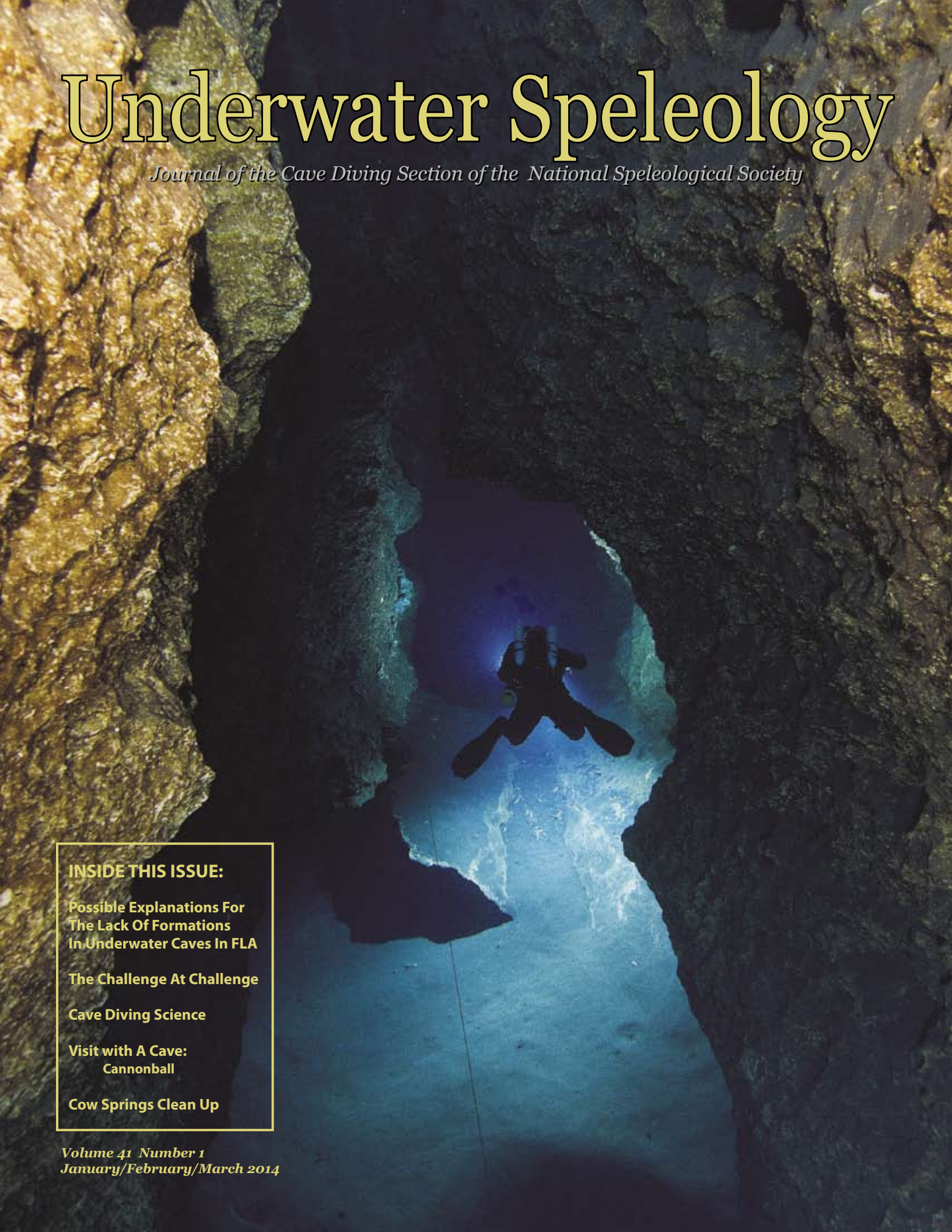
Underwater Speleology

Journal of the Cave Diving Section of the National Speleological Society



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January/February/March 2014

2014 Workshop

May 23,24 & 25
Florida Army National Guard Armory
Lake City, Florida

Friday Night Social at the Armory
Saturday Workshop at the Armory 9AM - 4PM
Sunday in water sessions at Peacock Springs

TOPICS AND SPEAKERS

Decompression Physiology - Richard Walker, MD
In Water Recompression - Tom Mount / Joe Dituri
History and Evolution of the NSS-CDS Cave Diver Training Program - Lamar Hires
Exploration in the USA and Abroad - To Be Announced

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Underwater Speleology
Volume 41 Number 1
January/February/March 2014

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Columns

Cover Photo: Michael Barnette explores a dark canyon in Peacock Springs
Photographer: Brandon McWilliams

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Please submit letters and articles to UWS EDITOR, 295 NW Commons Loop, Suite 115-317, Lake City, Florida 32055.

from the Chairman

Joe Citelli

Were I a philosopher, I might say the CDS is in a state of flux. Due to personal issues, our Chairman, Bert Wilcher, and board member, Marissa Lasso, resigned and somehow I was elected Chairman. I thank the other BoD members for having this confidence in me, and I pledge to do my best to ensure the success of the CDS in its endeavors. We, the BoD, collectively thank Bert and Marissa for their service and wish them well for the future.

One of the first things I'd like to address is the clarification of the enactment of the Cave Mentor-Guide-Supervisor Program and whether or not Mentors-Guides-Supervisors can be paid for their services. It is apparent that there has been much confusion about this.

We will be posting a list of available, qualified supervisors on the CDS website. The plan is for supervisors to state when they are available so members can contact them. Supervisors cannot charge for this. If you contact a supervisor who states on the CDS website that he or she is available on a specific day, at a specific time, for guiding or anything else, you will not be charged. You may also contact a supervisor and ask when they will be available for "pro bono" supervision since many, including me, might not remember to post their availability.

Conversely, if you independently contact a guide who is listed on the CDS website as a qualified Cave Supervisor, but who has not stated he or she is available on or at a specific time, and you do not specify "pro bono", expect to pay for his services. To further clarify this, if you want someone to give up their time and travel at your whim, expect to pay him or her. The purpose of this program is two-fold. First, divers can find someone more experienced to "mentor" them free of charge. Second, divers traveling to places such as Mexico, who wish to hire a guide, will know they are hiring someone who will conform to a specific standard of safety. So, if a supervisor states on the CDS website he will be available at Eagle's Nest on a given date, at a given time, he or she cannot charge you for this. But, if you obtain a supervisor's phone number from the CDS website and request he or she meet you at Eagle's Nest, at a date and time of your choosing, expect to pay him or her. Obviously, all of this should all be worked out beforehand.

Additionally, please understand that none of this will impact any existing programs at any NSS-CDS owned or managed systems. So, for example, if you wish to dive Alachua or School Sink, you will have to contact the existing guides and abide by their programs and rules.

As part of our effort to enter the 21st century, we are working toward upgrading the NSS-CDS website. Tim Thomas, a member of the NSS-CDS and CEO of MBSII.net, a prestigious web development company, has graciously volunteered his company's services to upgrade and maintain our website. He has already begun working on it. Tim will replace John DeRoo as our web committee chair and John will continue to provide assistance as needed. John, thank you for your services over the years and for the future. Tim, thank you and welcome aboard! I would also like to thank Forrest Wilson for his past services as webmaster.

The BoD also wishes to extend a hearty thank you to Steve Mann for lending his professionalism and expertise in running our DEMA booth this year. Steve has some new and exciting ideas to help make the CDS presence better known in this type of environment.

Our UWS editor, Cheryl Doran, has accepted being appointed Chair of the newly formed Publications Committee. Cheryl is a doer with a track record. She does a wonderful job with UWS and I am sure she will do the same with any other projects that come her way. Thank you, Cheryl!

BoD member TJ Muller has graciously donated a mobile cave app that members can download free from Google Apps or the Iphone Store. With this app members will be able to locate caves, dive shops and much more using their Smart Phones. Thank you, TJ.

Another topic of interest among the membership has been the *Cave Diving Manual*. At the February 2012 CDS BoD meeting, a motion was made to "Revise the Cave Diving Manual, with review by the Training Committee." It passed IIIII. Our former Chair, Gene Melton, has been in charge of collecting the various chapters and working with CDS member Jeff Bozanic on editing them for this CDS project. Manuscripts were contributed by a number of respected members of the cave diving community and many of these people, as well as many CDS members, have expressed interest in seeing this updated volume come to print. The book was supposed to be ready by the end of summer. Progress had been reported several times, and at the May 2013 membership meeting a projected completion date of the summer of 2013 was given.

On September 11 a BoD member queried Gene about the book and reported the following via email: *"It is my understanding through conversations with Gene is that he will not turn over the work that has been completed due to personality conflicts with member(s) of the board."* Recognizing the absurdity of this, and realizing we needed to address this matter, attempts were made to arrange a Skype Meeting between me, Jeff, Gene, our Publications Committee Chair, Cheryl Doran, and BoD members Dave Jones and Tony Flaris. Our intent was to obtain the collected submissions and have them archived on the CDS servers and get the project back on track. Several dates were proposed via email and finally Dec. 5th was decided upon. Gene never responded to the email invitation, and when called via telephone indicated he had other plans for that evening. On the eve of the meeting Jeff was able to contact Gene via cell phone and he participated. We did not receive a full accounting of the chapters and were informed that there was a loss of data some months ago and that the editing is not completed. We requested that all files be presented to the CDS for archiving and that Cheryl Doran, Chair of the Publications Committee, be included in the process and kept up to date on all progress. Since projects such as this fall under her committee, she will report to the BOD. Jeff agreed to send us the files they had for archiving, and after some prodding Gene went along with him. While we do not yet have the files or any further updates, taking into consideration the holiday rush, we will wait until after the New Year to address this further.

To prevent future data loss, communication failures, and any other issues which may arise, the BoD is instituting a policy of archiving all data in multiple locations. From here forward, no one individual will be the sole keeper of any critical NSS-CDS data. It will be archived on NSS-CDS servers as well as kept by the individuals working on the projects, who will also be required to submit any updates along with progress reports. If the person managing the "project" cannot or does not perform within the guidelines, we will offer additional assistance and/or assign additional or alternative members to complete the project as necessary. Realizing time constraints and other issues can delay a project's completion, we will institute policies and procedures to prevent this sort of thing from happening again.

The CDS has been blessed with an infusion of new, young blood with fresh ideas in its BoD. As Chairman, I intend to utilize that talent and energy to the best of my abilities and funnel it into a productivity that will help the CDS fulfill its mission concerning all aspects of cave science, exploration and survey, cartography, photography, and physical techniques. Our job is to protect and promote the interests of the NSS-CDS and its members. An important path toward that goal is to make transparency and forthrightness become the new norm.

Looking toward the future, this BoD wishes to encourage member involvement. If there is something you wish to be a part of, please ask. We will make a place for you. The NSS-CDS can only be as good as its membership's desire to be involved.

Respectfully submitted,

Joe Citelli

Possible Explanations for the Lack of Formations in Underwater Caves in Florida

By: Dr. Jason Gulley (Department of Geological and Mining Engineering and Sciences, Michigan Tech) and Dr. Jason Polk (Department of Geography and Geology, Western Kentucky University)

Cave divers flock to the Yucatan and Bahamas to explore underwater cave passages that are highly decorated with formations such as stalactites and stalagmites (also known as speleothems). Stalactites and stalagmites only form by dripping water and offer irrefutable evidence that caves in the Yucatan and Bahamas were once air-filled. The lack of stalactites and stalagmites in well-traveled underwater caves in Florida has led many geologists and cave divers to the conclusion that Florida's underwater caves must have been completely submerged since their formation. There are, however, a few underwater caves in Florida that have stalactites, such as Warm Mineral Springs and Salt Springs, suggesting that at least some caves in Florida were air-filled in the geologic past. In this article, we discuss the controls on stalactite and stalagmite formation and how differences in the geological setting of Florida and the Yucatan may have resulted in cave formations being widespread in the Yucatan, but less extensive in Florida.

Formation of stalactites and stalagmites is made possible by the chemical reactions that control the dissolution and precipitation of limestone. Limestone is composed of calcium carbonate ($CaCO_3$), which is highly soluble in water (H_2O) that contains dissolved carbon dioxide (CO_2). The chemical reaction can be written as follows:

$$CaCO_3 + H_2O + CO_2 \leftrightarrow Ca^{2+} + 2HCO_3^-$$

The reaction indicates that calcium carbonate (limestone) will dissolve into calcium and bicarbonate ions in the presence of water and carbon dioxide. CO_2 dissolves into water to form carbonic acid, which in turn dissolves limestone. Key to the formation of stalagmites and stalactites is that the reaction is reversible, as indicated by the double arrow. Typically, water and limestone are abundant in aquifers and CO_2 availability limits dissolution. Carbonic acid will dissolve limestone, increasing the concentrations of the Ca^{2+} and $2HCO_3^-$ until the solution becomes saturated; that is, no additional limestone can be dissolved unless more CO_2 gas is added. If CO_2 is removed from a saturated solution, then the solution becomes supersaturated and Ca^{2+} and $2HCO_3^-$ combine to form limestone. This removal of CO_2 and subsequent supersaturation of the water with respect to calcite is the primary driver of stalactite and stalagmite formation (Fig 1).

While there is some CO_2 in the atmosphere (the concentration is approximately 0.04%), most CO_2 that is involved in formation of caves or cave formations is derived from the soil and from the rock between the soil and the water table, which is known as the vadose zone. Soil and vadose CO_2 are derived from the respiration of

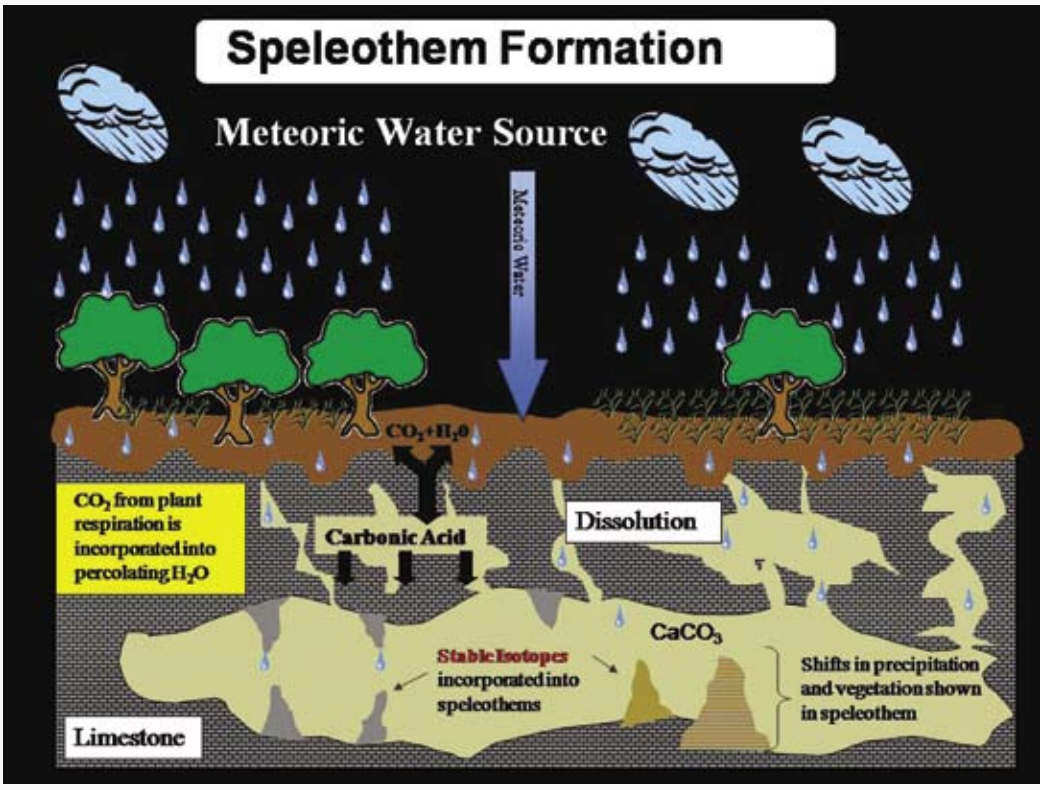

Figure 1: Stalactites and stalagmites form from rainfall that accumulates CO_2 as it passes through the soil and vadose zones and dissolves limestone. Rainfall ingasses CO_2 in the vadose zone and degasses when it reaches underlying cave passages that are ventilated to the outside atmosphere. Ventilation lowers CO_2 concentrations in the cave and causes the infiltrating water to degas CO_2, causing dissolved limestone to precipitate stalactites and stalagmites.

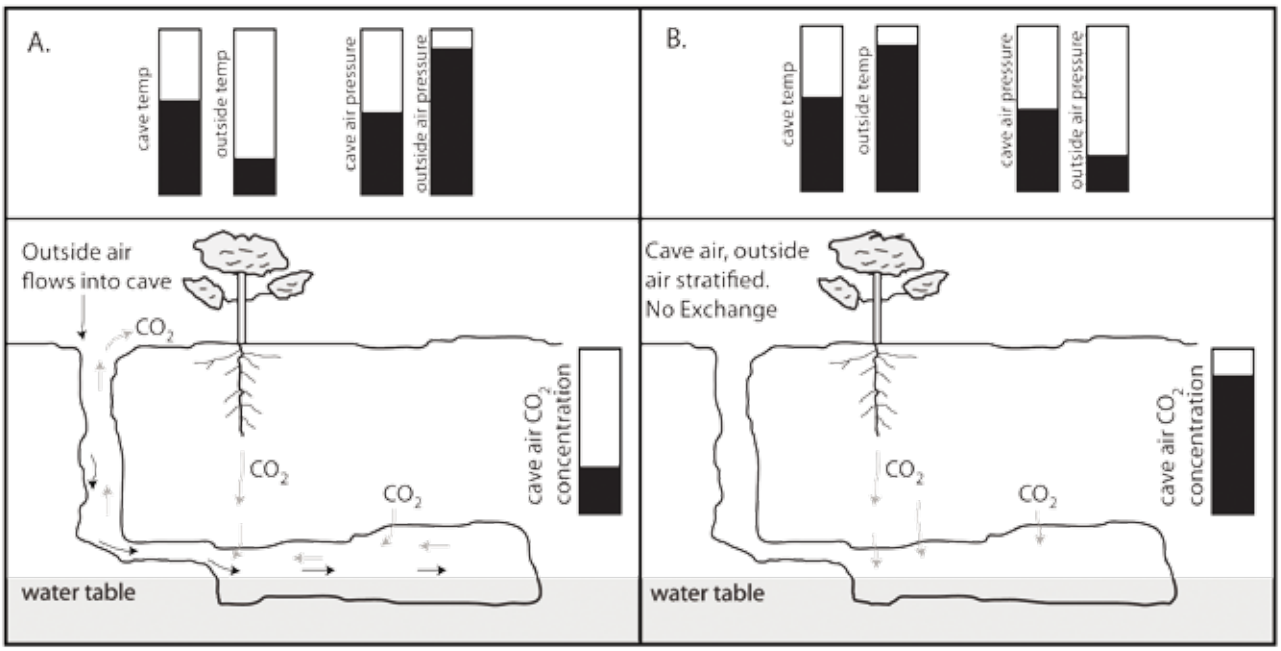

Figure 2: Ventilation of caves that have entrances higher than the main passage elevations is controlled by outside air temperatures. During periods when caves are not well-ventilated, infiltrating rainwater cannot degas in the cave and stalactites and stalagmites will not form. A) CO_2 is constantly flowing into caves from the vadose zone. When outside air temperatures are lower than cave temperature (average annual surface temperature), outside air flows into the cave and dilutes CO_2 concentrations. B) When outside air temperatures do not decrease below cave temperatures, such as during late summer, outside air is less dense than cave air; cave air becomes density stratified and outside air no longer flows into the cave. CO_2 concentrations build up in the cave and infiltrating rainwater can no longer degas. One reason most dry caves in Florida may lack speleothems is because most rainfall occurs during the same time periods when CO_2 concentrations are elevated due to lack of ventilation.

tree roots as well as microbial breakdown of organic matter (Fig 1). These biological processes allow CO_2 gas in the vadose zone to reach concentrations as high as 21%. In aquifers that do not have caves, CO_2 concentrations typically increase with depth below the soil and approach a constant value at some depth below the surface. CO_2 concentrations of 6-10% a few meters below the soil zone are common. Rainfall that percolates through the soil and vadose zone accumulates CO_2 as the gas dissolves to achieve equilibrium with the higher concentrations of CO_2 in the vadose zone, forming carbonic acid and dissolving limestone.

In aquifers that have air-filled caves, cave passages exchange air with the outside atmosphere. Atmospheric air that has low CO_2 concentrations flows into the cave and dilutes air that flows into the cave from the vadose zone, which has high CO_2 concentrations. As long as caves are being ventilated by outside air, rainfall that is percolating through the vadose zone will experience increased CO_2 concentrations with depth, form more carbonic acid and dissolve limestone until the solution becomes saturated. As that rainfall percolates through the roof of a ventilated cave, dripping water rapidly degasses CO_2 and precipitates calcite to achieve equilibrium, thus forming stalactites. Where these drips splash on the ground, further degassing CO_2 during their fall and the splash, stalagmites begin forming.

Cave ventilation is a critically important control on whether or not caves will form stalactites and stalagmites. If ventilation is absent or poor, then there is no degassing of CO_2 and stalactites and stalagmites do not form. Lack of ventilation could be one reason why stalactites and stalagmites are not common in Florida's caves.

The mechanism of cave formation in Florida may not have made the caves amendable to ventilatio previous issue of Underwater Speleology, recent research has suggested that underwater caves in Florida formed at lower water tables associated with lower sea levels. The relationships of the cave passages with surface streams and rivers have suggested that caves formed without entrances connecting them to the surface. As sea level increased and flooded these lower, entranceless caves, rivers formed once water tables were elevated above low points in the land surface topography. Entrances to underwater caves were formed by accidents of erosion and as the rivers incised into the cave systems, forming Florida's springs. If caves lacked entrances during lower sea level elevations, there would not have been any ventilation by atmospheric air. Without ventilation, there would not have been lower CO_2 concentrations to drive the formation of cave deposits, such as speleothems.

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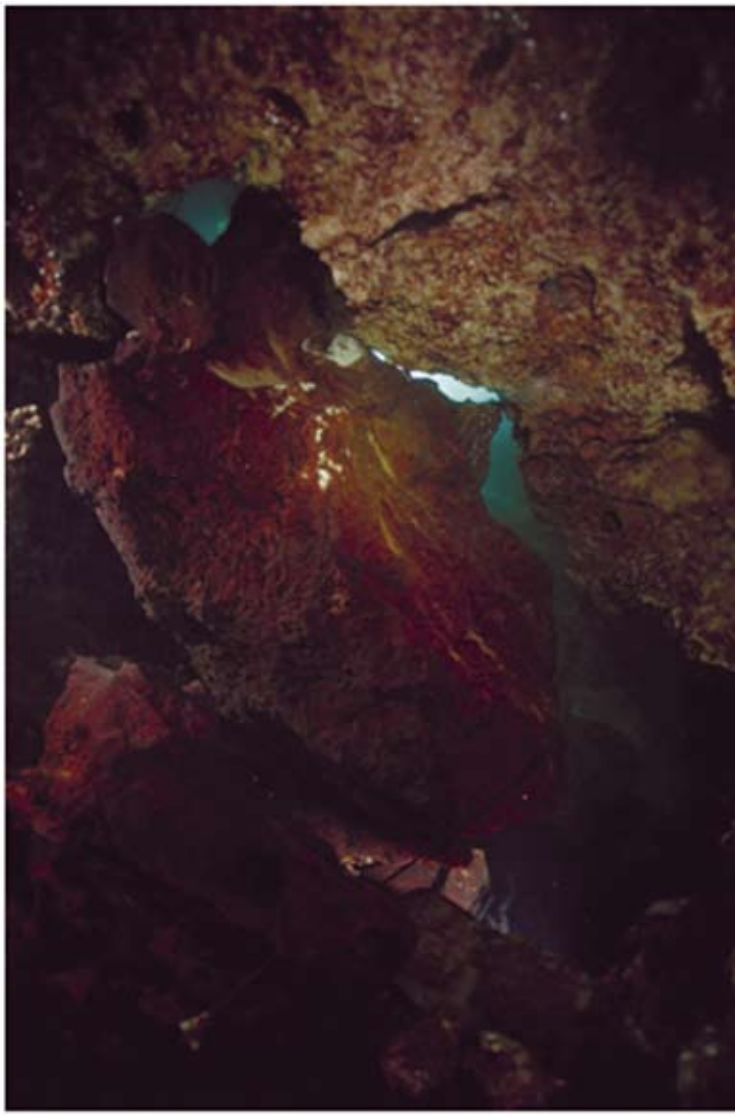


THE CHALLENGE AT CHALLENGE

By: Jim Wyatt

On September 14, 2013, divers from the North Florida Springs Alliance (NFSA) entered the cave system at Orange Grove Sink to conduct a fauna count for State of Florida biologists. These fauna counts have been going on for over ten years and have been spearheaded by Kelly Jessop. The counts provide valuable information to State of Florida biologists in their quest to study the health of Florida's aquifer.

This particular day Kelly and his dive partner, Mike Stine, swam from Orange Grove Sink (OG) to Challenge and found a large boulder blocking the exit, as shown in the photograph above by Gene Page.

This rock was sitting squarely in the center of the opening to the surface and occluded the water flow almost entirely.

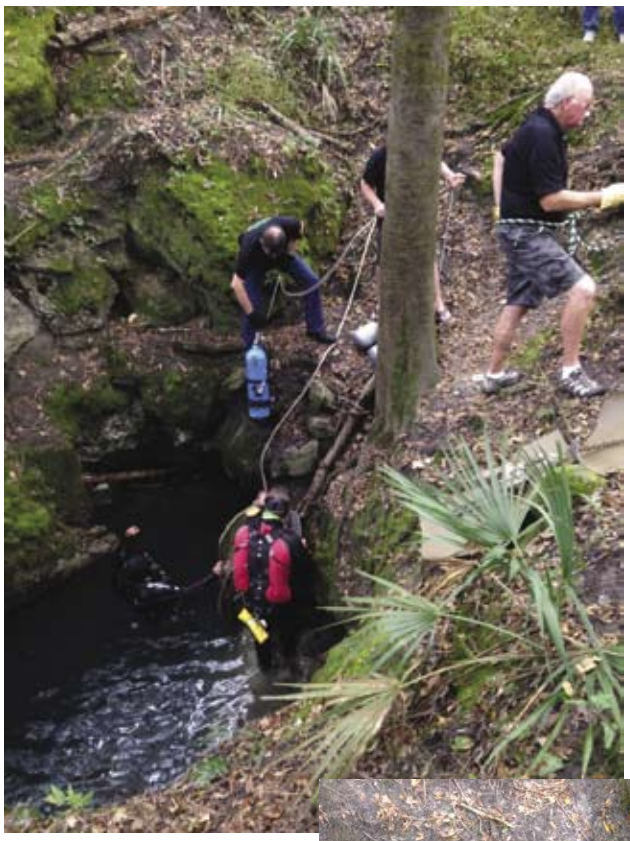
The NFSA line committee was notified and two divers were dispatched to inspect the rock and to develop a plan to get the rock out of the opening. The NFSA sent a geologist and an ex-US Navy Ships' Salvage diving officer to do the initial survey of the rock and to determine how best to deal with this rock.

Jerry Murphy was the geologist diver and Jim Wyatt was the ex US Navy diver. The survey dive was conducted the following week. The rigger was Tom McMillan who is a US Navy certified rigger/crane operator.

Jerry and I drew several conclusions about this rock from this survey dive.

- The rock was sitting very precariously and was subject to move again at any moment. The blockage was caused by one large rock with three or four rocks on top of it.
- The rock weighed at least 1000 pounds.
- Divers could not pass by the rock safely.
- Divers in back mounted tanks would have to squeeze by the rock by putting pressure on it, which could cause it to shift and fall.
- Side mount divers could go through by turning sideways.
- The rock needed to be relocated and rendered safe.

The rock was observed to be sitting on a thirty degree angle and if disturbed would fall down into the tunnel leading toward Orange Grove. We were unable to predict where the rock would end up and what collateral damage it may cause when falling in that direction. We pondered what other rocks it may hit and bring down during its' fall. We also considered how much of the slope would be disturbed when it slid downhill toward Orange Grove.



On the drive back to High Springs Jerry and I started developing a plan, which went through several revisions during the next few weeks.

One plan we devised was to simply trip the rock and let it fall toward OG sink. Because the rock was barely sitting on a ledge being supported by less than 5-10% of its size, it would have tripped and slipped off of the ledge quite easily. This would have been the simplest and quickest solution. The downside to this plan was discussed above. We simply could not predict with any degree of confidence the final resting place of the rock and what additional damage it may do on its trek down that passage way.

The second plan, and the one we used, was to pull it essentially backwards through 120 degrees and let it fall onto the bottom of the sinkhole, in open water. This of course was the more dynamic plan and seemingly the only unknown was how well the bottom of the rock would be supported through the 120-degree arc of the fall. The concern was that the sinkhole bottom could give way and allow the bottom of the rock to kick toward OG and slide down the slope a short distance, or not at all, blocking the entrance again.

Over several meetings and phone calls we decided plan B was the best plan because the outcome seemed more predictable to us.

The plan was submitted to State of Florida officials for approval and a date was set to do the work. We chose November 20, 2013 so as to have the least impact with visitors to the park. The park had to be closed to cave diving during this operation.

The devil is always in the details of course. We knew what we wanted the rock to do; now we had to figure out how to do it. The plan was relatively simple. Place chain around the rock, run the chain up to the surface and attach it to a winch. Jerry had a hand operated winch, he had chain, and he borrowed chain from Pete Butt. Steve Boyer had chain and brought several lengths as did Tom McMillan.

November 20 arrived and about a dozen of us met at the park. We immediately began setting up to hardware because we had a definitive and approved plan.

The chain was wrapped around the rock by divers Jerry Murphy and Rich Courtney and passed up to topside helpers. The chain was then attached to a heavy duty loading strap, secured around a large tree, and winching began.

The rock was winched through the 120 degree arc and landed uneventfully on the bottom.

Moments later we started seeing a boil on the surface and were heartened by the knowledge that the rock was no longer impeding the natural flow of the cave system. The boil we see there now is quite remarkable.

Cave Diving Science

By: Peter Buzzacott

I love cave diving and I love science but, most of all, I love cave diving science. Recently I presented some research at the International Symposium on Hierarchical Flow Systems in Karst Regions, in Budapest, Hungary. Here are two of my posters. In the first, last winter I was showing a mate some mine entrances in the cliffs underwater in a lake near where I live in Australia. The site is a former coal mine with tunnels that run for miles, reportedly reaching as deep as 300 feet (but I won't dive in them because they're about as unstable as you could imagine). To steady myself while taking a photo of a wooden pillar I put my hand on the rock above the mouth of the cave and unexpectedly I felt the rock was warmer than the water. So, I returned with some sensitive instruments and discovered warm water rising up out of the mines. This may explain why the lake increases in acidity every winter, which has been a mystery for many years. It appears when the lake cools in winter water that has been sitting in the mine all summer rises up and out of the shafts. What I have also shown is that we cave divers are more sensitive to temperature fluctuations underwater than our dive computers so if anyone feels a warm or cold patch of water in a cave then remember where exactly and start investigating.

In the second poster I present the first evidence that groundwater is entering Australia's largest and most famous caves. Caves such as Cocklebiddy and Weebubbie are enormous, 300' beneath the desert and yet the plain above is totally flat with no old river beds to be found. So, I have never quite swallowed the theory that these caves were formed by rainwater dissolving organic material in a previous era, or that they were sections of an enormous subterranean river system extending hundreds of miles from the center of Australia to the coast. Nope, I believe they were formed by warm, mineral-rich groundwater rising up through the floor and I've spent the last three years collecting temperature readings and water samples. Now, at last, I seem to be getting somewhere. A 15-minute documentary about this was broadcast on Australian television in February and can be downloaded here:http://www.abc.net.au/catalyst/stories/3692968.htm

Mermaid Pond. Photo courtesy of Library Cristina Zenato

Dr .Peter Mallik and Peter Buzzacott

I'll be back in Australia gathering more data in October 2013 and then again in October 2014 where I am planning to collect samples in three excellent flooded caves in the west. If anyone is involved in post-graduate research and wants an unusual field-trip then come join us for a week or two, whether you're studying hydrology, geomorphology or even physiology. You can never have too many scientists around the campfire, under a trillion stars, 600 miles from the nearest city.

peter.buzzacott@uwa.edu.au

NSS-CDS Instructor Institute
November 2013

Congratulations to Elena Kryzhanovskaya of St. Petersburg, Russia for completing her NSS-CDS instructor institute on November 21, 2013.

Max Kuznetsov was her sponsor. Jim Wyatt and Reggie Ross conducted the instructor examination over a two day period in North Florida.

SCHOOL SINK CLEAN-UP

February 1, 2014

9 am to 5 pm

lunch/ drinks provided

Editor's Notes

An optimist stays up until midnight to see the new year in. A pessimist stays up to make sure the old year leaves. - Billy Vaughn

There are always two ways to look at things. I have often jokingly refered to them as "the wrong way and my way." But I have a good feeling about the new year for the CDS. I am seeing more progress and new ideas.

January should bring members a new NSS-CDS Website; more modern, user friendly and informative. It will also bring the launch of the CDS smart phone app. Cave shops, cave sites and information at your fingertips. I have in my hot little hands a prototype of the new CDS App and I love it! Watch your e-mails for more information.

The Hart Springs Workshop is coming in January with a great hands-on format. There will be no indoor lectures, just in-water demos and skills.... and I understand there may even be an opportunity to match your cave skills against other divers, with a little competition.

February 1 brings a cleanup and social at Waynes World. And plans are moving forward for the May Workshop which will be held in Lake City, Florida this year.

Kelly Jessop is our election coordinator and currently assembling a list of nominations for the NSS-CDS Board of Directors election in 2014. It is required that you be an NSS-CDS member in good standing for a minimum of one year. Please e-mail Kelly if you are interested. kjessop@bellsouth.net.

Events, updates and new ideas. Definately looking forward to the new year, not back.

Dive safe,

Cheryl

Skills, Tips & Techniques

By Georges Gawinowski

Visualization… Let's Visualize Your Dive, And Dive It

While working on my cave instructor rating, the cave instructor/mentor I had the honor of assisting was at the surface of the water, his eyes closed, patiently waiting for the team to get ready and join him. One of the students asked, "Hey Georges what is he doing??" The first thing that came to my mind was, "He is visualizing the dive." We all have seen athletes in preparation before a jump or race stop, close their eyes and visualize their next steps to increase their chance of success. Divers can use these same techniques.

Visualization techniques have very diverse forms and can apply to many situations, like an upcoming professional interview or to help review a past event using different scenarios. Our objective is to acquire reflexes and ready for contingencies, as well as prepare the mental functions that intervene in the processes of reaction to constraining and stressing events.

In cave diving, a first degree of visualization can relate to the memorization of acts considered to be effective. For instance, we want to memorize the exact location of our back up second stage to ensure that in an emergency we can find it quickly and without having to think. We then repeat the gestures required until our brain records them and is able to retrieve them.

We also must consider unfavorable or unexpected circumstances which would come to oppose or prevent our use of these learned gestures, such as not being able to take our back up regulator with the right hand because the necklace is broken. We may find it beneficial to envision alternative solutions, we have to be able to quickly adapt to a new situation or risk, if not we will react negatively to this constraint (negative stress). We will be able to consider a "Plan B" and if that is not effective, we will have to improvise using the individual qualities of each solution. A reason for concern can lead to panic **or** an effective solution. By way of anticipation we will project ourselves mentally into any kind of scenario that might occur. When we imagine these various situations that may occur on a dive, we end up reacting, in spite of ourselves, by reflex, and we then discover ourselves closer to the "oneself" who will be diving tomorrow. These "imaginary" reactions are good hints and should be taken into consideration as we observe how we react. Are we quiet, anxious, inhibited? Do a mental review of the obstacles and tranquillize towards the difficulties. Accustom yourself to consider which solutions are possible and which are not. In the same way that we repeat physical gestures, we mentally repeat common processes applied to different situations. Indeed, you could not imagine all possible scenarios, but you will have practiced identical or sufficiently close scenarios to be able to avoid surprises when a situation occurs. It is like the traditional process of training, only this time applied to mental configurations.

Visualization joins the techniques of formulation of positive ideas such as mental imagery (a form of autogenic relaxation), forms of meditation and even hypnosis. They call upon similar psychological steps and then have real impact and beneficial consequences on our behavior. Their use and effectiveness are, however, subject to interpretation and dependent upon the parameters that we will consider in the practice exercises suggested here. I will add, that only the behaviors directed towards the acquisition of autonomy are a source of real development.

The above examples are not intended to answer the characteristics of each technique, thus it will be necessary for you to adapt them to your needs. Don't forget to formulate your initial motivation and this base, erroneous or right, will become your own training ground.

Like our basic cave diving skills, visualization techniques should be practiced before any cave dive. Visualization will bring you to a more relaxed and focused state, as well as improve accuracy in your reflexive gestures.

Following is a very cool 1000 cave dive milestone story from Peter McCumber:

I became a cave diver shortly after getting married. Cave diving back then was different than it is now. There weren't very many of us. You would show up at a site such as Peacock, Ginnie or Little River and it was rare that you would see someone you didn't know. Because of advancements in safety, gear and training, this sport has become so popular today that I might go to a cave site and not know any of the 20+ people diving.

But back in the day I remember hanging out with such people as Jim Calvin, Bill Rennaker, Mark Long and Annette Long and listening for hours about their stories of these amazing caves that were so far beyond my abilities, because of depth, and complexity, that I felt I'd never get a chance to dive them. They told me stories about Eagle's Nest and its 300' depths and giant rooms big enough to house a space shuttle in. They showed me pictures of Diepolder's cave where the water was so clear you could see hundreds of feet across the room. I remember thinking in my early 20's that these places might as well be on the moon, for my likelihood of actually seeing these caves in person was pretty remote. Well, it took a few years (more than a decade) but yesterday I made my most awesome dive ever, Diepolder's Cave.

For those of you who are not divers, Diepolder's Cave is located just south of Crystal River in Florida. It's located in the middle of the forest on a Boy Scout reservation. Driving down the winding dirt road past the entrance to the Boy Scout reservation you'll eventually find yourself coming upon a small opening in the woods. To the right you see a small pitiful-looking pond covered with green scum. I remember thinking to myself, "This might not be worth all the hype." Of course I would have never said anything to my buddy Tim Bixler or our guide Rick Crawford, but I remember thinking that I hoped we hadn't just wasted a bunch of time and money. Later I'd feel pretty foolish for that thought.

Rick spent a few minutes going over a dive briefing telling us what to expect. He explained again what the profile would look like, and what our approximate run times would be. Rick was the perfect combination of very thorough and easy going. I couldn't have felt more confident in my choice of dive buddy Tim or dive guide Rick. We finished our discussion and started gearing up.

We got in the water and started our descent. As soon as my head was underwater my attitude changed from, "I hope this isn't a waste of time" to "HOLY CRAP!!!" I wasn't even two feet from the surface and I was overwhelmed by what I was seeing. It was like seeing pictures of the Grand Canyon for many years and then actually standing on the edge of the Grand Canyon. I was overwhelmed. And I was only two feet from the surface. I had a LONNNNGGGGG way to go still.

As I descended the first 80' it was like the ground had opened up. This small pond on the surface dropped down immediately into what looked like a giant funnel more than 150 feet from top to bottom. This funnel was made of white limestone and even at 20 or 30 feet below the surface you could clearly see the formations of rock below you. Sadly, what we saw was indescribable. You'll really have to go see if for yourself. But I'll do my best to tell you what I witnessed.

We made it to the bottom of the funnel (in cave diving we call it a chimney) and at about 180 feet we entered this giant room. I'm not exactly certain of the dimensions, but if I had to guess conservatively it's about 600-800 feet long by about 300-400 feet wide and really stinkin' deep.

Rick attached a strobe light onto the gold line at the left, and then Tim and I started our trek into this giant room on the right. I looked at my computer and it read 180 feet. I kept watching the gold line which was getting deeper by the minute. I looked at my computer again and we passed 190, 200, 210, 220.... I thought visibility was pretty good. I had a 35-watt light and could easily see to the bottom. I'd guess the visibility was in the neighborhood of 70-100 feet. Our dive plan was to make a giant circle in this room, staying on the gold line that would lead the way. When I got to the far end of the room I checked my computer again: 257 feet. The floor of the cave was easily another 50-70 feet below me. Down below us we could see slabs of rock big enough to park school buses on. There were boulders the size of houses. But what really intrigued me was the areas of broken rocks down there that looked like perfect little swim-throughs under the rocks.

We made the turn at the end of the room and started heading back toward the exit. Far off in the distance we could see Rick's strobe light flashing to mark our exit. It looked to be 600+ feet away. Looking at my computer it looked like

our 20-minute dive would leave us with more than an hour of decompression. I know, that hardly seems fair ,right?

I tried to take in as much visually as I could. I knew we were only minutes away from our bottom time being over. I looked at the sheer magnitude of the cave, the giant rocks, everything. I tried to remember the overwhelming feeling of awe, and the sense of accomplishment of this dive finally happening. Finally, I had to concede that there was just too much to see in 20 minutes. I will have to go back a few more dozen times.

It was an awesome dive. Thank you so much, Rick and Tim. for being there with me to make this a reality. You guys are the best. I look forward to doing it again with you.

Congratulations to Peter and thank you for sharing your story!

What's your story? Email your milestone stories and photographs to me at abedavis@nsscds.org, or snail mail them to me at 1228 Gina Court, Apopka, FL 32703.

Shirley Kasser
NSS-CDS Awards Coordinator

Visit With A Cave: Cannonball

By: Douglas Rorex

Cannonball Cave is a jewel in southern Missouri. The cave has gorgeous multicolor, multilayer clay formations. There are some eye-catching sculptings, such as the Hour Glass, the Needle, the Twin Bridges and several columns. The spring was covered by Wappapello Lake when the Corps Engineers built a dam on the Saint Francis River and its tributaries in 1939. The flow before the lake was formed was 31.7 million gallons a day.

Diving is usually best in the late summer and autumn months. The cave is entered through a 10 to 12 foot-wide restriction which is anywhere from one foot to three feet high. The swim back to the pit is a little over 700 feet and takes you past two jumps, through the Twin Bridges and a good bit of breakdown. The pit is huge, and only when the visibility is exceptional (over 60 feet), will you be able to see the deco rope suspended from the ceiling at the edge of the pit. The pit drops sharply to a restriction at 280 feet. Larry Hodges and I ran a 1/2 inch rope through it several years ago which saves divers from using copious amounts of gas to get through. Still, even with the rope, it is near impossible to negotiate the high flow a large part of the year (this included almost all of 2013). I was attempting to get through the restriction some years ago, and struggling to the point that I thought I saw Elvis frog kicking in front of me. He was wearing a thong bikini bottom. It wasn't a pretty sight. I turned the dive at that point.

Beyond the restriction is a low, wide, silty room, between three and five feet in height, which continues for 250 feet. At this point, it opens up to the Deep Tunnel, which has been explored to a depth of 384 feet, and a side tunnel that is yet to be explored to any degree. Any exploration beyond the 280-foot restriction is difficult on open circuit. I think that future exploration in this region of the cave can probably only be safely pushed by teams using rebreathers. This past October I discovered there was a break in the line on one side of the 280-foot restriction. Someone had repaired it with some cave line, but it needs further work. Larry and I had used 3/8-inch rope in this area because of the flow, and it probably needs to be replaced with something as sturdy.

This still leaves a huge section of the cave open for exploration. The pit has a number of concentric ledges, from 50 feet to 160 feet, with a number of sculpted formations and beautiful layers of clay (Some of which resemble smiles and gorillas... Okay, it helps to have a vivid imagination). There are holes near the 280 restrictions where the flow is cutting a new passage into the pit. There is a jump off of the pit which leads to a small, silty tunnel that is especially lovely. The main passage has all kinds of interesting formations. The two side jumps off of the main passage have a number of small rooms, which you can not only explore, but also experience zero visibility as your exhaust bubbles dislodge the silt from the ceiling. You can make a hundred or more dives exploring this cave and still find things that you've never seen before. There are holes in the clay floor in a room just off the first jump, which are puzzling. I suspect fish may have dug them, since there is no flow in the area, but for now I'm telling other divers they were made by cave hogs. Several years ago, I found a line arrow in one of these holes that had the letters "PIMP" on it. Go figure.

Above: Column with a gost-like diver in background
Middle Right: Mick Jagger's Tongue (algae growth caused by a fish die off)
Bottom Right: The Hour Glass and the Needle
Bottom Center: Multiple layers of clay (top layer is a limestone cap)
Bottom Left: The Wild West

Photographers: Doug Rorex and Larry Hodges

Midwest Underground

By: Chris Hill

Surviving In Darkness

OCDA divers have sighted crayfish in underwater karst caves of the Ozarks. Many of their sightings have been on silt mounds in large submerged cavernous rooms beneath the spring currently under investigation, known as Roubidoux Spring. The conduit feeding Roubidoux spring is large (characteristic of karst aquifers, i.e.White, 2002), and alternates between these large cavernous rooms and conduits that resemble a single-thread river. Velocity is greatly reduced in these rooms resulting in the deposition of large mounds of fine sediment. Consequently, OCDA macrofaunal sightings (primarily crayfish) have often occurred on these silt mounds." And so begins our quest to better understand life in the darkness of Roubidoux Spring.

Like most karst environments, Missouri caves and spring systems have life forms. As divers, we often see these critters. We wonder how they survive with no apparent food sources and no light to see food that is obviously there somewhere.

A couple of years ago, Samantha Rose, a Drury University student, found the OCDA (Ozark Cave Diving Alliance) website and became interested in the possibility of using that team to further research of the university. Soon thereafter, she joined our team and brought us together with Dr. Teresa Carroll, Associate Professor of Biology at Drury. Over the course of the next couple of years, Dr. Carroll worked to obtain permits and develop procedures and protocols for the capture of specimens out of the Roubidoux system. When we were finally ready for a project, as Missouri weather would have it, delays commenced. Finally, on September 14, 2013, everything fell in place to allow a project to take place.

Throughout the years of Roubidoux Spring exploration, we have consistently noted many crayfish on the large silt dunes in the larger deeper passages of the system – primarily in Lithuania Tunnel, about 3000' inbound. Dr. Carroll quotes several sources explaining that crayfish are well documented in what they eat and that those food products are typically deposited in areas of low flow. She explains, "We believe these findings validate why

We all gathered that day at Roubidoux with the objective for the OCDA team to collect crayfish samples, sediment samples in the area of the crayfish collection, and water samples from the general system. The team is well versed in deep penetration and exploration into this system, but this project had added dimensions in terms of task loading, decompression planning, etc. Lithuania Tunnel runs 200'-220' in depth and roughly 3000' inbound. Allotted dive time in that area was 60 min, which resulted in a 480 min total dive time. Teamwork and communication to achieve the objectives was critical. As one of the team members put it, "This type of dive requires teamwork, more so than most divers consider. You have to have a true partner on such a communication-intense dive. The ability to ''read your buddy's mind'' is almost required." Another member commented, "Precise buoyancy control is always elusive, but becomes much more important and difficult when trying to chase crayfish that don't want to be caught. You have to be close enough to grab them, but not so close that you disturb the very volatile silt they are most commonly found on. The core samples were also hard to pull out of the ground. The clay/silt material accepted the sample tubes fairly easy, but created a vacuum when we tried to pull it out of the ground. It was difficult to pull up

while trying to not pull yourself down into the silt."

Dr. Carroll explains project objectives: "The overall purpose of the Roubidoux investigation is to describe the crayfish species found in these isolated habitats and to define possible food sources available within these silt mounds, which would serve to explain why crayfish are consistently found there."

She goes on to state four key goals (as translated by my cave diver mentality): how much organic food is in the sediment, whether there are little animals (called meiofauna) in the sediment for crayfish consumption, classifying what little animals are present in the sediment, and classifying the crayfish samples captured. She explains further, "This information will allow us to provide an initial understanding of trophic food web relationships in these remote settings. This is intriguing as these systems represent not only isolated, but resource-limited ecosystems, and yet a good number of invertebrate macrofauna are somehow supported."

The sediment samples we collected in the Lithuania Tunnel are currently being processed and analyzed to determine the amount of edible organic matter present that crayfish could eat. If organic matter is present, then Stoichometric analysis will be done to see if enough exists to support crayfish growth. (That's more cave diver interpretation). Continuing in her words, "Additional sediment samples collected are also currently being examined using a high power stereomicroscope for the presence and identification of meiofauna. Crayfish have been prepared for DNA and taxonomic analyses. DNA analysis will only be required if taxonomic identification is not possible."

Dr. Carroll concludes with, "The importance of groundwater to surface stream systems has long been noted (Hynes 1983). As most flow in streams is dominated by groundwater inputs, the physical and chemical state of surface waters is largely a function of that which occurs in groundwater systems. This makes knowledge of true groundwater systems essential for the maintenance of groundwater and surface water fauna, as well as the protection of groundwater, as it plays a major role in the world's water resource potential. Anthropogenic activities such as withdraw for drinking water, commercial bottled water operations, stock watering, and irrigation are all contributing to ground water depletion (van Everdingen 1991). Groundwater aquifers can also be overloaded with pollutants such as fertilizers and pesticides, creating further degradation of groundwater quality. An advantage to studying these sediment-associated organisms is their quick response to any change in the system (Hummon et al. 1978) such as that caused by pollutants and other stressors. Assessing the biodiversity and feeding relationships of these isolated habitats could prove helpful in developing an underwater cave biodiversity index for assessing and protecting the biological integrity of these sensitive karst systems."

It's great when our hobby combines with a purpose and can further scientific and environmental knowledge. As one team member put it, "We explore underwater caves to see what is around the next bend, or over the next ridge. We rarely stop to think that the creature or rocks we see are scientifically significant. We make many dives in pristine places, but in general we are the only ones who ever visit or see them. This is an opportunity for others to experience the unique worlds we visit. We are the eyes and ears of the scientists."

So that day, with Dr. Carroll, six of her students and five OCDA members, we were able to collect and prepare 6 crayfish, 6 sediment samples, and completed a continuous sampling of the spring water. Success! Hopefully, this will lead to new knowledge of this water system and the life that lives in its darkness.

(Drury students present: Deborah Pears, Keisha Murray, Shelby Hoover, Emily Lawson, Caitlin Redmond, Erin Tuttle)

OFF to tHe Side.....

By Rob Neto

What Are You Weighting For?

Many divers, if not most, who dive sidemount will agree that once properly trimmed out in sidemount it is one of the most stable configurations you'll experience. Anyone who has spent some time in backmount can tell you what happens when you lean one way or the other as if to look over your shoulder. The weight of the double steel cylinders shift and you begin to tilt over. If you were to let momentum take over you would be on your back facing the surface.

This doesn't happen in sidemount. When you lean one way to look up the weight of the cylinder on that side pulls you back down. Placing the cylinders farther apart and lower on your body creates a more stable profile than when they are close together and on top of you.That's what happens side to side. But I'm not here to discuss the difference ofsidemount vs. backmount.

What I want to discuss is trimming out head to foot in sidemount. The weight of heavy steel cylinders high up on the back can make a diver foot light. Some backmountdivers will use heavier fins; others will use ankle weights to counteract the heavier weight on the opposite end of the body.

When we move those cylinders closer to the feet, with the valves under the armpits, that shift in weight is enough to make most divers foot heavy. Ideally, we'd have the valves at some point in between so that we could be properly balanced from head to foot. However, doing so would shift the cylinders too low at the valve, placing them in front of the shoulders, in effect front mounting the cylinders.

Manufacturers have tried to address this issue for a long time by creating sidemount wings with more air space at the lower end of the wing. Bungees were also used to trap air in the lower part of the wing. Smaller rigs, such as those made for aluminum cylinders, tend to have the smaller wings positioned over the lower back so when inflated the lift is closer to the feet. One manufacturer even introduced a wing designed to fit under the butt plate and create more lift closer to the feet.

Another option that has been used for some years now is the placement of trim weights on the shoulder webbing of the harness. By placing weights on the opposite end, the heaviness of the feet is counteracted and trim is corrected so the body is in a horizontalposition. The weights can be placed either on the front of the rig, usually under the top D rings, or on the back just above the shoulders.

So which method is correct? Well, that depends. If you are already overweighted, then adding more weight is not a good idea. Remember that neutral buoyancy test we all learned in our open water class? The first thing to do is get in the water with your sidemount system and cylinders that are nearly empty. Do a neutral buoyancy test by floating at the surface, taking in a normal breath and holding it. If you are neutrally buoyant you will drop to eye level with the surface. Once you exhale that normal breath, you will descend below the surface. If you don't descend, then you have to add weight.

Proper weighting does not mean being neutrally buoyant at the end of a normal dive. It means being neutrally

buoyant at the end of a dive where you've had to tap into your emergency gas reserves. That means you will be "overweighted" during all of your normal dives. But it's better to have that than to be too light when something has gone wrong that has caused you to have to breathe your cylinders empty. Many divers will need additional weight. If you're one of those that does not need additional weight then adding trim weight is not the best option.

If you are neutrally buoyant with empty cylinders then the best option is to try to configure your rig so your body position is horizontal. If you're still overweighted with empty cylinders then using the wing to maintain that horizontal position may work for you. However, if you are neutral with empty cylinders, that means you won't have any air in your wing at that point so you won't be able to shift air to compensate for a foot heavy position. This is something that needs to be considered.

If you do need additional weight, why not have that weight play double duty? Use it as neutral buoyancy weight and trim weight. Why use trim weight rather than shifting air lower in the wing to correct trim? Well, first off, as stated above, when neutral you won't have any air in your wing. Second, trim weight won't fail but wings do fail. I have personally had three wing failures and know several other divers who have had wing failures as well. If you depend on having air in your wing to maintain proper horizontal trim then should you have a wing failure you will also have trim failure. While this may be acceptable in open water, it is not acceptable in a cave. If a wing failure causes you to go from having near perfect horizontal trim to having a 15-20 degree angle or more to your body you will not only be dealing with poor trim but you will also likely be kicking up silt and creating significant drag by the larger profile that will be created.

Most of us who dive steel cylinders also have redundant buoyancy control. For many of us, that redundancy is in the form of a dry suit. With a wing failure we automatically go to our redundant buoyancy. It's what we're taught. If you're also depending on your wing for trim you'll need to then depend on your dry suit for trim as well. This isn't as easy as in a wing, and also requires having to put more air at the feet, something which many of us try to avoid.

Bottom line is choose the method that works best for you. If you need to add weight anyway, then ask yourself, "What are you weighting for?"

DEMA 2013

Photo: Jim Wyatt

Conservation Corner

By: Kelly Jessop

Hooray! Hooray! The Giant Is Dead

Typically this column is dedicated to cave conservation and preservation, which is something the Cave Diving Section hold as one of its primary missions. We give high regard to the unique formations in the cave systems, but frequently we don't give high regard to the water medium through which we swim. The last few years, we have seen Florida gripped by a protracted drought, which has led to diminished flow and low water levels. This hasn't impeded our activity, but has made it a challenge in some cases where steps into the water were several feet from touching the surface.

During the spring and summer, parts of the southeast experienced above average rainfall. Due to this above average rainfall, we are seeing springs returning to near normal flow levels, and water levels at the pre-drought levels. We can walk up to your favorite spring with azure blue water and see a discernible boil at the surface. I even attended a workshop recently where I heard the mayor of White Springs, a spring that has been considered "dead", speak excitedly because she was seeing this spring flow again. This is great news, but can we can declare the drought over with and resume our normal activity? Unfortunately not, as we are only seeing a temporary fix, with the real the problem still present.

Here is some interesting information from the Florida Springs Institute:

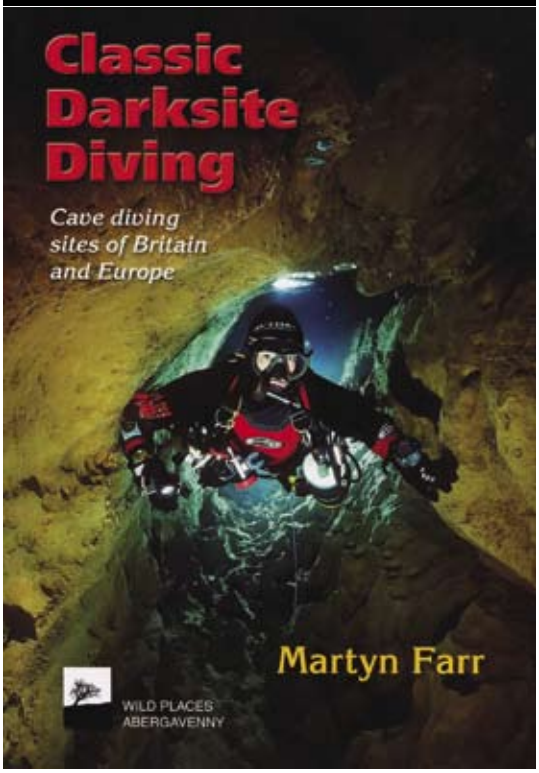
- The Floridan aquifer system extends 100,000 square miles and includes all of Florida and portions of South Carolina, Georgia, Alabama and Mississippi.
- The total recharge to the Floridan Aquifer System during an average year is estimated as 13.9 billion gallons per day, all of which used to flow out through springs.
- Wells are functionally the same as springs - they are artificial discharge points from the Floridan Aquifer System. Currently, we are pumping an average of about 3.6 billion gallons a day from the system, or 1/4 of the former average spring flow.
- Spring flows are dependent upon the pressure in the Floridan Aquifer System and decline rapidly as levels decline. A spring will stop flowing when aquifer levels are reduced by as little as 10 to 20 feet. Water levels in the Floridan Aquifer System have already been reduced in many urban areas by 30 to 90 feet.
- Conclusion: We are already exceeding the capacity of the Floridan Aquifer System to supply adequate water to maintain springs health. The only way to restore health to these springs is to greatly reduce our reliance on groundwater from the Floridan Aquifer System.

During the drought period mentioned previously, many complained of below average conditions, with some sites being considered non-divable. Is this something that is acceptable to us, as it impacts our recreation? The intent of this column is awareness, but a search will show you there are many statewide grassroot organizations that are trying to preserve the future of the springs, and they need our support.

BOOK REVIEW

Classic Darksite Diving: Cave Diving Sites of Britain and Europe
Author: Martyn Farr.

By Bill Mixon



Classic Darksite Diving: Cave Diving Sites of Britain and Europe. Martyn Farr. Wild Places, Abergavenny; 2013. ISBN 978-0-9526701-8-6. 6 by 10 inches, 192 pages, softbound. £27.50.

Famous British cave diver Martyn Farr has compiled this guide to cave-diving sites in Europe that are easily accessible and where permission is not required or is easily gotten. The emphasis is on Great Britain, where sites described include some sea caves and flooded mines. That being said, Farr also discusses other caves, including many well-known ones, on the continent and on islands in the Mediterranean.

The material on each site includes color photos, a simplified map, detailed directions, and access information. The history of diving at each site is discussed in the text, which makes it quite interesting even to those who never expect to visit any of them. Each site is flagged according to the training needed: cavern, intro or full cave. It is, at first glance, a bit mysterious that sites that have been dove to depths of around 600 feet in France are flagged as cavern dives, but this is because they have nice entrance pools for cavern diving. Not exceeding one's level of training is emphasized throughout the book.

Unfortunately, this book is not sold by any of the usual cave-book sources in the US. Postpaid from the publisher, Wild Places Publishing, PO Box 100, Abergavenny NP7 9WY, United Kingdom, the cost is $64US and checks drawn on US banks are accepted by mail. An on-line source for ordering is Speleo Projects in Switzerland (speleoprojects.com); they accept Visa and MasterCard and will charge your credit card €40 (currently about $54). — Bill Mixon

Ginnie Springs Says Good Bye

It is with great sadness we inform you of the passing of a long term Ginnie Springs Family Member. Duncan Jones was found deceased at his home October 29, his passing was sudden and unexpected. Duncan has been a valued member of our family for more than 20 years. He was a Veteran of the Vietnam War. His relationship with Ginnie Springs began as our attorney and he was instrumental in saving our springs and river from the proposed land fill that threaten to destroy them both. Seven years ago Duncan retired from practicing law and came to work directly for Ginnie Springs, where most of you met him. He was known as the Greeter at our Front Gate after the store was closed. Duncan was a very unique individual that we will all miss for a long time to come. You will never meet another like him, therefore, we consider ourselves lucky to have known him.

Duncan you have two families. You will be missed greatly by both. Rest in Peace Friend

The Loop

By Joe Citelli

Maintaining Equipment, Skills and Proficiency

When first pondering the purchase of a rebreather, many people hold the mistaken belief that a huge amount of setup and maintenance time, along with an equally onerous amount of training, is necessary to safely dive one. This viewpoint is to be expected and quite normal. It is totally understandable why someone considering learning how to dive a sophisticated piece of equipment paralleling that used by astronauts to survive in outer spacewould believe that. Unfortunately, once the student is trained and becomes completely immersed in rebreather diving, that viewpoint often begins to diminish and reverse itself. The tendency to become somewhat cavalier about equipment maintenance, skills and proficiency is common, especially among divers who are convinced they have finished the learning phase of rebreather diving, and they are now in a comfort zone that encourages complacency, a very dangerous place for them to be. Suddenly the former neophyte becomes invincible. He is confident to his own detriment.

As in many forms of advanced diving, rebreather diving can often appear to be easy; deceptively easy. Modern rebreathers rarely fail so one can dive a very long time experiencing no issues. This can lead to quickly adopting the mistaken notion that rebreather equipment is relatively maintenance free. That notion, like a cancer, quickly spreads and diminishes their attitude towards skill maintenance also.

There are certain basic tenets one abides by when diving a rebreather. One is the use of a checklist when “building” or assembling the unit prior to a dive, a process borrowed from the aviation industry. An investigator failing to find a checklist either on the person or with the belongings of the victim is a common element in **every** rebreather fatality. Do you reliably use a checklist? Do you allow yourself to be distracted when “building” your unit? If you are distracted do you restart the process from the beginning? Do you “build” your unit the day before your dive so you can do so at a leisurely pace or do you wait until the last minute, predisposing yourself to errors?

Are you proactive in your maintenance? Do you inspect and change o rings before they fail, or do you wait and say “Ahhh, they’re still OK”. What about the solenoid? Do you inspect and service it per the manufacturer’s instructions? And what about spares and consumables? Do you maintain enough of each so you are not tempted to make suboptimal choices because you don’t have another sensor, an o ring or more sorb?

When was the last time you checked the IP of your rebreathers’ oxygen and diluent regulators? For those who might not know, IP is an acronym for Intermediate Pressure – the pressure the first stage delivers to the second stage in an open circuit setup. For open circuit setups the second stage acts as an OPV (Over Pressure Valve) and will “free flow” in the event of IP “creep” (when the first stage no longer maintains the correct pressure and the IP rises above its maximum safe level), a clear and annoying warning that your equipment is in need of service. In CCR’s (Closed Circuit Rebreathers) there is no second stage to “free flow”, hence no obvious warning. Even though an OPV should be installed in all CCR first stages, unless your buddy is very diligent, minor over pressurization leaks can easily go unnoticed. Remember that CCR first stages are usually mounted on inverted tanks and concealed behind a back plate and wing. Small leaks are not as obvious as they would be on an open circuit manifold or valve mounted in an upright position. Because todays modern equipment is so well made and reliable it is easy to develop the tendency to procrastinate what should be scheduled routine maintenance, especially on a rebreather because these things just continuously work. They function flawlessly and seamlessly for what appears to be forever, at least until they no longer do so because of a catastrophic failure. When a rebreather regulator malfunctions there is no free flow to annoy you and encourage you to service your equipment. It does not change the way the unit breathes, or for that matter, cause you any inconvenience whatsoever. All it does is keep working until it ruptures a high pressure seat or sets off an OPV. Some people will react to that by saying no problem, just get an allen key and turn the OPV pressure up until it stops leaking rather than service the regulator. Not a very good idea.

As long as we are on the subject of regulators let’s not forget our bailout regulators which, for many divers, are the most abused, ignored pieces of equipment they own.

Continued on page 29

INSTRUCTOR'S CORNER

By Carl Griffing

Sidemount Diving

One aspect of cave diving that has exploded in popularity over the past several years is sidemount diving. What used to be a niche activity for a select few in the cave diving community for exploration and diving in cave passages in which back-mounted cylinders would not be possible, has developed into an accepted, safe configuration for even new cave divers.

With a qualified instructor, divers may take their cavern through cave diver courses using a sidemount configuration, however, this does not qualify the divers for using sidemount as an advanced form of cave diving. For divers qualified at the Cave Diver level who wish to utilize the sidemount configuration to its full potential for cave diving, the NSS-CDS offers the Sidemount Diving specialty course.

NSS-CDS Sidemount Diving Specialty course description:

> *The purpose of the Sidemount Diving specialty course is to expose the trained cave diver to the basic fundamentals of the use of alternative cylinder and harness configurations when back-mounted cylinders are not appropriate or available in underwater caves while under the direct supervision of a qualified Sidemount Diving Specialty Instructor.*

To enroll in the course, the prospective student must have NSS-CDS Cave Diver level of training or equivalent. The Sidemount Diving specialty course is typically conducted over at least 2 days and allows for a maximum of 2 students per course. Course discussions and topics include: Analysis of the limitations of back-mounted cylinder configurations, sidemount cylinders as an alternative due to logistics of the dive site (for example - steep climbs, long walks, remote sites, and the need to lower equipment), equipment configurations and set-up, physical aspects of the cave dives, cave conservation / damage avoidance, gas management, balancing reserve in cylinders and dive team relations.

At least 3 sidemount cave dives will be made and post dive debriefings will be conducted to provide students with the opportunity to gain the knowledge, techniques, skills and experience to more safely engage in sidemount cave diving. Upon completion of the course, the students who fulfill the requirements may then be qualified as an NSS-CDS Sidemount Diver.

If you wish to find an NSS-CDS instructor who can teach the Sidemount Diving specialty course, go to the NSS-CDS Instructor listing in this issue of Underwater Speleology or on the web at **www.nsscds.org/instructorlist.**

Current NSS-CDS Instructor Listing

Jim Wyatt, Training Director, trainingdirector@nsscds.org

Jon Bernot 378 Basic
High Springs, Florida, USA
jbernot@me.com

Emanuela Bertoni Cave
Quinta Roo, MX
pachacavediving.com
elabertoni@gmail.com

Brent Booth 241 Cave
High Springs, Florida, USA
Stage, Sidemount, DPV, Overhead Nitrox, Sponsor
bcb241@aol.com

Peter Butt 186 Cave
High Springs, Florida, USA
Stage
kes@atlantic.net

Juan Carlos Carrillo 342
Mexico DF, Mexico
Cave, Sidemount
undergrounddiving@gmail.com

Andrey Chivilev 377 Cave
Tyumen, Russia
Chivilev65@mail.ru

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While it is easy to imagine caves that lack entrances to the surface are not being ventilated by outside air, certain caves that have entrances can also lack ventilation for at least part of the year. Ventilation is a density driven process. Because warm air is less dense than cold air, gradients between cave and outside air temperatures drive ventilation. For caves that have entrances that are located at higher elevations than the rest of the caves, which would decribe the morphology for all underwater caves in Florida when they were dry, ventilation only occurs when outside air decreases below cave air temperature (Fig 2). Under current climate conditions, cave air is approximately 72°F. Whenever outside air temperatures decrease below 72°F, atmospheric air sinks into the cave and dilutes inputs of air from the vadose zone, which is enriched in CO_2 (Fig 2). During Florida's summers, outside air temperatures rarely decrease below 72°F at night, causing cave air to become density stratified. In the absence of ventilation by outside air, CO_2 continues to accumulate in the cave until cave air CO_2 concentrations approach the concentrations of CO_2 in the vadose zone (Fig 2). Accumulation of CO_2 gas in caves during the summer can elevate CO_2 concentrations in caves to values that are too high to allow precipitation. Because most aquifer recharge occurs during the same time period that cave air is density stratified, dripwater percolating through the cave would not be expected to form stalactites and stalagmites. Interestingly, air in caves in the Bahamas and the Yucatan does not become seasonally density stratified because nighttime temperatures decrease below the cave temperature year round in the tropics. As a consequence, caves are ventilated each night and CO_2 concentrations are kept low to allow for precipitation of cave formations.

Another important factor in speleothem formation is the dripwater's source and flowpath. Dripwater saturation is often in direct correlation with cave air CO_2 and during periods, such as summer, when in-cave CO_2 levels are high, the saturation of dripwater is often low, thus preventing calcite precipitation. In much of Florida's highly permeable limestone, the water can move relatively quickly through the vadose zone under increased recharge conditions, particularly during the wet summer season. If the water is not saturated enough with dissolved calcite, when combined with the higher cave CO_2 levels during summer, the dripwater may not become supersaturated with respect to calcite, which is needed for mineral precipitation and speleothem growth to occur. The lack of cave ventilation during summer that can cause CO_2 to increase in air-filled caves, most of which also have entrances at higher elevations than the rest of the passages, would only exacerbate the lack of speleothem formation under these conditions. A final reason that caves in Florida may lack formations is that stalactites and stalagmites may have formed when caves were air-filled, however, the formations may have since dissolved away. Many caves in Florida are located along rivers that reverse flow during floods (caves in the Suwannee and Withlacoochee River Basins) or receive water from sinking streams (such as Wakulla or Oleno). Floodwaters are highly acidic and continued flushing of river water into caves during floods causes their enlargement. Any stalactites or stalagmites that might have formed in many caves in Florida would have been dissolved away by these flood events. Caves that lack connections to flood waters, such as Warm Mineral and Salt springs, have had their cave formations preserved, offering some support to this hypothesis. Similarly, formations are preserved in the Yucatan and Bahamas because these locations lack rivers.

Previous studies in Florida on stalagmites from air-filled caves indicate periods of growth occurred throughout the past 30,000 years. This provides evidence that even during the Last Glacial Maximum (20,000 to 26,000 years ago), lower water tables and drier hydrologic conditions were still optimal for speleothem growth. One possible explanation is that decreased recharge would have allowed longer residence time of the water in the vadose zone, in turn causing increased calcite dissolution due to longer contact time with the bedrock. Greater temperature extremes would have allowed for increased cave ventilation, thus creating ideal conditions for calcite precipitation from supersaturated dripwater, despite the overall drier climate. Other periods of growth coincide with much wetter conditions, such as the mid-Holocene (5,000 to 8,000 years ago), wherein warmer and wetter climatic conditions may have contributed to increased overall calcite dissolution and the propensity of speleothem formation throughout the year, even during the somewhat drier cool seasons, thereby overcoming some of the limiting conditions mentioned above.

The lack of cave formations in Florida's underwater caves continues to be a subject of debate; however, as we have described above, there are several plausible reasons why many underwater caves lack formations. There is abundant geological evidence to suggest that Florida's caves were once dry, so the argument that caves lack formations because they have always been full of water is almost certainly not correct. We therefore suggest that caves could lack stalactites and stalagmites because (1) the conditions were not right for their formation, or (2) because the formations were there at one time but have since been dissolved away. In either case, underwater caves in Florida are not alone in their absence of cave formations, as most air-filled caves in Florida lack cave formations as well.

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Tanks are filled, regulators are charged, purge buttons are depressed and maybe a breath is taken from the second stage every once in a while. That is the extent of attention many bailout regulators get for months, or even a year or two. In the interim they are subject to being banged, dropped and dragged through mud and silt plus a myriad of other insults. When was the last time you checked the IP on your bailout regulators? When was the last time you confirmed the QD (Quick Disconnect) on your bailout regulators were functional and not frozen or jammed? When was the last time you actually confirmed your bailout regulator was able to function trouble free for an extended period of time? IP gauges are inexpensive and are a worthwhile addition to a rebreather diver's tool kit. With it you not only get to check the regulators Intermediate Pressure, but also confirm the integrity of any quick disconnects. (The IP Gauge typically snaps into a BC type quick disconnect to read the regulators IP.)

The heart and soul of any rebreather is its oxygen sensors. How many of you have a sensor verification and replacement program you adhere to? An oxygen sensors predictable life span is between 12 and 18 months. Are you aware of the age of the sensors in your unit? Do you know if they come from different manufacturers' batch numbers? (Statistically, you are less likely to experience multiple failures because you avoid the possibility of getting all your sensors from a "bad batch".) There are several good ways to accomplish this, one of which is to replace one sensor every six months whether it needs it or not. Another method is to replace all of them once a year so you always have fresh sensors and yet another is to replace only when needed or at a maximum age of 18 months. Which method, if any do you use?

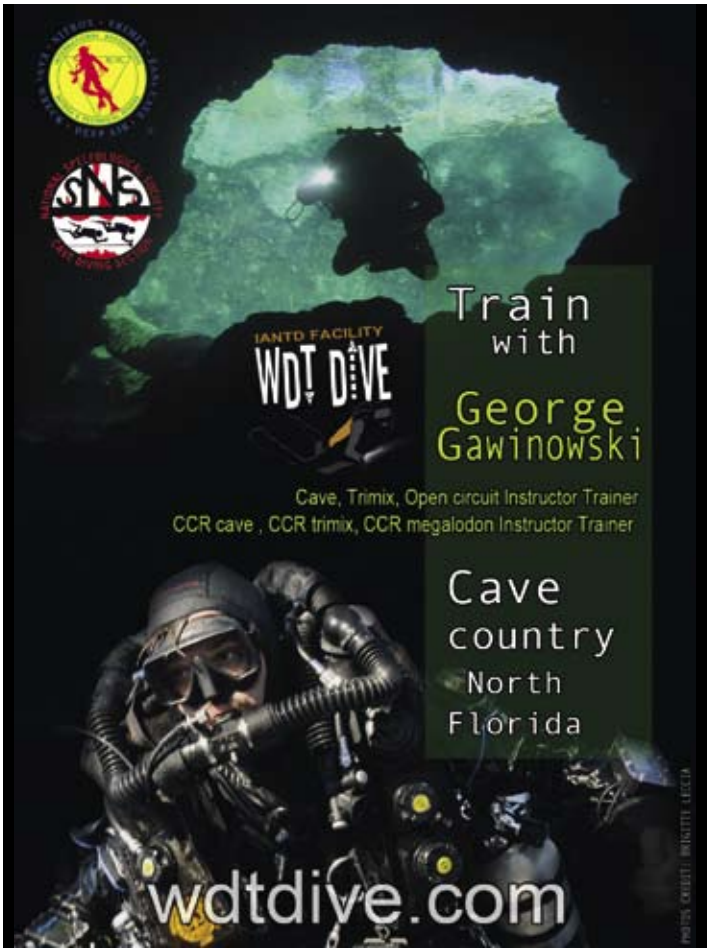
What about loop inspection and sanitizing? Do you adhere to a schedule of disinfecting your breathing loop and regular intervals or do you wait until you see mushrooms growing in your counter lungs? Do you religiously inspect the check valves (or "mushroom" valves) in your DSV (Dive Surface Valve)? Do you stretch out your loop hoses and look for cracks, nicks and cuts?

Hypoxia, Hyperoxia, Hypercapnia -Boom

These four drills are pounded into your head for the duration of your training. By the time you finish you should be having nightmares about them. But, how many of us actually practice them after training? When was the last time you confirmed you could reach and operate both of your on board gas valves effortlessly? How often do you practice "feathering" an O2 valve (a skill where you only open the valve enough to allow a slight trickle of gas to enter the loop) as a remedy for a solenoid that is stuck open? When was the last time you simulated a semi-closed bailout? (Semi closed is a process by which one breathes the loop down, counts breaths to determine when to exhale and flush with diluent rather than add oxygen as a means of maintaining loop integrity. This technique is used to stretch gas resources in an extreme emergency.) Some part of every dive should be dedicated to some aspect of drills and self-training. When was the last time you passed bottles around within your team while exiting a cave? All of these skills and techniques learned in class must be mastered and committed to muscle memory. Practice and diligence with skills and equipment maintenance is the key to successful, safe rebreather diving. In that vein, what have you done recently to further your dive education? Reading books and reports are as important as taking classes. You should always strive to improve upon your knowledge base.

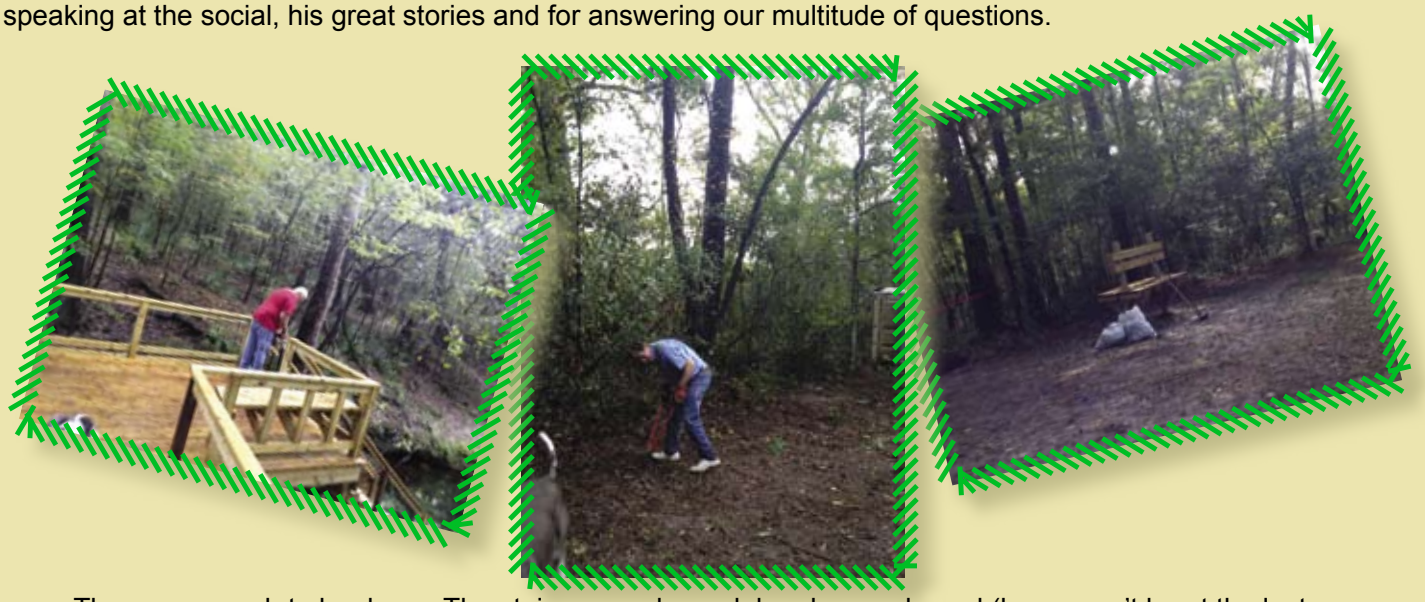
Your instructor can at best give you the tools with which you can become a good rebreather diver. He can TEACH but only you can LEARN. If you want to perfect the skills and tools you were given during training, you need to continue the education process by making some part of every dive a training session.

Hypoxia, Hyperoxia, Hypercapnia -Boom



Cow Springs Clean-up And Mini Social

Our thanks to the volunteers who helped with the Cow Spring clean-up. Bill Rennaker, Howard Smith, Li Loritz, Marilyn Boyer, Steve Boyer, Eric Simon, Rick Simon, John Dinkins, Sandy Robinson, Rick Robinson, Jeff Reeves, Tony Flaris and Cheryl Doran. Thanks to Dive Outpost and Cave Excursions and special thanks to Manta Industries/High Seas Millworks for sponsoring the lunch and the great door prizes. Special thanks to Lamar Hires of Dive Rite for speaking at the social, his great stories and for answering our multitude of questions.



There was much to be done. The stairs were cleaned, brush was cleared (hey, wasn't he at the last clean up?) and trash picked up from the woods and along the Street.

Everyone worked, mowing or picking up sticks. Well, some of us may have chatted now and then. And we did have lunch!

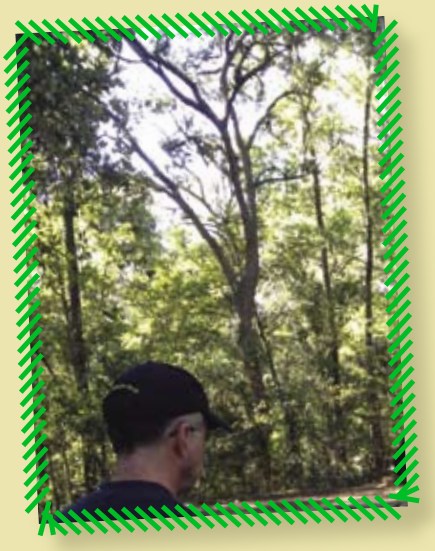



The brush was piled HIGH, and we won't tell you what we learned about starting a fire....but will mention we learned a leaf blower helps!



Then Bill brought out another toy....he has the best toys! And a new trail was cut to the far right. This is part of the erosion control plan and will allow the new plants to take hold and the old vegetation to fill in. Please cooperate and stay off the old trail.

Our thanks to all those who helped and donated to this event.



The following morning, over coffee, bagels and danish, we were treated to stories of the history and exploration of Cow Springs by Lamar Hires.

Our thanks to Lamar for his time and his stories.

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