USA

April 22-24, 2016—Spring VAR 2016, hosted by Tri-State Grotto, will take place at Endless Caverns, New Madison, VA. For more info contact John DiCarlo at springvar2016@myactv.net

April 22-24, 2016—(Earth Day Weekend) Texas Speleological Association Spring Convention, Edwards County Fairgrounds, Rocksprings, Texas. Camping, presentations, banquet, and fundraising auction. This year talks are focusing on the karst of the Edwards Plateau, and local ranchers are being invited. Details are on our Facebook Page, or contact event coordinator Jim "Crash" Kennedy (cavcrash@gmail.com)

May 5 - 8 2016—Commander Cody Caving Club 40th Anniversary Celebration, Thorn Spring Park, 42 All Star Drive Franklin, WV 26807. All past and present members of the Commander Cody Caving Club are welcome to join us in celebrating our 40th year as a grotto. For more information you can e-mail us at info@commandercodycaving.com or visit our event page - https://www.facebook.com/events/15665171272002427/

May 13-15, 2016—Franklin County Grotto will be hosting the 2016 Spring MAR in Shade Gap, PA.

May 27-30, 2016—Speleofest 2016 will be a celebration of the Louisville Grotto’s 50 years of NSS membership. Located in the heart of cave country, at The Lonestar Preserve, in Hart County Kentucky. Early arrival on Thursday available, and you can stay until Monday. Howdy Party on Friday night with live music, bonfire. Cave Central on Friday night with trip signatures for the weekend. Banquet Saturday night with guest speaker and door prizes. Cave Social/ Lantern tour in Lonestar Cave Sunday night. Plenty of camping spots, port o potty’s, and hot showers. Breakfast will be available on Saturday and Sunday mornings. Gear Vendors will be onsite. Vendors and Inquiries, Contact David McClintock, Speleofest Chairman, at 502-643-4590, or dmcauto@hotmail.com. Visit www.facebook.com/events/15665171272002427/ for more info and like event page.

Cave & Karst Science

April 11-14, 2016—International conference on the origins, resources, and management of hypogene karst, Deep Karst in Carlsbad, NM. Deep Karst 2016 is being organized by the National Cave and Karst Research Institute in cooperation with the Karst Hydrogeology and Speleogenesis Commission of the International Union of Speleology. More information and registration form. For more information contact Gary K. Soule at garyksoule@hotmail.com.

October 6th - 9th, 2016—39th Annual TAG Fall Cave-In hosted by the Dogwood City Grotto on Lookout Mt. Near Menlo, GA. (always the weekend before Columbus Day). NSS Members or guests only. No dogs, no generators, no air horns, no off-highway vehicles.

Rescue

May 7-14, 2016—The National Cave Rescue Commission (NCRC) Cave Rescue Operations and Management Seminar in Mentor, Alabama. Extensive classroom instruction and fieldwork in all phases of cave rescue including underground environment, vertical rescue, hauling systems, extrication techniques, medical management, communication systems, and the organization and management of cave rescue operations. For more information please visit our website at http://ncrc.info or facebook page at https://www.facebook.com/NCRCtraining.

Foreign

August 13–20, 2016—European Federation meeting in Ingleton, UK


Cave & Karst Science

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Conference on Subterranean Biology in Fayetteville, Arkansas. Information: www.speleobiology.com/icsb2016/

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Back cover, right: The Gruta do Janelão is the centerpiece of a new National Park in Brazil being developed to help promote its conservation. Photo by Val Hildreth-Werker.

Back cover, left: Brazilian cavers on a cave clean-up. Photo by Val Hildreth-Werker.

Below: Steph Petri eyes pristine stalactites in a middle Tennessee Cave. Honorable Mention photo from the 2015 Photo Salon by Ed McCarthy.
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Gary Gibula

Department of Corrections: Apologies to Photographer John Woods, whose lovely photo on our April cover went uncredited. We’ll likely see more of his photos in the Convention guidebook.
We share this prose poem to open the pages of the 2016 NSS NEWS ANNUAL CONSERVATION ISSUE. The accounts within boldly address several of the myriad issues and realities surrounding cave and karst conservation.

With persistence, we can make a difference.

Keep caving. Advocate cave and karst ecosystem health.

Go safe. Move soft. Cave clean.

May the cave rise up to teach you.

May you safely reach the depths below.

May you softly move to beckoning airflow.

May you gently mark pathways as you go.

May your gear be clean and spore-free.

May you take only photos to tell the memory.

May you do no harm—primum non nocere.

May you mentor those who claim your stake.

May you leave better cavers in your wake.

We dedicate this Annual Conservation Issue to the memory and contributions of Helena David, PhD, a Brazilian speleologist and art conservator/restorationist who sought and developed minimum-impact techniques to protect and preserve the fragility of cultural sites and spelean environments. (Included in this issue is an article highlighting her work in Ballet Cave, Brazil.)

If you’d like to put your inspiration to work as part of the NSS Conservation Team, we invite you to contact the NSS Conservation Division Chiefs, Val Hildreth-Werker and Jim Werker:
werks@cunacueva.com
The NSS Conservation Pages: caves.org/committee/conservation/

“Leave nothing behind.” This is the cavers’ motto.

I was on a Cleveland Grotto trip to Poor Farm Cave in April 2015. Hazel Barton was leading the trip along with Kai, Julie, and me. Training in cave photography and surveying were on the agenda.

In an area towards the middle of the cave, I found a plastic bottle—trash! I was amazed that it had a sticker on it from Cleveland Grotto. I hauled it out. “Good caver!” I thought. Once back outside. I found this bottle was not trash, but had a purpose. The bottle in question, the label states:

THIS IS NOT A CARBIDE CONTAINER!

Please don’t dump your carbide in this cave. If you forgot a plastic bag—take one. If you have extra bags—leave them. Try picking up dumped carbide and erase cave writings on the way.

If we all try a little—it will mean a lot!

I found my answers through Bill Nordgren. This was an ecology project, believed to have been started by Ray Setteur, done in the late 60s and early 70s. The cave project was to provide cavers with a plastic baggy to haul their spent carbide out of the cave. There’s that motto again. Leave nothing behind.

Cavers frequently used carbide lamps during this period. This plastic container of baggies has been in service for over 40 years. Now with the vast improvements of lighting and battery technology, this ecology-minded container of the 60s has run its course. Time to retire it to the Grotto archives, the showing of a successful project. Well done!

As for me—right or wrong—I will continue to haul out trash from caves, and leave nothing behind!

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Right: Two generations of cavers tandem climb out of Natural Well in TAG—pictured are Scott Thompson and Lisa Troyer. Photo by Jonathan Carman.
The age of the average caver is increasing. That’s not a hard fact backed by a PhD in statistics, but among most cavers I know, the observation is generally accepted as true. Unfortunately, data do not yet exist to create a graph showing how the average NSS member-age has increased over time. If it did, I’m pretty convinced that the line would be more than a bit positive if measured with an inclinometer!

When it comes to hard facts, we are limited to just two. The age of the average NSS member is about 53 while the average American is about 38. (Statistics Feb 2016 from NSS Member Data www.caves.org and CIA Factbook https://www.cia.gov/library/publications/the-world-factbook/geo/us.html).

Why is this happening? Where are the younger cavers? What can we do to get more 20ish—30ish cavers involved?

The caves we love will need cavers to care for them when we’re gone. Fewer cavers means more graffiti, not less. Stewardship and protection is about passing the torch, and the responsibility. Future discoveries await if new cavers seek them out. We all care for them when we’re gone. Fewer cavers means more graffiti, not less. Stewardship and protection is about passing the torch, and the responsibility. Future discoveries await if new cavers seek them out. We all need to talk to a real person to get directions or permission. It’s one of the reasons the sport of rock climbing is taking off like mad among this generation while caving certainly is not. It’s pretty easy to get started on your own as a climber, and quite honestly, nowadays it’s hard to get started caving without first getting a foot into the caving community.

Community is another important difference between cavers and climbers. Climbing, while very fun, is a lot about individual athletic accomplishment. Rock climbing fits pretty well with the individualistic mindset of a lifetime built on instant gratification and “happy meals.”

Caving on the other hand, is more about building on the discoveries and accomplishments of others. Even the most narcissistic jerks of the caving community have to establish and maintain relationships with other cavers and landowners. The result is our real caving community, while the climbing community often only exists among the most elite climbers and route developers.

So wait a second—are there a few younger cavers in your grotto? Sure, some of us are out there, but I guarantee that almost every young caver you know had an upbringing that deviates from that of their peers in significant ways—or they had an older caving mentor who helped them get involved.

For myself, I grew up in a farmhouse that my family rented and I had free reign of the place without much direct supervision. Video game console? Who needs that when you have 150 acres of farm with four ponds and a BB gun? My grandmother moved in with us when I was 10, and my oldest sister is 16 years older than me. While I had plenty of friends my age, I spent most of my time hanging out with the owner of the farm who was five decades my senior.

Most other kids my age grew up in a bubble of kids in their own age group. A bubble they never really left until they got their first real job. The only adults they spent much time with were authority figures.

So how can we cross this pit, this chasm that separates younger and older generations?

For starters, let’s recognize that young people who have shown up to their first grotto meeting took a big step by the (crappy) standards of my generation. They showed up, in person, when they could have been watching Netflix. This doesn’t mean they get extra points, but it does mean there’s a good chance they’re really interested in caving.

However, that interest won’t last for forever, particularly if it seems like attending meetings won’t actually get them any closer to a cave. Consider the setting of a grotto meeting. Any outsider walking into a room of people who have known each other for years or decades will have a tough time socially. This problem is only made worse when the outsider is from my generation, and the caving club is made up of people far older.

Members of a generation with poor interpersonal skills are pretty likely to show up to a meeting and sit there, be nice and polite, but not take a lot of initiative when it comes to conversation, and then just leave when the meeting is over. It’s the responsibility of the grotto members to engage them, to talk to them when the next events are, to explain how they can get involved, and most importantly to get them underground soon!

It is pretty tempting to think the younger generation should just get their act together. But, for the most part, we honestly don’t realize how different our upbringing is from that of our parents and grandparents, and therefore, how different we are.

Understanding a problem is the first step to fixing it. To establish the next generation of cavers, it’s up to current NSS members to reach out across the pit and help ‘em find footing in the caving community. Get motivated and get creative about bringing in the younger set! The caves need our energy, and the cavers need us. Far too much is at stake to make us figure things out on our own.

Crossing the Pit: Help the Next Generation Find Footing in Our Caving Community
Jonathan Carman
Ballet Cave: Rock Art Conservation in Brazil
Luciana Alt and Vitor Moura
Instituto do Carste (Brazilian Karst Institute)
Belo Horizonte, Minas Gerais, Brasil and www.institutodocarste.org.br
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Ballet Cave is one of the most important archaeological and speleological sites in Minas Gerais, Brazil. The Ballet style\(^1\) may be one of the oldest rock art styles identified in South America, with relative dating of at least 10,500 AP (Neves et al., 2012).\(^2\) Ballet Cave is about 150 meters long, and is located in the Private Reserve of Natural Heritage—PRNH Fazenda Bom Jardim,\(^3\) which is part of the Lagoa Santa Karst Environmental Protection Area. In 2002, the infrastructure project and installation were carried out, as well as extensive conservation work on the cave and restoration of the rock art panels. This “nationwide first” project was coordinated by Helena David, speleologist, and PhD in art conservation and restoration. This article presents results of this study, the current situation of the site, and future prospects.

**VISITATION AND CONSERVATION PROJECT AT BALLET CAVE / 2002**

Ballet Cave, well known in the region, received unmanaged visitation until the end of the 90s. Unfortunately graffiti covered practically every smooth and accessible surface, including rock art panels, cave walls, ceiling, and speleothems. These graffiti were made with different materials and techniques, especially coal, clay, chalk, and incisions.

In the 90s a barbed-wire fence and gate were installed in order to protect the cave. But that was not enough to stop the vandalism. At the beginning of the new millennium, the cave conservation status was pitiful. There was a significant amount of scattered garbage, many broken speleothems, and cattle feces covering large areas of the floor.

At that time, besides the graffiti, several changes on the pictorial panels were found: nests and hives of insects, animal droppings; mineral deposits (probably caused by successive applications of water to “enhance” the visual quality of the paintings); dust accumulation (possibly a consequence of trampling over sedimentary layers); this was described by David & Moura (2002).

To protect Ballet Cave and other human and natural heritage places, the creation of PRNH Fazenda Bom Jardim was mandated by environmental agencies along with other actions, including a Visitation and Conservation Project for Ballet Cave, coordinated by Helena David and implemented in 2002.

The Project first steps included cave survey, impact mapping, and detailed photographic survey of rock art panels and all surfaces to be restored. Photos were taken before, during, and after conservation actions.

The project coordinator took another important step and implemented solubility testing over different types of graffiti on different substrates (rock, speleothems). These tests enabled the development of various techniques for removal of different types of graffiti, dirt, insect nests, and animal excrements. Deionized water was the solvent used to avoid harming the cave fauna.

In order to understand the dynamics of the cave microclimate and to avoid causing any microclimate changes, David initiated baseline temperature and relative humidity measurements, then continued collecting these data throughout the process.

The conservation/restoration work lasted about four months, and only three people were involved.\(^4\) It was a painstaking job, accomplished with minimum impact techniques and control measures to safeguard the integrity of the cave environment and archaeological heritage.

The second phase of the project included planning and installation of the infrastructure to facilitate resource preservation. For protection of the archaeological sediment, a wooden platform was installed at the cave entrance zone, and access to the cave interior was restricted.\(^5\) Also, signs were installed in strategic locations, posting warnings or interpretive content to guide visitors.

The platform is made of removable pallets that provide a smooth surface, comfortable and safe for visitors. They were put together with flexible joints and supported directly on the cave floor. The installation process called for no excavation or disturbance in the sedimentary layer, thus avoiding irreversible damages to the archaeological site.

Platform installation resulted in better views of the rock art panels and improved the overall conservation of the site. Moreover, the platform can easily be removed during future archaeological excavations. The use of pallets made the project feasible due to the reduced cost of installation and maintenance. The platforms also protect archaeological sediment from compaction and disturbance caused by trampling, and help avoid dispersion of fine particle matter and subsequent deposition over pictorial panels.

**PRESENT SITUATION**

Nowadays Ballet Cave receives about 600 visitors per year, mostly students. They enter the cave in groups up to 15 people, guided by a LafargeHolcim S/A employee. The cave visit is included in a broader preset visitation program. The interpretive program lasts about two hours and includes other human and natural heritage places within PRNH Fazenda Bom Jardim. Visitation is held from Monday to Friday and must be booked online, 10 days in advance.

A 150-meter wooden walkway was recently installed on the hillside forest between the dirt road access and the entrance of the cave. This walkway provides easy access for visitors and will possibly reduce erosion processes.

Apparently, there was a significant recovery on the hillside forest in comparison to the situation observed in 2002; thus, the barbed-wire fence is now better camouflaged by vegetation, and does not constitute a big visual impact.

The conservation status of the cave, in general, has improved. Now because of the platform, fewer intrusive footprints are observed, indicating that most visitors have respected the installed infrastructure and the guides’ instructions.

Furthermore, observations confirm only rare new incidents of graffiti. This attests to the theory that the existence of graffiti attracts new graffiti, and also shows that cave management has been effective. In 2002, during the beginning stages of the project when there were still large amounts of unsightly graffiti in the cave, we often found new graffiti over strips we had already restored.

It should be noted that, from time to time, the conservation interventions performed on

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1. This style is characterized by elongated human figures, with male and female nominees, arms raised, head and mouth often elongated and open.
2. Relative dating for Ballet Style figure found in Lapa do Santo, Matozinhos, by the Laboratory of Human Evolution Studies team, led by Walter A. Neves.
3. Owned by LafargeHolcim S/A.
5. Access is allowed only to conduct scientific research and monitoring activities.

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6. NSS News, April 2016
incised graffiti need to be monitored and maintained. In 2002, cave sediment mixed with deionized water was applied with delicate paintbrushes to fill the incisions. For example, 13 years after completion of the Visitation and Conservation Project, in a few places the camouflaging technique used on incised graffiti already needed to be revised because filler material was apparently removed by natural processes such as airflow, temperature changes, activities of invertebrates and rodents, and so on.

In some places, insect nests began to form over the rock art and other surfaces. When this kind of nest is formed over the rock art panels, removal is crucial. The removal process can cause damage to the pictorial layers and should be performed only by specialists.

**FUTURE OUTLOOK AND RECOMMENDATIONS**

The good condition observed in 2015 in Ballet Cave attests to the management qualities, and because of that, it is possible to consider expansion of the visitation circuit within the cave. In addition to rock art, the cave possesses other attractions, such as a main hall that contains historical evidence of saltpeter extraction. This main hall also contains the remainders of recent archaeological excavations.

Given the importance of Ballet Cave it could well be included in regional touristic circuits and could be opened to the public on weekends, without prior appointment, in order to expand the audience and outreach potential.

Currently there is no monitoring program in place for the cave. Is recommended that monitoring of cave fauna dynamics be developed in order to evaluate possible interference of the installed infrastructure. This monitoring study is important for assessing the impact of introduced construction materials on cave fauna.

It is also recommended to carry out an annual photographic monitoring of rock art panels and other cave surfaces. Over time, the photomonitoring images help to identify and record possible changes (speleothems breakage, graffiti, insect nests, animal dung deposition, and so on).

These monitoring actions call for the planning of immediate conservation studies. Monitoring systems are important tools for pinpointing needs in management and surveillance review, and in proving the conservation and management effectiveness.

**ACKNOWLEDGEMENTS**

This article is a tribute in memory of Helena David, who introduced us to the world of cave conservation, and instilled into us a strong awareness about the fragility of these environments. She showed us the need to seek and develop minimum-impact techniques. We acknowledge Jose Duarte from LafargeHolcim S/A for allowing and supervising our visit to Ballet Cave. We also acknowledge André Alt for reviewing the English translation.

**REFERENCES**


Cumulative consequences of human impact are of great concern for cave resource conservation. Several Brazilian show caves are in areas protected for environmental, historical, and cultural significance. In some cases, evidence of anthropogenic impact in popular tourist caves spans more than 100 years of public visitation. Graffiti, trash, construction rubble, broken speleothems, stained formations, and disturbed sediments have resulted from decades of infrastructure installation, maintenance, and visitor-flow operations. Without proper conservation management, the cave habitats, microclimates, and faunal populations may be at risk. The urgent need to implement conservation activities with ongoing monitoring, mitigation, and restoration in fragile Brazilian cave environments stimulated coordination of the first International Cave Conservation and Restoration Course in Brazil.

Held during April 2014 in Brazil’s southeastern state of Minas Gerais, the Course to introduce current best techniques, philosophy, and ethics with hands-on projects. For on-site training, we used two heavily visited Brazilian show caves, Gruta do Maquiné and Gruta do Rei do Mato. Cave management plans for these caves describe the cumulative anthropogenic impacts of installations, maintenance, and commercial operations, as well as resulting detriments to fauna, habitat, and microclimate (Alt, Moura NCKMS 2013).

For the Course, the two cave sites provided very different types of installed infrastructures, management characteristics, and impacts for students to practice resource assessment, project planning, and mitigation strategies. Participants benefited from theoretical discussion in the classroom followed by practical application in the cave. Each day, students used what they learned in the classroom to produce tangible mitigation plans as well as real progress with hands-on, in-cave restoration work.

Augusto Auler, President of the Instituto do Carste (Brazilian Karst Research Institute), in cooperation with corporate sponsor Anglo American Mining Company, invited Jim Werker and Val Hildreth-Werker to collaborate with Luciana Alt and Vitor Moura in conducting the seven-day training.

The Course, an important step toward initiating conservation actions set forth in management plans for both caves, was enabled through environmental compensation laws and cave protection legislation established after 1988, and is one of Brazil’s pioneering initiatives in karst outreach and restoration.

**HISTORY, IMPACTS, MOTIVATION**

Gruta do Maquiné, located in the highlands of Minas Gerais, is a popular national destination renowned for paleontological discoveries made during the 1830s by accomplished Danish scientist, Peter Wilhelm Lund.

Famed twentieth-century Brazilian novelist, João Guimarães Rosa, who was born in the nearby small town of Cordisburgo in 1908, described the magical chambers and beautiful speleothems of Maquiné.

About a century ago, Maquiné became an important tourist site and the first Brazilian cave developed for organized visitation; and in the late 1960s, also the first to install an electric lighting system. This show cave is one of the most popular commercial caves in Brazil and receives about 50,000 visitors per year.

A second show cave named Rei do Mato lies about 50 kilometers from Maquiné, near the city of Sete Lagoas. State and municipal agencies organized commercial tourist visitation in the 1980s and installed walkways and stairs. The walls of Rei do Mato protect a splendid multi-level chamber filled with speleothems of rare beauty.

Administered under the supervision of the State Forestry Institute, both caves are in protected areas and operate through public-private management partnerships. The State Tourist Board of Minas Gerais implemented a national advertising campaign promoting the Peter Lund Museum and three show caves, including Maquiné, Rei do Mato, and Gruta do Laphina, as destinations located on highways north of the major city of Belo Horizonte along a regional tourist route known as Rota Lund (Lund Route).

**CAVE MANAGEMENT PLANS**

Both cave operation units began implementing resource management plans written by Alt and Moura in 2009/2010. These plans include detailed studies and diagnoses of environmental impacts, provide recommendations for visitor activities, document concerns regarding installed infrastructure, and propose measures to reduce harmful consequences by improving infrastructure and mitigating negative-impact activities (IEF, 2010).

In addition to historic and contemporary signatures, graffiti, trash, broken speleothems, and debris from development, Alt and Moura describe a variety of specific problems such as iron stains on speleothems, metal flaking from walkway degradation, accumulations of iron plates under the catwalk, and deteriorated wood left from old walkways in Rei do Mato, as well as compacted soils, disturbed sediments, and leaded visitor pathways, questionable handholds, and other concerns in Maquiné.

Between 2009 and 2013, cave managers began to implement a few of the conservation recommendations proposed in the management plans, but progress was slow and sporadic. For example, an LED-based lighting system was installed to replace old high-voltage lamps.

With many issues described in the management plans, and little remediation initiated at the cave sites, the Brazilian Karst

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Students worked in small groups, identifying anthropogenic impacts in Gruta do Maquiné and creating impact maps for their assigned areas. Photos by Luciana Alt, Val Hildreth-Werker.

Course participants spent a day collecting trash in Maquiné, completing the tasks by sorting the garbage to determine what activities generated the waste—they defined that management needs to improve communication of protocols for infrastructure maintenance and for visiting tourists. Trash sorting in the parking lot blossomed into spontaneous art statements using objects found in the cave passages. Lata lixo is Portuguese for trash can! Photos by Luciana Alt, Val Hildreth-Werker.

Left and above: discussion and testing to find the best techniques for removing a thick lint layer covering speleothems in Rei do Mato included using mindful protocols for wildlife and minimum-impact techniques. Participants gained valuable hands-on experience in a variety of restoration tasks. Photos Luciana Alt, Val Hildreth-Werker.

Group shot of course participants
Instituto (Instituto do Carste) partnered with Anglo American Mining in applying federally mandated environmental compensation fees to support the First International Course on Cave Conservation and Restoration.

The main objective of the Course was to provide hands-on training in identification, mitigation, and control of environmental impacts linked to tourism and public visitation.

**Brazil’s First Cave Conservation and Restoration Course**

To reinforce the conservation-management processes of these two show caves, the Course Directors defined four objectives: 1) train and engage conservation stewardship; 2) initiate mitigation projects; 3) teach monitoring techniques; and 4) motivate ongoing restoration progress.

A pioneering initiative in Brazil, the first International Course on Cave Conservation and Restoration is a milestone for future conservation and restoration activities in the country. The intent was to train, motivate, and establish practical experience to enhance ongoing advances.


During the seven-day Course, all theoretical and practical activities were carried out in the facilities and caves of Maquiné and Rei do Mato. Lectures, discussions, demonstrations, and group assignments filled the week with conservation management activities.

Following classroom presentation and discussion of theoretical concepts, we assigned small teams with daily hands-on cave projects involving resource assessment, impact analysis, decision-making, planning, group dynamics, consensus building, and execution of cave management tasks.

The seven-day schedule enabled participants to spend many hours each day in small groups, literally planning and executing a series of in-cave activities, giving students technical training for performing current best practices in caves based on the foundation of *primum non nocere*—first do no harm.

Drawing from current best practice concepts published in *Cave Conservation and Restoration* (Hildreth-Werker and Werker 2006), the Course curriculum covered techniques, philosophy, and ethics of conservation management. We include the word *current* in front of best practices, as a reminder to stay abreast of new studies and use science-based information to continually improve and redefine standards and practices in cave conservation (Spate, et al. 1998; Hildreth-Werker 2006).

**Tangible Outcomes**

Participants accomplished much impressive conservation work in the two protected show caves during the Course week. Teams identified, documented, and initiated restoration projects addressing some of the conservation concerns described in the cave management plans.

All students gained tangible field experience in resource assessment, identification of conservation issues, impact mapping, low-impact caving ethics, cave cleaning, special attention for historic materials, lint debris removal, speleothem restoration, lentanyl-flora control, trail delineation, historical and cultural marking analysis, contemporary graffiti removal, and visitor routing to enhance safety and mitigate impact.

The week of instruction, discussion, and practical training inspired participants to propose follow-up programs for continuing the work initiated through the Course.

Following the Course, participants employed in various federal, state, and private cave-resource-management jobs created new minimum-impact protocols for work in their respective scientific disciplines. Results include new protocols for cave archaeologists and biologists. These documents represent tangible positive outcomes of the philosophical discussions, technical methods, and impact-reducing ethics presented during the Course.

However, the proposed plans for continuing conservation and restoration projects in the caves have not yet been implemented. Much still needs to be done—thus, we will design our next course to stimulate continued training and especially to motivate ongoing annual restoration events.

Brazil’s first International Course in Cave Conservation and Restoration is an important initiative for karst outreach and instigates new pathways forward in the protection and conservation of caves in South America and throughout the world. We appreciate this opportunity to share and expand conservation methods. As well, we are enthusiastic about reinforcing these initiatives and continuing to develop future training events.

**Acknowledgements**

We extend gratitude to the Anglo American Mining Company and their supportive representatives; to our friends and colleagues from the Brazilian Karst Institute (Instituto do Carste); Chico Mendes Institute for Biodiversity Conservation—ICMBio; National Center for Research and Conservation of Caves—CECAV; Minas Gerais State Forest Service—IEF-MG; Maquiné Foundation; Gruta do Maquiné team; Gruta Rei do Mato team; and all the amazing people at Brazilian cave sites we visited. We deeply appreciate the opportunity to participate in Brazil’s conservation management and karst outreach.

**References**


versial work of Frank Cummings Hibben (1910-2002), professor of Anthropology at the University of New Mexico, and his search for evidence of pre-Folsom culture in North America. Hibben conducted excavations in Sandia Cave from 1936 through 1941, and attempted to associate prehistoric human material with extinct Pleistocene fauna, including mammoth, mastodon, horse, and camel.

Because his excavations were conducted prior to acceptance of radiocarbon dating in the 1950s, his interpretation was based on the stratigraphy of the cave. Hibben purported that below a Folsom Age stratigraphic layer that contained several fluted projectile points was a layer of material where Pleistocene fauna were found in association with a distinct type of stone projectile point.

This type of point, dubbed “Sandia points” by Hibben, had a single-shouldered side reminiscent of Solutrean points found in northwest Europe (22,000 – 17,000 B.P.) The find was significant, as it suggested that human use of Sandia Cave represented the earliest known occupation in North America, predating the Folsom period, which was the oldest established period at that time.

Controversy erupted regarding the true age of the points, as other archaeologists questioned the cave’s actual stratigraphy and whether Hibben himself had planted the artifacts. Hibben’s contemporaries questioned whether the stratigraphy of the cave was intact and if layers had been mixed by rodent activity, artificially integrating later-period artifacts into earlier layers. Following a series of published academic articles questioning the veracity of the finds at Sandia Cave, Hibben’s work was largely discredited.

**SPORADIC HUMAN USE CONFIRMED**

Recent reanalysis of faunal material from the Hibben excavations has provided adequate evidence to the debate surrounding prehistoric human use of Sandia Cave. In a 2008 analysis of patterns of bone fragmentation, researchers concluded that carnivores introduced most of the bones recovered from the cave, including those from extinct Pleistocene species.

Human use of the cave appears to be sporadic, and only two percent of the bones analyzed in the study displayed evidence of possible human modification, in the form of cut and percussion marks, charring, and bone tool manufacture. Subsequent studies where modified bone material was subjected to radiocarbon dating indicate that there is no evidence for human use of the cave prior to the Folsom period.

Despite the controversy surrounding Hibben’s excavation results, the debate that ensued over Sandia Cave continues to be taught in the history of Paleoindian and Southwestern archaeology. Popular and professional articles revisiting the site and discussing the Hibben controversy continue to be published into the 21st century and suggest that Sandia Cave has significance because of its persistent use from the Paleoindian period to the present.

**Sandia Cave Archeological Controversy**

Much of Sandia Cave’s notoriety in the twentieth century derived from the contro-

Sandia Cave Restoration: National Historic Landmark
Sandra Arazi-Coambs-USFS and Carrin Rich-Sandia Grotto

Spiral stairs leading to the mouth of Sandia Cave, viewed from the half-mile trail from the parking lot. Photo by Pete Lindsley.

Sandia Cave (formerly as Sandia Man Cave), high in the walls of Las Huertas Canyon in northern New Mexico, holds cultural and spiritual significance for several of the surrounding tribes. Lying within the Madera limestone formation dated to the Pennsylvanian Age, Sandia Cave has a verified Folsom component and evidence of human use for as many as 10,000 years. As such, the site is a National Historic Landmark that has played an important role in the history of archaeological thought about the Paleoindian period and Southwestern archaeology.

The cave is also a popular tourist destination and has been open to the public for many decades. A 466.4-foot horizontal solution cavity proximate to the city of Albuquerque, New Mexico, Sandia Cave is navigable by explorers of all experience levels. The site is accessible by car and appears on many maps and navigation apps.

The site features a half-mile access trail with spectacular views and a thrilling 20-foot spiral staircase to the cave mouth. Unfortunately, the same ease of access that allows visitors to experience the historic and natural richness of Sandia Cave also leaves the site vulnerable to vandalism.

**NSS News, April 2016 11**
Cultural/Spiritual Site Marred by Vandalism

Even while this site holds contemporary cultural and spiritual significance to many surrounding Native American communities, the integrity of Sandia Cave diminished extensively throughout the 1990s and early 2000s. The mouth of the cave, its first two chambers, and the metal infrastructure by which the cave is accessed were heavily and repeatedly vandalized with spray paint, marker, nail polish, and etching. The cave walls were severely sooted and blackened by fires illegally lit in its interior, and large amounts of graffiti and litter appeared along the trail from the parking area. USFS archaeologists concerned with Sandia Cave (as well as NSS cave restoration specialists Val Hildreth-Werker and Jim Werker) believed that the heavy graffiti at the site potentially obscured valuable historic and prehistoric markings on the rock surface of the cave.

Partners in Appropriate Restoration Strategy

In fall 2013 the Cibola National Forest and National Grasslands paired with Sandia Grotto to address the possibility of restoring Sandia Cave to a more natural-looking state. Developing an action plan to mitigate degradation at Sandia posed special challenges due to the multitude of agencies and groups that are concerned with the cave, have ancestral ties to that land, or are involved in its ongoing management. Discussion of restoration strategies was conducted over a two-year period and involved extensive outreach and collaboration with Pueblo tribal members, state and federal governments, and specialists in graffiti removal, archaeology, and cave science. Once a proposal was developed, it had to be reviewed internally by USFS, the National Park Service, New Mexico Department of Cultural Affairs, affiliated tribal members, and experts from the National Speleological Society (NSS), the NSS Southwestern Region (SWR), and Sandia Grotto.

In January 2015 UNM Public Archaeology graduate student Katherine Shaum collaborated with Sandia Grotto and USFS to submit a grant to New Mexico Historic Preservation Division to fund the restoration. The grant was awarded and provided $16,777 toward the project. Rock Art Restoration Specialist Jannie Loubser of Stratum Unlimited in Alpharetta, Georgia [www.stratumunlimited.com] was contracted to lead the restoration. Dr. Loubser’s experience with restoring other natural and cultural sites throughout the American West and his sensitivity to art forms that are all but obscured by graffiti placed him in a unique position to lead the restoration effort at Sandia.

Complex Overlays Required Special Expertise

Mounting a wide-scale restoration at Sandia Cave was complex for a number of reasons. The graffiti covering the site had accumulated over a number of decades and existed in layers and in multiple varying media. Restoration techniques that might work on one layer wouldn’t necessarily work on the next layer. Likewise, the rock surface of the cave and trail varies in its composition, so removal techniques that worked on one instance of graffiti wouldn’t necessarily be effective on...
For two consecutive weeks in June and July 2015, the site was closed to the public and Dr. Loubser set about training volunteers in specialized removal techniques. More than 32 individuals logged volunteer hours with USFS during the project, totaling some 670 labor hours.

To say the restoration effort at Sandia Cave was nearly entirely volunteer-based would not be an understatement. Under Loubser’s guidance, volunteers trained other volunteers and were immediately able to apply what they were learning to the rock surfaces of the site.

**HIERARCHY OF GRAFFITI ASSESSMENT/ REMOVAL TECHNIQUES**

A wide variety of removal techniques were employed at Sandia Cave, starting with safer “dry” techniques and moving on to riskier “wet” techniques that involved the use of solvents where needed.

Before work began, areas in the second chamber that might contain fragile underlying markings of historic significance were marked off with painter’s blue marking tape, and left undisturbed.

1—Dry Methods First

On each area of graffiti designated for removal, we first used dry paintbrushes to remove loose dirt and dry dust from many rock surfaces. Next, we tried nylon-bristle brushes. Then we used steel brushes of various sizes, nylon or steel dental picks, and elbow grease to chip away materials that readily dislodged from the rock. Battery operated drills with rotating steel-haired brushes and Dremel drills with diamond-tipped bits were effective on more resistant and etched graffiti.

Outside of the cave, we used a tungsten-tipped Paasche air eraser on eleven surface sites. However, its efficacy was limited by the physical infeasibility of employing a portable generator and compressor unit at the site. The carbon dioxide tank with pressure gauge provided insufficient air pressure for removal. The most effective solvent was then applied either by the tedious cotton poultice method to remove media layer-by-layer, or

**2—Creek Water Rinse Required**

Even with these “dry” techniques, multiple creek water rinses were necessary to facilitate complete removal, and all 75 instances of graffiti that were removed from the site depended on the application of water. We employed many disposable rag cloths and sturdy low-lint paper towels to catch applied water before it flowed down rock surfaces. Pooling of any sort was disallowed. Used rags and towels were transported off-site daily, and we brought along fresh, clean rags and towels for each day’s work.

Paper towels soaked in water were applied as poultices on nine panels within the cave and were effective in lifting bonded dust from the rock surface.

**3—Specially Tested Products and Protocol**

All solvents used in the Sandia Cave restoration were biodegradable and of neutral pH. [Please note: biodegradable also can mean “yummy for biota” and can be harmful to bio-films, invertebrates, bats, other animals, and even humans; we used these products only in the broad entrance area where there is open ventilation and minimal intermittent cave life.]

The most effective solvents were This Stuff Works™ Multi-Master (containing potassium hydroxide), Sensitive Surface Graffiti Remover™ (containing limonene plant oil), and Elephant Snot™ (active ingredients unspecified by manufacturer).

Which of these would be most effective on any given graffito was determined by testing first. A small cotton-wad poultice wrapped on a wooden stick was soaked with a solvent, then rolled over a portion of the graffito to gauge how much material was transferred onto the cotton by each solvent.

The most effective solvent was then applied either by the tedious cotton poultice method to remove media layer-by-layer, or

a neighboring instance, even if only a foot away.

And throughout the site, any given graffito might be overlying historic or prehistoric markings of unique and irreplaceable value. Effective techniques for removing graffiti but preserving any potential underlying features had to be customized for each of the 75 discrete instances of defacement that were removed during the restoration.

Adding to the challenges is the fact that Sandia Cave is positioned some 300 feet above the floor of Las Huertas Canyon. Materials had to be hauled manually up and down this rise, including rinse water from Las Huertas Creek, which Dr. Loubser recommended for its chemical similarity to the natural elements the site is normally exposed to.

Great care had to be taken to capture all runoff and washed-off debris so no paint remains collected on the floor of the cave to damage the site further.

**VALUABLE VOLUNTEERS TrAINED ON SITE**

After an initial site assessment in April 2015, Dr. Loubser returned to mount the bulk of the restoration effort, with assistance of USFS employees from multiple ranger districts throughout New Mexico, and a tremendous outpouring of volunteer support from Site Watch, SWR, and Sandia Grotto, and members of the general public from the Albuquerque area.

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The most effective solvent was then applied either by the tedious cotton poultice method to remove media layer-by-layer, or
with a paintbrush application to a small, manageable area. The treated area was then scrubbed with a steel brush and carefully rinsed repeatedly with water, employing special vigilance to catch all the rinse water containing solvent.

Rinsing with creek water during and after removal with solvents was vital throughout the site to ensure no solvent residue splashed, sprayed, or remained on the rock. We completed each small area before moving and treating the next small area.

Volunteers conducting the removal were ubiquitously seen balancing a spray bottle of water, a cloth rag for blotting, a steel brush for scrubbing, and a small container of solvent with paintbrush for application. The process was painstaking, repetitive, and slow-moving, and involved treating the same area multiple times to remove graffiti layer-by-layer. This conservative approach, while time-consuming, allowed for safe and controlled removal while preventing damage to underlying rock and any markings of archaeological significance.

4—Pro Camouflage Finishing after Graffiti Removal

Post-removal camouflaging was required on more than half the instances of graffiti at Sandia Cave. Hard brushing and abrasive techniques had the potential to remove not just unwanted graffiti but the outer skin of the rock as well.

Lighter-colored patches that were left in these instances required the application of inorganic pigment powders to visually blend the treated area with the surrounding rock. Many volunteers were surprised to learn of this additive component of the restoration process; graffiti was first removed and camouflaging was then applied with artistic feathering and blending to achieve a complete restoration.

The camouflages used at Sandia were Earth Pigments (dark umber, burnt sienna, and light-yellow ocher), as well as charcoal harvested from fires burned in the vicinity—the carbon remains of the area’s natural vegetation. For each instance of graffiti, the color profile of the surrounding rock was assessed and a customized combination of pigments was mixed.

Creek water was applied to wet the surface to be treated, and the pigment mixture was combined with creek water to make a paint-like liquid that could be applied to the rock surface with a fluffed paintbrush or spray bottle.

Charcoal was frequently applied dry, and was especially effective in camouflaging etched graffiti inside the cave. While the lighter pigments were used extensively on the lower surfaces of the cave and exposed trail rocks, a mixture of black manganese pigment powder and pulverized charcoal was employed on the ceiling of the cave to blend with the darker surfaces found there.

Volunteers followed protocols clearly defined by Dr. Loubser, first employing dry techniques, then moving through the testing and removal strategies described above. All graffiti and markings in the cave were photodocumented and tied to survey points before any removal began. Historic markings and potential cultural markings on the walls and ceilings were inventoried, photodocumented, and marked off-limits for the duration of the restoration project.

PUBLIC OUTREACH INFORMATION EVENT

One of the most valuable and enduring aspects of the Sandia Cave restoration project was the Cave Open House that was held on June 27th in the midst of the restoration work. For this single day the site was opened to the public, and over a hundred volunteers had the opportunity to see the restoration in progress, to speak with volunteers from their own communities who were carrying out the work, and to get guided tours of the cave from USFS Cave Specialist Jason Walz and USFS Archaeologist Sandra Arazi-Coambs. Reporters from local news outlets covered the event, and the project was publicized in both print and television, enabling the restoration effort to reach an even broader audience.

ENCOURAGING OUTCOMES

The results of the restoration work at Sandia Cave are both striking and enduring. Since the end of the project in July, no new graffiti has appeared in the cave, lending credence to the idea that graffiti attracts more graffiti, and that a site that is clean and well-maintained is more likely to remain so.

To protect the achievements attained during the restoration, Sandia Grotto volunteers and USFS employees implemented weekly monitoring of the site immediately following the restoration, and that monitoring continues today. Fewer than ten new incidents of graffiti have appeared along the trail since the end of the restoration. These incidents are small in size, and have been photodocumented and painted over or removed and camouflaged quickly after application.

The ongoing, visible presence of these volunteers offers opportunities to connect with and educate the visiting public, and communicates that this is a site that is actively cared for and respected.

A new standard of comportment appears to be emerging at Sandia Cave, evidenced by a reduction in litter, partying, and abuse of the site. Through the efforts of all who have contributed, Albuquerque’s “sacrifice cave” is becoming a place of education, awareness, and respect for our common natural and cultural heritage. For updates on the continuing restoration of Sandia Cave, visit Sandia Grotto’s Web site at http://caves.org/grotto/sandia/Sandia_Cave/
A felony conviction in a cave vandalism case sets precedent in Texas law!

A San Angelo man was found guilty in September of damaging the Caverns of Sonora after a criminal bench trial held before 112th District Judge Pedro Gomez Jr.

Adam William Garcia-Gallegos pled guilty to knowingly removing items from the caverns and not guilty to knowingly destroying, defacing, marring, or harming items of a cave.

After hearing all the evidence, including testimony from eyewitnesses, Gomez found Garcia-Gallegos guilty on both counts, according to a press release from the 112th District Attorney’s Office.

Gomez sentenced Garcia-Gallegos to five years community supervision and to $9,480 in restitution for repairs to be paid within 36 months to Gerry Mayfield Ingham, one of the owners of the Caverns of Sonora, the release stated. If Garcia-Gallegos fails to complete his sentence, he could be sent to 730 days in a state jail per count. Seven hundred thirty days is the maximum sentence for a state jail felony and five years is the maximum for a probated sentence on a state jail felony.

Evidence presented during the bench trial included a 17-year-old eyewitness who observed Garcia-Gallegos break a stalactite during their tour, the release stated. The incident occurred on May 24, 2014.

Louise Ingham testified that she asked Garcia-Gallegos to empty his pockets and he pulled five items from his pocket. Along with the stalactite, Garcia-Gallegos had pieces of calcite from inside the cave along the tour trail.

Bill Sawyer and the eyewitness were able to find the location from which the stalactite had been broken.

Testimony was also presented by Sawyer concerning the process and costs which will be necessary for repairs to restore the stalactite.

“This family decided to open the caverns for the education and enjoyment of the public and to preserve and protect the natural resource itself,” Ingham said.

The Caverns of Sonora has been owned by the Mayfield family for five generations.

A Sutton County Grand Jury indicted Garcia-Gallegos on September 9, 2014 on two counts for damaging the caverns, the release stated.

“The Sonora Caverns represent a precious natural resource that must be protected and preserved for future generations. The removal of even the smallest items from the caverns damages the integrity and beauty of this natural wonder,” said Laurie English, 112th District Attorney.

The law concerning damage to caves within Texas was modified in 2007 and the penalty was increased from a misdemeanor to a felony after the Caverns of Sonora sustained damage to the “Butterfly” which was the premier feature of the caverns.

The Mayfield Family of Sonora and the Wuest Family, owners of Natural Bridge Caverns near San Antonio, Texas were instrumental in getting the penalty raised to a state jail felony. This is the first recorded prosecution in the State of Texas under this statute.

The amendment bill was filed in the Texas Senate by then senator Jeff Wentworth, R-San Antonio, and a “mirror” bill in the Texas House of Representatives by then State Rep. Harvey Hilderbran R-Kerrville.

Comal County District Attorney Dib Waldrip drafted the amendment and spent several days at the Texas Capitol lobbying on behalf of the caves. The bills would not have been filed without his help.

The Caverns of Sonora was opened to the public July 16, 1960. It is located off of Interstate-10, 15 miles southwest of Sonora.

The Caverns of Sonora marks the halfway point between San Antonio and Big Bend National Park.
What would you do if you were told an international airport was going to be developed over a cave system you love? Through a Save-the-Caves Conservation Grant, the National Speleological Society is an official sponsor of “The Future of the Riviera Maya” conservation documentary by Green Collar Productions (directed by Stacey Chilcott). This essential and important film recognizes the relevance of cave/karst conservation where tourism clashes with cave preservation.

Have you ever travelled to Mexico? If you have, you may have visited the east coast of the Yucatan Peninsula, or even Cancun. Many know the area for its famous tourist hotspots and all-inclusive hotels, but few venture into the lush jungles to stumble upon the hidden caves and underground rivers.

**VITAL KARST – LIFEBLOOD OF THE YUCATAN**

When I say underground rivers, I don’t just mean a small, muddy, stagnant waterway that no one ever sees or knows the location of. I mean a pristine, interconnected, majestic underground river system—flooded with crystal clear waters that turn turquoise through the light beam of a torch.

These waters are the lifeblood of the Yucatan Peninsula, weaving their way underground through karst channels for thousands of kilometers, nourishing the surrounding ecosystems, wildlife, and communities living in the area.

It is relatively unknown that these are some of the largest underground river systems in the world. Stunning scenery of waterbirds resting on jungle palms adjacent the Mesoamerican Reef provide an economic asset for sure, but at the peril of a burgeoning tourism and development industry.

**INSPIRATION AND CONTAMINATION**

My first visit to these caves was in 2010. I was working as a freshwater biologist for SAVE (Save Akumal’s Vital Ecology): a grassroots NGO that works directly with stakeholders and developers to preserve the ecology of the area. Enthralled by my work, I submerged myself deep into the advocacy world, regularly writing letters to scientists, authorities, even to the president of Mexico.

My inspiration: hundreds of hotel developments sprawled along the coastline, the majority of which lack the infrastructure to support the enormous amounts of sewage their holiday-seekers produce. Sewage of such proportions cannot be contained amidst this karst landscape.

Current waste management practices allow for the sewage to be injected deep into the flooded cave systems, creating wide scale contamination of the freshwater supply. Of course, with every hotel comes the destruction of enormous tracts of land and waterways as well as an enormous 18-hole golf course, loaded with chemicals and pesticides that also infiltrate into the porous limestone cave systems.

**FIRST DIVE IN MEXICO—SPEECHLESS**

After several weeks working to protect these caves, I met Luis Leal—a resident cave diver who invited me to experience my first dive in the Mexican waters. I remember being awestruck by the majestic cave entrance. As I approached the cave, I took a step over the water and within a few seconds I was fully submerged.

Following Luis, we left daylight and used our torches to guide the way underground. Luis would often point out stalactites and stalagmites that decorated our path, drawing my attention with the light of his torch to structures that were particularly beautiful. He pointed out fossilised sea animals that had been preserved in the rock for thousands of years. These are also the resting places of skeletons from a pre-Mayan civilization; saber toothed tigers, bears, and ancient megafauna. Luis later informed me that a new skeleton is found at least every week in these underground chambers.

We continued to float underground like astronauts until we resurfaced at the entrance point where we began our dive. Luis asked, “So what do you think?” I didn’t know what to say, so I smiled and responded without words—there simply were none. This was my first of many dives in these systems, and an important lesson in my understanding of the fragility of the landscape.

**THREATS OF INCREASING DESTRUCTION**

The last thing you want to be told about something you have fallen in love with is that you’re going to lose it. Over the next few months of my stay, I witnessed examples of destruction on a daily basis and was becoming increasingly disturbed by those who knew it was happening and looked the other way. Very few people with whom I spoke were making an effort to reduce the impact tourist developments were having on the area.

Every day, the stories of destruction seemed to be getting worse. During my final week working with SAVE, I was informed of the plans to develop an international airport directly over the largest known junction of cave systems, just north of the small town, Tulum. The airport would destroy the cave systems, surrounding jungle, archaeological evidence of previous inhabitants, and severely impact the culture and economy of the area.

**ACTION**

After some contemplation of how to bring exposure to the situation, I became inspired to pick up a camera and make a film about what was going on. Having never filmed anything before, I captured as much footage as I could and interviewed a handful of people in a short amount of time.

Upon my return to Australia, I discussed the footage I had collected with a friend, Jesse Lee, who offered to help me edit it into a short film. Together, we created a powerful story that was shown at film festivals in Australia.

My aim to spread international awareness about the issue has been achieved, but I want the story to go further. My next idea was to contact the ABC (Australian Broadcasting Corporation), one of Australia’s largest media outlets.

The producer of the ABC’s Foreign Correspondent (documentary program) showed an interest in my documentary immediately, and for the next two years I worked with Foreign Correspondent to pull together a story they could use to influence the public.

However, a week before the crew was scheduled to leave Australia, a new producer took over the story and rang me to explain that they had picked up another story about a shooting in the USA—their filming schedule was going to clash with the pre-planned filming in Mexico.

As a result, I was informed that the production crew were no longer going to go to Mexico.

Dismayed, I explained to the producer that this production was the result of years of...
of consultations and was required to push for the protection of these caves systems. I pleaded with him to work out a way to film in the USA and also travel to Mexico. The producer said he would think about it again and would call me back within an hour.

For a very long hour. I waited in anticipation to hear his decision. When the phone finally rang I picked it up in a heartbeat. In a few short sentences, I heard that the decision has been made for the production team to again head to Mexico to create the report. I let out a sigh of relief, thanked the producer and jumped straight back working out the logistics.

After the ABC team filmed in Mexico, the Foreign Correspondent report 'The Veins of the Earth' was created and aired several months later in Australia. Foreign Correspondent sell their documentaries overseas, which greatly increases the number of views for the program and within days, the report was broadcast across the world.

WORLD HERITAGE SITE PROTECTION VS. BOOMING TOURISM INDUSTRY

The situation in Mexico was even addressed by the Australian Prime Minister, Julia Gillard, in one of her speeches. Foreign Correspondent also brought attention to the neglect of UNESCO to protect this area, which has at least 7 of the 10 values that qualify it as a World Heritage Site or a group of World Heritage Sites.

Many people from the area have written to UNESCO asking for their support before the government permits the area to be completely developed.

Unfortunately, UNESCO has declined any responsibility in protecting the area because it has to be federally protected before they can designate it a World Heritage Site. As the government is reluctant to protect an area that has been primarily reserved for a booming tourism industry, the area is unlikely to see any federal protection in the near future—therefore unlikely to become a UNESCO World Heritage Site.

This stretch of coastline will continue to be opened up for development by foreign investors while the residents continue to fight for the protection of their caves and water supply. At present, locals are petitioning for the protection of at least one of the subterranean river systems.

LOCAL INNOVATIVE ACTION

While residents wait for the government to take action, local solutions are being innovated daily to handle the influx of wastewater. In places where the septic system is too fragile for toilet paper, locals are using composting toilets to avoid or reduce any contamination.

New homemakers in the jungles are now choosing to seek the guidance of local architects who combine traditional housing techniques with new, appropriate, wastewater technologies to make sustainable housing with minimal impact.

However, with inaction from both the Mexican federal government and UNESCO in protecting the water supply in the major tourism districts, these efforts can only go so far.

It is difficult to know where to go from here. One thing is for certain—Mexico needs as much international attention as possible to get the attention of the federal government.

DOCUMENTARY SHOWCASING SUSTAINABLE SOLUTIONS

After being back in Australia for two years, I was convinced I had to provide information about sustainable accommodation in the area, showcase the local wastewater management solutions and encourage the public to take action towards the Mexican government to force them to make a change in their zoning laws. This sparked a creative endeavor with the editor of our original documentary, Jesse Lee, and fellow environmental scientist, Django Van Tholen, to make a follow up documentary to our original one.

We ran a successful fundraising campaign over several months and gained the support of other organizations including Healthy Reefs Initiative, The Thin Green Line Foundation, Razonatura and SAVE. Since the documentary re-make began, we have gratefully accepted the support and sponsorship of SubFilms, the National Speleological Society, Amigos De Sian Ka’an and Luis Leal’s local sustainable dive center: Dos Ojos Dive Shop. This is now an international issue.

By the time we arrived in Mexico, the wet season was well and truly underway and soon after our arrival, I and Django fell victim to Dengue fever. At the time, I was filming the 9th National Assembly of Environmentally Affected Peoples in San Miguel De Allende, Guanajuato with Jesse Lee. We captured interviews and filmed people discussing water management issues in their hometown.

It was perfectly clear that mismanagement of the water supply was happening all across Mexico, and most everyone were challenging the authorities to make suitable changes to infrastructure and developments. Nancy De Rosa represented the desperately needed protection of the caves in the Yucatan Peninsula.

We continued to pursue our film, expanding into areas where people had little exposure, such as the sustainable housing development initiatives. We found ourselves
falling deeper into a story centered within the heart of the tourism industry and realized there was more to the story than we originally thought.

Besides the obvious ecological issues attached to the contamination of the water supply, we also regularly heard interviewees refer to the tourism model as self-defeating. Some believe that the tourism model runs for approximately 30 years and then collapses, leaving the local residents disempowered while the tourism investors take their money and run to the next development hot spot.

The current model on the coast of the Yucatan Peninsula doesn’t seem too far off from this theory. It is destroying the ecosystems, transforming the economy so it is largely dependent on the income of the foreign-owned all-inclusive hotels, and has replaced the local culture with commercially owned foreign enterprises.

The film has now become more than a conservation film to protect the largest subterranean river system in the world—it has become a humanitarian effort to protect local culture and sustain communities that already existed and survived along the Riviera Maya.

We cannot continue to sit back and watch another case study of ecocide unfold before us. We are now living in a globalized society, where we not only have the ability to visit these stunning locations; we also have the ability to protect them. If you have read this article, you are in a position of power and can do something to help.

Tourism and destruction do not need to go hand in hand. Instead, you have the power to contribute to an existing solution. Our current fundraiser is now running and we are looking for official sponsors and people like you to join the thousands of others that are in touch and engaged with this action to protect the Riviera Maya. We are looking for other sponsors to help us complete this film before it is too late. The largest subterranean river system in the world—do we have to destroy it?

Get in touch at:
www.greencollarproductions.com
Official Trailer: https://vimeo.com/123817034
Like our Facebook page https://www.facebook.com/greencollarproductions
Our documentary Facebook page https://www.facebook.com/groups/161588340693624/

Diving through flooded caves to find ancient ruins. Photo BY Jeronimo Aviles Olguin Segovia.

Light penetrates the entrance to a cave. Photo by FishEye Photography.

What lies beneath. Photo by FishEye Photography.

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As of this writing, White-nose syndrome (WNS) has been confirmed in 26 states and five Canadian provinces. The fungus *Pseudogymnoascus destructans* (Pd), which causes the disease, has been detected in four other US states, plus Europe and China. The disease has been confirmed in seven bat species in North America, and the fungus *Pseudogymnoascus destructans* has been detected on five other species in North America without causing the mortality associated with the disease.

Though several species of bat seem resistant to the disease, some species are seeing mortality of up to 98%. There is some hope of resiliency in survivors and maybe even some hope of recovery. There won’t be a miracle cure for WNS, but there is the potential to increase survival rates with several potential treatments being tested.

**Northern Long-Eared Bat Listed as Threatened Due to WNS**

Due to impacts from this disease, the northern long-eared bat is now protected as a threatened species under the Endangered Species Act [http://www.fws.gov/midwest/nleb/](http://www.fws.gov/midwest/nleb/). Under the final rule, documented hibernacula for the species are protected year-round with “incidental take,” which includes unintentional harm or harassment of bats, being prohibited within a quarter mile radius of documented hibernacula. Information on documented hibernacula is sometimes available through each state’s Natural Heritage Inventory database. [http://www.fws.gov/midwest/endangered/mammals/nleb/nhisites.html](http://www.fws.gov/midwest/endangered/mammals/nleb/nhisites.html)

**Rapid Response Fund**

The White Nose Syndrome Rapid Response Fund is still an important funding source for researchers as federal funding is limited to federal or state agencies. So far the NSS has provided over $115,000 of funding for 22 research grants. Due to limits on federal grants, our funds can fill in gaps. In 2015 we awarded a grant for a study on tracking bats near Lake Ontario. We can still award a few small research grants. Find application information at [http://caves.org/WNS/application.shtml](http://caves.org/WNS/application.shtml)

**Education and Outreach**

Two of my goals are to increase communication on WNS issues to cavers and to communicate the value of cavers to agencies. As the NSS WNS Liaison I have been participating with the WNS Communications Committee, Conservation and Recovery, and the Stakeholder Committee. I was able to submit comments on a revision to the USFWS Cave Advisory, which will be issued soon. The decontamination protocol revision is still being tested and I have not yet been able to contribute to that revision.

I attended the 2015 North American Joint Bat Working Group Meeting in March in St. Louis, where I attended presentations on bat research and was able to discuss bat related issues with agencies and researchers.

We had a WNS Roundtable and Presentations by USFWS and USFS at the NSS Convention in Missouri this past summer. Kristen Alvey from Missouri Bat Census represented the NSS at the WNS Treatment workshop in July. I’ll be attending the next WNS Workshop in June. I’m hoping to have another WNS Roundtable and Presentations at NSS Convention in Ely this summer.

There is an e-mail list to share WNS information among cavers. You can join the email list at [http://lists.caves.org/mailman/listinfo/wns/](http://lists.caves.org/mailman/listinfo/wns/)

There is also a Facebook page for NSS WNS Liaison where I am posting news. Our webpage at [caves.org/WNS/](http://caves.org/WNS/) is another WNS information source.

**Responsible Caving**

For the last 75 years, the NSS has promoted conservation and responsible caving. Responsible caving now includes clean caving, and it’s easy to do your part. Follow the decon protocols at [http://caves.org/WNS/resources.shtml#Decon](http://caves.org/WNS/resources.shtml#Decon)
SUBMIT ABSTRACTS FOR CONSERVATION
TUESDAY AT 2016 NSS CONVENTION
IN ELY, NEVADA JULY 16-23 – 75 YEAR
CELEBRATION!

Calling for presentations, PowerPoints, workshops, or panel discussions to fill our NSS Convention Conservation Day. Please send Val Hildreth-Werker a quick email now of your intent to present: werks@cunacueva.com

We invite abstract submissions for any Conservation, Restoration, or Management talks. Send abstracts by May 1, 2015 to werks@cunacueva.com

Limit abstracts to 250 words or less. Include title of your presentation and the authors’ names, professional affiliations, mailing addresses, and e-mail addresses. For later publication in the Journal of Cave and Karst Studies, abstracts must draw a conclusion or explain the upshot of your study or project in a concluding sentence.

Equipment will be available for PowerPoint presentations. Please make special arrangements with us for any other media-viewing equipment. For online details about sessions and abstracts, visit the NSS Convention Web site: nss2016.caves.org/

Cave Conservancy Roundtable at NSS Convention

Since many cave conservancies have become well-established institutions, what do we do now to build permanent legacy and extend the concept in perpetuity? Everyone interested in cave management is welcome to attend and share ideas so we can all learn from each other.

The Nineteenth Annual Cave Conservancy Roundtable will be held at the 2016 NSS Convention in Ely, Nevada. The session will start about 2:00 PM on Friday, 23 July. Check NSS Convention Web site updates for exact time and place: nss2016.caves.org/

Group and Grotto Cave/Karst Conservation Awards

Now accepting nominations for Grottos or Groups in recognition of conservation activities.

The NSS Conservation Division offers two annual awards recognizing conservation efforts of Groups and Grottos. Winners will be announced at Convention, receive a certificate, and have their names posted on a permanent plaque displayed at NSS Headquarters.

Candidates for the Group conservation award may be any of the following: an NSS Conservation Task Force, NSS commission, committee, subcommittee of a committee, division, conservancy, expedition, project, region, section, survey, taskforce, affinity group, institutional member, or a subunit of any of the above. An Internal Organization IO, Group, or Grotto to be nominated for these awards should be in good standing with the NSS. For more info, see the NSS Conservation Web pages http://caves.org/committee/conservation/conservation-awards.shtml

For consideration for either of the two 2016 awards, please send a letter of application or nomination summarizing your contributions to cave or karst conservation, along with supporting documentation and letters of support.

Please send nominations to the Conservation Committee Awards Chair, Kathy Lavoie by May 31, 2016. lavoiekh@plattsburgh.edu

VICTOR A. SCHMIDT CONSERVATION AWARD

The annual Victor A. Schmidt Conservation Award recognizes one NSS member who, over time, has demonstrated outstanding dedication to the conservation of caves. Nominations for candidates are solicited by the NSS Awards Committee. The recipient will be approved by the Board of Governors upon recommendation of the Awards Committee.

The recipient must have been a member in good standing of the Society for at least two years immediately prior to his/her name being submitted as a candidate. The Awards Committee shall give preference to candidates who have not received the Outstanding Service Award or Honorary Membership.

To nominate a caver for a the Victor A. Schmidt Conservation Award, please send complete resume and nomination letters describing the caver’s contributions to cave/karst conservation over many years. Send nominations by November 15 each year to: Bob Vandevert vandeventerbob@netzero.net 317-889-4501 525 Lawndale Drive Greenwood IN 46142-3904

Conservation Task Forces: Making a Difference

A Conservation Task Force (CTF) is a great way to gather like-minded people and make good things happen in cave and karst conservation.

Some CTFs have a specific project that may take a year or two to complete. Or it may be an ongoing project that continues and maintains conservation for many years.

A CTF may tackle a significant cave vandalism problem, or it may work alongside landowners and civic leaders to clean up a groundwater pollution source. Any conservation or protection concern fits.

NSS CTFs make a difference in karst areas around the United States. Since passing of the Federal Cave Resources Protection Act of 1988, many CTFs are recognized by local federal agencies as primary representatives of the caving community on conservation issues in their areas.

Due to the ongoing efforts of CTFs, caves are mapped and inventoried. Management plans are implemented. Restoration and cleanups happen—cave habitats are restored.

Passages are cleaned up. Many caves no longer have unsightly boot prints where they don’t belong! Vandalized stalagmites have been rejoined! In some areas more caves are being restored than are being vandalized. Cave locations revealed on the Internet and through Social Media are disappearing because cavers are catching it and addressing it and getting it offline—Conservation is gaining!

CTFs do outreach to residents in karst areas, sharing the use of current best practices to curtail and prevent pollution and excessive siltation of cave systems. Members of CTFs are helping to manage caves on behalf of public and private landowners.

Join an existing CTF http://caves.org/committee/conservation/CTFS.shtml

Establish a New CTF

Create an NSS Conservation Task Force to focus on local cave and karst conservation issues. If your work would benefit from CTF designation, contact CTF Coordinator, Jonathan Beard: mokanman@att.net or contact Conservation Division Chiefs, Jim Werker and Val Hildreth-Werker: werks@cunacueva.com

Save-the-Caves Conservation Grant

The Conservation Committee is authorized to award up to $5,000 annually from the Save-the-Caves Fund to make grants of up to $1000 to Internal Organizations, Conservation Task Forces, Conservancies, or to individual NSS members for specific projects that involve cave or karst conservation, restoration, cleanup, or outreach.

The Conservation Committee is responsible for establishing the application, review, and award process. Recipients of these grants shall submit written reports to the...
Society as stipulated by the Chairman of the Conservation Committee. To be considered for a grant award, applications must include adequate description of one or more of the following:

- scientific investigation of cave or karst conservation problems;
- speleological research that will directly contribute to cave or karst conservation;
- remediation of ecological problems in cave, karst, or pseudokarst areas;
- hands-on, in-cave efforts to restore cave passages to a former ecological state;
- equipment and supplies for conservation or restoration projects that include hands-on participation from cavers;
- or public outreach to inform and raise awareness of cave and karst values.

Conservation Grants are awarded throughout the year, subject to availability of funds and number of applications received.

SAVE-THE-CAVES CONSERVATION GRANT APPLICATION PROCESS

Awards are based on the nature of the project and available funds. For relatively uncomplicated grants to NSS members and activities, send an e-mail application that includes the following points. Institutions and foundations should submit the more formal NSS grants application (insert link). Priority is sometimes given to conservation projects that provide quantitative research data.

Please specify in your application:

- who the applicant is (name, address, telephone number and other contact information)
- who the official grant recipient is to be (name or organization, title, address, etc.)
- what, specifically, the project and/or research will entail
- what benefits are expected
- when the work is to be done
- dollar amount being requested from the NSS, including how that money will be used
- a statement assuring the NSS that an article for publication, video, presentation, and/or other comparable account of the completed project or research will be provided in a form accessible to the membership to account for expenditure of NSS funds

Please call or e-mail the Conservation Grants contact person if you need more information.

Val Hildreth-Werker
P.O. Box 207
Hillsboro, NM 88042
(575) 895-5050
werks@cunacueva.com

NSS CONSERVATION WEB PAGES AND CAVE CONSERVATION FACEBOOK GROUP

All things caving encompass conservation. The NSS Conservation Pages are online at caves.org/committee/conservation/

We welcome input. Send to Val Hildreth-Werker werks@cunacueva.com

Through the efforts of John Durall and John Wilson, we also have a Cave Conservation Facebook Group for cavers across the speleo spectrum! It’s a broad, quick, all-in-one, easy spot on Facebook to serve the global caving and cave-interest communities! Join us, add members, repost, and share the site. https://www.facebook.com/groups/257740784385806/

Caving is drenched in deliberate conservation choices with:
- Every trip we take
- Every station we set
- Every step we place
- Every speleo detail we learn
- Every cave or karst decision—good, bad, or ignorant
- Whether well-intentioned—
- or state-of-art-and-state-of-science

Stewardship choices always kick in along the way, and all of caving is about choices and acts of conserving! So let’s make this Facebook Open Group Space work for us all!

Support Cave Conservation — Donate to Save-the-Caves Fund

The caves, cavers, and the NSS appreciate your financial support!

Contributions are tax deductible, of course!

Please specify Save the Caves — find fourth item in list after you click on blue link
Donate via an online donation form.
Donate via a PDF that can be completed online and mailed or emailed in.

Use the comment area provided in links above to include a special note.

Make a special tribute to a friend or loved one with your Save-the-Caves Donation in Honor or in Memory … Your gift could look like this:

The National Speleological Society has received a gift in memory of C.K. Void and in honor of our friend Karsten Caver

With this gift, caves on our Earth will receive conservation, restoration, and protection

Save The Caves!
Your name, Your address

Mailing address:
The National Speleological Society
6001 Pulaski Pike
Huntsville, AL 35810-1122 USA
(256) 852-1300
nss@caves.org

NSS Conservation Network

The NSS Conservation Network is an e-mail resource expressly developed (at the request of Val and Jim) to quickly disseminate important and often ‘short-fused’ conservation-related updates to IOs and interested individuals. Send info bursts to werks@cunacueva.com and stevenlsmith@usa.net

We emphasize that we’re not trying to overload anyone’s email in-basket—notifications are sent out on an ‘as needed’ basis, with often with months between notices, and then suddenly a ‘hot’ topic can arise (think WNS a few years ago) where there can be a flurry of notices fired out to keep the conservation community up-to-speed on what’s going on. These notices are sent to an IO’s Conservation Chair (or overall Chair if the IO doesn’t have a Conservation Chair), and also to any individual caver who asks to be on the Conservation Network addressee list.

While I strive to keep the addressee list as up to date as I can, I don’t have a crystal ball! If I don’t get updates from IOs when a Chair or Conservation Chair changes due to elections/moving out of town/etc., it’s difficult for me to keep the IO list up to date… I would appreciate it greatly if every IO would keep me informed of whom within their group should receive any Conservation Network notices, someone who will subsequently forward to the individual members within that IO.

Also, individuals are welcome to be included in the overall Network addressee list. However, every time I send out a notice, I get at least a dozen ‘bounce-backs’ because of out-of-date or otherwise ‘unable to contact’ email addressees. Thus, if you’ve received alerts from the Network in the past, but have been wondering why they suddenly stopped showing up, it’s probably because you changed your email address and didn’t let me know!

If you want to keep a finger on the pulse of important conservation issues that affect us all, I again ask all IOs and individuals to keep me up-to-speed on any changes to email addresses.

Thanks!

Steve Smith,
Coordinator – NSS Conservation Network
stevenlsmith@usa.net

NSS News, April 2016
Blue Hole at Ichetucknee Springs, also known as Jug Hole, is a unique submerged cave system with a large cavern separated by small restrictions going into the cave. This cave system is located at Ichetucknee Springs State Park, which is a crown jewel in the Florida State Park system. Before this became a state park, the site was visited by divers who explored its depths, but also left some semi-permanent reminders of their visits by marking graffiti on the walls of the cavern. Some of this graffiti dated back to the 70s.

The park engaged the North Florida Springs Alliance, which is a nonprofit park support organization, about performing removal of the graffiti. This presented a challenge because we found no existing documentation on damage-preventing graffiti removal techniques for submerged caves.

Testing Techniques and Process

Thus, we divided the task into several steps. First, we examined the extent of damage and photo-documented all the graffiti on the walls.

In the second phase, we determined appropriate tools to remove the graffiti; some was very superficial and some had very deep gouges. We picked a 3x3-foot area and tested nylon scrub brushes with varying bristle stiffness, as well as a stainless steel wire brush. We tested each instrument for its ability to remove graffiti carved into various depths in the limestone, making sure not to cause more harm with scratch marks and surface maring.

The test square was cleaned and immediately photographed, then photographed again after three months to see whether it developed a "patina."

Once everyone examined the test area, we were given the green light to complete the project. Three divers worked on graffiti removal, and another diver served as a safety diver to observe and provide assistance. The dive took nearly two hours, and we were able to completely remove the graffiti.

Thank you to personnel of Ichetucknee Springs State Park, North Florida Springs Alliance, Mike Stine, Bonnie Stine, Bobby Franklin, Xenia Mountrouidou, Jim Womble, and Kelly Jessop.
Catamount Institute, an environmental education non-profit in Colorado Springs, recently had a cave delivered to its backyard. Catamount runs after-school clubs at eleven elementary schools in Colorado to teach 4th and 5th graders about conservation. The clubs, called Young Environmental Stewards (YES) Clubs, are studying Underground Ecosystems for the entire semester. To kick off their study, about 150 students and their families spent a day doing hands-on lessons to learn about caves, bats, and geology. Most students had never been in a cave before, and roughly 40% come from low-income (Title 1) families. The event was free for students and their families, thanks in part to the generosity of Barb Bentzin and Bob Montgomery, both NSS members.

The first stop for families at the event was CaveSim’s mobile electronic crawl-through cave simulator, which travels across the country for cave rescue trainings, NSS Conventions, and regional events. Students, siblings, and parents crawled through CaveSim’s branching cave passageways while carefully dodging cave formations and trying not to disturb the bats and other cave life.

CaveSim is a cave obstacle course crossed with video game scoring where visitors are challenged to cave softly. CaveSim detects careless caving with electronic sensors behind each cave formation, artifact, and cave creature inside the mobile cave. When damaged, objects beep, talk, and light up, giving immediate feedback to visitors. A computer tracks the progress and skill of each person as they navigate the cave. Results are displayed on computer monitors, which visitors review after exiting the cave.

Catamount Institute’s YES Club students (and even many parents) bravely explored CaveSim, despite having never caved before. One student, Sadie, from Lake George, CO broke a record for the day, doing zero damage to the cave and its inhabitants.

**CaveSim Mapping, Safety, Learning**

Dave Jackson, NSS member and creator of CaveSim, gave several students the extra challenge of mapping the cave without damaging the formations. CaveSim also had a squeeze box on hand for students to find out just how small a space they crawl through, with many students slipping through a space of just five inches. Oh, to be young again!

While visiting CaveSim, students also learned to be prepared for caving by choosing between two bags of cave gear (one with useful gear, and the other with a toothbrush, a plastic leaf, and a party mug). Students helped to light carbide lamps and practiced cave rescue by carrying each other in a Sked and talking on cave rescue phones that really transmitted their voices!

**Engaging Geology**

After caving, students and families participated in hands-on geology lessons led by Catamount Institute staff. The rock cycle has never been so engaging – kids danced the Rock Cycle Cha-Cha! They then applied their new knowledge by looking at rock samples to decide if a rumor about Pikes Peak being a volcano has any merit. A careful look at the rocks told the truth: Colorado Springs is safe from impending doom from our favorite peak; Pikes Peak is NOT a volcano, despite the popular local rumor!

Students also learned to identify limestone in preparation for their upcoming visits to Cave of the Winds, where they will go on special “Bats & Caves” tours. These trips will include bat presentations, geology in Cave of the Winds’ underground laboratory, and cave exploration inside Temple Mountain.

To learn more about the YES Club study of underground ecosystems, visit catamount-institute.org. Catamount works with ~8,000 students a year through summer camps, after-school programs, field trips, and school partnerships, working to fulfill its mission of developing ecological stewards through education and adventure.

**CaveSim Continues Growth**

While these students continue to learn about caves, the formations in CaveSim will continue to grow. Continued support from NSS member Dick Blenz is making it possible for CaveSim to add new helictites and other formations to get CaveSim ready for the 2016 NSS Convention in Ely, Nevada. Be sure to visit CaveSim at the high school during Convention.

CaveSim is also building a much larger, permanent cave simulator in Colorado Springs (complete with a 40-foot pit and constructed passage so realistic that people have asked us if we dug it).

To learn about bringing CaveSim to your event, or about having CaveSim build a cave for you, visit www.cavesim.com.

As always, thank you to the many NSS members and grottos who have supported CaveSim over the years.
On October 10, 2015 over 30 people made a trek up a steep mountain trail. We carried backpacks, ropes, survey equipment, food, water sprayers, and tools. Months of preparation, dozens of conference calls, and the organization of numerous groups of people from all over Montana finally came together. Incredible events unfolded. Our team was on a mission and that mission was the Lick Creek Cave Restoration Project.

Just a handful of miles outside of Great Falls, Montana, lies Lick Creek Cave. Lick Creek has been visited thousands of times and is one of the most widely known wild caves in Montana. It is home to the largest underground rooms in Montana and is one of the largest bat hibernacula. However, this notoriety makes it one of the most well-known and disrespected caves in the state.

After many cave trips over the last couple years, Lick Creek Cave has always been on my mind. It was my first exploration and the original spark that got me hooked. It has always been the “go-to” cave for new cavers but with each trip we witnessed the cave’s deterioration. This history and first hand evidence of abuse gave way to the Lick Creek Cave Restoration Project.

The cave was in serious condition. Thousands of feet of passage were riddled with graffiti, garbage, and debris. We had no complete detailed map. The extent of the hibernaculum was unknown. These problems instantly turned into goals. We quickly realized that we needed multiple organizations to undertake such a large project. Calls were made and meetings scheduled.

After months of phone calls, meetings, and planning sessions the project was laid out. Over 40 cavers had signed up from all over Montana and Wyoming. The USDA Forest Service (USFS) was our first partner, providing backpack sprayers, the use of an entire campground, and 75 gallons of water for cooking, cleaning, and drinking. The next partners to sign on were the University of Montana Cave Club, Northern Rocky Mountain Grotto, and the Big Fork Cave Club. These caving organizations provided all the people as well as the experience we needed for proper mapping, rigging, and bat observations.

We then started partnering with businesses to provide gear, food, drinks, and funds. Lolo Peak Brewery provided funding, drinks, and one of the owners even joined us in the field for his first caving trip. The Missoula, Montana REI donated shirts and water bottles for project members. The Montana Ranches at Belt Creek donated everything we needed for our welcome BBQ. Everyone came together to achieve our common goals of conservation, preservation, and exploration.

Saturday at 10:00 a.m. we entered the cave. Over a period of six hours, we accomplished each goal that we set. Our teams removed over 100 pounds of trash and debris, surveyed and mapped 1,700 feet of cave, observed 57 bats, removed over 50 spots of heavy graffiti, replaced over 300 feet of handlines, and installed interpretive signs and log books. We even aided a distressed group of cave visitors by leading them to the surface.

It had been a long day. Tired, battered, and covered in mud, we made our way back to base camp. Lucky enough, my parents were incredible camp managers. By the time we returned, they had built a roaring fire, cooked enough hot food for 40 people, and provided a clean organized camp ready for a night of celebration.

In the end, we made great strides in the restoration of Lick Creek Cave. More importantly, we created and strengthened our relationships. The USFS stepped in as a major partner and played a critical role that lead to the project’s success. We will use such successes to move Montana caving forward and embrace our shared values of conservation, preservation, and exploration.

Part of the team looks up from the bottom of a pit.

Project leader Taylor Woods carries a backpack sprayer to the bottom of the cave.

Al Zepeda from Lolo Peak Brewery scrubs away graffiti.

Project Wildlife Biologist Ellen Whittle looks for bats.
As a preserve manager, sometimes it can feel tedious putting together workdays. Something about finding a date that works for everyone, sending out lots of e-mails, organizing what projects need to happen—it all can seem kind of boring when I’d really rather be caving.

Not so this time! As a weekend conservation project for the Boston Grotto, Ramon Armen organized a preserve workday at the Merlins Preserve. Perfect! All I had to do was show up with a list of things I wanted done. April even provided us with perfect weather: sunny, but not too hot. The major project for the day was to cut and mark a new loop surface trail that runs down the sink line past the Dome 12 sink to the edge of the property, then loops back at the south end of the preserve meeting back with the main trail near the Merlins Cave entrance.

Eleven of us showed up with rakes, loppers, shovels, saws, and enthusiasm! On the way to the start of the new trail, we cleared winter blow-downs and fixed water bars on the main trail, before reconvening at the Merlins Cave entrance. Here, we put up a small wire fence around some fragile blue cohosh that the botanists from the Hawthorne Valley Farmscape Ecology Program asked us to protect.

Then we started in on the new trail! I lagged behind putting up our yellow NCC trail markers, and the group made good time staying ahead of me the whole way.

By mid-afternoon the new loop trail was cleared and we all met in the parking area for some snacks and to rehydrate. In the future, we hope to install some interpretive markers pointing out karst features, sinkholes, and historic features such as the charcoal circles. All in all, we had a very successful work day! Thanks so much to Ramon and the Boston Grotto, and to everyone else who helped out: Mitch Berger, Larry Bernier, John Dunham, Logan Fortune, Tristen Miller, Chuck Porter, Mike Telladira, Zach Yarter, and Kourtney Yeamen.

The NCC’s Bentley’s Cavern Preserve is located on 5 acres of land south of Berlin, NY. The preserve was donated to the NCC in 2009 and is one of eight preserves managed by the NCC. Jonah Spivak has been the cave preserve manager since the creation of the preserve in 2009. The cave is locally well known and gets about 150 visitors a year who sign in/out at the register (139 in this past year). In early 2015, Jonah was asked by John Dunahm and the Vermont Cavers Association (VCA) about doing a cave cleanup at the preserve.

According to John, at the February VCA Grotto meeting, the grotto voted to approve a motion to get the VCA more engaged in conservation activities. The text of that motion was as follows:

“The VCA shall dedicate one activity each year, which may be a regular monthly activity or an additional activity, to a conservation project work day at a local cave or cave preserve. Such projects may include, but are not limited to: trash cleanup and removal; graffiti removal; sinkhole cleanup; surface trail construction and maintenance; landscaping; maintenance of informational signs and kiosks; or any other work necessary to protect caves and maintain cave preserves. The responsibility for organizing this work day yearly shall fall to the current VCA President, VicePresident, and Conservation Chair, in collaboration with the NCC Preserve Manager or land owner of the property in question.”

The VCA decided to focus their first conservation activity on Bentley’s Cavern, since the preserve was likely to see significant visitation during the Spring NRO in Hancock, MA. The preserve also offered a combination of surface trail clearing and marking work, and graffiti and trash removal in the cave itself.

On the third Sunday of March, despite the bitter cold weather and −12 windchill,
a full 18 people showed up to help clean up Bentley’s, including three of the four newly elected offices of the VCA. Although about a third of the participants were VCA members, some local unaffiliated cavers and some cavers from south and west of the area also made the trip to help out.

Inside the cave the group split into several teams, each armed with spray bottles, stiff brushes, and wire brushes for the particularly tough cases. The amount of graffiti in the cave, while not the worst example of such things, was still significant and noticeable. The worst area was the Big Room, just past the water crawl. This area held the largest concentration of graffiti. The entrance canyon and several corners were also decorated with paint. Happily, with so many people working, the group was able to clean more than 95% of the spray paint off the cave walls, leaving only a few very difficult places and around some historic signatures and formations that we did not wish to damage.

The whole cave was effectively cleaned in less than three hours—spray bottles were especially effective, removing the top layer of mud film and the paint along with it without damaging the underlying rock. Some before-and-after photos, included with this article, show the restored interior of the cave. Hopefully the clean walls will now not encourage any future would-be vandals.

While not an important cave for hibernating bats, particular care was made to not disturb the bats that were found. Three tricolor bats and three large brown bats were located, a similar number to that found in previous bat counts in the cave.

In addition to the work in the cave, Jonah and Mike Telladira worked above ground to update the blazes, cut down fallen trees, and remove brush along the trail.

All told, a total of 76 volunteer hours were spent in and around the cave as part of the cave cleanup effort, plus 42.5 hours of travel time, and 1,672 travel miles. In addition to the wonderful results of the actual work done, this donated time and mileage is used by the NCC as a match for future grant applications.

Preserve Manager Spivak commented that “This work by the VCA exemplifies the best in the caving community. I’m impressed that the VCA has made the move to include regular conservation efforts as part of the group’s mission, and I’m deeply grateful on behalf of both Bentleys Cave and the NCC for this work!” Spivak notes that this is the largest single effort volunteer effort at the preserve since its inception.

Thanks go out to the VCA and everyone who participated and the generous donation of time and effort. An honorary trail blaze was awarded as a thank you to each of the participants. With any luck these efforts will set a good example for landowners, locals, and cavers-to-be alike.
How It Began: For several years BSA Troop 43 Venture Crew, from Diamondale, Michigan kept asking the Eastern Indiana Grotto to find a conservation project they could participate in on their annual cave trip with us. Year after year, nothing appropriate came up.

In 2014 we took the Scouts to visit Salts Cave in Lawrence County, Indiana. On arrival, rather than simply escorting them to the cave entrance, I handed the Venture Crew a compass and topo map showing the location of the cave. Pointing to the appropriate dot on the map I instructed them to “Go find it. Old school!”

Their search led us to a very large sink at the edge of a pasture, a few hundred feet from the entrance. It was absolutely covered with trash that had obviously accumulated over many decades. I had never seen it before but immediately recognized it as the source of bits of refuse that had been finding its way into the cave for years. “Boys” I announced, “I think you’ve just found your conservation project”.

Can We Do This? We knew it would be a major undertaking. This trash had been deposited long ago during one or more previous landowner’s stewardship and the current owner was delighted at the prospect of seeing it cleaned up. He had removed most of the recyclables but doing more than that was beyond his capability. Over the next couple months the Eastern Indiana Grotto (EIG) retuned to study the logistics of the endeavor and develop a plan. It was obvious this would not be a one weekend project!

We decided it would take at least two or three preparation trips to stage the trash for removal, but it was doable! The BSA Venture Crew was to return in early November so we planned to have the trash ready for removal by then. They could help load the refuse into a dumpster and give the sink a final once over.

July 25, 2015: Eight EIG members gathered at the sink on this hot and sunny summer morning. Armed with bags, shovels, hoes, picks, rakes, chain saws, and pry bars we confronted the sink to find the first thing we needed was a weed whacker and of course that was the one implement of destruction we didn’t have! So it goes.

Virginia White was the first to dig in and what is the very first thing she finds? A large “NO DUMPING” sign! Of course the sign was laying down on the job. We began by clearing two paths into and out of the sink.

Much of the easy stuff layering the surface along with several large items were removed and staged at the edge of an adjoining pasture. We created two piles for bagged trash, two for large or heavy items, and one woodpile. The sink was littered with many old wood pallets and boards of varied sizes. We also created a bit of a shrine from the no dumping sign, several dolls, doll heads, and stuffed animals. The heat finally took its toll on us. Time Spent: 4.5 hours x 8 cavers = 36 hours plus project recon time, project prep time, and drive time.

August 22, 2015: Another hot and sunny morning! Today fifteen volunteers including members of the Windy City Grotto (WCG), Central Indiana Grotto (CIG), and Bloomington Indiana Grotto (BIG) participated. This time we started with those much needed weed whackers and of course the Shrine. The rest of us grabbed tools and began digging around several large items that were visible but mostly buried. Mattresses, overstuffed chairs, plastic tarps, a couch, and enough vinyl siding to do a small home were dragged up and out of the sink to our piles!

We managed to expose the sink’s drain and were able to peer down about 4 feet into a 2-foot-wide hole through buried wooden planks and boards, revealing more trash at its bottom!

The ladies in our group seemed delighted to find a large cache of 70s- and 80s-era makeup, compacts, purses, colognes, and such.

Eventually the heat took its toll on us and the WCG wanted to visit the cave before the end of the day.

August 22, 2015. Photo by Brian Leavell.
leaving so we called it a day. Our junk piles had tripled in size and our shrine of oddities was beginning to look a bit macabre. Time Spent: 4.5 hours × 15 cavers = 67.5 hours + prep and drive time.

**September 26, 2015:** Hot again! Today would be our final prep trip. Commitments, family affairs, and so on, reduced our roster to five volunteers. We each picked a spot and began digging out completely buried trash.

In one small area was bag after bag full of everyday household garbage. Bags on top of bags buried under a layer of bricks, landscape stones, and top soil … and under all of that we discovered an intact backyard swing set for kids! We all took turns at the swing set but were unable to free it from the overburden of landscape stones and soil. The darn thing was laying on its side with its top bar deeply interred in the side of the sink. We had mostly exposed two legs and a bit of the top bar was still 3-to-4 feet into the earth/trash bags/stones. Digging was very slow.

Giving up on the swing set, four of us decided enough was enough. Grabbing what we could carry we headed out of the sink and called to Jonathan Annonson who had been working on the other side. The far side of the sink was relatively trash free with the exception of several hundred feet of tangled landscape stones and soil. The darn thing was laying on its side with its top bar deeply interred in the side of the sink. We had mostly exposed two legs and a bit of the top bar was still 3-to-4 feet into the earth/trash bags/stones. Digging was very slow.

Nine cavers with two utility trailers gathered to begin shuttling the trash from the sink, several hundred feet to the dumpster. To everyone’s surprise we had all the trash loaded in the dumpster in only 2½ hours!

With time to spare, we trimmed overhanging limbs from the owner’s driveway, the lane to his barn, and our usual parking area. I had ordered a 30-yard dumpster and was nervous about it holding all the trash. In the end, we collected exactly 30 yards of disposable trash! We all climbed atop the dumpster to stomp and rearrange some things so that nothing protruded above the top, but it fit!

**November 7, 2015:** Today dawned cool and sunny but soon warmed to near perfect temps. With seven cavers and eleven Troop 43 Venture Crew and Leaders we were ready to put this project to rest. Except (long story) … we had no dumpster! Our plan was to have everything cleared out by 1:00 p.m., leaving time for the scouts to explore the cave.

Plan B: Our cavers worked at getting a few more buried items out of the sink, including that pesky swing set, while the scouts used a utility trailer to move the wood pile to a place where the landowner burned brush.

Next they collected and loaded all the old tires into Jim Beasley’s truck. Jim had found a facility that would recycle the tires at no charge. I counted 22 tires so Jim was able to save us a fair amount of money! By 12:00 noon we were all ready for a break and the Scouts provided everyone with a fine lunch.

During our break we looked around and decided we had accomplished more than expected and could move on to the cave. The Scouts, however, were anxious to get a little more “service time” so they spent another half hour or more consolidating trash piles and giving the sink a light “once over.”

Our tour of Salts Cave led us under the sinkhole where everyone took a critical interest in the bottom of the sink’s drain. Looking up from beneath, one peers into a gutted appliance (dishwasher?) and other smaller items blocking the way. Of course much talk of opening another entrance ensued! Time Spent: 4 hours × 18 cavers = 72 hours + prep and drive time.

**November 14, 2015:** It was a rare sunny and warm day for mid-November in Indiana. I had been concerned that if we didn’t remove the trash soon it would have to wait until spring. With favorable weather predicted, we ordered the dumpster and made one last plea for volunteers.

Nine cavers with two utility trailers gathered to begin shuttling the trash from the sink, several hundred feet to the dumpster. To everyone’s surprise we had all the rubbish loaded in the dumpster in only 2½ hours!

With time to spare, we trimmed overhanging limbs from the owner’s driveway, the lane to his barn, and our usual parking area. I had ordered a 30-yard dumpster and was nervous about it holding all the trash. In the end, we collected exactly 30 yards of disposable trash! We all climbed atop the dumpster to stomp and rearrange some things so that nothing protruded above the top, but it fit!

After posing for a few pictures we helped ourselves to some well-deserved liquid refreshment while discussing the project and the possibility of returning next year to pick up where we left off. (At the Eastern Indiana Grottos January meeting we unanimously voted to return in 2016 and pick up where we left off in 2015.) Time Spent: 3.5 hours × 9 caver = 31.5 hours + preparation, documentation, and drive time + in-kind contributions of equipment and services.

Salts Cave has been a cavers’ favorite for many decades and thanks to the landowner’s generosity, cavers have always been welcome to visit. We are thankful to be able to repay them in some way and for being allowed to repair a human injustice to the earth. Not many will ever see our accomplishment. It’s not on the way to the cave entrance but those who venture that way will not be confronted with an unsightly dump … and Mother Nature’s karst system is certainly breathing a sigh of relief.

Over the course of five days totaling 21 hours of sinkhole work, 34 volunteers donated their time and resources to the project for a whopping total of 227 caver hours in addition to hours spent for project prep, documentation, driving, cost of the project, and in-kind contributions.

Monetary donations from the Central Indiana Grotto, Evansville Metropolitan Grotto, Windy City Grotto and many individuals fully covered the nearly $500 cost of the project. The EIG would like to offer everyone involved a very gracious Tip-O-The Helmet for a job well done!
If you haven’t been to Mammoth Cave recently, you should know there are some neat opportunities for cavers to spend rewarding time underground while helping the National Park Service.

It’s called ‘restoration,’ but I’d more accurately call it light work underground. NSS Resto Camps happen three weekends every year and the first full week of August—and here’s my report on what we did this year last time.

GATHERING
A couple dozen cavers, all familiar faces, gathered once again at the Maple Springs Research Station over the first week of August to participate in the 2015 Mammoth Cave Restoration Field Camp.

Cavers have been helping the Park Service for nearly three decades now, and that’s certainly a proud accomplishment that evidences the love, respect, and appreciation we all have for the world’s longest cave (according to the Cave Research Foundation, the very latest mapped mileage of Mammoth Cave currently stands at 405).

This year’s activities began with a nice Sunday evening meal paid for and prepared by the Mammoth Cave National Park Association. Grilled burgers and watermelon on a warm summer’s eve… perfect!

It was a welcome sight when professional chef Mark Williams drove into camp. He and his good friend, caver Chuck Shubert, made the week-long restoration camp commitment despite travelling directly from another week-long event (the Great River Rumble). Thanks, Mark and Chuck, for your commitment and sacrifice.

This was Mark’s third year planning the menu and running the kitchen at Resto Camp. A true pro and one of the nicest guys you’d ever meet, Mark is a member of the American Culinary Federation’s nonprofit Chefs de Cuisine Association of St. Louis.

**DAY ONE—WIRE DIGS, DUST, DRAINPIPE**
Monday morning dawned with a 7:00 a.m. breakfast of scrambled eggs and sausage. Fording the Green River via ferry for the first of dozens of times throughout the week, the group of 24 then drove to the Historic Entrance of Mammoth Cave and split into several work teams: those digging old wire out of the ground, the dust-bunny crew, and four people working on a drainage project.

Your humble narrator was part of the third group, working at a site located a couple hundred feet in from the cave entrance.

Years ago, it was thought that cave airflow also could help cool the Mammoth Cave Hotel, located directly above the main passage. A 10-foot-diameter ventilation shaft was drilled and, for the first two or three months, the idea worked. But then, officials noticed that the moist air was causing mold to grow on all the wood in the hotel and the shaft was then plugged at the top.

The drilling had passed through a layer of shale that routed a trickle of water that even today continues to lightly rain down the shaft. Officials noticed that historic hollowed-out logs previously used for water pipes in the saltpeter mining operation (behind a railing, along the side of the passage) now were starting to grow white mold, presumably from the humidity and moisture.

It was believed that the water dripping down the ventilation shaft was not helping the problem. Although the now-useless shaft reportedly had a brass drain at the bottom, we were told it was buried in sediment. The water had been forming a shallow pool at the bottom of the shaft and gradually dissipating into the ground.

Leave it to the resto crew to attack the problem! With a few rudimentary tools, Brian Hunsaker, Scott McGlamery, Ken Dejonge, and I went to work. After nearly an hour of digging while under a constant shower of water, I voiced my skepticism that the drain even existed. But it was Brian’s dogged perseverance that finally uncovered the prize: a shiny brass drain-head, about 18-inches below the surface. Truly an “ah-ha” moment. Way to go, Brian!

**SALTPETER WORKS, HISTORIC LOGS**
After the evening meal, about 17 cavers returned to the Historic Entrance where Park Archaeologist, respected researcher, and University of Kentucky professor Dr. George Crothers met us. As we walked to the Rotunda Room, he explained all about the saltpeter mining operation that took place in the 1800s. It was a wonderful education, and we were honored to hear it from the preeminent authority on this aspect of Mammoth Cave’s history.

Our caver-manpower was needed to move some very large and heavy historic logs from one side of the trail to the other. By sizing up the average log, and by the grunts I involuntarily emitted while carrying them, we figured each log weighed nearly a quarter-ton. One by one, we carefully lifted more than a dozen of the monsters and transported them a few hundred feet to their designated new locations.

**DAY TWO—TACKLING A GATE**
While most of the resto cavers returned to the cave, some of us joined NPS staffer Eric Ford on a mission to ridgwalk through thick woods, locate a small lesser-known cave, and get the gate open. With Ken, Brian, John Kirk, and handheld GPS units, we used our machetes to hack our way through the thick, jungle-like foliage, avoiding slobbering anacondas, wild boars, and swooping predators… OK, actually, it only was some light woods with a few spiderwebs.

It took a couple hours, but we got ’er done.

**WALL ANCHORS, LIGHT FIXTURES, MORE HISTORIC LOGS**
After lunch, we drove to the Historic Entrance and hiked to Great Relief Hall to
remove embedded anchors that held old wiring to the wall.

Due to his experience at Wind Cave, Jonathon Lewis was in charge of supervising the procedure. We’d also received the go-ahead to install a light fixture at the end of a live electrical line that ended at the same location. With the expertise of caver Larry Matiz, a fully-qualified and certified electrician, the light got hooked up and provided extra illumination for tourists descending the concrete steps at the end of the Fat Man’s Misery stoopwalk. Nice job, Larry!

Following a tasty dinner of meatloaf and taters back at Maple Springs, we returned to the Rotunda to help George with more logs. The job was slightly different this time, as several logs of varying sizes needed to be transported up several hundred feet from their current display spot to an area where they would be examined and treated for mold. George and his three university assistants all were grateful for our team efforts.

**DAY THREE**

After a tasty breakfast of Mexican scrambled eggs, served with slices of fresh pineapple (thank you again, Chef Mark and Chuck), the entire resto crew drove through overgrown woods and brush covering a nice blacktop-paved single-lane road to Wondering Woods Cave, a former commercial operation, long ago closed, and now owned by the Park Service. We geared up and hiked up the hill, and found the steel door entrance. But it was ‘not to be’ that day, as camp director Bill Copeland had been given the wrong key for the cave gate. He tried and tried, but it just wouldn’t open. We did an about-face and drove back through the over-foliated road.

But the non-cave-trip and now-diminishing drizzle could not dampen our spirits. We headed back to the Mammoth Cave Historic Entrance and split into three crews (lint, wire, and wall anchors), and headed underground. I joined those who were being supervised by Roy Vanhooser (former resto camp director) hiding and removing wire near the trail leading down from the feature known as the Giant’s Coffin.

Next was a return to the Great Relief Hall, where some of us removed wire from a maintenance area located behind the bathrooms. After that, we removed a few wall anchors from a low-ceiling area near the bench seating area at River Hall.

This also was time when the group posed for the annual cave photo of participants. (Photo by Ken… well done!)

While some cavers then returned underground for an ‘educational trip’ to see Miller Avenue, a few of us stayed topside to see a slide show and lecture from Ranger Kennetha Sanders at the campground amphitheater.

Her talk was excellent! Kennetha explained about the history of the many families who resided in and around the Park, showed photographs from her own personal collection, and finally revealed to the audience of 30 people that she herself is a fifth-generation Guide. Wow.

There was another ‘wow’ when we all returned to Maple. In gratitude for everyone’s help with the logs at the saltpeter works, George brought a couple cases of beer for the cavers to enjoy. And it wasn’t just the cheap stuff … there was Summer Shandy, Guinness, and Budweiser. George added, “For cavers, beer is the ‘universal currency’.” Thanks again, George! When you need help with other tasks, just whistle!

**DAY FOUR**

Food, to me, was a major factor of the week-long camp—we ate another great breakfast of French toast and bacon on Thursday morning before Bill obtained the proper key and we all drove back to Wondering Woods Cave.

It’s only a couple hundred feet long, but the cave is very nicely decorated. Brian and John clambered up the hill at the end of the cave and (re)discovered a small back room. Meanwhile, Bill, Ken, and I held an impromptu on-site cave photography workshop and shot a bunch of tripod photos. Our official purpose in being there was to evaluate what it would take to remove any existing old wire, prior to an environmental assessment and possible future re-opening of the cave.

After an hour or so in the cave, the group ascended to the Mammoth Cave elevator entrance patio for lunch, then hiked down to Boone Avenue to improve areas where electrical cable had been plastered to the cave wall in a less-than-aesthetic fashion. Using hammers and chisels, we chipped away plaster and mesh screening, removed a bit of old wiring, and pried away some non-lead anchors that were in the walls.

The group exited the cave some hours later, and a couple of us met George and Park Ecologist Rick Olson at the cave’s Violet City entrance. The drizzle rain had returned, but we made a ‘grid search’ and I was able to spot the USGS benchmark marker that was located about 30-feet into the woods off the roadway.

Back at camp that evening, it was a Mexican dinner with chicken enchiladas, steak tacos, and a delicious apple empanada dessert.

**DAY FIVE**

Grits and eggs for breakfast—my favorite—I love grits.

Bill announced that Friday was a light day of work that would end before mid-afternoon. We parked at the elevator entrance, pressed the “CL” (cave level) button on the elevator keypad, and descended.
Some cavers had expressed interest in returning to the unfinished work in Boone Avenue, but another group wanted to follow Roy for the one-hour walk down to the Echo River. I opted for the Boone Avenue tasks.

The work itself was not too strenuous. I positioned a ladder along the wall, climbed up and chipped away at the ugly plaster. It was a good thing we were told to wear safety glasses, as there were plenty of plaster chunks and nasty dust thrown in all directions. We positioned a tarp at the bottom of each work area to catch the detritus and swept up any crud that splattered off to the side. Before long, it was time to clean up and say goodbye to Mammoth Cave for the week.

The entire group was out of the cave by 2:00 p.m. Having the afternoon ‘off,’ some chose to see the Visitor Center, others took a shower, and some enjoyed a well-deserved afternoon nap.

After a dinner of pork chops, asparagus, salad, and strawberry shortcake, we pitched in to help clean the kitchen and mop the floor. When Chef Mark finally declared the kitchen to be ‘closed,’ he sat down, and Bill began the Awards ceremony.

**Day Six**

Saturday was a day for ‘reward trips,’ including a visit to Great Onyx Cave, led by Bill Copeland, and a longer trip to the seldom-visited Salts Cave (which is connected to the Mammoth system).

Participants on the Great Onyx Trip included Bill, John, Roy, Jonathan, Larry, Dave Ruth, and Brian Lantz. According to Bill, “we basically followed the tour route up Edwards Avenue till we got to the rimstone dams, then down Cox Avenue. Larry showed everyone where the tour took off to do the in-cave boat ride. We were in the cave for 2.5 hours.”

Ranger Rick Olson (who also is a NSS and CRF member) led four others on a seven-hour trip to Salts Cave. According to Brian Hunsaker, “it was a great trip with stories about Native Americans who lived and mined the cave as well as info about Pike Chapman, who created an entrance that collapsed on him. I also got a chance to try and climb the ‘Un-climbable Wall.’ We saw ‘Mummy Valley’ and the spot where the remains of ‘Little Alice’ were recovered beside a large rock with a story scratched in cursive writing, very difficult to read. The beginning and the destination had visitor trails, but the middle section did not, since work there was abandoned when the Pike Chapman entrance collapsed.

**Recap**

Bill summarized the work done throughout the week: four bags of lint picked strand-by-strand from speleothems by the ‘dust bunnies;’ a dozen lead anchors removed; three or four plaster sections in Boone Avenue cleaned; identified live electrical wires and installed one light fixture in the Great Relief Hall; opened the gate at that small, wild cave; evaluated wire removal at Wondering Woods Cave; helped move heavy logs at the saltpeter display; drain work in the ventilation shaft; drain work at the camp bathroom showers; and removed of about 1,000 feet of old wire. Nicely done, everyone. That’s quite a list!

All in all, it was another great restoration camp. In the five years I’ve participated, I’ve observed that each camp always has new elements: from swinging a sledgehammer, to helping at sinkholes and other area caves, to picking up candy wrappers and lint. As cavers, it’s very fulfilling to be part of this. It makes us feel good knowing that we’re helping the cave, helping our National Park Service, and setting an example for visitors from across the country and around the world who come to see this ‘grand, gloomy, and peculiar’ place.

**NSS Resto Camps at Mammoth Cave National Park**

If you’d care to get involved, annual restoration weekends are scheduled over the first weekends of March, May, and November. The week-long camp is always the first full week in August. On-line registration begins on the first day of the month preceding the event. Go to www.restore-mammoth.com/ for more information.

Gary Gibula is a grotto chair, NSS Life Member, and NSS News assistant copy editor who also writes for the Chicago Tribune.
CAVE GEOLOGISTS

When you think of a scientist, you probably think of someone in a laboratory, or lab, wearing a white coat and looking into a microscope. To some people, being a scientist doesn’t sound like a very exciting job.

In fact, nothing could be further from the truth. Scientists work in venues all over the world. Field scientists conduct important research in some of the most extreme environments imaginable, from high atop mountains to the darkness of the ocean deeps, from the heat of sand-covered deserts to the lush jungles of the Amazon. Scientists are as diverse a group as the subjects they study.

One group of scientists, the speleologists, study the unique environment of caves. Traveling deep underground to places relatively few people ever see, speleologists study one of the most extreme environments on Earth. Some may be interested in the animals to be found in caves, the prehistoric fossils to be unearthed, evidence of early use of cave by ancient humans, or incredible geological treasures found nowhere else on the planet.

One of the most interesting aspects of speleology is geology. Cave geologists study different mineral formations found in caves, the flow of water across the face of our planet, the stability of land in cave-rich regions, ancient climates, and even help to unravel hidden clues that help explain how the Earth was formed.

In this nicely illustrated and well-written book, Christine Honders explores the many facets of a career as a speleologist, especially a cave geologist. In doing so, she introduces young readers (grades 4 - 6) to one of the most remarkable jobs in science. In fact, it's hard to determine from her descriptions which is more exciting: the work that cave geologists do or the places where they do it.

Full-color photographs of caves and caverns complement the text, and a series of boxed inserts (Science in Action) provides an array of interesting facts about cave geology. A short glossary is a valuable addition.

Life as a cave scientist isn’t for everyone, Honders explains. In addition to having to learn how to be a scientist (which involves a lot of time studying in school), one also has to be adventurous, and not afraid of dark and sometimes narrow places. Special skills and equipment are also needed to safely work underground.

This book is part of the PowerKids Press’ Out of the Lab - Extreme Jobs in Science series. Other titles in the series include Antarctic Researchers, Astronauts, Astronomers, Forensic Detectives, Oceanographers, Marine Biologists, Paleontologists and Archaeologists, Climatologists and Meteorologists, and Rocket Scientists.

The various titles in this series highlight the many unconventional science jobs available to those adventurous enough to pursue them. In taking science out of the laboratory and into the field, they will help to motivate young readers towards a unique and rewarding career in science. Academia doesn’t have to be synonymous with classrooms, libraries, or uninteresting homework assignments. Learning about real-world applications of classroom skills will help to fuel an interest in non-traditional career choices among students as well as educators.

Danny A. Brass

HELLO, BUMBLEBEE BAT

This concise, easily understood question-and-answer board book will introduce beginning readers (preschool to second grade) to the fascinating world of natural history, as they learn about the life and habits of the tiny bumblebee bat (the smallest-known bat and, possibly, the smallest mammal). Children will learn about what this bat looks like, where it lives, what it eats, and how it sleeps.

The principal strength of this publication lies in its exquisite collection of full-color illustrations, each one beautifully depicting the answer to a particular question. These images are sure to grab the attention of young readers and stimulate an interest in the animal world.

This book is a simplified version of a previously published picture book. The unabridged edition of this book, originally published in 2008, was the recipient of a Theodor Seuss Geisel Honor Award. This award recognizes distinguished books for beginning readers.

Other books in this series include Hello, Baby Beluga and Hello, Mama Wallaroo.

Danny A. Brass

A LITTLE BROWN BAT STORY

In this heavy-duty board book, Melissa Kim describes a typical day in the life of a
little brown bat living deep in the forest.

The author follows the activity of one bat, as it flutters through the forest consuming insects. As dawn approaches, the bat seeks out the shelter of a cave in which it will hibernate. It will spend the long and cold winter months huddled with other bats deep underground.

But something is wrong this year. For some reason, there are far fewer bats in the cave than there should be. And some of the bats that are there periodically wake up and fly out of the cave…never to be seen again. The little brown bat is fortunate not to be among those afflicted.

While the little brown bat “sleeps away” the winter deep in its cave, scientists are among those afflicted.

The little brown bat is fortunate not to be fly out of the cave…never to be seen again.

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will hibernate. It will spend the long and cold winter seeking out the shelter of a cave in which it living deep in the forest.

As dawn approaches, the bat, as it flutters through the forest consuming—interactions. The first title in this four-part series was A Snowy Owl Story; a third title about the endangered Blanding’s turtle is scheduled for release in the spring of 2016.

This book will be a nice addition to the home library for young readers, especially that of budding, young naturalists. It is sure to open a world of new ideas for parents and children to explore together.

Danny A. Brass

BATS AND VIRUSES: A NEW FRONTIER OF EMERGING INFECTIOUS DISEASES

Over the course of the last two decades, it has been increasingly recognized that the majority of emerging human infectious diseases are zoonotic in nature, originating in animals and spilling over into human populations. The occurrence of many novel disease outbreaks is frequently driven by a range of anthropogenic activities. These include continued destruction and fragmentation of habitats (including deforestation and agricultural expansion), increased urbanization associated with continued encroachment of human civilizations on wild areas, and the sale and consumption of bush meats. Dangers are compounded by the relative ease of travel on a global scale.

Evidence for a role of bats as important reservoirs of various emerging viruses continues to accrue. Some of these pathogens have been associated with significant disease outbreaks in humans and/or animals. The increasing attention paid to bats has brought into specific relief how little is actually known about the basic biology of bats and disease. As a result, medical researchers and public-health authorities are turning a critical eye towards understanding the epidemiology of many emerging infectious diseases, and especially any potential association with the natural history of bats.

In this multi-authored work, a panel of experts provides a broad overview of our current state of understanding of the association of bats and select zoonotic viruses (including rabies and the rabies-related lyssaviruses, SARS coronavirus, Ebola virus, Marburg virus, Hendra virus, and Nipah virus, as well as a host of others), with emphasis placed on relevant aspects of epidemiology, ecology, virology, pathobiology, immunology, genomics, disease surveillance, host/pathogen co-evolution, viral diagnosis, disease modeling, and methodology. Information is considered from a global perspective.

Recent work in this field is critically reviewed, with ample discussion of the limitations, pitfalls, and biases inherent in studying the epidemiology of viral diseases in bats. These include issues related to study design, specimen sampling, and interpretation of findings. The importance of ecosystem services provided by bats is stressed, and the need to reconcile conservation efforts with protection of human and animal health (including development of research strategies that not only benefit human and domestic animals, but that also help to protect vulnerable bat populations) is highlighted.

The underlying roles played by various bats—particularly species-specific importance and controversial concepts of bats as special reservoirs of disease—in the epidemiology of many viral pathogens of both medical and veterinary significance remain to be clearly defined. Elucidating the natural reservoirs of viral pathogens and unraveling the mechanisms of both intra- and interspecies transmission is fundamental to prospects of disease control in animal and human populations.

This scholarly work will be of considerable interest to epidemiologists, virologists, medical professionals, and bat researchers working in the field of disease ecology of bats.

Danny A. Brass
Jason Richards posted (Facebook, January 31) a topo overlay of a cave passage running under a building site to illustrate successful efforts to convince developers to change their plans so as not to affect Military Spring and Cow Crap Cave in Rutherford County, Tennessee. In this and a February 4 post, he related that one of the buildings that would have been above the cave had been moved, a stormwater pond threatening the Military Spring Cave entrance was relocated, and a planned cave gate was replaced by a fence. He thanked all who helped put the pressure on.

Matt Vinzant related (Facebook, February 4) that he and Andy Pitkin did an exploration dive in Twin Dees Cave to look at a south lead in the connecting passage between Twin Dees and Weeki Wachee Spring Cave, both in Harnando County, Florida, discovered in 2014 by Brett Hemphill and Pitkin. After only 300 feet, it took a hard left and ended at a depth of 320 feet, earning the name of Deister’s Disappointment in recognition of tireless efforts as a support diver. They checked another lead behind F-Well, tying it into the connector passage after several hundred feet. Total run time for this dive was 713 minutes with a max depth of 329 feet. Eric Deister, Howard Smith, and Derek Ferguson provided support and Kirill Egorov, Bob Beckner, and James Draker did photo dives. Andy Pitkin (Facebook, February 15) posted a video of the connection passage.

Three crews entered Lowmoo Cave, Alleghany County, Virginia, on February 6. Ed Saugstad (Facebook, February 7) on drool bucket, David Socky sketching, Dave Collins drawing cross sections, and Brad Blase doing front shots netted 400+ feet in 18 stations. It was slow going because they had to do a lot of digging in very sticky clay mud. There was one 54-foot shot down a crawlway that still needs to be dug out.

Mark Long (Facebook, February 11) noted that he and Tom Morris helped a French team doing a documentary about the Florida Aquifer. Paul Heinrth was the diving coordinator and safety diver and Morris and Long were the on-camera talent for the cave diving portion of the show as the “science team.” They filmed in Buford Spring, Eagle’s Nest Cave, Orange Grove Sink, Peacock Spring Cave, Devil’s Eye Spring Cave, and Ginnie Spring Cave, the first two in central Florida and the last four in north Florida.

Brian Williams (Facebook, February 15) jotted a few thoughts after Valentine’s Day exploration and survey in newly discovered Zipper Pit in Montgomery County, Virginia, with Steph Petri and Jon Lillestolen. It was freezing cold going in and snowing hard getting out of the loose-rock virgin pit. A good bolting job by Lillestolen kept the rope off the edges and the boulders in place.

Andy Pitkin (Karst Underwater Research Web site, February 15) posted a Google Earth overlay map of the cave and a missive about a dive into a lead in Weeki Wachee Spring Cave that he and Brett Hemphill discovered during 2012. Following a series of progressively longer and more complex dives during which open circuit bailout gas was placed, Pitkin and Matt Vinzant prepared to explore the lead, 7,500 feet out, 5,000 of which was at about 300 feet deep. They dropped stages and a backup scooter at its entrance and tied and lined in. They quickly came to a room with its floor covered with piles of flat rocks like paving stones. A lead appeared to the left of the main conduit, which curved around and back to the main passage. The tunnel opened up into a spectacularly large room with huge breakdown boulders scattered among a jumble of flat slabs. Rooms like these often signify a transition in cave morphology. Exiting the room, the passage took them to minus 310 feet and led them to another large breakdown room, and then another large room. Ascending the room’s breakdown, a small opening down and to the right and another ahead of them sloped down into another potential passage. They had almost exhausted all the line on that reel, so Matt tied off while Pitkin checked the lead ahead, concluding that it looked possible but not particularly inviting. They surveyed 883 feet on the return swim, stopping to check a couple of other leads on the way. Their max depth was 329 feet and they surfaced after 12.5 hours underwater. The support cave divers were Eric Deister, Derek Ferguson, Kevin Leonhardt, David L. Jones, Charlie Roberson, Brett Battlefield Hemphill, AJ Gonzales, Brian Richardson and others: tinyurl.com/ze3685v.

Dave Socky (Facebook, Feb 19) took a group of geologists from the University of Akron into Maxwelton Cave, Greenbriar Cave, West Virginia. They spent 6.5 hours in the cave collecting water samples and various measurements from about ten different locations in Cove Creek. Three different instruments were used to measure temperature, pH, dissolved oxygen, and conductivity. Graduate student Alex Dalla Piazza is doing his thesis on the origin of manganese coatings on the rocks and walls of Cove Creek in Maxwelton Cave. Others on the team included Kelsey Budahn, Nick Wander, and Hunter Campbell.

Mark Hodge (Facebook, February 21) wrote that about 30 cavers went to Butler Cave, Bath County, Virginia, as five distinct project groups. Hodge’s group of seven went to the Air Dig to resurrect it after a multi-year hiatus, digging for nine straight hours and making ten feet of progress. There was very good air flow but only intermittently, as it was windless outside, and they pushed the tunnel to over 160 feet long. As they were considering quitting, Nick Socky arrived with another hardy group, cold from swimming in the Frosting Slot, that then did more work at the dig face. The two groups pulled 101 buckets of sediments out of the tunnel.

Maureen Handler (Cavers Paradise Facebook, February 21) posted before and after photographs of a cleanup at Run-to-the-Mill Cave watershed. The group of 34 worked four hours and collected four tons of trash and 80 tires.

Brett Hemphill and Matt Vinzant (Facebook, February 28) jotted a few bullets on a physically demanding 16-hour cave dive into Weeki Wachee Spring Cave. Their average depth during exploration was 360 feet! They were rather tired the next day but suffered no DCS symptoms. They ended up connecting within 200 feet of Hemphill’s 2007 end-of-line at Mount Dooms White Room and then added 400 feet of line beyond it.
Mark Jancin after a science expedition in Lechuguilla Cave (I. D. Sasowsky)

Mark Douglas Jancin, PhD, NSS 13011, died on Oct. 21st 2013 at age 59. He had been an NSS member since 1971.

He was trained and worked as a geologist, bringing to bear his excellent powers of observation to understand the geology of many areas. He earned an undergraduate degree in geology from Franklin and Marshall College (cum laude) and a PhD from Penn State. His dissertation research work included geologic mapping, done while camping out in an unnamed rugged and roadless peninsula east of Eyjafjörður in north Iceland.

He taught geology at Georgia Southwestern College for a time, and worked many years as a consulting geologist on groundwater projects at sites across the United States including Florida, Georgia, Kentucky, New Mexico, Pennsylvania, Virginia, and in Trinidad. He was an accomplished structural geologist and karst hydrogeologist, both in practice and in teaching. He published many scientific papers throughout the years. Two exceptional ones in the area of karst dealt with the movement of sediments in caves (1), and the importance of thin carbonate beds for groundwater and contamination movement (2).

He loved to cave, and was active in many areas across the US. He was on the July 1972 trip to Q87 in Flint Ridge, a precursor to the Mammoth-Flint Ridge connection later that year. He caved extensively in the Dougherty Plain of Georgia, and throughout the central and southern Appalachians. He had a commanding presence when speaking before a room full of people, which came from the depth of his knowledge and from meticulous preparation. He also would enliven virtually any situation, from a geologic field camp to a meeting with government regulators, with spontaneous quips and aphorisms, delivered to the delight of his audience.

His family and friends will miss him. Gifts in his memory may be made to the Ralph Stone Research Award Fund, which can be accessed at https://secure.caves.org/nssapps/donate.shtml.

Walter F. Ebaugh & Ira D. Sasowsky

FOOTNOTES (REFERENCES)


Out in the west, opportunities for cave exploration and study are severely threatened by population growth and urban expansion. The WCC protects caves through conservation easements, management agreements and outright purchase.

By providing our experience and resources to government and private landowners, we help manage these unique environments in a way that permits reasonable public access while protecting the caves from development and environmental degradation.

Visit us online at www.WesternCaves.org or at the NSS 2016 Convention in Ely, Nevada!