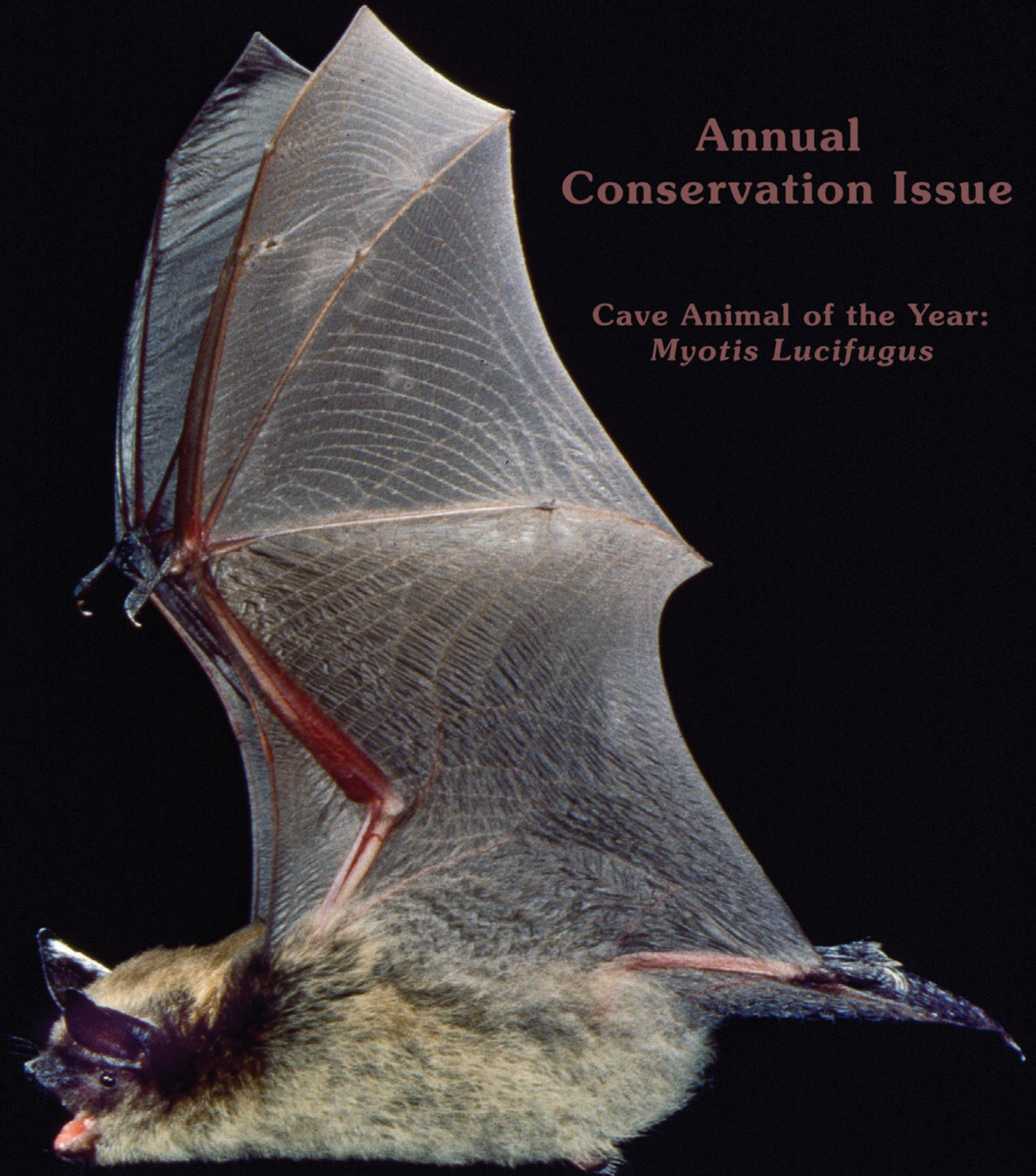


NSS NEWS

April 2022

Annual Conservation Issue

Cave Animal of the Year:
Myotis Lucifugus



CALENDAR

USA

June 13-17, 2022—NSS Convention in Rapid City, South Dakota. Visit www.nss2022.caves.org for more information.

July 16-23, 2022—NCRC Cave Rescue Operations and Management Seminar, Covington, VA. Extensive fieldwork and classroom instruction in all phases of cave rescue. Register at <https://ncrc.regfox.com/ncrc-2022-national-seminar>

June (week to be determined) 2023—NSS Convention in West Virginia, rescheduled from 2020.

INTERNATIONAL

July 24-31, 2022—18th International Congress of Speleology in Savoie, France, <http://uis2021.speleos.fr/>

Send items for the calendar to davebunnell@comcast.net at least 4 weeks before desired month of publication (e.g., by April 1 for the May issue).

Sanctuary

*Take me to a cave,
Deep within the Earth,
Where there is only warmth, rock and dirt,
Where the mind goes quiet and soft peace
settles in,
A place we find self again.*

*Mud in the blood, sweat on the face,
A sweet escape from the surface rat race,
Trusted friends alongside,
Our lights as bright as a summer sunrise,
We explore, we survey and we protect;
This sacred space that allows us to forget,
reflect, and reconnect.*

*Take me to a cave,
Deep within the Earth,
Where there is only warmth, rock and dirt.
A place we are free to just be.*

Katie Balazs
NSS 68195

Right: The Bat Bath, photo by Katie Balazs with the assistance of Leon Petty.



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Deadline: Ads, articles, and announcements should be sent to the editor by the 1st of the month, 1 month before the month of issue (e.g., material for the March issue needs to be in by Feb. 1).

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NSS NEWS

April 2022

Volume 80 Number 4

FEATURE ARTICLES

Annual Cave Conservation Issue

Val Hildreth Werker, Editor

Caves at Risk—Brazil—Our Collective Voice.....	4
<i>Val Hildreth-Werker & Jim C. Werker</i>	
Meet the 2022 USA Cave Animal of the Year: The Little Brown Bat	5
<i>Matthew L. Niemiller, Michael E. Slay, and Gretchen M. Baker</i>	
Conservation and Maintenance of Southern Arizona Caves	7
<i>Dave Hamer, Andrew Moreland, and Steve Dexter</i>	
Challenges to Conservation of Caves in Wilderness Areas on Forest Service Lands.....	10
<i>Hans Bodenhamer</i>	
The Pros and Cons of the BHS Cave Club's Point-and-Shoot Photomonitoring Methods	12
<i>Hans Bodenhamer, Bigfork High School Caving Club</i>	
Society News Conservation Announcements	14,23
The Cave Formation Repair Project 2021	15
<i>Michael C. Mansur</i>	
Sociedad Espeleológica de Puerto Rico Inc. — 45 Years in the Organized Exploration and Preservation of Caves, Caverns, and Sinkholes	16
<i>Adolfo Rodríguez-Velázquez</i>	
Exotic Snakes: Threat to the Puerto Rican Karst.....	18
<i>Adolfo Rodríguez-Velázquez</i>	
Bat Monitoring in Southern Arizona: A Multi-Grotto Project	21
<i>Sandy Wolf and Dave Dalton</i>	
Stronger than Ever: CaveSim Conservation Education	22
<i>Dave and Tracy Jackson</i>	
Book Review The Cave Formation Repair Project.....	25
<i>Chris Howes</i>	

DEPARTMENTS

Reading	25	President's Message	27
Underground Update.....	26	Classified Ads	27

ABOUT THE COVER

Our front and back covers feature the Cave Animal of the Year, the Little Brown Bat or *Myotis Lucifugus*. Both images copyright Merlin Tuttle of Bat Conservation International.

The upper image on the back cover is from Phillippe Crochet and taken in Gruta Temimina, Brazil. It ties in with our introduction and call for help for Brazil's caves.

Caves at Risk—Brazil—Our Collective Voice

Val Hildreth-Werker & Jim C. Werker

NSS News Conservation Editors/NSS Conservation Division Joint Chiefs

Not to reiterate the obvious, but it's been another rough year of changes via Year Two of the COVID Pandemic, redundant waves of natural disasters, ominous stats and models of climate shock, divisive politics on the global scale, and months of dread building to the awful war in Ukraine. Our hearts are saddened by the loss of cavers and loved ones due to viral variants, and our hearts reach out with concern to our caving and speleological friends and colleagues who are in Ukraine and Russia.

It is timely and important to note that Brazil is also facing major threats. In recent years the world has been perplexed by numerous provocations to the social, economic, and environmental balance of Brazil. The world watches in sad, angry disbelief as denuding of the Amazon Rain Forest continues, coupled with diminishing investments in science, as well as severe threats to indigenous communities across Brazil. Now Brazil's caves are also critically targeted! Brazilian cavers and speleologists are reaching out with requests for global help.

On 12 January 2022, the President of Brazil launched Federal Decree No 10.935, targeting Brazil's caves. If not stopped, the Presidential Decree will destroy the intent of the robust cave protection protocols that were established under Brazil's Constitution of 1988. The people, speleologists, and legislators of the world have limited time to speak out against the decree. An international display of concern will serve to focus legislators on since coordination with Brazilian speleologists. The original time-frame for comment expires in early April, but please participate anyway—your voice will add to the effort. Brazil's caves are vulnerable and in great need of global help via two simple actions—a click to vote and an email letter to send off (cut-and-paste template included).

Click here to add your support in Brazil's race to overcome the new decree and keep their caves protected:
bit.ly/brazil-caves

Brazil is also asking that we write letters (a sample-template is available). The Brazilian Speleological Society (BSE) is requesting respectful letters of support from around the world, and they are specifically asking for NSS Internal Organizations, institutional members, and individual members to send

letters via email. BSE has provided a sample letter, and they've made it easy for you to add your own words. Go to <https://caves.org/conservation/supportSBE.shtml> for the letter template and quick email instructions. The caves, cavers, and speleological heritage of Brazil want to thank you for your efforts to save the caves of Brazil, support BSE, and defeat Presidential Decree No 10.935.

Brazil's caves are definitely at risk. Now more than ever. All caves in Brazil are currently subject to beautifully robust cave protection legislation. But the protection protocols and policies could suddenly change. If not stopped, the Presidential Decree could open all of Brazil's caves to industrial/commercial damage and destruction. The Presidential Decree comes with a very small 90-day window to persuade the authorities to invite the expert participation of the Brazilian speleologists in improving the proposed Decree to include means for sustainable development while maintaining robust protection measures for caves and karst. Timing is critical. Please send your letters of support for SBE as soon as possible.

Let Brazil and other stories of cave protection remind us how cave protections can change quickly, even at the whim of a signature. How protection standards can be lost overnight to greed and power. How stories get twisted. How years of sustainable protection can be swept away in an instant.

Let us be vigilant in understanding caves as systems, assimilating and synthesizing full-system cave conservation information, watching over the caves and karst systems in our own backyards, and supporting protection protocols for spelean resources everywhere.

Let us be reminded that we are the stewards of underEarth speleological heritage. Our collective voices can make a difference, especially during this second International Year of Caves and Karst (IYCK 2021-22). Register events at <http://iyck2021.org/index.php/events/>

Our collective work in caves can also make a difference, especially when projects include minimum-impact caving awareness, ethics, and protocols. Michael C Mansur, NSS26393CL,FE has self-published an e-book highlighting his decades of cave conservation work that have led to the

development of a project that is scoring thousands of volunteer hours for caves. The Cave Formation Repair Project focuses on involving volunteers in project caving by inviting them to participate in the repair of speleothems and in the creative, collaborative development of innovative tools to use in repair processes. Available through Speleobooks at <https://tinyurl.com/cave-repair>. Kudos and thank yous to Mike for donating \$5 from each sale to the NSS Save the Caves Fund. Check out the book review in this issue.

Conservation Life Membership Pins are now available! NSS Staff graciously remembered this long-standing idea and worked to make it happen. Michelle Vaughn sent out letters and pins to all existing Conservation Life Members. The official Conservation Life Pin is now included in the packet with the Conservation Life Letter and Certificate. Kudos and thank yous for making this happen, Michelle Vaughn and Christy Starr, our office team at the NSS Headquarters in Huntsville, Alabama! For information on all types of NSS Membership, go to <https://members.caves.org>

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Meet the 2022 USA Cave Animal of the Year: The Little Brown Bat

Matthew L. Niemiller, Michael E. Slay, and Gretchen M. Baker

The USA Cave Animal of the Year program enters its third year in 2022. This program brings attention to the amazing animals that live in caves and associated subterranean habitats. Many animals live underground in the thousands of caves that occur in the United States. As cavers, we are the visitors to their domain, and it is good to get to know our hosts a little better. What animal is the focus for 2022? The USA Cave Animal of the Year is the Little Brown Bat (*Myotis lucifugus*).

Little Brown Bats belong to the family Vespertilionidae, which is the most diverse (>400 species) and widely distributed bat family found in a variety of habitats in both tropical and temperate regions. Vespertilionid bats, often referred to as common, vesper, evening, or simple-nosed bats, are carnivorous and primarily insectivorous relying on echolocation to find and catch food on the wing. The Little Brown Bat is one of the most wide-ranging bats in North America and is known to roost in a plethora of locations from caves and abandoned mines to behind peeling tree bark and attics of homes. Historically, thousands of Little Brown Bats were known to communally hibernate in individual caves, but populations have dramatically declined due to White-nose Syndrome (WNS).



Michael Slay



Jordi Segers

Getting to Know the Little Brown Bat

Little Brown Bats, also called Little Brown Myotis, are medium-sized bats measuring 8–9.5 cm (3.1–3.7 in) in total length with wing spans ranging 20–28 cm (7.9–11 in) and weighing just 6–12 g (0.2–0.4 oz). They have relatively long, glossy olive brown to dark brown fur on their backs that is lighter on the belly. The wing membranes, ears, and snout are dark brown. The ears are relatively short with a blunt and rounded tragus (i.e., the fleshy projection in the ear). Compared to other mammals of similar body size and weight, Little Brown Bats have a remarkably long lifespan, up to 31 years. Breeding takes place in autumn or early winter and females store sperm until spring when fertilization and gestation occurs. Females typically rear a single pup, which can fly on their own in about three weeks and reach adult weight about a month later.

Where Can I Find Little Brown Bats?

Historically, Little Brown Bats were abundant throughout the forested regions of North America, ranging from Alaska and southern Canada southward to southern California, northern Arizona, and northern New Mexico in the western United States and to southern Mississippi, southern Alabama, southern Georgia, and northern Florida in the eastern United States.

Little Brown Bats are considered troglodytes and use caves as hibernation sites during winter. Hibernation sites in caves, as well as abandoned mines, tunnels, and other underground structures, typically have high humidity, little airflow, and constant temperatures. Males and females will hibernate together and emerge in

the spring to migrate to summer roosting and foraging areas in forested regions. In summer, Little Brown Bats use both natural and manmade structures as roosts, including under loose bark and in tree cavities, under bridges, in buildings, and in attics. Males typically roost alone while reproductive females roost together at hot and humid sites near water. Little Brown Bats are known to share roost sites with other species of bats. Some bats will travel hundreds of kilometers between summer roosting and winter hibernation sites.

What Do Little Brown Bats Eat?

Little Brown Bats are carnivorous and specifically insectivorous. They are voracious nocturnal predators feeding on many flying insects near water, such as mayflies, midges, mosquitoes, moths, and beetles. Nursing females may eat nearly half their body weight in insects during a single night! Little Brown Bats may travel up to 80 km (50 miles) a night to forage.

Threats to Little Brown Bats

Little Brown Bats are one of three bats most threatened by WNS, which is caused by the fungal pathogen *Pseudogymnoascus destructans*. Historically, Little Brown Bats were one of the most abundant bats in



Jordi Segers

North America. Some winter hibernation sites housed tens-to-hundreds-of-thousands of bats. However, after the arrival of WNS in 2006 and its subsequent spread across the continent, only tens-to-hundreds of bats use these same caves, mines, and tunnels as hibernacula – declines of 90–100%. WNS grows on the muzzle, ears, and wings of hibernating bats and causes them to arouse more frequently during hibernation, burning valuable fat reserves and causing dehydration that ultimately leads to starvation and death. Little Brown Bats are also threatened by deforestation, particularly the loss of large snags and hollow trees used as roosting sites in summer. Wind turbines may also result in mortality of migrating and foraging bats. Because Little Brown Bats are long-lived and females only rear a single pup during a breeding season, recovery from population declines is slow. These factors put the species at increased risk of extinction. Some models predict that the species will be functionally extinct in the northeastern United States by 2026.

Conservation of Little Brown Bats

Bat biologists continue to monitor populations through winter hibernacula surveys and summer acoustic surveys as well as targeted population assessments. Significant hibernacula are prioritized for conservation measures, which include cave gating and/or restricting visitation during the hibernation season to minimize disturbance. Likewise, patches of forest, particularly snags and trees used as maternity roosts, are prioritized for protection. The Little Brown Bat has been



Jordi Segers



Little Brown Bats roosting in a Tennessee Cave.

© Merlin Tuttle

assessed recently as Endangered by the International Union for the Conservation of Nature (IUCN) and is currently under review for listing under the U.S. Endangered Species Act

Why are Bats Important?

Bats provide several important benefits to humans. These ecosystem services include insect pest control, plant pollination, and seed dispersal. For example, some estimates suggest bats save U.S. farmers over \$20 billion each year in pest control benefits through reduction of insect crop damage and use of pesticides. Cave-roosting bats, including Little Brown Bats, are important links to the surface for many cave ecosystems. While much of the organic matter found in caves is washed in, the energy and nutrients obtained by bats and transported into caves ultimately becomes available to other cave organisms in the form of their guano and carcasses when they die.

Cave Animals of the Year from Other Countries

Countries that celebrate Cave Animal of the Year agreed to feature bats to celebrate the International Year of Cave and Karst which has been extended through 2022. If you'd like to learn about some additional cave-dwelling bats, you can find links on our NSS website for the Cave Animal of the Year in other countries, such as Germany (Lesser Horseshoe Bat—*Rhinolophus hipposideros*), Italy (Common Bent-wing Bat—*Miniopterus schreibersii*), Australia (Ghost Bat—*Macroderma gigas*), and several others.

How You Can Participate

We need your help spreading the word about Cave Animal of the Year. First, please visit the website: <http://caves.org/conservation/caveanimaloftheyear.shtml> where you will find additional information about caves as habitats, cave bats, and past Cave Animals of the Year, including cave beetles and pseudo-scorpions. Please share the website address with friends and through your Grotto social media. If you are lucky enough to find a Little Brown Bat while caving, help others see it and learn about these cave species. We invite you to take a photo of the bat and post it on the USA Cave Animal of the Year Facebook page. In addition, we encourage cavers to report sightings of Little Brown Bats to state biologists that are tracking and studying the species. Have another great year of learning about and helping to conserve habitat for the fascinating animals that make caves their homes!



Jordi Segers

Conservation and Maintenance of Southern Arizona Caves

Dave Hamer, Andrew Moreland, and Steve Dexter

Over the past four years, Grottos in southern Arizona (Escabrosa Grotto, Inc., Cochise County Cavers, Southern Arizona Grotto) have been building a cave maintenance program in cooperation with the Forest Service. We co-manage nine caves on the Coronado National Forest: Amazing Canyon Cave, Cave of the Bells (Bells), Cave Mine Cave (CMC), Chiricahua Crystal, Ida, Van Horn (and Lower Van Horn, LVH), Papago Springs, Sutherland Peak, and Sphinx. Escabrosa Grotto, Inc. (EGI) also holds the lease and manages Onyx Cave.

Projects include the Lock Maintenance Program, Gate Repair Program, Cave Register Program, Sphinx Cave Restoration, Lower Van Horn Rope Rotation Project, Trail Work, Onyx Cave Management (Survey and Carbide Cleanup Projects), and Cave Entrance Welfare Check Program. This has truly been a joint effort. Special thanks to EGI conservation assistants Andrew Moreland, Tom Moreland, Jeff Stevens, and Steve Dexter. Many thanks to Forest Service personnel: Doug Ruppel (Douglas District Ranger), Mary Braun (Douglas Ranger District Office), Benjamin Bresnahan (Supervisor's Office), and especially Manuel Silva (Minerals and Geology Program Manager). And of course, many cavers have helped to make these projects successful.

All the caves are our responsibility and should be cared for by cavers, regardless of their Grotto affiliation (or no affiliation). We need to protect the resource we love. Caving is more than a passing fling for many of us, it is a way of life. Cavers can help protect the caves by visiting them.

Lock Maintenance Program

Once a year, during a window of approximately two weeks, we visit each cave to conduct lock maintenance. Because gas is

expensive for volunteers and to minimize our environmental impact, we try to minimize travel, so some trips may fall outside of the window. Two caves require semi-annual checks because of high humidity levels. Bells sees quite a bit of traffic, so more frequent maintenance is necessary.

All locks are removed from cave gates, brought back to town, and serviced according to the manufacture's recommendations. Results are more satisfactory in town rather than in a time-constrained attempt in the field. Temporary locks are used until the currently issued lock can be put back in place. Lock maintenance should only be done by those familiar with the proper procedures and necessary tools. Cavers notify the issuing Keyholder of any problems encountered with the lock/gate performance. As part of this project, we replaced the lock at Papago Springs last summer.

Gate Repair Program

There were recent break-ins in two caves we manage, and since management, gates, and locks are a part of cave conservation, we handle these repairs. Bells and CMC were both broken into, in spite of numerous precautions, and were open for an indefinite time. Jeff Stevens re-welded the broken bar at CMC a few days after the breach was discovered in July by bat monitors.

To solve the problem at Bells, we put in a new "old" gate. Due to safety and vandalism concerns with the steel-bar gate door at the entrance, we decided to remove it and return to using the original concrete and bar gate a little farther in the cave. The old bars were lost; it took quite a lot of effort by EGI Conservation Chair Dave Hamer and SAG Conservation Chair Jeff Stevens to figure out how the old-style gate worked and to create new parts that fit. These include two

horizontal bars, padlock, pin, and keys. All three southern Arizona Keyholders have a new key and we have also issued a fourth key to the Forest Service. The entrance gate will remain in place for a time to ensure the new system is properly working. Eventually it will be removed in the hope that bats will start using the entrance area again.

We are grateful to Manuel Silva for working with us and letting us take the lead in this issue. Project members include Dave Hamer, Jeff Stevens, CCC Chair Anastasia Rabin, CCC Secretary Brenda Haynes, Bat Specialist Dave Dalton, and Andrew Moreland, Tom Moreland, Steve Dexter, and Lori Nichols.

Cave Register Program

Dave Hamer started this program* about a year ago. All registers are being rotated annually during lock maintenance trips and old registers are being archived. There are two parts to the program. All filled-in registers will be curated by a single Grotto member. This Archivist will handle the task for three years, and then hand it off to a new Archivist in one of the other Grottos. This process will continue, rotating among the three Grottos. This way, all register material can be found in one location at any time. Archivists will accept, organize, rebuild, and manage all the registers from the nine caves we co-manage, as well as a few other southern Arizona caves as needed. They take out the filled-in pages and replace with fresh empty pages, then rebind the registers to be rotated back into the cave for the next year. The result is that all register pages will be neat, organized, readable, usable by whomever needs them, and archived by cavers. Dave Dalton volunteered for the first rotation and is setting the system up. The team who goes to a cave for lock maintenance will take



Hamer/Dexter



Hamer/Dexter

Left: Tyvek and comb-bound cave register, pencils, and instructions. Generator at Cave of the Bells entrance used to power the welder.



Hamer/Dexter

Air-ventilation system being installed for Bells gate repair. Left to right: Dave Dalton, Brenda Haynes, Lori Nichols.



Hamer/Dexter

Jeff Stevens at the newly repaired inner gate to Bells

along a fresh register with supplies and bring the old one back for archiving.

Register sheets are printed on 8.5- by 11-inch Tyvek waterproof paper using a laser printer; the pages and print are waterproof and very tough and are bound using a comb binder machine. We supply #2, 0.7-millimeter lead pencils and instructions (also on Tyvek paper) for filling out the register on the same sheet as instructions on proper key usage. These materials produce a readable register impervious to mud, dirt, or water. The cover sheet has the cave name, the three managing Grottos, and their contact information. The register, pencils, and instructions are stored in a thick (8 millimeter), extra-large (8.5 by 11 inches) Zip-loc bag. We are investigating the use of welding rod storage containers for the in-cave registers in lieu of PVC pipe.

Sphinx Cave Restoration

Sphinx is a very muddy cave except for the prettiest section, which is at the back of

the cave after a climb up and over flowstone. The goal is to prevent mud being tracked into the back from the rest of the cave. For the first two years of the project, we prepared the “landing” by building a flagstone trail on top of the mud so we could traverse, and therefore work, in the pretty section without tracking in mud. The flagstone-lined trail is at least 40 feet long, and goes over deep, and in places deeply trenched out, mud. Sphinx has been closed for most of the last two years due to Covid-19, but we are planning to resume work soon. Small teams will first use dry nylon brushes to clean away as much mud as possible, then start the slow, deliberate process of wet-cleaning mud from delicate areas. This will include an 8-foot-wide brown swath down a white flowstone wall, which will be the last and most difficult section. After that we can re-flag the trail in the restored section and issue permits again; permits will require compliance with strict rules about glove and shoe changes at the climb. All Grotto members and other cavers will have input on developing the protocols. Sphinx will remain closed to recreational caving until the conservation project is complete.

Lower Van Horn Rope Project

Lower Van Horn Cave had a rope left in it by unknown people. We do know that it has been there for seven years because of the metal tag, and seems to be in acceptable condition, but we do not know the rope’s history before it was placed in LVH. Last year Brenda Haynes donated a rope and webbing. Our current plan is that Brenda will buy another rope (11-millimeter PMI) and enough webbing for two rigs. Each rigging has three substantial anchors (0.5-inch diameter, 7 inches long) installed by Mike Cuomo. There are many reasons not to leave ropes in a cave, but we believe we need to be proactive to prevent problems in this cave. All trips going into LVH use a rope (or should). If we don’t leave a rope there, some other caver will, and we won’t know the rope’s condition. Among the three

Grottos, we have the expertise and the ability to maintain and rig the ropes. These ropes and webbing will have metal tags with installation dates and will be rotated, cleaned, deconned, and inspected annually by local cavers. Ropes and webbing will be replaced when determined they should be.

Trail Work

Part of the wilderness and caving experience includes the trip to the cave entrance. Visual cues on the way to a cave, or anywhere we like going, set a tone for what is to follow. It is part of an attitude that many of us have about our surroundings, especially for the wilderness that so many of us love. A trail to a cave that is poorly maintained increases risk of erosion and environmental degradation. It also may send the wrong message to visitors about the need for conservation of all natural resources in the area. We have done considerable work at Sphinx and Onyx, including re-routing the trail to Onyx near the top. These trails receive more traffic because of the project work we do in the caves, so we made the trails extra beefy, both for the sake of the hillsides and for cavers’ safety.

Thanks to Peter Kane and Justine Mayo, who did much of the trail work at Sphinx. Thanks to all who worked on the Onyx Trail, including many SAG members:



Hamer/Dexter

The entrance at Bells with air-ventilation and power cable going to the former inner gate that is now retro-fitted



Ashley Mains

The new inner gate at Bells from the inside showing locking bars in open position and instruction plaque for upper bar release

Joan-e Rapine, Tom Rapine, Beth Pajkos, Zylia Pajkos, and Carl Stubens.

The last 100 feet of trail leading to the Onyx entrance was constructed a couple years ago and has seen quite a bit of trampling by cows. A future trip will be necessary to repair the damage.

Onyx Cave Surveying and Carbide Cleanup Projects

Onyx cave is managed solely by EGI, following its Onyx Cave Management Policies. Cavers from other Grottos, as well as EGI members, have contributed to the cave's conservation and restoration efforts. Onyx Cave has been closed since early 2020 due to the Coronavirus pandemic and the political climate surrounding it. The EGI Board of Directors is discussing how best to reinstitute recreational and work trips so that cavers feel comfortable and different preferences are accommodated.

Onyx has appreciated the time off; with no human traffic, some impacted areas have begun to recover naturally, and the cave looks better than it has in decades. The gate has been maintained and is functioning properly. Someone attempted to dig into the Annex area last summer but was stopped by the reinforced concrete. We filled in that area and it is now looking good.

No carbide cleanup or surveying trips have taken place since the pandemic. Hopefully surveying will resume soon, and we can finish the map in honor of Lang Brod, who started the mapping of Onyx many decades ago. Carbide clean-up trips will probably be an ongoing project for many years to come. Thanks to the many who have helped out and supported both these projects.

Flagging tape in the more sensitive areas of Onyx has been maintained as needed and changed every two years, regardless of condition. Flagging is used in sensitive/delicate areas to mark surfaces that are prone to human impact. It will be replaced on the next trip. (Editor's Note: Surveyor's flagging tape, especially the biodegradable type, is not appropriate for some cave habitats. Test first, and then monitor any product placed in a cave for long-term applications.)

Cave Entrance Welfare Check Program

When the caves close for bat season, we do our crawling and climbing aboveground. This leaves cave entrances unchecked for a good portion of the year, and unfortunately, we have been experiencing some vandalism during that time. Dave Hamer has initiated a Cave Gate Welfare Check program so that when an incident occurs, we can investigate and begin repairs as quickly as possible. We are responsible for 10 gated caves and would

like to also include five ungated caves in the program. While the caves are open, the Keyholder schedule shows which caves are being visited and how frequently. If the caves are visited, any vandalism should be reported. If there is a gap in visitation or the caves are closed, we will have a list of volunteers that Dave can contact so that the entrance can be checked and reported. When the caves are open, the welfare check will also include a permit for a trip inside should the volunteer desire it.

Forest Service and Grotto Partnership

These projects, and the relationship the Grottos have with each other and Coronado National Forest, are the result of hard work over several years, spearheaded by Dave Hamer, Anastasia Rabin, and Jeff Stevens, and assisted by many others. As a result, cavers have the lead in decision-making and actual management, which will help the caves immensely. We, the local Grotto, have the interest, the knowledge, and the expertise to take on management of these caves, and we are working in partnership with USDA Forest Service personnel to plan and implement conservation measures. Grottos in southern Arizona are working on conservation of all aspects of our caves, those we've discussed above, as well as biological resources and habitats. Our multi-Grotto bat project is described in another article.

Acknowledgements

Among southern Arizona Grottos, we like to recognize and put to work the diverse skill-sets and expertise that different cavers can contribute to the overall goals of cave conservation management. On that note,



Hamer/Dexter

Steve Dexter, Jeff Stevens, Dave Hamer removing outer Bells gate door

we extend big thank yous to everyone who does background work or shows up to help accomplish all these projects. For the word-smithing and editing to prep this NSSNews article, we especially appreciate the time and expertise of Dave Dalton and Sandy Wolf.

*Conservation Editor's NSS History

Note: Registers in Arizona Caves were initiated decades ago, circa 1970s or before, as part of a national NSS and federal agency effort to document cave visits and gather data on the human use of caves. Encouraged by John M. Wilson and other NSS members, through a project known as the NSS Contemporary Cave Use Study, many agency, conservancy, preserve, and private land managers worked with NSS Grottos to install registers, monitor the containers, and archive the register documents that accumulated. Register projects evolved as cave management programs matured. Over time, programs in some areas slowed due to lack of funding and personnel. NSS members are working to rekindle, reorganize, collect, and replace registers to continue this multi-decade cave monitoring project. Contact ccus@caves.org regarding the NSS Contemporary Cave Use Study.



Bells gate installation crew. Left to right: Steve Dexter, Jeff Stevens, Lori Nichols, Brenda Haynes, Dave Dalton, Anastasia Rabin.

Challenges to Conservation of Caves in Wilderness Areas on Forest Service Lands

Hans Bodenhamer

This article considers challenges associated with cave conservation in designated wilderness areas managed by the US Forest Service. There are similar challenges for cave conservation in wilderness areas managed by other agencies. However, this article is based on observations made by the Bigfork High School Cave Club and their work in caves on four US Forest Service wilderness areas, three in Montana and one in Arizona. This article does not dwell on the problem of defining caves as independent wilderness areas. It only considers caves that are within designated wilderness areas and therefore part of the wilderness area, and subject to the same guiding philosophies, management, and regulations as the surface above the caves.

What is a Wilderness Area?

The Wilderness Act of 1964 describes wilderness as an area of generally undisturbed federal land. Specifically, Section 2(c) defines wilderness as:

A wilderness is an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain...without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions... with the imprint of man's work substantially unnoticeable; (The area) has outstanding opportunities for solitude or a primitive and unconfined type of recreation.

Accordingly, conservation activities conducted in caves in wilderness areas must not detract from the undeveloped primitive

nature of the area. Yet, without reasonable conservation efforts, it is likely that some caves will be highly impacted by the recreational activities of visitors and will lose the character of being "untrammeled by man."

Observations From a Few Caves in Wilderness Areas

The observations of the Bigfork High School Cave Club are limited—we have worked in a handful of wilderness areas on Forest Service lands. However, there are considerable similarities to caves in other wilderness areas. Hopefully this article will provide managers and others interested in cave conservation with some insight.

1. Most caves in wilderness areas probably do not need special consideration in regard to conservation. In a review of 159 known caves in the Bob Marshall Wilderness of Montana, most were very infrequently visited and only two contained rare and fragile resources. Visitation rates to most caves in the Bob Marshall Wilderness are less than 5 people every 10 years. Two caves in the area contain rare and fragile mineral deposits, and one contains a significant paleontological site. None of the caves are known to provide unique habitat for cave adapted fauna.

2. In some wilderness caves that have rare and fragile features or contents, the resources are being severely impacted by human visitation. Although caves in wilderness areas with rare and unusual resources are often little known and remain in good shape because they're very difficult to access, a few have been plundered and others are left with negative impacts from visitor traffic.

One small cave in the Miller Peak Wilderness Area of Arizona was plundered by unscrupulous persons searching for Native American artifacts. In 1989 the cave contained ochre-painted Native American rock art covering most of a 2-foot-wide calcite drapery. By 2017, when the BHS Cave Club repeated monitoring, the drapery had been chipped out and removed, and the floor of the cave near the drapery had been illegally excavated to a depth of over 3 feet.

In the Bob Marshall Wilderness of Montana, Blood Cave contains spectacular blood-colored speleothems. In a recent trip to establish monitoring, the BHS Cave Club determined that many of the spectacular speleothems had been trampled, smeared with mud, or broken by careless cavers (see Figure 3). Two other caves in the Bob Marshall Wilderness Area contain large areas of pristine, mud-cracked, clay-covered floors. The formerly pristine surfaces of these deposits probably dates back to the last glaciation. Unfortunately, sizeable parts of the floors in both caves have been heavily trampled by the over-zealous actions of cavers searching for leads that would make the caves go deeper.

3. A few caves in wilderness areas have high visitation. Some caves in wilderness areas are recreational destination sites and receive unusually high visitation. Wind Cave in the Jedediah Smith Wilderness Area of Idaho has an estimated annual visitation which exceeds 1000 person-visits per year. This cave is well advertised on the internet and social media. Consequently, the cave is a focus of management for the Forest Service.



Figure 1. Ochre-painted Native American rock art on stalactites in a wilderness cave in Montana. Similar rock art in a wilderness cave in Arizona was removed by unscrupulous persons who broke out a drapery decorated with Ochre-painted dots. Looters also illegally excavated the floor below the drapery to a depth of over 3 feet.



Figure 2. A grizzly bear skull and bones of small mammals on the floor of a pit just beyond the entrance of a cave in a Montana Wilderness Area. The floor is estimated to contain the bones of over 50 animals that fell into the pit. Without the proper research permits and carefully considered minimum-impact protocols, removing bones or the contents of caves is a federal offense, detailed in the Federal Cave Resources Protection Act of 1988.

Parking has been moved back from the trailhead to accommodate more cars. The trail to the cave is well maintained with a footbridge crossing a stream and a safety fence and sign at the cave's entrance. However, other caves with unusually high visitation often lack any management.

The Blood Cave/Silvertip System receives an annual visitation between 25 and 200 person-visits per year. This high visitation has impacted resources and probably also affects the encounter standards set to maintain the character of wilderness solitude. The Forest Service recently sponsored the BHS Cave Club for two trips to establish monitoring in Blood Cave, but no Forest Service personnel has visited the cave in over 20 years, and plans for conservation of the cave seem to be assigned to a low priority.

The Challenge of Access

Most caves in wilderness areas are in remote settings and access is often arduous. Transporting caving gear to explore cold, wet, vertical caves can create logistical nightmares. This often selects the caliber of visitors to wilderness caves and offers a modicum of respite from visitors likely to write graffiti or break speleothems to take as souvenirs. However, it also makes some cave management and conservation activities nearly impossible. The patrolling and repeat monitoring of caves are not casual endeavors to be added to the wilderness managers workload. Furthermore, any conservation activities that require special training and the transport of special equipment will necessitate much forethought and extra planning.

The Challenge of Limited Forest Service Staff and Funding

According to the Forest Service National Visitor Use Monitoring program, visitation to wilderness areas has been gradually increasing for some time. However, in 2020 visitation to wilderness areas saw a 75% increase associated with the COVID 19 pandemic. This increase waned to a 25% increase in the following year but still remains higher than most previous years. The increase in visitation to wilderness areas is not coming with additional funding or staff. Also, because the increase is mostly concentrated near river corridors and major trails, there are less Forest Service funds and staff available to focus on conservation of caves in wilderness areas.

The Challenge of Wilderness Guidelines and Regulations

The BHS Cave Club repeated cave monitoring activities in two caves within the Miller Peak Wilderness Area of Arizona. Both caves have well established in-cave trails and one has an internal gate. The in-cave

trails are semi-permanent and were built using a combination of PVC pipe and survey ribbon. These trails have guided visitors away from fragile floor deposits for decades. The internal gate in one cave selects who visits one particularly fragile part of a cave by requiring potential visitors to acquire a key from a local grotto. These in-cave trails and the internal gate may have preceded the designation of the area as a wilderness and could be considered "grandfathered in." However in 2017, when the BHS Cave Club repeated monitoring in both caves, none of the Forest Service staff had been in either cave and none were aware that these wilderness caves contained in-cave trails or a gate. [Editor's Note: Please be alert to the fact that the effects of long-term PVC outgassing can cause harm in cave ecosystems.]

As a result of the effectiveness of the in-cave trails for conserving cave floor deposits in Arizona's Miller Peak Wilderness, the BHS Cave Club recommended installation of similar trails in Blood Cave of the Bob Marshal Wilderness in Montana. They also recommended considering a gate at the entrance of one cave with outstanding paleontological deposits. These recommendations were met with some opposition and seem unlikely to be heeded. Forest Service personnel felt that installing semi-permanent trails in a cave in a wilderness area would be a breach of wilderness guidelines and regulations. Similarly, they did not consider a gate on the entrance to a wilderness cave to be a viable conservation option.

The Challenge of the Wilderness Caver Mindset

Cavers that venture into wilderness areas to explore caves are often looking for an extreme recreational experience that will separate their adventure from that of most other caving enthusiasts. These cavers yearn to be the first, or among the few, to explore a newly discovered cave. This wilderness caver mindset, in itself, is noble; it typifies mankind's spirit of exploration which has allowed us to advance as a species and as a society with diverse interests. Furthermore, the mindset of valuing exploration would seem to be congruent with the wilderness ethos of visiting a place which is "untrammelled by man." Yet, the reality we see in the wilderness setting is that good conservation practices often take a backseat to the wilderness caver mindset.

Because the access route to wilderness caves is often long and arduous, wilderness cavers typically are tired when they start the trip into a cave. Tired cavers are less careful, and that makes it difficult to avoid damaging fragile cave features. Also, because caves in wilderness areas are typically not easy to access and explore, most cavers plan trips that are part of a special vacation. This results in a sense that the cavers have very limited time to explore wilderness caves. Consequently, conservation practices are neglected—for example, the protocols of taking time to find routes around fragile features, or placing trails on durable surfaces through areas with fragile

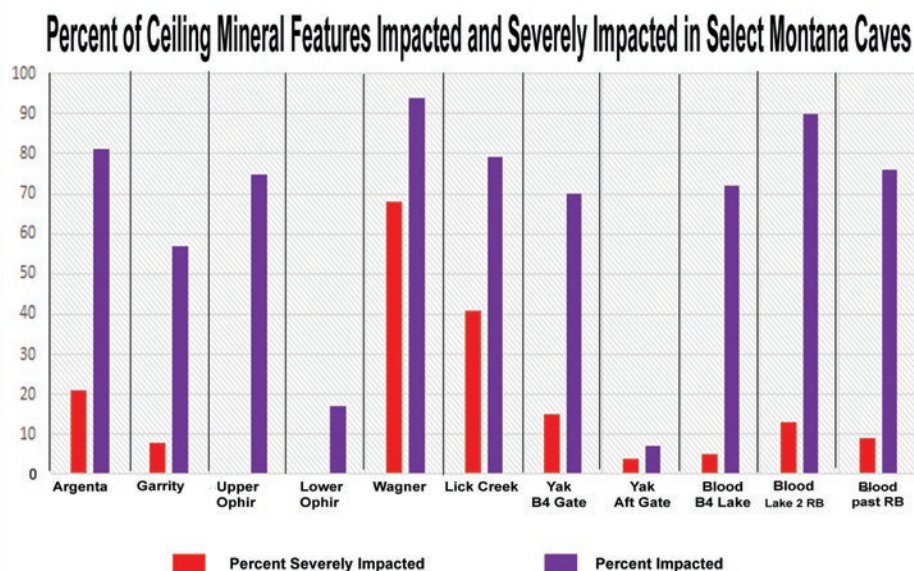


Figure 3. This graph compares the condition of ceiling mineral deposits in heavily vandalized, non-wilderness caves throughout Montana to those in three parts of Blood Cave. Blood Cave data is on the far right of the graph. Red bars show the percent of severely impacted features in each cave and purple bars show the percent of impacted resources. Note that in some parts of Blood Cave, mineral features are in much worse condition than those which are outside of the wilderness area in caves considered heavily vandalized.



Figure 4. Visitor traffic has covered blood-red flowstones in Blood Cave with a thick layer of mud. Also, the flowstone on the left has been badly smeared by visitor hand traffic, and there are a few broken stalactites in the lower right. A slightly more difficult route to the left would have avoided damaging these features.

floors deposits are not followed. Lastly, some wilderness cavers feel that few if any will follow in their footsteps. Because they feel that no one is likely to see the cave again, they tend to have underlying attitudes about attempts to conserve fragile features being wasted efforts.

Suggestions

There are no easy solutions to the challenges of conserving caves in wilderness areas. A few suggestions are made here-in. Hopefully these will spur wilderness cavers and managers to consider activities and programs which will help conserve wilderness caves and maintain these caves as an integral part of the "untrammelled" wilderness experience.

1. Develop and approve strategies and techniques for management of wilderness caves depending on the spelean resources and recreational values of each class of cave. Rather than wait to develop specific management actions for wilderness caves as problems develop, the Forest Service and interested parties could develop a plan that considers wilderness caves in classes based on resource and recreational values. In this plan provisions could be made to install cave signs, trails, and gates in rare cases where exceptional resources are in danger of being damaged by visitors.

2. Assign Forest Service staff at the regional and/or federal level the specific task of managing caves in wilderness areas. At present regional and federal cave and karst coordinators serve in an advisory role to

Forests with caves in wilderness areas. Most of these coordinators serve in these roles as a collateral duty prioritized lower than other programs. Giving the staff in these positions slightly more authority, time, and resources could alleviate problems with turnover at the local level and provide for a more consistent nationwide program.

3. Develop partnering agreements between the Forest Service and those interested to plan and conduct conservation activities in wilderness caves. NSS Grottos in Arizona assumed much of the management responsibility for the caves in the Miller Peak Wilderness Area. Unfortunately, this is not typical in comparison to the agreements and partnerships that are common in other parts of the United States. NSS Grottos and Conservation Task Forces have done exemplary jobs in their management of many caves. Their management of keys, restoration projects, compliance with closures for bat use, construction and maintenance of gates, in addition to leading guided tours in some caves, are a phenomenal testament to the dedication and deep concern that NSS Grottos have for wilderness caves and their resources. Yet it seems that many of these well-conceived practices could devolve if Forest Service personnel turns over, or the good intentions of Grotto members erode. Formal partnering agreements ensure that good practices continue and allow the Grottos and the FS to clearly define their roles as partners.

The Pros and Cons of the BHS Cave Club's Point-and-Shoot Photomonitoring Methods ***Hans Bodenhamer, Bigfork High School Caving Club***

The Bigfork High School Cave Club's photomonitoring methods are simple and basic. Their style of photomonitoring is easy to establish and easy to repeat. Their methods require a detailed cave map, but do not require placing permanent in-cave markers. When repeating photos, it is easy to add additional photo points, which can be useful for previously unnoticed features or changes that are outside of existing photo views.

The BHS Cave Club's Point-and-Shoot Photomonitoring Methods

To establish photomonitoring, we make photographs of features considered to be of high resource value, or features likely to be altered by natural causes or human activities. We use a handheld, Canon PowerShot digital camera with a built-in flash, but almost any camera with an automatic focus and reasonable resolution could be used. For each image, the point from which the photo is taken is marked on a 1:240 (1 inch = 20 feet) paper copy of the plan map of the cave. A brief description of the feature and the magnetic azimuth of the photo view are also

documented. Magnetic azimuths are taken with a SUUNTO KB_20 360R compass.

After the in-cave work, the number of the photograph and the year it was made are digitally labeled on the image using Photoshop. After labeling, all photo data is transcribed into GIS, photos are hyperlinked to photo points on cave maps, and the condition of features in photo views are classified. However, simpler methods of archiving data could be used for those who do not have access to Photoshop and GIS.

Photomonitoring images are repeated by taking laminated, paper copies of the original photos and photo point maps with descriptions into each cave. Two or more members of the monitoring team advance in front to locate photo views. For each located view, they place a laminated photo on the floor, or against the wall, so that it is oriented the same direction as the photo view. Then, two or more members of the team follow, and at each laminated photo point, the following team attempts to rephotograph the original view. Typically, one member will hold the laminated photo and light the

area to be rephotographed, while the other member positions and holds the camera to match the view in the laminated photo, and then retakes the photo.



BHS Cave Club member relocating photo views to make repeat photomonitoring images.

Findings of Recent Repeat Photomonitoring

Recently the BHS Cave Club repeated photomonitoring for eight caves on US Forest Service lands throughout Montana. The initial photomonitoring in these caves was established seven to eleven years ago. Repeat photomonitoring detected natural and human-caused changes in all of the caves.

Natural changes were far more noticeable and dramatic than human-caused changes. Natural changes included decreases in the size of wood rat middens in five caves, decreases in the amount of moss growing at the entrance of two caves, decreases in the amount of fungal growth on logs in the entrance pit of one cave, and an increase in the amount of algae growing on walls just inside the entrance of another cave. Although these changes could be part of a natural cycle, they might be driven by human-caused climate change.

A few human-caused changes recorded damages to cave features. These changes were minor. They included three new graffiti which had been lightly scratched into bedrock; a slight increase in mud smearing of surfaces due to visitor traffic; and one rock surface that had become slightly chipped and broken by visitor traffic. However, in all of the caves, mud smearing and rock chipping were minor compared to the mud smears and other traffic wear which had already accrued and been recorded in the initial photos.



Figure 2. A decrease in the size and thickness of a wood rat midden in Granite Mountain Cave.

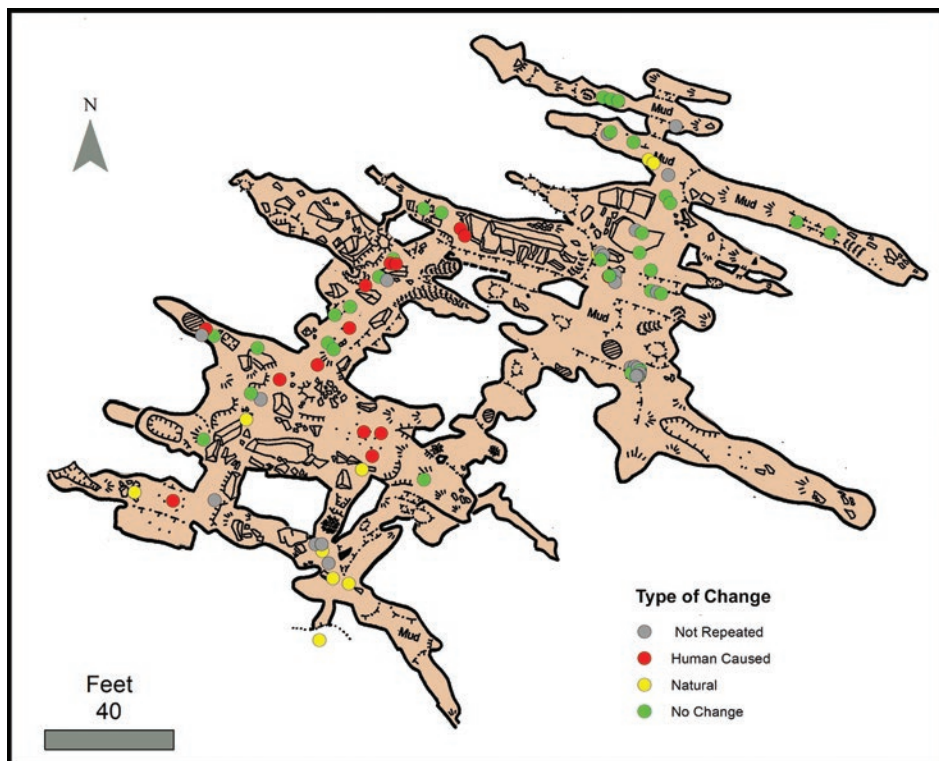


Figure 1. Types of changes detected by repeat photomonitoring in Granite Mountain Cave. Only 64% of the original 2012 documentation photos in the cave were repeated. Over 90% of the repeated photos showed no changes. A few repeated photos showed natural changes including a dramatic decrease in the size of wood rat middens. A few also showed human-caused changes. Most of these showed a semi-permanent trail which had been installed to keep visitors from trampling delicate minerals on the floor.

It is suggested that, for all caves in which the BHS Cave Club recently repeated photomonitoring, resources are probably not going to be greatly or rapidly impacted by human visitation unless visitor use changes. It is further suggested this equilibrium of very gradual resource degradation could

come to a tipping point if visitation to the caves dramatically increases. A dramatic increase in visitation might result from the rapid population growth in some Montana counties and/or future social media venues promoting caves as recreational destinations.



Figure 3. New scratched-into-rock graffiti detected in Ophir Cave. White arrows point to the new graffiti.

Consider the Width of the Photo View

Using the BHS Cave Club's methods, the most effective photos for accessing change have photo views that are about 10-feet wide. Wider photo views did not capture enough detail to effectively record changes. However, a wider image could work with better lighting and a higher f-stop. To improve the lighting and increase the f-stop, an off-camera flash and a camera tripod mount might be required, which would complicate the club's simplified procedure. Narrow photo views (2-feet wide or narrower) are difficult to relocate and do not seem to provide enough information about the condition of the targeted feature and its surroundings.

Cons of the BHS Cave Club's Point-and-Shoot Methods

One negative aspect of the BHS Cave Club's photomonitoring method is that careful inspection of cave features is required to relocate photo views and match frames. If time is limited, some photo views will be poorly aligned, and some photos won't be repeated. For the eight caves in which photomonitoring was recently repeated, all the views were adequately aligned to assess changes. The percent of original photos that were repeated ranged from 38 to 100% and averaged 76%. In caves where the percent of repeats was low, many photos were of biological items that were not possible to



Figure 4. A poorly aligned repeated photo. Although the photo is poorly aligned it was possible, with careful study, to determine that the two tin pieces and several logs had been moved by visitors, probably for safety reasons. It is also possible to determine that one log has much less fungal growth. The BHS Cave Club takes considerable effort to realign photo views. However, in the interest of time and other factors, some photos are not so well aligned. Even a poorly aligned photo can supply useful information regarding changes to cave resources.

relocate, such as closeups of bats and fungus-covered wood rat carcasses.

Closing Thoughts on The BHS Cave Club's Photomonitoring Methods

Cave managers contemplating the merits of using the BHS Cave Club's photomonitoring methods should decide whether it is important to repeat every photo. If using the club's method, it is possible to improve the percent of repeated photos in any cave, but doing so will require more in-cave time and might not provide much more information regarding changes. If when establishing photos, managers feel that certain photo views absolutely need to be rephotographed, and the photo view should be precisely oriented, a more finely tuned method could be used, or a hybrid method could be developed. For a hybrid method, a few select photo views could be located with permanent stations and other photos could be repeated using the BHS Cave Club's simple, quick method. A more precise photomonitoring method which uses permanent stainless steel stations is detailed in "Photographs as Cave Management Tools", by Val Hildreth-Werker, in *Cave Conservation and Restoration*, Hildreth-Werker and Werker editors, 2006, pages 203 to 214.



NSS Conservation Announcements-Part 1

Submit Abstracts for Conservation & Management Tuesday at the NSS Convention in Rapid City, South Dakota - June 13-17, 2022

Calling for presentations, PowerPoints, workshops, or panel discussions for NSS Conservation & Management Tuesday Talks. Please send Val Hildreth-Werker a quick email with your request to present: valhildrethwerker@caves.org

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.

Check <https://nss2022.caves.org/index.php/abstracts/> for current infor-

mation on abstract deadlines. We invite abstract submissions for any Cave or Karst Conservation or Management talks addressing stewardship, outreach education, cave management, minimum-impact caving, or restoration. Send abstracts to valhildrethwerker@caves.org

Victor A. Schmidt Conservation Award

The annual Victor A. Schmidt Conservation Award is given annually to recognize outstanding dedication to cave conservation. The award may be given to one NSS member or to a pair of members who qualify equally for the award based on work they have done together over time. 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:

[Val Hildreth-Werker award-schmidtconservaton@caves.org](mailto:ValHildreth-Werker.award-schmidtconservaton@caves.org)

continued on page 23

The Cave Formation Repair Project 2021

Michael C. Mansur, Project Leader

The Cave Formation Repair Project began in June, 2018. It started as a trip into Black Cave to repair a broken stalagmite, after I had received training on how to apply the epoxy and drill reinforcement holes for stainless steel pins from Jim and Val Hildreth Werker. I want to thank them for their willingness to share this information with me. To date, 49 volunteers have spent a total of 1648.6 in-cave hours on this project repairing a total of 381 broken cave formations in 12 caves: Carlsbad Caverns, Spider, Slaughter Canyon, Black, Virgin, Hidden, Hell Below, Cottonwood, Pink Dragon, Fort Stanton, Little Manhole, and Rushmore. The volunteers have driven a total of 8,6313.8 miles round-trip from their homes to participate in this project.

Our latest work was Slaughter Canyon Cave and Spider Cave. There was a large irregular shaped stalagmite in Slaughter Canyon Cave that had been broken into two pieces. There had been a previous attempt by someone in the past that had tried to use a 1/8 inch diameter stainless steel wire to reinforce the two broken joints, but that had not worked. We found the two broken pieces in a small pit next to the base of the formation, which was located next to the visitor trail.

Erin Lynch, Cave Specialist at Carlsbad Caverns National Park, had asked me to attempt this repair, so we scheduled a date to do it in November, 2021. I had decided to use a 3/8 inch diameter by 6 inch long stainless steel all thread to reinforce the joint. We were able to do this successfully.

Erin had also asked me prior to the pandemic to repair to a large broken stalactite in Spider Cave. We had to put this project on hold until we received the approval to do it in December 2021.



Drilling one of the holes for the stainless steel pin. Photo by Erin Lynch

We had entered the cave with the intent to make this repair, but after arriving at the site of the broken stalactite, we began locating matches to 7 other broken stalagmites and flowstone. We decided to work on the smaller repairs on that trip, because I wanted to work on a safer method of supporting the large stalactite. We ended up repairing 7 broken formations on that trip. We also found three more broken stalactites that we will still need to locate their points of origin. It was another very productive year for the cave Formation Repair Project. I have written an eBook entitled The Cave Formation Repair Project: Restoring the Beauty of New Mexico's Caves. In it, I have highlighted all the formation repairs we have done up to July 31, 2021. I have also written step by step details on how to make the many devices we have invented which make the formation repair process more simple

and efficient, so that others can undertake similar projects. The book is available at Speleobooks, and I have copied the link here <https://speleobooks.secure-mall.com/item/The-Cave-Formation-Repair-Project-by-Mike-Mansur-4005>

The 2006 book, Cave Conservation and Restoration by Jim Werker and Val Hildreth-Werker, can be purchased through Amazon.

I want to thank all the participants for their valuable and enthusiastic help on this great project!



The broken stalagmite in Slaughter Canyon Cave after the joints have been repaired. Photo by Erin Lynch.



The two broken stalagmite pieces in Slaughter Canyon Cave. Photo by Michael Moffitt

Sociedad Espeleológica de Puerto Rico Inc. — 45 Years in the Organized Exploration and Preservation of Caves, Caverns, and Sinkholes

Adolfo Rodríguez-Velázquez, SEPRI Educational Committee Director



Family day in Cueva Yuyu / Photo by the Author

Puerto Rico has more than 2,000 caves and caverns, of which approximately 415 have been explored and about 207 have been documented. Many of these tasks have been part of the efforts of the Sociedad Espeleológica de Puerto Rico Inc. (Speleological Society of Puerto Rico Inc.), which celebrated its 45th year as an organization in December 2021.

In 1969 La Gruta Troglodite (Troglodyte Grotto) was constituted as the first foreign

chapter of the National Speleological Society (NSS), a group that by December 1976 became known as the Speleological Society of Puerto Rico Inc. (SEPRI). The incorporating members of this organization were Norman Vee, Arturo Torres, and José Martínez Oquendo. In addition to the development of organized caving in Puerto Rico, SEPRI has historically enjoyed several national and international achievements.

To highlight some of this work with recognition and thanks to the efforts of SEPRI, the following laws were established; Law 111 (July 12, 1985) "Law for the Protection and Conservation of Caves, Caverns, and Sinks of Puerto Rico," and Law 292 (August 21, 1999) "Law to Protect, Preserve, and Prohibit the Destruction of Karst Physiography in Puerto Rico." Puerto Rico was one of the first countries in Latin America and the Caribbean to achieve legislation for the preservation of cave resources.

It should be noted that in 1987, SEPRI was the main driving force behind the creation of the Río Camuy Caverns Park and Reserve. SEPRI was a pioneer in carrying out countless explorations, rescues, scientific investigations, and other activities on the Park and Reserve. In the aftermath of hurricanes Irma and María, part of the cleaning and inspection tasks for the reopening of the Park were carried out by SEPRI.



Vertical Practices / Photo by Robert Moreno

Members of this organization have represented Puerto Rico in scientific congresses, explorations, and training sessions, among



Orlando Díaz, member of the research group, taking environmental measurements in Cueva Chorros / Photo By Luis Nieves



Immersion group IN Cueva Ensueño



Research Group working in Cueva Lechugas / Photo by Luis Nieves

other activities at the international level. The most recent representation was during the National Congress of Speleology in Mexico last November. SEPRI has been a fundamental contributor to the development of scientific research in the study of troglobites, bats, and minerals, among other topics. To mention one example, we can highlight the study of the ecology and biology of *Alloweckelia gurneei*, a tiny crustacean endemic to the caves of the Camuy River; the last sighting in the system was in 2014 by scientists from the Universidad del Sagrado Corazón and members of SEPRI.

The SEPRI organization offers workshops to train members in vertical techniques and cave safety certifications. They also organize monthly talks on various topics for the benefit of the members and the general public. In addition to its board of directors, SEPRI has seven permanent committees to carry out work, structuring, and action. The committees are Safety and Rescue Committee, Education Committee, Scientific Committee, Exploration Committee, Underwater Committee, Conservation Committee, and Activities Committee. These committees have been important factors in the achievements and operation of SEPRI.

Without a doubt, SEPRI is an organization that deserves to be celebrated, known, and supported. The effort and commitment that its members have given over the past 45 years to the conservation and preserva-

tion of sensitive and important spelean ecosystems will be an incalculable legacy for future generations. Happy Anniversary SEPRI! For more information you can visit <https://www.sepri.org/> or <https://www.facebook.com/sepri.org>.



Anniversary Celebration Group Photo



Río Camuy Caverns Park and Reserve was opened in 1987 with SEPRI's help.

Under Earth Images



Exploration Trip Cueva Vientos /Photo by the Author



Research Group working with Puerto Rican Boas at Cueva Melano / Photo by Luis Nieves

Exotic Snakes: Threat to the Puerto Rican Karst

Adolfo Rodríguez-Velázquez, SEPRI Educational Committee Director

Introduction

In Puerto Rico, the karst region makes up 28% of the land surface, and 90% of the karst in the north region of the Island. According to the last population census carried out in 2020, of the 78 municipalities that make up the island, the north zone has the 7 municipal territories with the highest population density per square mile. In this northern karst region with the highest population, there are 8 state forests. These areas are susceptible to the introduction of exotic species due to their proximity to urban areas and fragmentation. An exotic species (also called foreign species, alien species, or introduced species) is one that reaches a new ecosystem accidentally or intentionally. Once it is established and begins to cause damage to the local ecosystem, or begins to cause harm to humans, it is then called an invasive species.

Invasive and Exotic Species

Due to its tropical climate, geography, number of inhabitants, and other factors, Puerto Rico is susceptible to invasive species. According to Appendix 2 of the Regulation 6765 of the Department of Natural and Environmental Resources (DRNA), 14 species of animals are classified as invasive, and the Appendix 5 exposes 37 classified as exotic species in the wild. This list has not been updated since 2004, and clearly the number has been increasing.

In the last decade, a group of snakes that pose the greatest risk to karst forests has raised red flags. No species of snake is listed in Appendices 2 or 5 of Regulation 6765, even though conservation groups, herpetologists, speleologists, and other scientific researchers have documented and alerted authorities about the presence of at least 4 species of exotic snakes. Some even have populations established in the wild in Puerto Rico and fit the criteria to be considered invasive species. It is understood that the arrival of these snakes has been a product of the market or pet trade; the vast majority is illegal. It should be noted that Appendix 4 of Regulation 6765 only allows the sale and possession of two species of snakes on the Island, the garter snake (*Thamnophis sirtalis*) and the ball python (*Python regius*).

Exotic Snake Species Introduced to Puerto Rico

Red-tailed boa (*Boa constrictor*):

It is native to Central and South America. It grows to average 2.3 meters (7.5 feet) in the wild. In captivity it can exceed 3 meters (10 feet). They give birth to live young (20 to

60 hatchlings per litter). Currently in Puerto Rico, populations of this species are established in the West, North, and Southwest zones. It is a constrictor snake and generally feeds on small mammals, birds, and reptiles. Usually, it is more active at night. It is believed that the first population was established in Mayagüez and that it could have been from an accidental liberation at the Mayagüez Zoo. Also, some people indicate a possible looting in the institution and the release of certain specimens. It should be noted that the red-tailed boa is a very popular pet in Puerto Rico, despite being illegal. The trafficking of specimens has been documented. This activity could have helped the distribution of *B. constrictor* on the island. These organisms have been observed in vehicle engines, acting as stowaways, and traveling long distances, further distributing individuals. This species, if cornered or manipulated, can attack.

Reticulated python (*Malayopython reticulatus*):

It is native to Southeast Asia. In Puerto Rico, there are populations established between the municipalities of Bayamón, Naranjito, Comerío and Aguas Buenas. Specimens have also been found in Barceloneta and Arecibo. It can grow to an average length of 4 meters (13 feet) in the wild. In captivity it can exceed 6 meters (20 feet). This species lays eggs (20 to 60 per clutch), which can be guarded by females. It is mostly active at night and constricts. It usually feeds on mammals, birds, reptiles, and even fish. On the island there are various reports of these predating poultry animals (chickens, turkeys, ducks). The first individuals found in the wild were in the mountainous area of Bayamón and Naranjito. It is said that

these could be linked to the accidental or incidental release of specimens. They are often popular with collectors of exotic pets for their size. This is considered the largest snake in the world with reports of specimens of up to 10 meters (32 feet). It is extremely rare for an individual to reach these dimensions in captivity and unlikely in the wild. It is usually quite aggressive if it is cornered, or if manipulation is attempted. They are quite strong snakes and large individuals should not be handled by one person. Despite not being a venomous species, its bite can be quite painful due to the type of teeth.

Striped Keelback (*Xenochrophis vittatus*):

It is native to Indonesia and Malaysia and introduced to Singapore and Puerto Rico. In Puerto Rico, there are populations established in the eastern and northern municipalities. It is a diurnal colubrid that usually feeds on amphibians, fish, and other small reptiles. It is believed that the species was brought to the island posing as garter snakes. The first individuals were collected in the municipality of Carolina and it is believed that these could be related to the escape of specimens from a container at the Luis Muñoz Marín International Airport. When handled it is extremely docile and generally does not cause bites. They can measure up to 70 centimeters (2.2 feet). This snake lays eggs (9 to 12 per clutch).

Ball python (*Python regius*):

It is native to sub-Saharan countries in West Africa. It is understood that it does not have an established population on the Island. However, adult individuals have been found in the wild in more than 15 municipalities.



Inspection of reticulated python that was captured in Naranjito



Ball python (*Python regius*) / Photo by the Author



Reticulated python (*Malayopython reticulatus*) / Photo by the Author

Possibly escaped or intentionally released pets because the purchase and sale of this species is legal in Puerto Rico. It is a constrictor and feeds on small rodents. In general, it is quite docile and when threatened it tends to roll into the shape of a ball (hence its common name). Identification of this species: It can grow to 1.5 meters (5 feet). It usually has brown and black asymmetrical patterns, and the belly has white scales and faint spots. However, these can have several variations in coloration (polymorphism), which is why they are popular as pets (yellow, albino, black, white.). These lay eggs (6 to 11 per clutch).

Negative Effects of these Species on Karst Areas

Competition and Displacement

These are top predators in food chains and therefore represent a threat to native organisms due to the demand for food and space requirements. For example, due to the similarities in diet and habitat, these

reptiles compete with our native snakes for the availability of prey, shelters, places to lay eggs, spaces for sunbathing, among others. The Striped Keelback preys on reptiles and amphibians, as well as a native snake, the Puerto Rican racer (*Borikenophis portoricensis*). In addition, both share similarities in habitat preference, which could limit spaces with ideal conditions and reduce the amount of prey available to the Puerto Rican racer.

Introduction of Pathogens

Some of these exotic species bring pathogens with them such as parasites, bacteria, and fungi that can affect our native fauna. An example of this is the fungus *Ophidiomyces ophiodiicola*, which affects the skin of snakes and makes it impossible for them to feed due to the deterioration of tissue in the jaw area. In 2020 this pathogen was detected in a Puerto Rican boa (*Chilabothrus inornatus*) in the karst zone of the metropolitan area. The arrival of this fungi to the island could be related to the increase of exotic snakes.

Predation of Native, Endemic and Migratory Species

Most snakes feed on vertebrates and have a varied diet of reptiles, amphibians, mammals, and birds. On the island, the red-tailed boa has been documented preying on native birds. The Striped Keelback has been documented consuming native frogs and lizards. This can lead to a decline in the populations of these species and/or make those that are already classified as endangered even more vulnerable.

Predation of Poultry and Pets

Species such as reticulated pythons and red-tailed boa may opt for slightly larger prey such as poultry. Sometimes these are trapped inside the cages after having ingested several animals. This could represent economic losses for the owners of the animals. Pets such as cats and dogs could be preyed upon by species such as reticulated pythons if they are kept outside the homes. In some cases, it may be difficult for the snake



Red-tailed boa (*Boa constrictor*) / Photo by the Author



Red-tailed boa eating a ruddy quail-dove (*Geotrygon montana*) in the Cambalache State Forest / Photo by Eliuned Maldonado



Striped Keelback (*Xenochrophis vittatus*) / Photo by the Author

to ingest them, but it does not exempt them from causing some damage to the point of suffocation.

Increased Fear toward Snakes

Snakes have a bad reputation and are feared by many people. When snakes begin to consume domestic and farm animals many people have chosen to kill them. In addition to not using the correct euthanasia methods, they kill native species because they do not know how to correctly identify exotic species. Some people even avoid going to natural areas for fear of encountering one of these snake species.

What Is Being Done and What Is Coming Next?

Environmental groups, certain government entities, researchers, and non-profit organizations are currently working on the eradication of these species from the karst zone and the rest of Puerto Rico. Likewise, research is being carried out to determine the ecological and biological aspects of these species on the island and their impact on the

native fauna. Initiatives such as “*Proyecto Serpientes en Puerto Rico, Inc.* (PSPR)”, have developed workshops, conferences, and guided tours to educate communities, government, and private agencies about how to identify and manage these species.

Despite the fact that various sectors are working to address this problem, a greater collaborative effort is needed along with stronger support for the various projects and initiatives carried out by private and public entities. Public education is vital, therefore outreach campaigns must be supported and promoted. These must be accompanied by specific management plans to eradicate or at least reduce populations. The panorama and consequences of invasive species in Puerto Rican karst areas needs much more attention.

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Bat Monitoring in Southern Arizona: A Multi-Grotto Project

Sandy Wolf and Dave Dalton, Escabrosa Grotto, Inc., Bat Research and Consulting, LLC

Some caves on the Coronado National Forest in southern Arizona are closed seasonally to protect bats. Closure dates were determined in the early 1990s based on available data on bat use and natural history patterns. Closures are divided into summer and winter seasons with set dates for each season. However, the caves have never been monitored systematically, or recently, for bat use.

Cave Canyon is at the south end of the Huachuca Mountains, just north of

the Mexican border, in oak-pine woodland with an ephemeral stream. Van Horn Cave (VH), Cave Mine Cave (CMC), and Happy Jack Cave (HJ) lie along a half-mile stretch of the canyon at elevations from 6100 to 6400 feet. Van Horn is gated and closed in summer for a maternity colony of Townsend’s big-eared bat (*Corynorhinus townsendii pallascens*, COTO). Happy Jack is ungated but also closed in summer for COTO. Cave Mine is gated and closed in winter for hibernating COTO and cave

myotis (*Myotis velifer*, MYVE).

We were contracted in 2006 by the Forest Service to survey these caves for bats; we documented maternity colonies of COTO in VH and HJ. We also observed fringed myotis (*Myotis thysanodes*, MYTH) in CMC in late summer. We had wanted to initiate a multi-Grotto bat monitoring project in 2020 to update these data, but Covid-19 prevented it. We did some monitoring at CMC ourselves and found bats (*Myotis* spp.) there all summer. In early 2021, we

presented the Cave Canyon project to the southern Arizona Grottos: Escabrosa Grotto, Inc., Southern Arizona Grotto, and Cochise County Cavers. We received enthusiastic support and participation from all three Grottos.

Objectives were to determine if the season that bats used a specific cave matched the dates the cave was closed to protect them, to observe seasonal changes in abundance, and if possible, to determine species and type of colony (maternity, bachelor, migratory).

Simultaneous emergence counts at the caves were necessary in case bats moved from cave to cave during the night or from night to night, so we needed three trained teams for each night. We trained cavers to set up and operate camcorders and infrared lights to video-record the bats exiting the caves.

Teams, consisting of two or three people for safety, monitored bats during evening emergences once a month April through October. Observers sat away from the entrance to minimize disturbance to the bats and watched the exit on a video monitor or laptop. They counted bats with clicker counters, counting bats flying out and flying in. Camcorders don't have the resolution of high-speed surveillance cameras, so we filmed at least one count at each site with an Axis P1364 (1/250 second exposure, 60 frames/second). With this camera it was usually possible to distinguish COTO from *Myotis* because of COTO's long ears; we verified that bats at VH were COTO. Live-counting during emergences is sometimes difficult, so we counted bats on all the videos. We used slow-motion as necessary to get a more accurate number, and to identify species if possible.

We also captured bats in a harp trap at the entrance to CMC on 7 August and 21 August to determine species, sex, and reproductive condition. This was an educational and fun experience for cavers who had never seen bats up close before. We caught six species. Most bats were male MYTH. The next most frequently caught were both male and female MYVE. The most interesting captures were six female long-legged myotis (*Myotis volans*, MYVO); these bats are more often found at higher elevations than Cave Canyon. Finally, we captured one southwestern myotis (*Myotis auriculus*), and one COTO.

The project produced important results with implications for changes in cave management. Happy Jack was used by only a few bats (species unknown), which was a huge decrease from the COTO colony of 100-200 in the past. It may be necessary to gate the cave to enforce the summer closure and allow the cave to be reoccupied.

Three myotis species occupied CMC spring through fall, although patterns seem to change somewhat from year to year. In 2021, abundance peaked at 140 bats in mid-September. In 2020, abundance peaked earlier (mid to late August), with about 100 bats. The cave seems to have been used in the summer of 2021 by a bachelor colony of MYTH, a small maternity colony of MYVO, and a late-summer, migratory colony of MYVE. We think the cave should be closed to protect these bats. Because it's already closed in winter for hibernating bats, the best time to open it to cavers without negatively affecting bats seems to be spring and fall.

The best news is that the COTO maternity colony of about 200 bats at VH seems stable. It may not be a coincidence that this is the best protected cave; it is gated and



Video still of Townsend's big-eared bat (*Corynorhinus townsendii pallescens*, COTO) at Cave Mine Cave.

closure dates are biologically appropriate to protect the colony.

The Cave Canyon 2021 multi-Grotto project for monitoring bats was a huge success. Volunteers (including us) contributed 746 hours and 7,398 miles. At current rates for Forest Service volunteers, the total worth of the project is \$25,432.00. Participants, both caver and a few non-cavers, were Steve Dexter, Andrea Amaya, Peter Kane, Justine Mayo, Nicole Davis, Brian McMillan, Jeff Stevens, Vicki Stevens, John Maier, Chris DeMille, David Oase, Katrina Oase, Joan-e Rapine, Belinda Norby, Alina Downer, Yurany Amaya Nieves, and Evan Laughlin. Special thanks to Melanie Bucci, a professional colleague of ours (non-caver), who helped with bat captures and field work. All work was conducted under Arizona Game and Fish Department Permit SCL#407146 and followed USFWS white-nose syndrome protocols and Arizona Game and Fish Covid-19 protocols for working with bats.



Southwestern myotis (*Myotis auriculus*).



Typical monitoring set-up: camera, near-infrared lights, and battery. A cable connecting the camera to a video monitor allows observers to sit away from the entrance and watch bats on the monitor.

Stronger than Ever: CaveSim Conservation Education

Dave and Tracy Jackson



A student emerges happily from exploring CaveSim.

We've all heard plenty of bad news over the past few years. So how about some good news for a change? While it may seem improbable, cave conservation education is thriving despite the COVID 19 pandemic. How is this possible given virus variants, lockdowns, and social distancing? The answer is simple: CaveSim. Because CaveSim programs are typically conducted outdoors with a ventilated mobile cave, we were able to resume in-person programs in late March of 2021, and we have done more conservation education than ever before. Schools, museums, show caves, and other organizations are eager to have CaveSim educational programs at their sites, and we conducted 120 days of in-person teaching in five states from Colorado to Alabama last year. Online educational programs continued as well, and we used Zoom and other platforms to teach 60 days of interactive online classes. All told, we spent one out of every two days of 2021 teaching kids and adults about cave conservation, exploration, and science.

And what do all of these kids and adults learn? First and foremost, they learn to love caves. By putting on a helmet and exploring 60 feet of artificial cave inside the CaveSim trailer, they experience the thrill of cave exploration. One young man in Tennessee told us, "That is the coolest thing I've ever done!" CaveSim changes the way that non-cavers think about caves. Instead of thinking of caves as shadowy abstractions, the people who experience CaveSim realize that caves are amazing, beautiful systems with many

interrelated resources that are worthy of respect and protection. As a middle school science teacher from Mississippi said of CaveSim last year, "I can predict that a few years from now, CaveSim is going to be in a lot more schools because you're teaching kids, and you're making memories with kids, and you're taking care of a natural resource that we really need to take care of. These kids are going to be good stewards of caves and of our earth in general."

Participants in CaveSim programs also learn interesting and important science concepts. At some programs, students conduct multiple experiments with live cultures of slime molds (such as *Physarum polycephalum*) in Petri dishes. The students use logic and reasoning skills to discern the biological kingdom to which *Physarum polycephalum* belongs, and they learn first-hand about how organisms are sensitive to environmental issues. Students also play games in which they learn about White Nose Syndrome and about the stochastic processes involved with the spread of *Pseudogymnoascus destructans*. Thanks to a generous in-kind donation by Mary Sue Socky, some students also get to see bat guano up close to observe the presence of insect exoskeletons.

During other CaveSim programs, students participate in engineering labs, including an activity for which they design, build, test, and re-design waterproof caving flashlights. The students do not use kits for their projects, but instead use scrap materials like recyclable bottles to make their flashlight enclosures. With careful supervision, the students learn to solder circuit components.



Students in Texas are excited and proud of having bravely explored CaveSim.

While engineering labs may seem unrelated to cave conservation, these projects allow students to develop the logic and critical thinking skills that they need to accurately understand scientific concepts and to participate in conservation work as adults.

At the end of each program, students see a demonstration which illustrates that all of their school subjects are important, and that all subjects are used by CaveSim staff to build artificial caves and to teach our programs. This leaves the students with a memorable lesson about the importance of their own education. By teaching the students to love learning, we aim to develop generations of informed citizens who will advocate for the conservation of caves and karst. We wholeheartedly agree with Senegalese forestry engineer Baba Dioum who said, "For in the end, we will conserve only what we love. We will love only what we understand. We will understand only what we are taught."

The future of cave conservation education is bright. We have already done many programs in 2022, and we are making great progress in our development of new CaveSim systems. Because of generous support from many individuals and grottos we have met our fundraising goal to purchase a trailer for our next CaveSim system. John Schneider deserves extra special thanks for helping us with this endeavor, as does the Richmond Area Speleological Society. We also want to thank Peter Jones for making amazingly beautiful CaveSim mugs for sponsors. If you would like to see the list of everyone who is supporting this work, or if you would like to support it yourself, please visit www.cavesim.com/support. There are other ways to help as well, including contacting us about putting on educational events in your region. You can reach us at jacksondmit@cavesim.com. We look forward to bringing CaveSim to the 2022 NSS Convention, and we hope to see you there!

Amy Morton teaches children in Texas about friction and other physics concepts at the CaveSim SRT tower.





NSS Conservation Announcements-Part 2

Conservation Task Forces: Making a Difference

NSS Conservation Task Forces (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. NSS members of CTFs are helping to manage caves on behalf of public and private landowners.

A 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. Other CTFs lead ongoing projects that continue 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. Due to the ongoing efforts of CTFs, caves are mapped and inventoried; management plans are written and implemented; restoration and cleanups are accomplished: cave habitats are restored. Any cave/karst conservation, management, outreach, restoration, or protection concern fits.

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

Establish a New CTF

Create an NSS Conservation Task Force to focus on local, regional, national, or international cave and karst conservation issues. If your work would benefit from CTF designation, contact the NSS Conservation Division, Val Hildreth-Werker valhildrethwerker@caves.org

Save-the-Caves Conservation Grant

The Conservation Committee is authorized to award up to \$5,000 annually from our NSS Save-the-Caves Fund to make grants of up to \$1000 to Internal Organizations, Grottos, 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

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 available on the NSS website. Priority is sometimes given to conservation projects that provide quantitative research data. Awards are based on the nature of the project and available funds.

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, powerpoint, 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 and include your phone number if you need more information: Val Hildreth-Werker valhildrethwerker@caves.org

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

Caves, cavers, and the NSS appreciate your financial support!

Our Save-the-Caves Fund supports NSS Conservation Grants.

Contributions are tax deductible, of course!

The Save-the-Caves Fund is used to support the conservation goals of the National Speleological Society. It supports conservation programs and funds a number of conservation grants for restoring and protecting caves around the United States. You may choose to donate in Honor or in Memory of a friend or loved one, and notice will be sent to whomever you designate. <https://learnmore.caves.org/index.php/donate/>

NSS Conservation Memberships

Gift the caves and yourself ... or gift the caves and honor a friend or relative with an NSS Gift Membership! Any type of Membership can be gifted. Find all NSS Member categories at <https://members.caves.org>

Regular Gift Membership – full membership privileges, including an electronic subscription to the NSSNEWS for a total of \$40.00 (introductory membership \$20)

Conservation Regular – combines a Regular NSS membership with electronic NSSNEWS, plus a donation to cave conservation, to total \$140.00

Conservation Life – goes to endowed funds for Life Membership in the NSS (\$1000) plus a \$1000 donation to cave conservation, totaling \$2000.00

Send an Article for the next Annual NSS News Conservation Issue!

Submit articles for our Annual Conservation Issue each year before New Year's Eve!

Please send a note anytime to valhildrethwerker@caves.org if you plan to submit.

This Annual Conservation Issue provides an overview of worldwide conservation research, projects, outreach, evolving current best practices, and networking efforts. Val Hildreth-Werker serves as Conservation Editor for the NSS News. Send submissions to Val at valhildrethwerker@caves.org by January 15 each year. (Drop-dead-line!)

- We include conservation pieces from one paragraph to several pages.

- Please do not exceed 2500 words (or a 15,000 characters+spaces count).
- Send only text in Word docs. Include title, captions, and bylines, but no photos in Word doc.
- DO NOT embed or place images into Word documents!! Send as separate files.
- Send images as tiff or jpeg files to valhildrethwerker@caves.org AND davebunnell@comcast.net
- Send maps and illustrations in PDF format.
- Please follow the NSSNews Submission Guidelines and Style Sheet <http://caves.org/pub/nssnews/style.html>

NSS Conservation Network

The NSS Conservation Network is an email 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 stevensmith@usa.net

Notices are sent out on an 'as needed' basis, with often with months between send-outs to IO Conservation Chairs (or overall Chair if the IO doesn't have a Conservation Chair), and to any individual caver who asks to be on the Conservation Network addressee list.

NSS Internal Organizations! Please keep me informed of new personnel or email addresses.

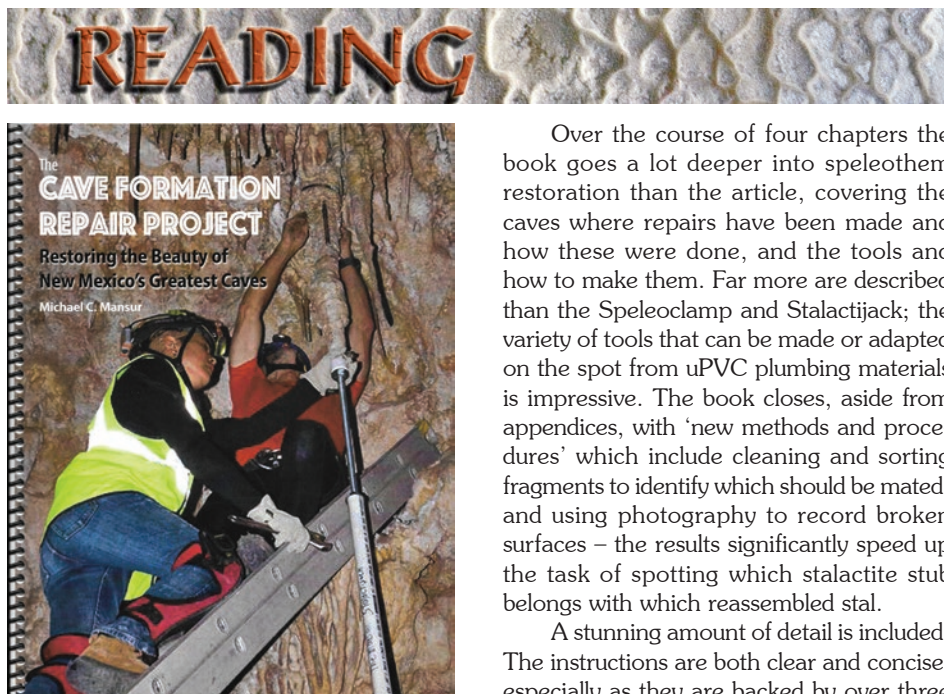
Send me a note if you want to keep a finger on the pulse of important conservation issues that affect us all. Steve Smith, Coordinator – NSS Conservation Network stevensmith@usa.net

NSS Conservation Web Pages & Cave Conservation Facebook Group

All things caving are about conservation! Stewardship choices kick in on every cave trip. All of caving is about minimum-impact choices and acts of protecting!

The NSS Conservation Pages are online at caves.org/conservation/

Check out the Cave Conservation Facebook Group! It's a broad, quick, all-in-one, spot on Facebook to serve the global caving and cave-interest communities! Join us, add members, repost, and share the site.



THE CAVE FORMATION REPAIR PROJECT

Michael C. Mansur. Self-published e-book. 2021. 62pp, 171 colour photographs. \$26.95. No ISBN

DESCENT (281) included an article by Mike Mansur on how he was involved in speleothem repairs in New Mexico for which, of course, the techniques could be used anywhere in the world. In essence, Mike was logically using epoxy adhesives to join broken stal, often having first drilled both pieces and inserting a length of stainless steel rod to strengthen and support the structure.

The real drawback, though, was how to support speleothems while the epoxy set, which sometimes required a long time in a cold, humid cave environment. To solve the problem, Mike invented the Speleoclamp (a lightweight device to hold fragments of stal in the correct orientation while setting, prior to being attached) and the Stalactijack (to support a stalactite from below while the epoxy cures). Now, Mike has gone a stage further in imparting knowledge of his demonstrably successful techniques with the release of an e-book, *The Cave Formation Repair Project*.

For a digital download, the book has a higher cost than might be expected in the UK. However, the work has been edited and designed professionally by Carrin Rich and Lois Manno, so it is stylish and lacks the errors that are so common in many self-published works. It is a move that has scored on that front. In addition, \$5 from each sale is being donated to the NSS Save the Caves Fund, which promotes cave conservation by restoring human-related damage to caves whether this be malicious or accidental.

Over the course of four chapters the book goes a lot deeper into speleothem restoration than the article, covering the caves where repairs have been made and how these were done, and the tools and how to make them. Far more are described than the Speleoclamp and Stalactijack; the variety of tools that can be made or adapted on the spot from uPVC plumbing materials is impressive. The book closes, aside from appendices, with 'new methods and procedures' which include cleaning and sorting fragments to identify which should be mated, and using photography to record broken surfaces – the results significantly speed up the task of spotting which stalactite stub belongs with which reassembled stal.

A stunning amount of detail is included. The instructions are both clear and concise, especially as they are backed by over three years of experience and are provided with a huge number of illustrative photographs. For example, this covers how to drill both halves of the calcite so that the line-up is exact and how to conceal repaired joins with paste containing dust from the drilling to obtain an exact colour match.

Beyond the *Descent* article, for a taster anyone can view Michael's YouTube presentation online at <https://tinyurl.com/stal-repair>, then head for Speleobooks at <https://tinyurl.com/cave-repair> to purchase the e-book. If you are faced with having to perform any speleothem repairs in any cave, anywhere, some of the tips in *The Cave Formation Repair Project* could save you significant time and expense, not to say increase the likelihood of a successful reconstruction. You gain a lot for your money.

Chris Howes

First published in Descent (284), February 2022

[Ed. Note: Mike also had an article detailing some of his inventions in last year's NSS News Conservation issue. Mike notes that a second edition of the book will be a hard copy, and will be ready by May 1, price TBD. It includes 7 more inventions that will aid in most any type of formation repair, including soda straws: Speleocrane, Speleotray, Speleosplint, Coke Table Clamp, Stalactijack Soda Straw adapter clip, and the Stalactijack curtain clip. A PDF copy of the 2nd edition will be provided for free to anyone who purchased the 1st edition.]



SIXTEEN LEGS

Produced by Bookend Trust and the Pennicott Foundation, Australia, 2021. Blu-ray contains theatrical version (98 minutes), a “younger audience version” (52 minutes) and a Broadcast Version in two parts (52 minutes each). They can be ordered here: <https://www.sixteenlegs.com/category-s/1817.htm>

It is also available as a digital download from [indiegogo.com](https://www.indiegogo.com), follow the link on the above page. The two books are available through them as well.

There aren't a lot of cave films that have theatrical release and even fewer devoted to cave biology. Sixteen Legs tells the story of the Tasmanian Cave Spider (TCS), a troglophile endemic to Tasmania. This “dinner-plate-sized” spider is found on the surface as well as in caves, and can live for decades.

The spider was named in honor of Victor Hickman, a Tasmanian biologist who specialized in spiders. There is only one species in this branch of the arachnids, *Hickmania troglodytes*. And it was only first described in 1958 by Willis Gertsch.

The film features stunning footage in some beautiful caves and a truly impressive series of macro shots showing how the spiders create their webs, how they eat, and how they mate. There is a parallel story told with graphics and moody shots of Neil Gaiman's face as he learns about the spiders with us and seeks to meet their queen.



There are several tangents relevant to spiders in general and people's relations to them, such as arachnophobia, which I found less compelling than the story of the main spider. The film also features interviews with prominent Australian cavers such as Alan Warild, Arthur Clarke, Cathie Plowman, and Julia James.

The story begins with some general info about cave biology. There are 3 missions for most cave animals: eat, avoid being eaten, and reproduce. Spiders are better adapted to cave life than most insects, which can't handle the high humidity of caves. And in that environment, most cave-adapted animals have shed water conserving mechanisms and developed elongated limbs,

Along the way we learn some fascinating things about these spiders. Their webs are made up of two kinds of strands, stronger structural ones and sticky ones for catching prey. Too, we learn that spider silk is a substance stronger by weight than anything humans have made. And unlike many spiders that make vertical webs to catch flying prey, the TCS makes horizontal

ones to catch primarily non-flying critters like crickets.

The spiders have a venom used to neutralize their prey and researchers studying it have found applications in both pest control and even cancer research.

The mating ritual is particularly fascinating. The males must find a receptive female, approach it, and do a certain kind of “head tap” to the female. If not done right, the smaller male risks becoming prey and perishing. If done right, mating proceeds and the close wrapping of the two 8-legged spiders gives the film its name. All this plays out in total darkness in their cave habitats.

Amazingly, the spiders have nerves in their legs that give them almost a sentience of their own, somewhat like the octopus.

Two books were released in conjunction with the film, one specifically about the mating (*Kinky Love: Mating of the Tasmanian Cave Spider*) and another about the graphics used in the film's parallel narrative about a poet who meets the spider queen: *Production Art: A visit to the queen of the dark*.

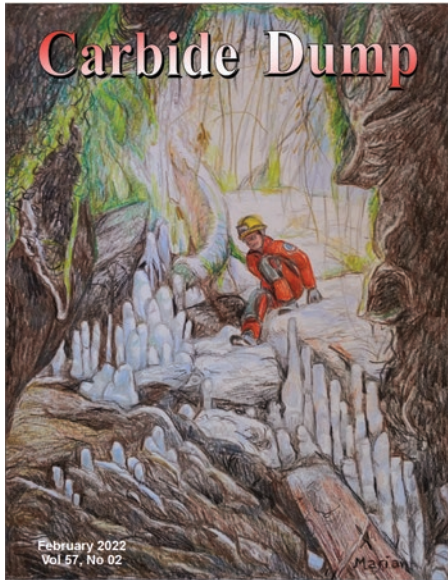
Dave Bunnell



The images on this page are screen captures from the film.

UNDERGROUND UPDATE

Ian
Reuter



The Carbide Dump

Blue Ridge Grotto

February 2022, Vol. 57, Number 2

On a chilly and wet Saturday in February Dave Socky led a team of cavers in the McClungs section of **The Great Savannah Cave System**. Surveying through a previously mapped passage the trio found the old survey ended short of the passageway's terminus. While old notes indicated the cave terminated in a tight squeeze, the group found themselves staring at a 30-foot waterfall dome that appears to be a good aid lead. A future bolt climb will reveal whether more passage lays atop the dome.



The Speleograph

The Oregon Grotto

Winter 2022, Issue 440

Garry Petrie, Oscar and Ahrlin Bauman

surveyed **B.O.G Cave** a nearly 250-foot long lava tube located in the Gifford Pinchot National Forest. The cave is split into three sections, with the largest containing a unique pool of water surrounded by lava scrolls. The trio also managed to explore and map the nearby **Nester Cave** and **Digestive Track Cave** during the same daytrip. Nester derives its name from the large nest located in it's large chamber, while Digestive Track, the longer of the two at 165 feet, is filled with lava scrolls.

Garry Petrie and Bob Roe re-surveyed the Mount Saint Helen's basalt flow's **Gremlin Cave** adding significant sections of passage located passed previously unmapped breakdown chokes. Over 1,000 feet of previously undocumented passage was surveyed bringing Gremlin to 3,212 feet long. Gremlin is now the ninth longest known cave in the basalt flow.

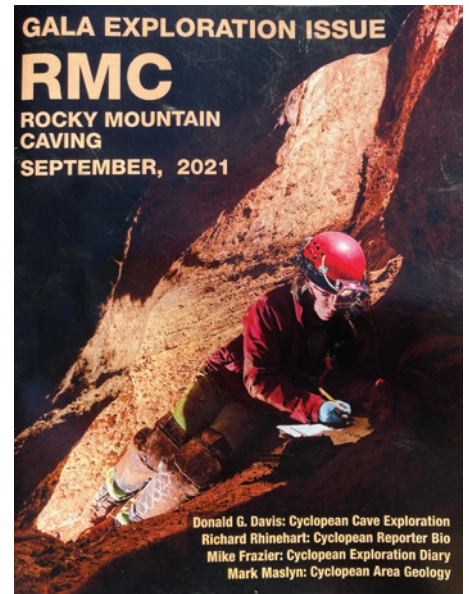
The Big Lava Bed's **Hyde'm Cave**, discovered by Josh Hydeman in 2018, is a lava tube system comprised of five closely interconnected segments. At 840 feet long the system took Garry Petrie, Oscar and Ahrlin Bauman a full day to survey. Several tight grabby leads remain in the system, which were passed over during the initial survey due to their less than inviting appearance.

Rocky Mountain Caving

Colorado Grottos of the NSS

September 2021, Vol. 39, Number 3

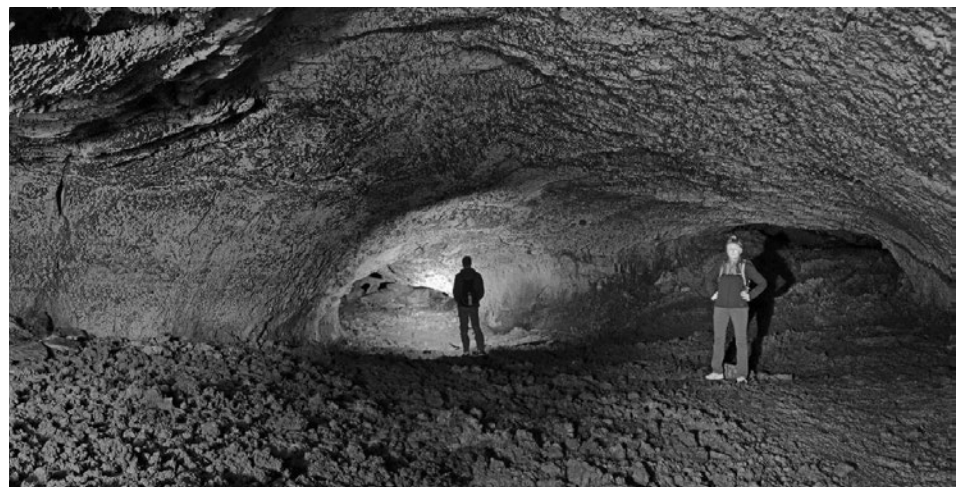
Colorado cavers have long believed **Cyclops Cave** to be more of a myth than a real cavern. However, a determined group of cavers have thoroughly researched and



reviewed late 19th and early 20th century texts and believe they have located the mythical cave. After narrowing down the theoretical location the group located an old mine shaft which they believe penetrates the top of Cyclops Cave. Significant surface fill and debris on the bottom of the shaft are restricting further access into any cave passage, but the group feel more confident than not that they have successfully laid to rest the myth of Cyclops Cave's non-existence.

Correction

George Dasher noted that in the February *West Virginia Caver*, as covered in this column last month, that he'd gotten the length and depth of Overholts Blowing Cave seriously wrong. The correct numbers are 7.81 miles long and 666 feet deep according to Walt Hamm.



JaR Cave from the Speleograph Issue 440. Photo by Ahrlin Bauman

PRESIDENT'S MESSAGE

Highest Honor

There is no higher honor than becoming the next president of the NSS. I am truly humbled and excited for the opportunity to serve the caving community and to continue my work on the NSS Board of Governors. I will officially take the seat on March 19, 2022 after a 3-year term as Secretary-Treasurer, a one year term as Director, and a one year term as Chair of the Directorate. In that time, I also served as the 2019 NSS Convention Treasurer and the Ad-Hoc Membership Committee chair. I feel that this experience and intimate familiarity with the finances, organizational processes, and bylaws allows me to fully immerse myself into the presidential role and responsibilities without too much of a learning curve.

In the last 6 years, Geary Schindel (15827 RL FE) has led the NSS with incredible leadership and dedication that will be hard to follow. He worked diligently, championing our headquarters as an invaluable resource for education and our role in safeguarding the world's largest speleological museum, archives, and library. He led us through a period of historic change and at the end of his tenure, our membership has strengthened despite the Covid-19 pandemic that stopped the world in its tracks. He is an amazing leader, caver, and friend. Thank you, Geary, for everything you have done for the NSS and the caving community.

I would also like to welcome John "Rocco" Stembel (25837 RL FE) onto the NSS Board of Governors as our new Secretary-Treasurer. I am excited to be able to work with him and assist in his smooth transition into the position.

2022/2023 Fiscal Budget

The 2022/2023 budget will have been approved by the time of this publication. We have been able to move forward with initiatives and focus on our Society's core missions in this fiscal year that has not been possible in the last few years, mainly from the impact of Covid-19. Generous donations and bequests, the payoff of the HQ, increased venue rental income and the assistance of our officers and Headquarters staff on drastically cutting operating costs and streamlining processes while eliminating expenses have made a very positive impact on our cash flow. The highlights of the budget are:

- Increased PR, fundraising, membership committee and IT funds for improved communication to our membership on NSS initiatives
- Continued earmarked money for ongoing

financial audits and services


- Increase to Education Division funding to account for larger programming portfolio, including the Vertical Training Commission, and a workshop series
- Increase to Cave Management funding over last fiscal year, correcting past underfunding of the preserves as well as expected increase in landowner support and acquisitions
- Cave Preservation Network line item to rebrand program, following a successful pilot with some lessons learned (self-funding program)

Membership

Our membership numbers continue to rise. As of March 1, 2022, we have 7,856 members. That is a net increase of 20 members from the February 1, 2022 membership stat of 7,836.

I am looking forward to spending time with our caving family in South Dakota at the NSS Convention. I hope to see you there! The 2022 NSS convention will be held June 13-17th in Rapid City. Register now to take advantage of pre-registration prices at <https://nss2022.caves.org/>

Kristine Ebrey
NSS President



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If your Grotto or Region is looking for great caves to explore in the Virginia area - look no further! RASS Grotto can offer a complimentary place to camp in Bath County, VA - where more than 100 caves are located within an hour's drive. We support cave conservation and education. Some COVID restrictions still apply. Contact Richie Ellison at rellison1120@gmail.com

The Richmond Area Speleological Society (RASS) supports cave conservation, education and research by offering grants to assist projects aligned with these goals. To receive a grant request application please email us at rass-grants-committee@googlegroups.com. Applications reviewed quarterly. 12

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