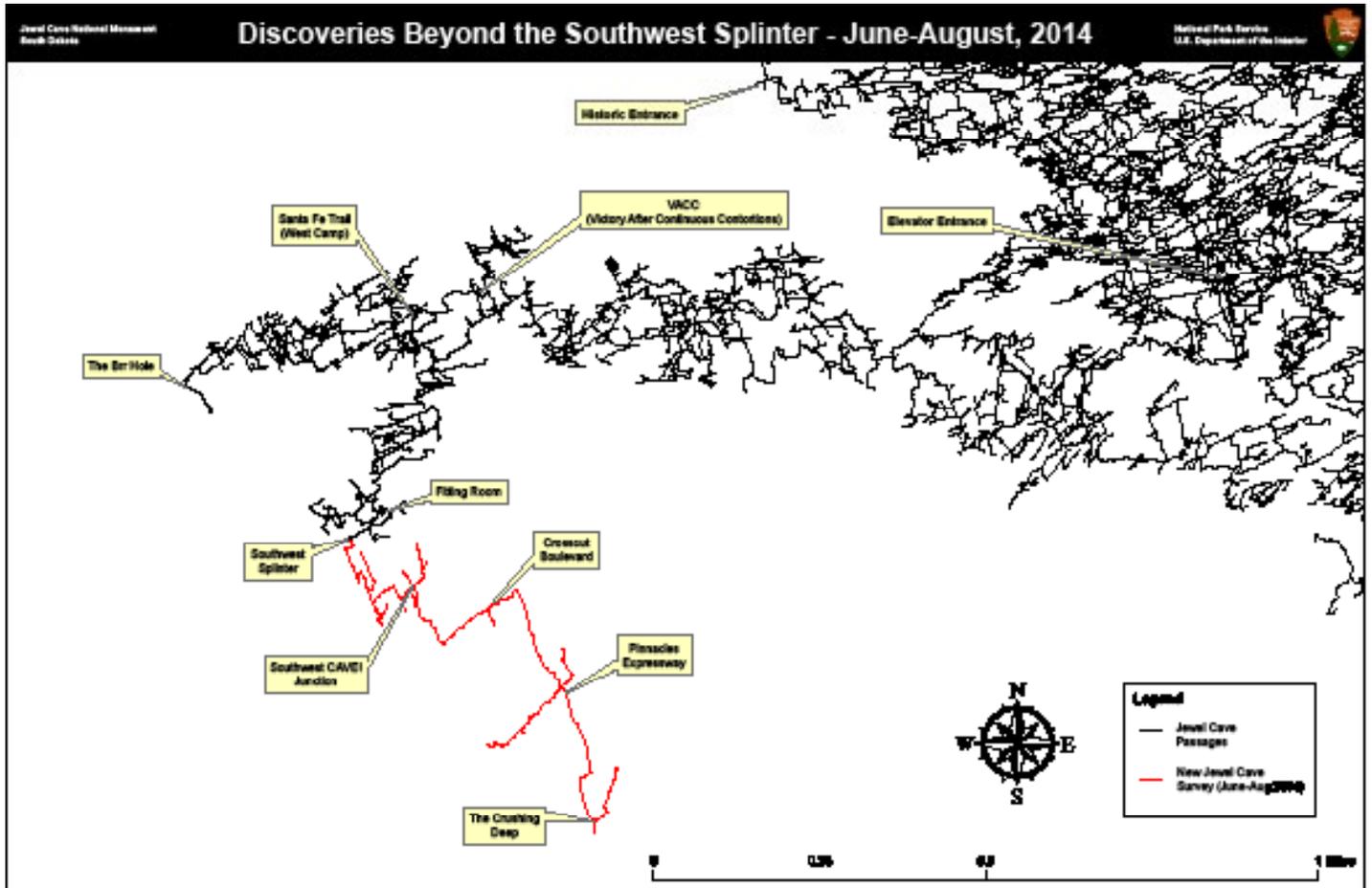




Inside Earth



This summer, Jewel Cave explorers made one of the biggest exploration breakouts in over a decade in the cave's southwest section. The areas in red above represent over two miles of passage and extend the map's footprint 1/2 mile to the south.

Contents

A Word from WASO

Highlights of the National Cave and Karst Program.....2

Items of Interest

Mosaics in Science Internship4

William L. Wilson Scholarship in Karst Science4

Park Updates

Buffalo National River5

Great Basin National Park6

Jewel Cave National Monument6

Lava Beds National Monument8

Oregon Caves National Monument10

Ozark National Scenic Riverways10

Timpanogos Cave National Monument11

Wind Cave National Park12

A Word from WASO

Submitted by Dale Pate

Calendar

Project EduBat - Education Taking Flight
October 29, 2014
2:00 p.m. E.T.
[Project Edubat – Education Taking Flight](#)

George Wright Society Conference
March 29-April 2, 2015
Oakland, California
www.georgewright.org

NSS Convention
July 13-17, 2015
Waynesville, Missouri
<https://www.facebook.com/NSSConvention2015>

National Cave Rescue Commission
Cave Rescue Operations and Management Seminar
July 25 - August 1, 2015
Park City, Kentucky
<http://caves.org/commission/nrcr/national/>

Geological Society of America
Annual Meeting
November 1-4, 2015
Baltimore, Maryland
<http://www.geosociety.org/meetings/2015/>

NSS 75th Anniversary Convention
July 17-23, 2016
Ely, Nevada
<https://www.facebook.com/nss75th>

Submit entries for the Calendar to
bonny_armstrong@nps.gov

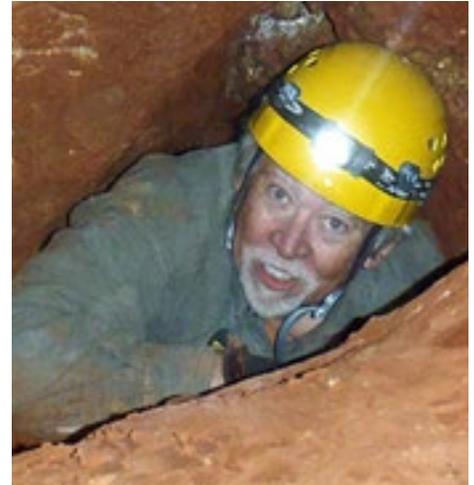
HIGHLIGHTS OF THE NATIONAL CAVE AND KARST PROGRAM

It has been a busy six months since Bonny Armstrong produced the Summer 2014 issue of Inside Earth. Thanks to Bonny for her great efforts and to Jim Ireland and Cami McKinney (Timpanogos Cave National Monument) for their support of Bonny to produce this newsletter.

PERSONNEL

Limaris Soto – began as a volunteer in February 2013, converted to a contractor in October 2013, and became a guest scientist under the Geosciences in the Parks (GIP) program in April 2014. Her primary duty throughout this period was to develop cave and karst summaries for individual park units. By spring 2014, she also began work with Jim Wood and me to help update our Caves of the National Parks poster. And then this summer, she worked closely with Joe Camacho, Jim Wood, and me to help develop a 24-page Junior Cave Scientist booklet and badge for use throughout the NPS system as part of the Junior Ranger Program. In September 2014, we were also able to send Limaris to Buffalo National River in Arkansas for a two-week detail to help the park gather dye-tracing and karst recharge area data for the park into a single report. Starting in November, 2014, Limaris will move to a new GIP position within GRD to help support various other programs. We wish her well with her new position.

Joe Camacho – also hired as a Guest Scientist through the GIP program, Joe worked for 3 months this summer as an illustrator helping us develop the Junior Cave Scientist booklet and badge. Joe's expertise helped us to create a



Dale Pate, NPS National Cave and Karst Coordinator. Photo by Johanna Kovarik.

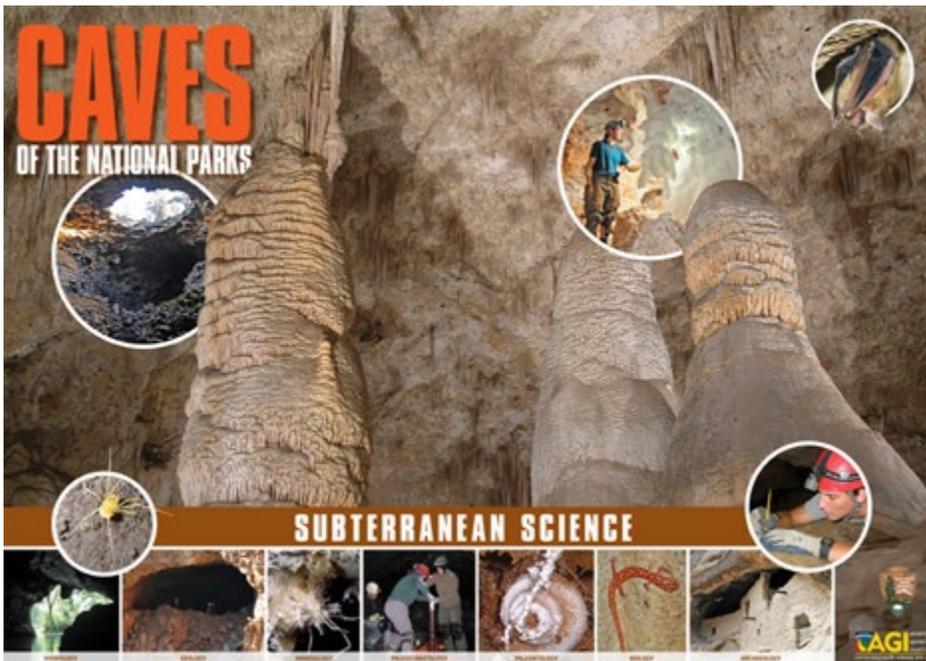
fun, entertaining, and educational booklet that we hope will provide thousands of kids (and adults) with a better understanding and appreciation of cave and karst resources found within National Parks and throughout the United States.

EDUCATIONAL MATERIALS Poster - Caves of the National Parks

Working in conjunction with the American Geosciences Institute (AGI), an updated poster, Caves of the National Parks has been printed for inclusion into AGI's 2014 Earth Science Week Packet. The Cave and Karst office has also received copies of this poster for distribution to interested parks. For parks wanting hard copies of this poster for distribution to staff and the public, please contact me at dale_pate@nps.gov or Limaris Soto at limaris_r_soto@partner.nps.gov. This poster can be downloaded as a PDF from the following link: http://nature.nps.gov/geology/education/ESW_classroom_posters/2014_caveandkarstnpsPoster_LRes.pdf

Junior Cave Scientist Booklet & Badge

As mentioned above, this booklet and badge will be part of the NPS Junior Ranger Program and



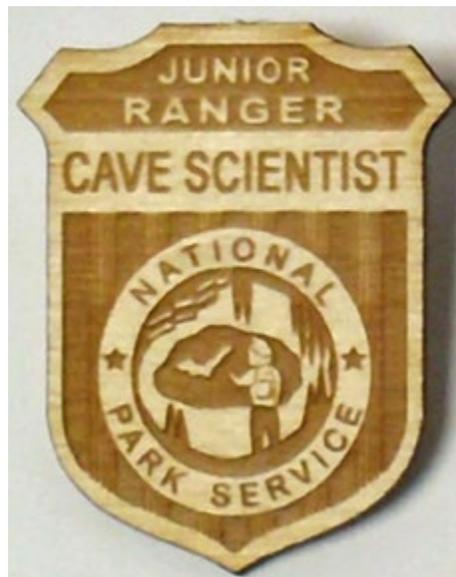
Caves of the National Parks poster.

available to parks and partners for educational uses. This booklet is not quite ready for prime time, but once completed will be printed and distributed to interested parks and partners. Thanks to Joe's intuition and help, we were able to solicit the talents of a local Boulder student, Paloma Hernando, to develop the cover of our booklet. She did a great job and we were glad she could participate. The booklet will provide definitions, discuss ways to safely study cave and karst areas, discuss types of caves and speleothems, look at the types of fauna that inhabit caves including bats, talk about White-nose Syndrome, cave microbiology, cave fossils, archeology, and discuss karst. We hope this will be an excellent tool that kids (and adults) can use to learn more about these great resources (while still having a lot of fun) and that will ultimately lead to long-term viable protection for these areas that we all love. Also thanks to Beth Fratesi for providing an initial design that we modified to create the Jr. Cave Scientist badge.

CAVE & KARST SUMMARIES

Since the beginning of this project to develop cave and karst summaries for each park unit, Limaris

has completed 56 draft reports. These have been used to provide information for several national-level programs and after further review, we will be placing them on our Cave and Karst Program website for others to use as well. We have begun this process with summaries from Abraham Lincoln Birthplace National Historic Park in Kentucky, Montezuma Castle National Monument in Arizona, and Tuzigoot National Monument in Arizona now available as .pdf downloads from: <http://nature.nps.gov/geology/caves/publications.cfm> Once there scroll down to Park Cave and Karst Resource Summa-



NPS Junior Ranger Cave Scientist badge.

ries.

NATIONAL PARK SERVICE/ NATIONAL SPELEOLOGICAL SOCIETY – MEMORANDUM OF UNDERSTANDING

A long-time in the making, we have finally updated a long overdue MOU with the NSS. You can also find this signed document on our Cave and Karst Program Website under Publications. Once there, scroll down to Agreements. The link is: <http://nature.nps.gov/geology/caves/publications.cfm>

TECHNICAL ASSISTANCE RE- QUESTS

Two more technical assistance requests for this year required site visits.

Buffalo National River

As many know, a large hog farm Concentrated Animal Feeding Operation (CAFO) has been placed on top of karst within the Buffalo River watershed, but outside the boundary of the park. This CAFO has been active for over 1 year now and because it is within the watershed and on karst, it is only a matter of time before the waste it generates begins to show up in the Buffalo River. A lot of effort has been expended over the past year to remedy the situation including a major lawsuit by outside organizations. By invite from Chuck Bitting at the park, I visited Buffalo National River in June to review the situation and help where I can. An NPS team has already been working with the park on a weekly or bi-weekly basis for over a year now to help direct actions that may alleviate this problem. One of the action items I have been able to help with was to send Limaris Soto to the park to help gather information on dye-traces and recharge areas that have already been completed for the Buffalo watershed into one report. A draft report is in the works as well that will outline other activities that may help the long-term viability of the river.

Items of Interest

Grand Canyon National Park

A site visit to Grand Canyon National Park (GRCA) was taken in September to discuss the timing and content for a Cave Management Plan (CMP) for GRCA. The park is nearing completion for their Backcountry Management Plan and the next step is to tier the CMP off of this plan. A major discussion also centered around springs found below the north rim at the base of the Muav/Redwall limestones and the primary water source for the park, the recent decision to redo the entire water system that currently provides water from Roaring Springs to all facilities on the north and south rims, and the lack of knowledge concerning the recharge area of this and other springs. The site visit also included a field excursion to Cave of the Domes to discuss management issues associated with this cave. A report to the park will highlight these discussions and provide recommendations as they move forward with various planning efforts.

To receive this newsletter and pertinent updates and announcements, join the NPS Cave and Karst listserve here:

http://nature.nps.gov/geology/caves/email_info

MOSAICS IN SCIENCE INTERNSHIP

A call for Proposals has been issued for the National Park Service- Mosaics in Science Internships for the summer of 2015. The deadline for project proposals is coming up soon (November 1, 2014). Please take this opportunity to apply. Project proposals must be submitted by NPS staff, however they can be developed in collaboration with non-NPS partners.

Twenty-six or more internships will be chosen that best meet the selection criteria for the Mosaics in Science program. Parks will be notified of the selections by December 1st. If your position is not selected there is an option to advertise and fill the position through the Geoscientists-in-the Parks Program. For more information see, <http://nps.gov/waso/waso.cfm?prg=1117&lv=>

Mosaics in Science provides persons 17 to 35 years old that are typically under-represented in natural resource science career fields (e.g., Latino, African American, Asian, Native American/Pacific Islander, and Native Hawaiian and other Pacific Islander) with meaningful, on-the-ground, work experiences in the National Park System. The program is administered by the Geologic Resources Division in collaboration with other NRSS Divisions, the NPS Youth Programs Division, and in partnership with The Geological Society of America.

The summer internships are fully funded by NRSS and the Youth Programs Division and consist of eleven weeks working in a park or central office followed by a one-

week career workshop in Washington DC. Natural resource science disciplines covered in the Mosaics In Science program include air resources, biological resources, climate change science, geologic resources, natural sounds, night skies, scenic resources, social science, and water resources.

For more information visit <http://nps.gov/index.cfm?handler=viewnpsnewsarticle&type=Announcements&id=16252> or contact the program coordinator, Lisa Norby (303) 969-2318 or (lisa_norby@nps.gov).

WILLIAM L. WILSON SCHOLARSHIP IN KARST SCIENCE

Administered by the Karst Waters Institute www.karstwaters.org

The William L. Wilson Scholarship in Karst Science was established in 2002 to recognize the significant karst science contributions of the late William (Bill) L. Wilson. Bill Wilson used a variety of techniques, and unusual creativity, to tackle some of the most difficult karst science questions in Florida and elsewhere. He developed a leading karst consulting company in the United States, Subsurface Evaluations, Incorporated. To stimulate the development of new, energetic, motivated, and creative karst scientists, and to remember Bill Wilson and his dedication to karst science, the scholarship has been established in his memory. The value of the scholarship as a one-time award is \$1,000.

To apply for the William L. Wilson Scholarship, the following conditions exist:

1)The applicant must be currently

enrolled in, or have been accepted into, a master's degree program at an institution of higher education in the United States. PhD students are not eligible.

2) A written proposal of the planned karst study must be submitted. It is limited to 1000 words or less for the narrative, not counting figure captions and references. The research topic should be one concerning karst science, from the field of geochemistry, geology or hydrology. A very simple budget indicating how the funds would be used should also be included (it does not count in the 1000 word limit). Applicants are requested to not recycle master's thesis proposals as applications.

3) Academic transcripts of undergraduate, and any graduate work, should be submitted. Copies issued to the student by their institution are preferred.

4) Two letters of recommendation, with one of them from the student's advisor or mentor, should be submitted. It is requested that these letters be emailed directly to jbmartin@ufl.edu by the letter writers.

5) Applications are due by February 2, 2015. They should be submitted electronically as a single pdf file that includes the proposal, budget, and all transcripts to:

Dr. Jonathan B. Martin
Department of Geological Sciences
- University of Florida
PO Box 112120
Gainesville, Florida 32611-2120
jbmartin@ufl.edu

Questions regarding the scholarship should be addressed to Dr. Martin.

Applicants will be notified in early March of the decision of the Scholarship Committee.

Publications derived from supported research should acknowledge the Karst Waters Institute and the William L. Wilson Scholarship.

For more information, go to: <http://karstwaters.org/scholarship/>

Park Updates

Buffalo National River

Submitted by Chuck Bitting

This year Buffalo National River has seen a flurry of cave and karst activity. Much of this activity is a result of the 2012 permitting of a large swine concentrated animal feeding operation (CAFO) adjacent to one of the larger tributaries and within 6 stream miles of the river. Some of the activity is also the result of White-nose Syndrome being discovered in two counties the river flows through. WNS has not yet been discovered within the park, but we anticipate its discovery this coming winter.

The Cave Research Foundation has been busy mapping and documenting caves, monitoring caves for signs of WNS, and placing and maintaining WNS closure signs on cave entrances. This is a daunting task with nearly 400 documented caves, and very little staffing at the park level. Kayla Sapkota has been doing an outstanding job of keeping the crews active throughout the park.

The park has been conducting acoustic bat monitoring to develop a pre-WNS baseline of foraging conditions throughout the upstream portions of the park. The project, when completed, will

include several replicates of each of the vegetation associations within the park as well as a large number of replicates along the river and stream corridors. Data are being collected to meet the standards of the North American Bat. This work is being conducted by furloughed fire staff, and will be carried on into FY 2015 by an SCA intern and Arkansas State University. Thanks to the Biological Resource Division for funding the first year of the project.

Dale Pate conducted a technical assistance visit to the park in June. During that visit he facilitated Limaris Soto to come down and assist with summarizing dye tracing and water quality data the park has amassed over the years. Lima came down and has been working hard to provide this much-needed technical assistance. She did an outstanding job of assisting the park with consolidating the data that is needed to manage the karst of the Buffalo River into the future.

Dr. Matt Covington with the University of Arkansas convened the "Friends of Karst" the latter half of September 2014. The meeting was attended by 21 karst geologists, karst hydrologists, karst biologists, and cavers. The itinerary included a canoe trip, a field trip to Copperhead Cave within the park, a field trip to the CAFO area of Mt. Judea, and field trips to caves outside of the park.

Mike Slay, Karst Ecologist for The Nature Conservancy in north-west Arkansas and former NPS employee, announced that the 23rd International Conference on Subterranean Biology will convene in Fayetteville, Arkansas in 2016. Plans are being made to ensure they get to experience the wide variety of karst available in the southern Ozarks, including Buffalo National River.

Great Basin National Park

Submitted by Gretchen Baker and Ben Roberts

Park staff visited three high-elevation caves in mid-September to do a paleontological reconnaissance, biological survey, and to download and install additional temperature dataloggers.

A rabbit bone that had been broken by a bird of prey was collected, as well as some bighorn sheep bones. Staff noted the presence of a high number of Model Cave harvestman (*Sclerobunus unguulatus*) in one passage of Cave 24. A dead bat was collected, and bat scat was collected to assist with a Nevada Department of Wildlife study.

An acoustical monitor was deployed for three weeks outside of Cave 24 and sounds from a variety of bat species were detected. Additional data processing is ongoing.

This harvestman has been elevated to species level and placed in a new genus- *Sclerobunus unguulatus*. NPS Photo by Gretchen Baker.



Shakan Derkarabetian and Marshal Hedin published a paper reclassifying the Model Cave Harvestman, formerly known as *Cyptobunus unguulatus unguulatus* as *Sclerobunus unguulatus*. In 1971, T. Briggs published his paper identifying *Cyptobunus unguulatus unguulatus* found in Model Cave. Over the years, the subspecies has been found in additional caves. The current study elevated the subspecies to species level and placed it in a sister genus. The paper is available at: <http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0104982> More information will be found in the winter edition of The Midden, the resource management newsletter of Great Basin National Park.

GRBA has been conducting both acoustical and mist-netting surveys at several park caves as part of the WNS money provided by WASO this year. The results so far, by location:

Upper Pictograph Cave: The cave entrance and the road corridor

just downstream of the cave entrance were netted. Sixty-eight bats were caught in the mist nets (65 Long-legged Myotis, 1 Townsend's big-eared bat, and a few escapees). Interestingly, the majority of bats were captured entering the cave. Only four were caught on the inside of the net trying to exit.

Lehman Cave: Mist netting at the natural cave entrance captured 2 long-legged Myotis and 32 Townsend's big-eared bats. Many of these were juveniles and lactating females, suggesting that Lehman Cave is being used as a maternity roost. Two additional species (Hoary bat and Brazilian Free-tailed bat) were detected by an acoustic bat detector.

Snake Creek Cave: A harp trap and mist net captured 5 Townsend's big-eared bats and 2 Pallid bats. One additional Pallid bat was seen roosting in a crack near the cave entrance.

Jewel Cave National Monument

Submitted by Dan Austin

Cave Exploration

This summer, a huge breakthrough in the western branch of Jewel Cave has spurred exploration efforts in an entirely new and unanticipated direction.

In June, a survey team returned to the Southwest Splinter, a very narrow fissure discovered just a couple of months earlier near the Fitting Room in the western branch of the cave. The objective was to push two small leads at the end of the fissure passage, and airflow in these leads hinted at something much more interesting beyond.

It turned out to be one of the biggest breakthroughs in Jewel Cave in



Ian Chechet in virgin cave out West. NPS photo by Dan Austin

more than a decade.

Since the initial trip through the Southwest Splinter, nearly two miles of passages have been mapped beyond, and almost 100 leads remain to be checked, many of them walking-sized. The footprint of the cave has been extended by half a mile further south, and all indications are that this new area is going to keep cavers occupied for a very long time.

Much of the new breakthrough has produced some unexpected but nonetheless very interesting observations. For example, while much of the western branch of

the cave beyond the VACC (Victory After Continuous Contortions) is very small and sinuous, the passages beyond the Southwest Splinter have been large, complex, and multi-level fissure passages, some of them 60-foot tall and 20-foot wide. The length and direction of

some of these passages has also been puzzling; the last trip to the area finished surveying “Pinnacles Expressway,” a 35-foot tall passage trending southeast for ½ a mile, making it one of the longest passages in the cave. No other passage in the western branch trends in such a direction for long, let alone at that size. Another new discovery, “Crosscut Boulevard,” trends perpendicular to Pinnacles Expressway for about 1,000 feet before continuing along the same trend as a 40-foot tall by 20-foot wide lead.

A large room was also discovered at the terminus of Pinnacles Expressway. Cavers named it “The Crushing Deep” because they had travelled at a progressively downward slope to reach this point. It also turns out that this is one of the deepest points in the cave, only 64 feet shy of the record of 573 feet (below the elevation of the entrance).



Frostwork near the new camp's water supply. NPS photo by Dan Austin.

Gypsum, popcorn, and frostwork have been abundant in these new passages. A multitude of popcorn stalagmites along the length of Pinnacles Expressway helped give the passage its name. Some of these are 6-foot tall or taller. An interesting

clump of frostwork at the entrance to one of the leads along Crosscut Boulevard appears as if wispy strands have formed downward from the tips of each crystal, giving the frostwork an almost organic appearance. Manganese, almost always present in Jewel, has been nearly absent in these new passages, which instead contain a thick layer of dried mud on the lowest levels. The speleothems continue to be both baffling and interesting at the same time.

The furthest extent of the survey is now over 13 hours round-trip from the elevator entrance. Because day trips are limited to 18 hours in length, cavers now have less than 5 hours to survey on each trip. Still, the last two trips to this area combined have exited the cave with over 6,150 feet of new survey. The park recognizes that because the end is now so far away and time is becoming more and more valuable,

there is a need for a second cave camp. Plans are already underway to establish West Camp at the w1 Pit, about 4 hours from the entrance, to facilitate extended trips to this new area. While camp will be located a fair distance from the new discoveries, it will be centrally located to allow for extended

trips to push the far western end of the cave near the Brr Hole, as well as the new southwestern leads. It is also the only place discovered in the western branch with dripping water nearby suitable to collect for drinking water.



Organic looking frostwork in Jewel Cave's Crosscut Blvd. NPS photo by Dan Austin.

Dan Austin, Rene Ohms, Chris Pelczarski and Larry Shaffer have spearheaded the efforts to survey the new discoveries, but they have also been joined by Ian Chechet, Matt Covington, and Kelly Mathis on three of the exploration trips. Joel Derrick, Nate Hughes, Oliver Stubbs, and Marc Ohms have assisted Dan and Chris on two trips to haul in tarps, sleeping bags, therm-a-rests and stoves for West Camp. There are still some minor logistical hurdles to camping out west that need to be taken care of, but if everything goes according to plan, it is anticipated that the first camp will take place on or around Veteran's Day of 2014.

Current Projects and Filming

The park received funding for White-nose Syndrome purposes this year. Much of the funds were used to purchase SM3 ultrasonic acoustical monitors to place in and around the park. These monitors will be used to gather information on bat activity at specific locations and will help park managers determine what species are utilizing each site and the level of activity present. Five monitors were set up in August, and the data will be

analyzed this coming autumn when bat activity drops off due to hibernation. The monitors will be set up again in the spring so that data can be collected for an entire summer season.

The remainder of the WNS funds was used to purchase decontamination supplies and materials needed to complete a Bat Cam project in the Historic Entrance to Jewel Cave.

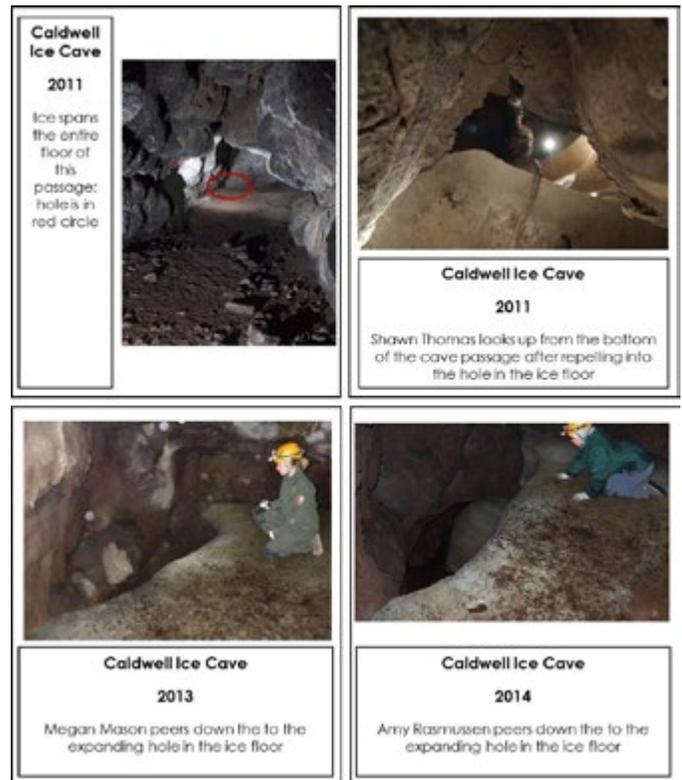
Mike Wiles and Dan Austin escorted a film crew from the Travel Channel to areas along the Wild Caving tour in July to film an episode for an upcoming television series. The premise of the show is to give viewers a sense of going to places that nobody else gets to see. It is anticipated that the new series will debut sometime this fall.

Lava Beds National Monument

Submitted by Katrina Smith

Accomplishments of the Klamath Inventory and Monitoring (I&M) Network's Cave Entrance Community and Cave Environment long-term monitoring protocol

Lava Beds was lucky enough this year to have a four-person cave team to implement the Cave I&M Protocol over the summer months. The team consisted of Katrina Smith and Megan Mason, Physical Science Technicians, Amy Rasmussen, American Conservation Experience Intern, and Sarina Patel, Mosaics in Science Geocorps Intern. Together we surveyed 31 caves for scat, invertebrates, and entrance vegetation, set up vegetation photo monitoring sites at each cave entrance and vegetation transects for 10 vertical entrances, and



Ice Monitoring in Caldwell Ice Cave.

downloaded 124 climate dataloggers. We also created and updated site dossiers for all parameters, and collected photos for invertebrate, scat, and vegetation field guides.



An adult male grylloblatid seen during invertebrate surveys in an ice cave. NPS photo by Katrina Smith.

Of special interest has been the success of the invertebrate monitoring protocol, as characterized by the plethora of invertebrates observed during surveys. Special finds include a pseudoscorpion (unknown sp.), numerous grylloblattids (*Grylloblatta gurneyi*), several dozen millipedes (*Plumatyla humerosa*) and diplurans (*Hapllocampa* sp.), a variety of spiders, a few rove beetles, fleas, mites, and lots of springtails – both the well-known Tomoceridae and additional unknown families.

Ice Cave Monitoring

As part of the Cave I&M protocol, Lava Beds is continuing to implement methods to monitor ice caves. Most recently, five photo monitoring sites were established in Skull and Caldwell Ice Caves to capture the breadth and significance of the ice deposits. Technical assistance was provided by Oregon High Desert grotto member and cave photographer Brent McGregor. During these trips, continued and extensive melting was observed and documented in Caldwell Ice Cave. The 2.5m thick ice floor has been melting away from the wall, expos-

ing the floor of the passage below. This melting has revealed new paleontological material, including two bighorn sheep vertebrae amid newly exposed breakdown, and a

scapula still half frozen into the ice floor at a depth of approximately 2 m. The radiocarbon date of a piece of ponderosa pine bark found frozen in this floor at a similar depth suggests that the ice at that depth was deposited 700-800 years ago. Efforts to date the scapula are in progress.

Rebel, the Rehabilitated Bat

In early August, Lava Beds staff had the opportunity to rehabilitate a bat stuck in an unfortunate situation. Caught in a sticky fly trap hung outside a trailer in the campground, the bat that became known as Rebel was brought to us by a Youth Conservation Corps member who was also staying at the campground. Covered in goo, the long-eared myotis' future didn't look too bright, but after some internet research and calls to others with bat rehab experience, we found the solution. A bath of olive oil, followed by a good rub down with Dawn dish soap and 36 hours of rest inside a tall box lined with soft towels and t-shirts, placed in a dark closet, did the trick to get Rebel up and flying again. The dozen or so mealworms he devoured on the

second day might have helped too. The positive interpretive experience for the YCC and Lava Beds staff was an unintended but influential consequence; the chance to see a bat up close, being fed water from a dropper and mealworms on tweezers was unique for many, and showcased the adorable side of this often misunderstood group of mammals to many who came with differing views on bats. One visitor was so enlightened as to rid his bad habit of taking a badminton racket to bats in his basement; he contacted us later that month telling of his success in removing a live bat from his house – “I cornered it in the back room and shoed it out. It flew away unharmed into the midge-filled night to feast again. A lot more work but much more satisfying.”



Rebel the rehabilitated bat. Above: covered in olive oil awaiting a soapy bath. Below: clean, dry, and happy, chomping on a mealworm. NPS photo.

Oregon Caves National Monument

Submitted by Emily Ring

Recent Findings

Multiple fossil and bone sites are getting a second look, which were originally described in 2007 during a system wide inventory. Of particular interest is a passage containing bones that were described as a jaguar skull and bones of various ages. This was documented for the inventory and since left undisturbed. In 2013 a seasonal 'rediscovered' these bones and took new photos.

Staff decided they may not be jaguar after all, and might need re-evaluation. Mention that the skull may be wolf, based on size and the proportions of braincase to snout, generated new excitement and motivated recruitment of professional help. Unexpected cementation of surrounding sediment, however, requires a second excavation visit by a paleontologist before identifying the skull down to species level.

This fall, Oregon Caves was fortunate to receive the assistance of paleontologist Keila Bredehoeft, from John Day Fossil Beds Nation-

al Monument. She and a colleague plan to return in February to continue their review. For example, one site has the shaft of a humerus from a large carnivore, either bear or large cat. Cursorily described as possible elk bone in 2007, this and other sites will benefit from scrutiny and preservation recommendations by our visiting experts.

There was yet one more potential fossil find last month, which would be exciting and valuable for informing regional records. Likely once near an entrance now closed, a bone was found that best fits the dimensions of the remains of a short faced bear, an extinct species thought to have been the largest mammalian carnivore in North America. The park is awaiting further confirmation of this tentative find. Regardless of identification results, all the sites remain valuable and worthy of continued protection and research.

The cave's potential as a microfossil locality has also been noted. Microfossils are generally not larger than four millimeters, and smaller specimens require the use of light or electron microscopy. Fossils which can be studied with the naked eye or low magnification like a hand lens are generally referred to as macrofossils.

Because of their ubiquity, some microfossils provide detailed histories of past environments. They often have

regional or even continental distribution, making for broad biostratigraphic correlations. A study of pollen from re-deposited wind-blown glacial silt (loess) in cave slackwater deposits over five feet thick in Oregon Caves likely would extend the age of plant distributions beyond the 26,000 year record of pollen that was previously done by Dr. Christy Briles at nearby cirque lakes.



Fragment examined during the 2014 bone and fossil survey. NPS photo by Nate Gilbert

We at Oregon Caves feel lucky to work at such a geodiverse and biodiverse Monument that has sustained much human impact but still offers secrets and treasures.

Ozark National Scenic Riverways

Submitted by Scott House

With over 400 caves documented within the authorized boundaries of the park, it has been a busy year for cave work. Working under the guidance of resource management, Cave Research Foundation does the bulk of the cave management, monitoring, and inventory work.

The area of the Riverways, referred to as the Lower Ozarks, is slowly showing signs of the pernicious



Excavations in search of a humerus fragment. NPS photo by Nate Gilbert.



A piebald cave salamander in Log Yard Cave. NPS photo by Scott House.

White-nose Syndrome. Winter monitoring efforts focus on identifying the progression of the fungal disease. Approximately 120 monitoring trips to caves were taken in fiscal year 2014. Some of these trips included the swabbing of bats and substrate to pick up DNA of the disease. However, WNS is not the only resource issue that monitoring examines: human overuse, ARPA violations, and inventories of other biota are also important.

Cave survey efforts continue in several Riverways caves; most of the current surveys are in stream caves characterized by flooding potential and low-air space conditions. Bealert Blowing Spring has now passed a mile in length; only three others in the authorized boundaries are longer. Several smaller caves have also been surveyed.

A cave gate was built on Bear Cave by CRF members and others. This once-popular cave has a long histo-

ry of user abuse. NPS staff did the cultural review, prepared the access trail to the cave, and arranged for the loan of equipment. With excellent preparation and cooperation between NPS and CRF, the gate was built in four days, start to finish.

With NPS support, major modifications were made to the Missouri Cave Database, maintained by the Missouri Speleological Survey and Cave Research Foundation. A faunal table was added which will allow for the input of species occurrences which are then instantly tied to the most recent locational and ownership information. Other cooperators in this effort include the Mark Twain National Forest and Missouri Department of Natural Resources.

Timpanogos Cave National Monument

Submitted by Cami McKinney

Partnerships

For the last several years, Timpanogos Cave NM staff have been working to build partnerships and improve cave education and protection outside the park. Utah BLM offices have annually requested support in building or repairing cave gates, assist in implementing monitoring programs, and advise in long term planning. In FY14, The Salt Lake BLM asked TICA staff to help create a rescue plan for Candlelight Cave. This highly decorated cave is only one hour from the park but has had many management complications in recent years, including a mineral claim sale of the cave on eBay.

Candlelight Cave was discovered in the 1930s when a vertical mine shaft breached the cave entrance.



Michael Bradford inches along a ledge above a pit during a survey in Bluff Cave. Photo by Jeff Crews.

Knowledge of the cave first became public in the 1990s. With a mile of surveyed cave, this hydro thermal cave is largely covered in delicate gypsum and aragonite features. TICA employees visited the cave several times to help improve safety and rescue planning on this delicate cave with several vertical passages. The park is eager to support cave preservation on neighboring lands and is working to enable the BLM to protect Candlelight and other caves into the future.

Another effort in partnerships also occurred in the summer of 2014.

Andy Armstrong admires a gypsum-coated passage in Candlelight Cave. NPS photo.



Superintendent Jim Ireland and Chief of Resources Cami McKinney visited staff at Kartchner Caverns State Park in Arizona. Kartchner staff shared recent research projects, discussed the pros and cons of cave facilities, and current efforts to monitor and protect the cave environment. In October, six members of Kartchner staff visited TICA to participate in the annual Restoration Camp. These skilled volunteers enabled TICA to not only clean lint and mud resulting from tour operations but to restore flowstone along the Introduction to Caving tour trail, build a flowstone

bridge through that area, and to repair several broken speleothems.

Middle Cave Ladder

This season also saw the demise of the Middle Cave Ladder. The ladder was placed high in the cave fault in 1936, when a team of surveyors and dreamers began scouting and measuring Middle Cave for the creation of tunnels that would allow for a one-way tour through Hansen, Middle, then Timpanogos caves.

The 110- foot drop proved challenging for the men but the ladder facilitated safe travel up and down the steep drop of the cave during their project. Once completed, the ladder was left behind. Since the completion of the tunnels in 1939, visitors have enjoyed tours, viewed and photographed that ladder. It became a cave tour favorite of adults and children alike and a memorable part of the cave tour for hundreds of thousands of visitors.

For more than 75 years the ladder remained wedged in a high passage with the cave humidity slowly eating away its integrity. Eventually the wood construction submitted to the cave and collapsed, falling to the trail below (during the night - no one was injured).

Wind Cave National Park

Submitted by Rodney D. Horrocks

Bats

We were surprised to recently document bats using the Natural Entrance to gain access into Wind Cave, which they are using as a day roost. Bat use of the Natural Entrance had never been documented before. We don't know if this behavior is due to the construction of the new airlock on the

nearby Walk-In Entrance, which eliminated the old revolving door as an easier access point for bats, or if we just hadn't documented this behavior before. It indicates how desirable the cave is to the bats, as they are willing to use the small, three-foot vertical entrance, a non-bat gate, and a very small passage partially obstructed by two sonic anemometers to access the cave. Based on this observed behavior, we may install a more bat friendly gate on the Natural Entrance culvert at some point in the future. This behavior was first observed on 8/23/2014, when Rod Horrocks and his son Matt observed a bat flight from the Natural Entrance at dusk. Although bats are using the entrance, it appears they are only using it when the barometric winds, which Wind Cave is famous for, are relatively low. It will be interesting to see if they continue to use that entrance in the winter; using the variable temperature zone of Wind Cave as a hibernacula site.

Projects

We recently completed a two-day cave restoration camp in Wind

Cave. This year we worked in the Post Office, Frostwork Ledge, and the Elks Room, cleaning areas that had not been cleaned in two years in addition to vacuuming 1/3 of the Fairgrounds Tour Route trail. We found unbelievable deposits of lint at the Post Office and Frostwork Ledge (see photo). Volunteer, Sandy Kramer, also discovered seven 75 cent cave tickets discarded near an old candle lantern storage area next to the Frostwork Ledge on the Fairgrounds Tour Route. During the two days, eight people were able to remove 234 pounds of lint, hair, dust, and one board from these three areas.

Research

Dr. Andreas Pflitsch recently installed temperature probes near the elevators to determine if air-



An example of material collected during the Wind Cave Restoration Camp. NPS photo by Rod Horrocks.

flow exchange with the surface is impacting cave temperatures in the immediate area. He also installed a probe in the low spot along the tour routes, known as the Blue Grotto, to help answer the question why we occasionally see our breaths in this area of the cave.

Cave Survey & Inventory

The resurvey project of problem surveys from the Wind Cave data has continued this fiscal year, with 4,234 feet resurveyed to date. The resurvey project has been on-going since 1999 and has been running concurrently alongside of the survey project. This year's footage brings the total resurveyed since 1999 to 9.67 miles.

Since the last reported length of the Wind Cave survey in Inside Earth, cavers have increased the surveyed length of the cave by 0.53 miles; establishing the current length of 142.92 miles, maintaining its standing as the sixth longest cave in the world.



Participants in the Wind Cave Restoration Camp. NPS photo by Rod Horrocks.



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