interesting fact is that the ninth longest cave in the world is the Fisher Ridge Cave System and the known passage lies less than 2 miles east of the Mammoth Cave Preserve boundary. It’s a “well known secret” that some of the passage in Fisher Ridge is mere meters away from passages in the Mammoth system. It is most likely that these 2 cave systems connect, but to date, no one has made the connection. It’s also a “known secret” that the cavers working on the Fisher Ridge system do not want it connected to Mammoth as they will lose their place on the longest cave list because Fisher Ridge would officially become part of the larger Mammoth System. (Project cavers that spend their lives mapping caves can be a little “possessive”)



Sometimes cave systems are connected via dry passage and sometimes by underwater passage. Either way, years of effort and exacting survey often produce the data needed to understand where the connections may lie. Sometimes its diligent caving and sometimes just lucky breaks. When Roppel cave was connected to Mammoth in 1983, Roppel itself was over 80 miles long but once connected to Mammoth it was removed from the worlds long cave list as it was now part of a larger Mammoth system.

So that brings us to the project we have been working on for over 10 years. The Logsdon River Sump in the Roppel Cave section of Mammoth cave. The first entrance to Roppel was discovered by Jim Borden in the early 1970's and Roppel to Mammoth connection was made by a group of dedicated cavers that had been pushing exploration leads in both systems. Cave maps overlaid on topo maps showed the relative position and possible connection between the two systems. Through the combination of accurate survey and hard caving, connections are made, and exploration continues to reveal new passage.

Cavers have been working on connecting smaller caves to the Mammoth System since the early 1950's. Many smaller caves were connected through concentrated efforts of survey and digging projects. Exploration and survey continues and is supported in part by the Cave Research Foundation, Central Kentucky Karst Collation and the National Park Service.

2009: Our involvement in the project started over 10 years ago when our team was contacted by a caver that was interested in the South Toohey Ridge exploration that was started back in the early 1990's by a team of sump divers that had made a breakthrough by "cracking" the sump in the upstream Logsdon river in Roppel. No other surface entrance into South Toohey Ridge had been found and therefore no exploration under this extensive area had been accomplished even though it held great potential, and some suspected it could add over 100 more miles to Mammoth cave. All the members of the original sump team had since passed away and no one had taken up the project.

A word about the dangers of sump diving. Cave diving is inherently dangerous, and sump diving is exponentially more dangerous. A sump is defined as a water filled passage inside a dry cave that can be flowing out like a spring or in like a siphon. The term "sump" is used to describe both flows. Advances in diving and equipment have made cave diving safer but sump diving remains a dangerous form of exploration due to the combination of factors that are not found in sport cave diving. Of the 5 previous sump team members, 4 perished in cave diving accidents.

Caving can be challenging and dangerous, but safety is always a top priority. Explorations in any virgin cave system can be dangerous due to a variety of hazards and when diving is added, the extremes of the environment and demands on the cavers are increased. The stress of exploration, time constraints, rugged environment, cold, mud, climbing, rockfall, and general fatigue are all factors that contribute to the hazards of exploration and our team works to mitigate these factors through training, experience and preparation.



Roppel 2017X divers Mike Young and Matt Vinzant head upstream toward Sump 2 after passing Sump 1 in Logsdon River. (photo by Jon Lillestolen)

The following is a brief trip report from the December 2017 exploration.

Logsdon River Sump Expedition 2017

DECEMBER 1-4, 2017 Expedition Leader: Mark Wenner

Dive Team: Matt Vinzant, Mike Young, Jon Lillestolen

Back-up Divers: Brian Williams, Josh Shouse

Support Team: Mark Wenner, Brian Williams, Stephanie Petri, Bill Walker, Brian Buchanan, Britt Hardwick, Jay Young, Erin Young, Josh Shouse, Ryan Olsen, Ray Clark, Joe Heinrich, Charles Walker, Dave Weller, Kyle Moschelle.

The 2017 Roppel Expedition successfully explored and surveyed 1680 feet of new passage beyond sump 2 which included both underwater and dry passage. Previous survey stations were located, verified and tied in. A radio beacon was placed in Swicegood Avenue and surface work confirmed the location of the beacon. A variety of new karst features were located during the surface survey. A crew of 16 cavers hauled gear to and from the sump, performed surface survey and provided field station support over a three-day period. The gear haul both in and out went smoothly which allowed for the dive team to make maximum use of their time and energy. The surface location provided additional data and confirmed passage location on South Toohey Ridge.



Support team and divers at "Crowbar Dome" prepare to move gear towards the Logsdon River sump.

The majority of the expedition arrived Thursday night at the Hamilton Valley Research Facility. On Friday, the haul team consisting of 14 cavers and divers moved gear to the sump. The staging room was set up, the drop to the river rigged and tanks moved to the mud bank at the sump. On Saturday, the dive team entered the cave with a smaller support crew of 6 and made final preparations at the sump. The exploration team of Mike Young and Matt Vinzant would be diving rebreathers while support diver Jon Lillestolen would be on open circuit gear.

The team began entering Sump 1 in intervals beginning with Jon Lillestolen at 11:30pm. Mike Young then entered at 12:00 with Matt Vinzant entering at 12:30pm. The dive through Sump 1 was uneventful and the team reconned on the upstream side of the sump and moved gear to

Sump 2. Young begin exploration in Sump 2 while Jon and Matt cleaned up the survey tie in at Sump 2. Jill Heinerth and Jerry Murphy's 2007 line utilized the same tie off as Ron and Roberta in 1985 (T01 from the 2015 survey). Using Ron and Wes's original survey notes they were able to locate WS16 at the edge of Sump 2. They tied T01 into WS16 and reshot T01 to S1 where the guideline meets the water surface at (S1 from my 2015 survey). All of the underwater survey in Sump 2 is tied now into WS16.

Mike Young was lead exploration diver adding 1300' of new line in Sump 2 beginning with station S24 and broke into dry passage after 1300 ft. Matt followed and began the new survey at S25 (the last station from the 2015 dive). The new survey began with SS1 and continued with that naming convention. The team surfaced in one large air bell at SS8, just 379' past the old end of line. This was a 20' tall dome but no way to exit the water. Matt continued the survey and the team emerged in large dry passage. The passage continued underwater for a total of 1304' in 32 stations from the 2015 EOL. Visibility was a milky 5-6' and walls were not visible for the majority of the dive. The survey was accomplished with a Seabear H3 digital compass and depth gauge mounted to a slate. Matt was lead survey and indicates he does not believe there are any questionable shots in the data set. Total dive time through Sump 2 was 62 minutes.



Mike Young preps at the entrance to Logsdon River Sump 1

The team surfaced at a break down pile that appears to act as a choke point during flood stage. There was a small creek carrying the same base flow we saw overflowing at Sump 2. The rebreathers were ditched at the exit point and a quick reconnaissance was made of the passage. A large breakdown room measuring 89' x 55' and 33' high. They subsequently named this the "Brian Williams Birthday Breakdown Room". There were huge coarse sand banks with large ripples forced over the breakdown in many places indicating heavy flow. The upper levels have a fine layer of mud and dark sharp flat rocks. A number of leads were pushed but the team had to be cognizant they did not damage a drysuit. However, Young tore a hole in his boot at the eastern most end of the breakdown chamber where the going passage was low with sharp protrusions and the decision was made to survey out from that point. Once back into the stream Vinzant climbed over a large mud bank into the flowing water and encountered a crawl ~16" h x 36" w carrying what he determined to be the majority of the flow. It was clean washed and very sharp. At this point the team was within 20 minutes of the predetermined turnaround time and called the end to the exploration. Vinzant feels that it is possible that past this breakdown area we will be back in larger river passage again. He detected no airflow but there was a large volume of sticks and other organic material captured in the small eddies of the river. The team surveyed 376' of dry passage in 16 stations. (Note: underwater survey was in FEET and the dry survey was in METERS due to the Disto settings.)

While the push team was working in upstream Sump 2, Jon Lillestolen proceeded into Swicegood Avenue to deploy the Cave Radio Transmitter (beacon) near our predetermined location at A23. This gave the surface team a possible open location in the field, and a high level place for the transmitter. It was the shallowest option possible. A23 could not be located but A24 was identifiable with carbide. Jon leveled a spot and surveyed it into A24. Note: The surface team located a strong null at: N37 09.324, W86 00.038 (8ft accuracy) Elevation 883' using a Garmin etrex 30x - Datum WGS84 --12/2/2017. The estimated depth based on the CRL was 269ft (+/- 15'). Jon also tied Brian Williams resurvey of Sump 1 into Ron and Wes's original survey with a single shot from the new tie off in the middle of the passage to the old tie off on the north wall of the passage.

At approximately 3:20 the surface locate team proceeded to a location off South Toohey road determined using GPS and Google Earth KMZ files. Kyle Moshelle operated the receiving unit at 3:30 and the radio signal was picked up immediately. Kyle began triangulating the location with assistance from Dave Weller. While the null was being pinpointed, Stephanie Petri explored into the woods along the edge of the field and found an approximately 8 ft x 25 ft deep pit. Steph, Mark Wenner, Bill Walker and Charles Walker donned vertical gear, a rope was rigged and the pit explored to a breakdown choke. "Ginger pit" was located at: N37 09' 20.52, W85 59' 59.28", elevation 895'. This has a strong correlation with the A23 canyon in Swicegood. According to Simmons notes it ends in a low mud crawl at the top. None of us have climbed to the end of that canyon. Additional karst features were located during a short ridge walk of the surrounding area including a small stream coming from the field pond with water sinking at various locations leaving the stream bed dry further down the gulley. Smaller fissures and holes were discovered along the contact line around the ridge. The surface team returned to the field station at approximately 5:30 for dinner. The dive team returned to the field station at 12:45

The success of this expedition can be directly attributed to the leadership of expedition coordinator Mark Wenner, the experience of the dive team, the strong motivation of the support team, and the generosity of Dave Weller and other private landowners. This expedition would not be possible without the survey obtained by previous explorations and the information provided by Jim Borden, Pat Kambesis Dave Weller, the CRF and CKKC. We would also like to thank the CRF for use of the Hamilton Valley research facility and all the support personnel who hauled gear and cooked food. Special thanks to PK cleaning up the Field station while the support team was removing gear from the cave.

This years team included: Mark Wenner, Matt Vinzant, Brian Williams, Jon Lillestolen, Mike Young, Joshua Shouse, Stephanie Petri, Brian and Tiffany Buchanan, Kyle Moschell, Charles Walker, Britt Hardwick, Bill Walker, Ryan Olson, Joe Heinrich, Jay and Erin Young & Pat Kambesis.



The haul team moving gear



Its not all walking passage, there is plenty of crawling and dragging gear through thick mud



This is Just one section of the 175 ft of ladders that must be negotiated in the entrance series to reach the beginning of passage at the bottom of the Weller Entrance.



Divers prep in the staging area above Logsdon River Sump



Gearing up in the mud at the Sump 1 can be a challenge



Matt Vinzant prepares to enter Sump 1



"Sherpas" are the backbone of the expedition and haul the gear to and from the sump. Here Steph Petri, lead sherpa in charge of gear haul provides some comic relief in the mud of the Logsdon River



Mark Wenner, Expedition Leader at the "Weller" entrance to Roppel Cave.



Some of the team members getting ready to head in for diver support on Saturday



Support divers Jon Lilliestolen and Brian Williams, with Lead Sherpa Steph Petri after a successful expedition and all gear has been removed from the cave.



Cavers need to keep the calories coming ! Dinner is served at the Hamilton Valley Research station



Surface preparation at the Research Station



Radio location topside while the dive team is 300 feet below.



Steph Petri is the first one to rappel down into a new pit she discovered while on the surface locate



Team members gather outside at the Hamilton Valley Research Facility located just outside of Mammoth Cave Preserve.

11/30/2017

- Team Members begin arriving at CRF Field Station1

12/01/2017

- 9am: Breakfast
- 11-12: Team meeting, packing, logistics.
- 12:30pm: Arrive at Weller entrance
- 1:30pm: Enter Weller entrance
- 3:30: arrive at sump with 18 bags of gear. 80lbs of lead located at changing room. Climb down to sump rigged with handline. All dive gear moved to sump landing.

- 4:30: leave sump
- 5:45: Out of cave

12/02/2017

- 7am-9am: Breakfast and debriefing, distos charged.
- 9:30am: Arrive at Weller Entrance
- 10:06am: Dive Team and support enter Weller entrance. Support and film crew: Brian Williams, Bill Walker, Charles Walker, Ryan Olsen, Josh Shouse.
- 11:00am: Arrive at sump, diver prep.
- 12:00pm: Lead diver Jon Lillestolen departs.
- 12:15pm: Mike Young departs
- 12:30: Matt Vinzant departs, support team leaves sump area
- 1:15: Support team exits cave
- 9:15am- Radio locate crew proceeds to old radio locate position (2014 expedition)
- 11:30am: Radio locate team returns to Weller Entrance
- 1:30pm: Radio locate team and support crew review KMZ files and determine approach to new radio locate position off South Toohey rd
- 2:30 pm: Begin radio locate. Pinger signal immediately detected.
- Kyle Moshelle in charge of radio locate begin triangulation to determine null. Surface team spread out from field to edge of woods. Steph Petri located a pit entrance inside the wood near the contact – GPS: 37.1557, -85.9998. “Ginger Pit” Pit was rigged and Steph, Mark, Bill and Charlie enter pit. Approximately 30 foot drop to walking passage. Passage ends in breakdown after approximately 30 ft. No survey. Kyle and Dave Weller located and marked null. Ridge-walking around edge of field in woods revealed several other holes and fissures.
- 5:00pm: return to field station for dinner (thanks PK)

12/03/2017

- 12:40am Dive Team returns to CRF Field Station
- 8:00- 9:00am - Breakfast
- 10:15 – Support team enters Weller entrance for gear removal.
- 12:55 – Gear removal complete. All out, cave locked
- 1:15 – Return to CRF to sort gear, clean field station, pack to leave.
- 2:30 – majority of team members leave CRF