Underwater Speleology

Journal of the Cave Diving Section of the National Speleological Society

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Cover Photo: Monstruo, giant stalactite in Chac Mool .
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Editor's Notes

If everyone is moving forward together, then success takes care of itself. ~ Henry Ford

Change and progress... I believe that the organization is making progress. We have new ideas and are maintaining past programs. The Supervisor Program is up and running, we will be represented at DEMA , have a clean up and social coming up at Cow Spring and there are several new committees up and running. In the coming months of 2014 we will begin with the Hart Springs Workshop which has a unique format that I am looking forward to, a clean up at School Sink and plans underway for the 2014 Workshop.

There is also some change. As you read this, we will have two new members of the BoD due to the resignation of Bert Wilcher and Marissa Lasso. I thank them for the time and energy they put into their tenure on the BoD and wish them both well.

Joe Citelli has taken the position as Chairman and I welcome TJ Muller and Nathan Spray as secretary and program director, respectively.

The UWS changes a little each issue. I am thrilled to have more member submissions this issue and hope you keep them coming. Congratulations to Cristina Zenato on her Mermaid/Chimney Hole connection. Her story begins on page 5 along with several other member articles throughout the magazine.

Peacock Spring, one of my favortie dives, has had an on-again/off-again year with continual flooding, and now a large rock has fallen and blocked passage through Challange Sink. I look forward to the time when I can once again do the Grand Traverse. In the mean time, I believe a trip to the end of the Water Hole Tunnel is in order. What are your dive plans?

Dive safe,

Cheryl

from the Chairman

Bert Wilcher

As we move into the drier time of the year in North Florida, Florida Cave divers are looking forward to greater access to the abundant caves in the area. Membership is also excited about the upcoming 2013 Midwest workshop in Missouri; as well as our participation in DEMA in November. We will also have a presence at React in Luraville. Your membership will be well represented at these events and we encourage everyone to attend.

The BoD would like to offer a big thank you to the volunteers who donated their time, efforts and talents to the construction of a new walkway and landscaping at Cow Springs. This project was designed to slow erosion at the site and conserve the natural fauna surrounding this beautiful spring. Please remember this is a dive site for members only and participants must register prior to use. If you observe any activity at this site that doesn't appear by our guidelines, you are encouraged to contact the sheriff's department and have them check for any wrong doing. It is not the responsibility of any member to confront someone at the site.

Your BoD is communicating with each other on a regular basis and exploring the use of new technologies to allow more of our membership to participate, not only in board meetings, but possibly workshops in the future.

The training committee is proud to announce the development of a Cave Guide program. This program is similar to a dive master or technical supervisor program that other training agencies offer. It is not a requirement for guides, but allows them to get specific training in how to supervise cave dives, mentor newer divers and protect and conserve cave environments. This program has been approved by one of the largest dive insurance organizations and allows trained guides to obtain insurance should they wish. This is an exciting new program and the training committee is to be commended for their hard work and attention to detail on this endeavor.

As we move forward, I want to encourage all members to have open communication with this BoD. We are here to represent you best interest and we welcome your input.

Safe diving,

Bert Wilcher

September 16, 2013, Bert Wilcher announced his resignation as Chairman and BoD member for health and personal reasons.

The NSS-CDS Board of Directors would like to thank Bert for his service to the organization and wish him well. His presence on the Board will be missed and we hope to have the opportunity to work with him again in the future.

September 18, 2013, Marissa Lasso announced her resignation as Program Director and BoD member.

The NSS-CDS Board of Directors would like to thank Marissa for her service to the organization and she will be missed also.

Joe Citelli became the new Chairman and we welcome TJ Muller as and Nathan Spray as secretary and program director.

NSS-CDS Board of Directors

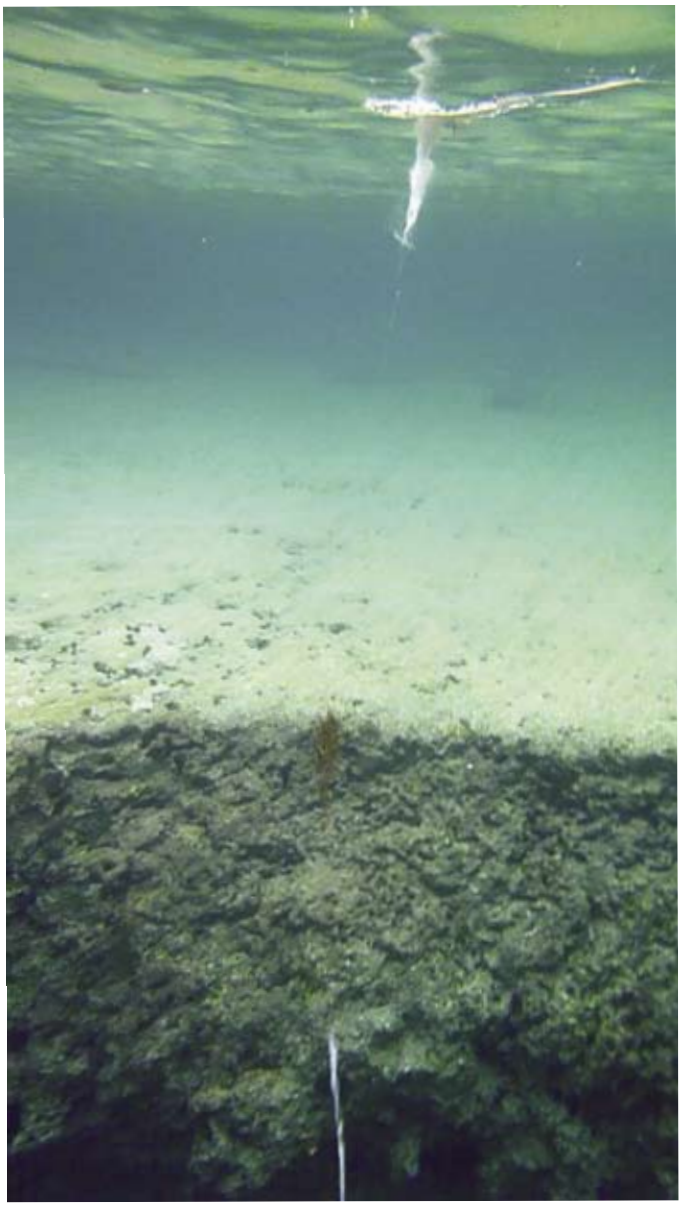
Making The Connection That Didn't Exist

By: Cristina Zenato

The Bahamas' blue holes have come to the world's attention in the last few years thanks to work by National Geographic Magazine and the lens of Wes Skiles.

Most cave divers have heard about the gorgeous crystal caves of Abaco, where renowned cave explorer Brian Kakuk has revealed a treasure beyond comparison.

I do not live on Abaco, but on Grand Bahama, where I have been cave diving, training and exploring since 1996. We have some beautiful caves, and we have some big caves here, but I have yet to discover a cave that matches Abaco's Dan's or Ralph's caves in their beauty and majesty. Yet I have not given up my dream of finding a similarly magical cave. I think the more I can explore, the more are the chances of my dream coming true. In the meantime, any hole, any ocean opening with flow becomes a place where I like to go and enjoy.



Chimney final stage of vortex before entering. Photo courtesy of Library Cristina Zenato

Many years ago I followed other cave divers' directions to reach an ocean blue hole known as Chimney Hole or, as Wes Skiles called it, that "insanely dangerous" vortex off Grand Bahama. Chimney is an ocean hole that lies about 300 ft offshore. When the tide's high, observers walk through chest-deep water to the entrance, but only through ankle-deep water when it's low. The "chimney" features a 10 ft.-diameter shaft that drops directly to 40ft. A small restriction allows divers to squeeze their way through the entrance and pop through, finding vertical fissures in most places between 15-30 ft. wide and tall with numerous offshoots in every direction. Old stalactites and stalagmites covered in limestone decorate the sides of these high passages and a thick layer of constantly moving sand and clay covers the bottom. Strong currents flow in and out of the cave. These currents, heavy layers of sea life and moving sediment make placing the permanent cave guideline a challenge in itself. Every few weeks a dive is necessary to clean the line of all encrusting creatures and growth, and making sure that it's not covered in layers of sediment.

Tidal movements limit Chimney's exploration. Only during slack tide can a diver attempt to descend the shaft. On outflowing currents, the hole looks like a boiling pot.

Mermaid Pond. Photo courtesy of Library Cristina Zenato

Attempting to swim against it would prove impossible. Tides move on this island with a delayed pause per cycle. During each pause the cave flow stops syphoning or blowing. It is fundamental to catch the tide that will reverse the hole into a boiling one. The diver has a window of about 20 minutes to enter the hole and swim into the tunnels so that when the flow increases in strength the diver is far enough away to require minimal effort to continue the exploration.

Visibility varies at times, but it's never above 40 ft. Particles of moving sediment are always reflecting the diver's light as the flow changes direction. Sparkling eyes of sea creatures and skeletons of drowned turtles and dead creatures litter the bottom and the walls of the cave. Tunnels open in every direction. The cave is big, bigger than the eyes and the light can see and reach.

I have dived Chimney since my cave diving certification in 1996, but never pushed beyond a certain point. Stories had it that the hole did not go too far. Most of the time I stopped between 1000 ft. and 1500 ft. in. A lot of exploratory attempts looped back into previously laid lines and showed the labyrinthine nature of the cave. In time, thanks to side mount and having accumulated a lot of exploratory experience, I gained interest in the place again. The rotatory nature of the tides prevent exploration for most days out of the month, when the time conducive to enter the cave is during the dark hours of the day.

Associate the limited entry time with a busy working schedule, a few ocean storms, impossible access and exploration done on personal time off, and you can see how taking five years to explore a mere 6000 ft. of this cave becomes a little more obvious. The goal? To reach a hole called Mermaid Pond, 300 yards away on landline.

Mermaid Pond is based on land, its surface littered for years with garbage of all kind, with slimy green moss and algae and a nauseating scent wafting up from it.

Mermaid Pond swallowed tons and tons of garbage during Hurricane Frances, looking like a gigantic flushing tub as the ocean came over the land and destroyed everything on its way. Through a restoration project the pond is now protected and the surface clean, making the access a little more bearable. The garbage still litters the entrance and the slopes leading into the cave.

I started the exploration of this hole in 2008. Mermaid is an alien world of dark water and orange bacterial growth coating the floor, ceiling and walls. It can surprise even the most comfortable cave explorer. I had previously worked inside Ben's Cave in the Lucayan National Park to prepare a map for the Bahamas National Trust. I was used to a very difficult environment of constant halocline mixed with thick black bacterial percolation, low bedding planes, white blinding clay and brittle falling ceilings disturbed by minimal bubble exhalation. Ben's Cave is fascinating but very challenging.

Mermaid Cave was one step higher in mental difficulty for exploring and laying line. The visibility at times was less then 10 ft., and the cave passages wide enough to prevent visualizing the walls on either side. Laying exploratory line felt like gliding through a black hole, reference provided only by the shiny numbers on the computer, the scent of hydrogen sulfide thick around the mask, and at times tingling on the lips. I naturally followed the path of least resistance and to my surprise it led me north, straight north, and 180 degrees away from Chimney. Exploration was made hard by the limited visibility and heavy percolation. Attempting to explore one passage would result in the total obliteration of the visibility in the cave on the way out, preventing further exploration of a different tunnel.

Oscar Svensson and Cristina Zenato after completing the traverse and exiting on the ocean side. Photo courtesy of Library Cristina Zenato

Cave below Mermaid. Photographer: Arek Pers

In the tunnels there was always a flow, a gentle flow, nothing to mind in terms of calculation of turn-around, but enough to transport the disturbed sediment everywhere. Under layers and layers of fluffy sediment were gorgeous crystal decorations so beautiful, it made my heart cry realizing that the heavy growth was caused by polluted water. Mermaid Cave became the key to the quest to save Ben's System. By documenting evidence of this cave's dire situation --- it is located under a settlement, stripped of its forest and fed by polluted water coming from an industrial creek --- the Bahamas National Trust was able to promote the conservation of the full grounds above its cave.

I still wanted to connect these two caves despite being told they did not connect. Exploration of Mermaid headed south, but after a few times of very slow and dangerous exits in absolutely zero visibility and pinched areas, I gave up that direction. I moved back to the ocean side (Chimney). By now I had moved into a cave similar to the land one. Swimming through the tunnels I could see the fresh water floating on top of the salt water 20 ft. above me. I knew I was swimming in tunnels under the land. The direction was not yet the correct one, I was heading west not north. But I had left the ocean, and the cave opened up even more in wide low bedding planes and several tunnels shooting in different directions.

Setting line on the ocean side, already below land. Photo courtesy of Library Cristina Zenato

The technique I used was to mark the line with cookies on the way in when visibility was good or acceptable and methodically explore further away tracing my way back to the entrance.

Different direction yields big passage. Then one day, trying to reach the end of my exploratory line I decided to take a different route. I tied into the existing line and off I went. The passage in front of me was enormous; how I had missed it so far was unexplainable. All of the sudden, it felt as if the cave had given in. After all these years of resisting my searching and prodding and laying thousand of lines into dead ends, it kind of gave up. (I do believe the cave is alive and in my mind, while I was swimming, I could hear it talking to me. Something had changed, and the way looked so obvious). In two dives just short of two hours each, I deployed two full exploratory reels. I ran out of line before I ruan out of time and gas.

At that point a very special guest and ex-student was supposed to come for the end of the year. Oscar Svensson, a Rolex scholar I had hosted in early October to teach him full cave, was coming back over the Christmas holidays. I waited for his return to take him with me to lay the last stretch of exploratory line. Besides, I wanted somebody to share the excitement with me and hopefully surface together at the other end. In a series of fortunate tidal movements I had a window of five different days to enter the hole. The last two overlapped with Oscar's visit.

New Year's connection. On December 31, 2012, we entered the ocean hole as it was slowly slacking. We descended and with a double stage system we systematically made our way to the end of my exploratory line. There I handed the newly packed reel to Oscar and offered him to go first. I have to admit he was "sort of" first, this being his first time I was slightly ahead of him trying to show the way. We were getting shallower, and then a visual cued me to the fact that we were getting close: human garbage!!! I believe it to be the only time I have ever been so excited about seeing litter at the bottom of the cave. What it meant was that we were close to an entrance, where the garbage had infiltrated.

I motioned Oscar to cup his light, and I did the same, and after few seconds a small dim spot appeared in the corner of my eyes. It was small and far, and although I tried it was impossible to surface through it. But I squeezed my head high enough to see the fronds of the surface vegetation, and I knew where we were. We continued swimming. This time I had the reel back in my hands around what looked like the breakdown pile of Mermaid, encountering more and more litter, spotting a second bigger light hole, and then right in front of us a descending line, my exploratory line that from Mermaid entrance headed north. We had come up to it at a very shallow depth, 25ft and from the southeast, not the depth or direction I had been exploring from the land hole. But it was there and it showed me that I had finally made a connection I was told did not exist. I placed an exit arrow on it and tied my exploratory line, then had to wait to surface.

I have done long decompressions, but the five minutes spent waiting to surface were the longest time underwater, ever.

Cristina Zenato is a cave explorer, technical dive/cave instructor, shark behavioral professional and head of diving at UNEXSO on Grand Bahama. See her website (and more photos) and contact her at www.cristinazenato.com and on Facebook at www.facebook.com/pages/Cristina-Zenato/167197770004623.

Decorations on ocean side. Courtesty of Library Cristina Zenato

On The Origin Of Florida's Underwater Caves

By: Jason Gulley
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While many US-based cave divers think of underwater caves in Florida as "normal" these caves have actually been perplexing cave researchers for decades. Some of the more bizarre attributes of Florida's underwater caves include: most caves appear to receive all of their water from porous limestone instead of from sinking streams; many caves have passages that extend beneath rivers; and several caves discharge via springs on both sides of rivers. The Devil's Cave System, at Ginnie Springs, for example, has all of these attributes; many of the passages extend beneath the Santa Fe River and water discharges via Devil's Ear and Eye, on the south side of the river, and via July Springs, on the north side of the river. Traditional models of cave formation do not predict caves to have these attributes and, consequently, the specific processes leading to the origin of underwater caves have largely remained a mystery.

To understand why the specific processes responsible for the formation of Florida's underwater caves have been so perplexing to cave research, it is important to understand the general requirements of cave formation. There are two necessary ingredients that need to be brought together to make a cave: water flow and dissolution (loosely defined here as acid generation). If there is flow but no dissolution, there will be no cave because there is no acid to dissolve rock. Likewise, if there is dissolution but no flow, there will be no cave, because once acid reacts with the rock, flow is required to bring in new acid to replace the old.

Many, but not all, caves are dissolved from limestone by carbonic acid and the caves in Florida are no exception. Rainfall percolating through the soil zone accumulates carbon dioxide that is produced by tree roots and microorganisms in the soil zone. CO_2 molecules dissociate in water to form carbonic acid, which can dissolve extensive cave systems over 10s of thousand to millions of years.

What is less widely recognized, however, is that formation of caves requires that water flow and dissolution become focused along narrow regions of limestone bedrock. If flow and dissolution are not focused, dissolution occurs everywhere and a cave cannot form. The highly porous limestone that is characteristic of Florida therefore presents a challenge for understanding how water flow and dissolution became focused to form caves: how do flow and dissolution become focused in a spongey limestone?

To understand why so little is known about underwater cave formation in Florida, it is important to know that most models of cave formation have not considered "spongey" limestone. Limestone is typically deposited in environments much like the modern day Bahamas. Initially, these limestones have dense networks of pore spaces created by gaps between calcite sand grains and shells. Dissolution of shells, which are composed of a type of limestone that is more easily dissolved than some of the other material, creates a spongey framework. If you look closely at some limestone in underwater caves in Florida, you may notice that many of the large pores have the shape of shells or fragments of shells. Over time, these spongey limestones can become deeply buried in the subsurface by a number of geological processes. During burial, the pore spaces in these limestones become compacted by pressure and get filled in by natural cements, turning what was initially a highly porous, spongey limestone into a limestone that more closely resembles a brick. Small differences in the characteristics of limestone layers result in thin gaps between bands of limestone called bedding planes. Frequently, bedding planes that have not been enlarged by dissolution are fractions of a millimeter in thickness. Later, when various geological processes bring this compacted and cemented limestone back up to the surface, stress imparted on the rock causes the rock to fracture.

Most of what we know about caves is based on caves that have been developed in the limestones described in the preceding paragraph – those that have been compacted and heavily cemented during burial. Understanding how flow and dissolution can become concentrated in these limestones is straightforward and most models of cave formation have been developed for this kind of limestone (to a large degree, this reflects the research bias of most of the people that study caves. Many caves in cemented limestones are air-filled whereas many caves in spongey limestone are water filled and there are very few geologists that are also cave divers). Because compaction and cementation have rendered most of the limestone impermeable, water can only flow through the interconnected networks of fractures and bedding planes. Steams flowing on impermeable rocks on the surface pick up CO_2 from the soil zone, flow into the ground along fractures, travel towards rivers along bedding planes and emerge at springs. Underwater caves form where mountain building events have warped the limestone beds, causing bedding planes to dip below the water table

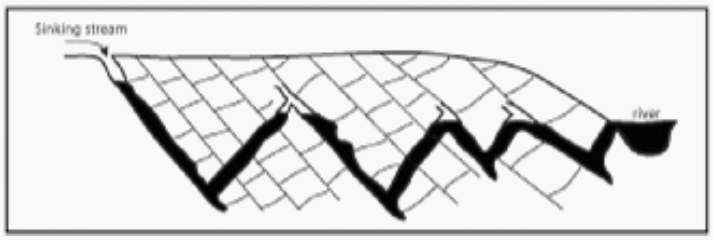


Figure 1: Underwater caves form in limestone that has been compacted and cemented during burial where sinking streams are forced below the water table by steeply dipping planes. Because the rock is impermeable, sinking streams have to follow convoluted flow paths along dipping bedding planes and joints to discharge at streams. Dissolution, driven by CO_2 in sinking streams, enlarges these convoluted flow paths to form underwater caves. Underwater caves that form by this process can be found in West Virginian, Kentucky, Tennessee and Missouri (in addition to many other locations in the US where limestone has been buried and exhumed by geological processes). Figure adapted from Gulley et al (in press).

(Fig 1). Water follows convoluted flowpaths between interconnected networks of joints and bedding plans to discharge at springs because these features represent the only efficient flow paths in the rock. The actual rock has very little ability to transmit water (imagine where water would flow most rapidly in a neatly stacked pile of bricks). If the fracture density of the limestone is low and the angle that limestone beds dip is steep, water can flow to great depths below the water table along bedding planes before encountering a fracture and flowing back toward the water table, eventually upwelling as springs along nearby rivers (Fig 1). Dissolution and enlargement of these convoluted flow paths is what forms underwater caves in limestones that have been deeply buried. Passages are typically simple tubes connecting a sinking stream with a spring and have few side passages at depth. In the US, underwater caves in parts of Kentucky, Tennessee, Missouri and many other states formed by these processes.

Understanding how dissolution becomes focused in limestone that has not been deeply buried and remains "spongey" requires the generation of acidity at some location in the subsurface. Underwater caves are found extensively in the Yucatan and the Bahamas but the highly porous limestone causes most rainfall to be rapidly absorbed by the ground, limiting river formation, and hence cave formation by sinking streams. Additionally, the spongey

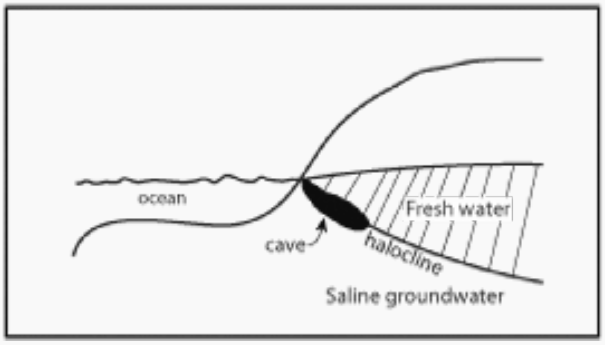


Figure 2: Underwater caves are thought to form in limestone that has not been buried and retains a "spongey" texture by dissolution resulting from mixing of fresh and salt water. Where these waters mix, additional limestone can be dissolved. Because mixing occurs below the water table, caves forming by this process would also form underwater. Some researchers hypothesize that underwater caves in the Bahamas and the Yucatan formed by this process. Figure adapted from Gulley et al (in press).

nature of the limestone reduces the ability of fractures to concentrate water flow. Consequently, flow and dissolution cannot be concentrated in the same manner that flow and dissolution are concentrated in limestones that have been deeply buried; caves in spongey limestone must therefore form by a different process.

Much of cave researchers' thinking on cave formation in spongey limestone has been influenced by research in near-coastal limestone aquifers, such as the Yucatan and the Bahamas. In these coastal settings, dissolution, and hence cave formation, is thought to result from the mixing of fresh and salt water. In near-coastal aquifers, freshwater floats buoyantly on underlying salt water and the interface between these two water masses is called the halocline. Typically, both of these water masses have already used up all of their acid to dissolve limestone by the time they meet at the halocline and, individually, neither one of the water masses are capable of dissolving additional limestone. Large differences in the concentrations of dissolved materials in fresh and salt water can, as a result of complicated thermodynamic properties, result in mixtures that are capable of dissolving small amounts of limestone. Because mixtures occur in narrow bands of aquifers, dissolution is focused. Because there is a constant flow of water towards the ocean, flow is available to bring in new "acid." Consequently, both flow and dissolution can come together near haloclines to form caves (Fig 2). Partly because the thermodynamic properties of mixtures of fresh and salt water are well known and partly because of the close association of haloclines with some underwater cave passages in coastal aquifers, the hypothesis that fresh water and salt water mixing are responsible for forming caves in spongey limestone has become popular. It should be noted, however, that testing this hypothesis has largely been accomplished using computer models and has not yet been rigorously tested using geochemical sampling.

If we think about how the ingredients of cave formation are brought together in near-coastal spongey limestone and in limestones that have been deeply buried, it presents a bit of a conundrum for understanding how underwater caves formed in Florida. Florida has underwater caves but it lacks the steeply dipping bedding planes that control underwater cave formation in limestones that have been buried. Additionally, most caves in Florida do not appear to be associated with sinking streams (which is why the water in many caves is so clear). As a result, caves in Florida cannot have formed by processes that are similar to caves formation in limestones that have been deeply buried. Caves in Florida are also too far from the coast to have been formed by mixing of fresh and salt water (when was the last time you saw a halocline in most caves in Florida?). Consequently, we're still left with that question:
"what processes concentrated dissolution and flow to form caves in Florida's spongey limestone?"

Continued on page 34

Conservation Corner

By: Kelly Jessop

Skills Quiz

One of the missions of the Cave Diving Section is cave conservation, and because of this primary mission, the organization has always had a conservation committee with a chair. In 1995, the CDS had the noted cave biologist Tom Morris as their conservation chair. In *Underwater Speleology*, Volume 23, Number 4, he wrote a very timely article regarding cave attrition issues that were being seen at that time. I don't want to reprint the article (although I would recommend getting an archived copy), but something he generated was a skills quiz. I want to share this quiz, and add some additional items to make the list relevant to 2013.

- Have you tried using your lungs as a sensitive buoyancy compensator to,"hover" in a precise position without "finning" or "fanning"?
- Have you tried tying off a reel without settling to the bottom or hanging onto something?
- Can you pick up a stage bottle "on the fly"?
- How is your spatial awareness-is it a rare thing to touch the cave, or do you leave a trail of ceiling "crumbs" behind you as you bounce and scrape along?
- Can you turn on a dime without stirring silt?
- Do you use the most efficient and nondestructive fin stroke for every situation?
- Are you in good enough shape to swim your whole dive in style without resorting to destructive "pull and glide" techniques?
- If you absolutely have to pull to move through high flow caves, do you look for holds that have already been used,inorder to minimize damage?
- Do you know light and hand signals well enough that you rarely have to use a slate (which often results in bottom-wallowing or ceiling cruching)?
- Can you put your hand on any piece of gear you want without fumbling around?
- Do you know how to play the current in a high flow cave in order to get through with the least effort and damage?

This ends Tom Morris' list, so there are a few items to add to this skills quiz

- Can you get off the trigger of a DPV at any point and be neutrally buoyant?
- Do you adjust the prop pitch of the DPV frequently based on the size of the passage?
- Is there enough DPV leash length to move the DPV into different planes to change your profile?
- Do you get off the DPV trigger frequently in silty or small areas?
- In sidemount do you have enough spatial awareness to know where the tanks are relative to the cave side walls?
- If having to go through a fissure area with sidemount, and having to swim on your side, can you avoid wall contact with the tanks, plus minimalize hand contact?

Learning to Sidemount with Mr. Santi

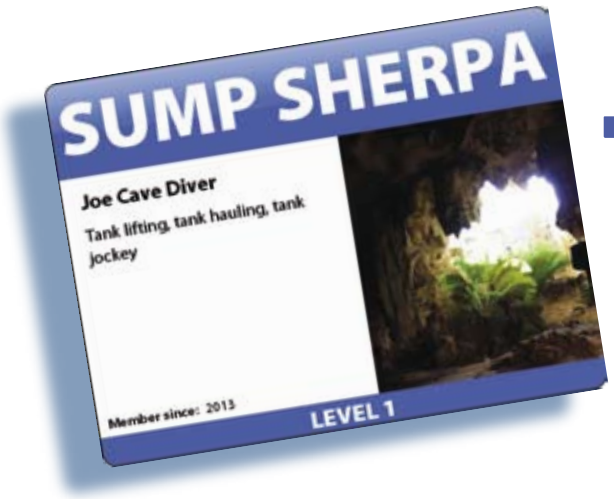
By: Moody Shwales

My jaw dropped. It really did. I could feel the trickle of water slip past the mouthpiece of my rebreather. The cause of this slack-jawed behavior? Quite simply, I was in the most stunning cave I had ever seen, Nahoch Nah Chich, located in Mexico's Yucatan peninsula. It is by no means an extreme dive, I imagine most cave divers who have visited Mexico have dived it and probably seen more of it than I have, but I was mesmerized nonetheless. Parts were like diving through an underwater forest and I took a quick glance at my computer. There it was, smack dab in the middle of the screen: depth 18ft! I couldn't help recalling at that instant all the hassle and expense that traveling with my rebreather had been for this trip, and here I was, in my favorite part, and I was only at 18ft. While I am a huge fan of rebreathers, on this particular occasion I couldn't help but think to myself that it may have been overkill for this dive and there might be an easier way, and as soon as I get home, I'm going to find it. After much research, I found my answer: sidemount diving.

Now that you have discovered my why, I can move on to the how. I thought this was going to be rather simple; I'll just get myself a sidemount harness, maybe take a course and I'll be all set. Oh, what little did I know. Ah, I know, I'll just do a bit of internet research, a couple of quick checks of the forums and I'm sure it will all become clear. That resulted in my going from being uneducated about sidemount diving to just being confused about sidemount diving. So many different options, so many conflicting opinions, how to make sense of it all! To date I have been very lucky to have had training and mentoring from some of the best cave divers around, so I started asking some questions from people I respect and trust and came away with the conclusion that there seems to be several schools of thought on sidemount out there, but I shall focus on the two major ones that I came across. For simplicy's sake I'll call the first one Florida style and the other Mexican style. It seemed to me that the Florida style is based on the presumption that a diver is diving steel tanks, probably in a drysuit, and the Mexican style is based on diving aluminum tanks, probably in a wetsuit. When looking at the equipment favored by the two styles it appeared that the Mexican approach to equipment had a minimalist aesthetic which really appealed to me, with the Florida style being a bit heavier and bulkier but usually having more lift than its Mexican counterpart.

For the most part I found that the Florida style equipment, with some modification, could handle diving in Mexico and other tropical destinations with AL80's, and the Mexican style with some tweaks and adjustments could be used to dive the caves in Florida or Europe. Specifically I had narrowed things down in my mind that if I went with the Florida style I was going to go with an Edd Modified SMS100 from Cave Adventurers or Steve Bogaerts' Razor. So, after taking the advice of my cave instructor and friend I honestly asked myself which type of diving I was most likely going to find myself doing and realized that in Florida I was probably going to dive my rebreather and existing setup and that the appeal of sidemount came from the ease of traveling with it and versatility of being able to make it work no matter where I went. This led me to the conclusion that the Mexican style was going to be the one that was going to best meet my needs. I know what you are all thinking now, how did you like the Razor? Well, my sidemount adventure had a few more twists and turns before it was all said and done. I really liked the Razor; I loved the minimalism, but I was concerned about the fact that it would not be as easy as I would like to add and remove weight and make adjustments for varying thicknesses of exposure protection. During my research I recalled a sidemount system called the Stealth 2.0 by xDeep; there was even a YouTube video that I came across that I finally watched. It seemed really well thought out. I liked the weight pocket pouch and the ease of adjustability. I made up my mind that the Stealth was going to be the best fit for me. Now the part that was even more important, instruction. I have always strived to try and be as good as possible in any endeavor I undertake. Many of the issues I had early in my diving career revolved around "you don't know what you don't know." With sidemount diving I felt I had an edge because I at least knew what I

Continued on page 33



The Sump Sherpa C-Card

By: Leam Hall

In my CDF inbox:

"If you are serious about helping with a sump dive, we are doing one today."

Less than three weeks before this note arrived we had moved 500 miles with two each of dog and cat kind. Stuff was still in boxes. I'd started a new job. Now I'm trying to figure out who FW is, what sump diving entails, and how I'm going to convince my wife driving several hours to meet someone I don't know in a place I can't quite find on the map to do something I'm not sure I can do isn't as crazy as it sounds. I don't think she ever really bought into the "isn't as crazy" bit.

Sump diving is a team adventure. On a boat you have the crew to take care of you. At the springs there are generally several other divers nearby. Once you drive to the middle of nowhere, hike across a hill or three, and then clamber further and further from cell phone reception, you are pretty much dependent on your team.

Each person brings skills to the team and their own challenges and dreams. Some are logistics wizards and ensure that food, water, and whatever other needed supplies are present. Others are mountain goats that carry tanks and bags over dale and under hill so the dive members can be at their peak in the water. Energy management is a critical skill for everyone. By dividing up responsibilities you can let each team member have phases of activity and rest.

People skills are vital to success of a sump exploration; not only the coordination and preparation of each team member but in the land owner relationships. A good team face puts the landowner a bit more at ease. Knowing that fences won't be damaged, trash will be picked up, and no liability is assumed by letting a bunch of oddballs tromp through the cow pasture goes a long way to securing a return trip.

Cartography skills, topside and below, are essential for a good report on the sump. Being able to describe the location so that everyone can get there sounds simple, but when I watched an experienced sump diver miss a hard to see cave entrance by less than dozen yards, accurate mapping and descriptions seemed worthwhile.

There are no major agencies in the US offering a "Sump Diver" certification. You can get a great start by reading the sump diving articles in "Cave Diving: Articles and Opinions" and being active in the local dry cave community. However, mentoring is currently the only safe way to learn sump diving. There are a lot of techniques and tools to figure out and the sump diving community is actively developing better and safer ways to adventure.

As a potential sump diver you need to find a team to join and find ways you can contribute. If the best you can do is carry tanks part way into the dry cave--AWESOME! You are really helping the diver hit the water fresh. During the planning and preparation phases you'll have opportunities to listen to what is going on, understand the challenges the team faces, and see how each challenge is overcome. This is your certification class and you have to be honest with yourself and your team about what you can do and what you are not comfortable with. Meanwhile you'll be seeing how sump dive gear is configured differently from normal cave gear, how you move in and through a dry cave, and how you blend with a team that greatly depends on each person doing their best under difficult circumstances. Sump diving goes past "what you know" and relies heavily on "what you do".

You do not need the body of Hercules to sump dive. That said, most of us can lose a few pounds and tone up a bit here and there. We could use a reason to avoid bad foods and queasy lifestyles. Experience shows that it is very difficult to break a bad habit or make a lifestyle change without sufficient motivation. Two key factors to success are goals and the replacement of good habits for bad.

We all know that a healthy and long life awaits us if we stop this and start that. How much does our behavior actually change when we are given a very long term nebulous goal? Let's push back on entropy and flab; set your goals based on sump diving and use them as your excuse to do a lot of fun things. Head to the grocery store and get

a couple bags of fresh veggies and some big steaks for the grill. Skip the shopping cart and carry the bags--you're practicing your tank carries and looking pretty manly at the same time! Toss the football with your kids and appreciate building your shoulders and avoiding rotator cuff injuries. Do some yoga when you first get up; married folks can have a lot of fun with the extra blood flow and flexibility.

Healthy activity starts to promote itself after a few weeks. You can think about CrossFit or rock climbing soon, or getting back into the pool for a few dozen laps. If nothing else go chase your (great)(grand)kids around the playground. You get ready for the sump dive and they get some of the best memories of their lives.

Get your mind ready for the adventure by going over maps, writing and drawing, and seeing if someone else can follow what you provide. Learn to cook with a camp stove and see what goodies can go into a stew pot. Maybe take some NASAR training as well as First Aid/CPR. Look in your emergency supply bag and actually check if the batteries still work in that old flashlight. Make a game of packing a knapsack in five minutes and trying to have a picnic with just what you packed.

We found the group and they welcomed me in. I contributed the best could and made mental notes about the things I could not yet do. My wife didn't leave me for someone sane. Since that day I've paid more attention to my dive skills and deepened the friendships with the team members. They have provided guidance and wisdom and I have tried to push against the challenges I faced.
If you are looking for a way to take your cave skills forward and broaden your diving so that it benefits all aspects of your life, join the Sump Diver's Forum on CDF and see what is happening near you!

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Visit With A Cave: Chac Mool and Monstruo

By: Luis Sanchez, Ricardo Castillo and Alfonso Caballero
www.rangoextendido.com.mx

22 kilometers south of Playa del Carmen you will find the entrance to the Cenote “Chac Mool”, great red jaguar (not to be confused with Chaac, the Mayan god of rain). The entrance fee (about $20USD) gives you access to the 3 entries to the system; Chac Mool, Little Brother, and Kukulcan. Within the facilities is a diving center with licensed guides, a small restaurant and parking.

This is one of the best known cenotes in the area due to its natural beauty and incredibly lit caverns. It is recommend that you arrive early to be among the first to enter.

One of the popular dives of this system is the one to “monstruo”, a giant stalactite measuring approximately 50ft in height and suspended from the ceiling of the cave. The Mayans call this “Xich Ha Tunich” which means “great rock that drips”.

This dive is made in a siphon and it is very important to manage your gas well, It is recommended that you use Nitrox and at least 240CUF of gas.

Chac Mool cenote entrance.

Above Left: Cave formation
Above Right: Tannic water and green rock
Above Center: Chac Mool entrance warning sign
Below Right: "Monstruo"
Below Inset: The "T "

Entering at cenote Chac Mool, the permanent line is located on the right at about 40 ft, where you will also find a halocline. Swimming about 35 minutes you will reach a "T" marked for the nearest exit on the right. Taking this route you are at a depth of approximately 20ft and a layer of tannic water causes limited viz and the rocks to appear green.

You will swim past beautiful large rooms and decorations, and after about 10 minutes (about 2000ft in and 30ft deep) you arrive at the room inhabited by "monstruo" on your right. It is a huge space that reaches up to 90ft of depth and here you will find a giant stalactite that defies gravity!

Be careful to plan your diving here to consider your distance from the stalactite (stay back about 40ft) since you will be separated from the main line. Below is an access that seems to be another passage but it does not lead anywhere. The walls in this room are spectacular. Remember to watch your depth and your gas while here.

This dive is a great opportunity to see this marvel of nature.

Midwest Underground

By: Chris Hill

It's Habitat Forming

Diver decompressing in habitat after Roubidoux Spring exploration dive.

Midwest overhead diving is always cold and often deep, so it's easy to incur some level of decompression obligation. For shorter decompression times, say less than an hour, and with proper thermal protection, deco can be fairly comfortable. However, as deco obligation increases, so does the issue of comfort and even some safety concerns.

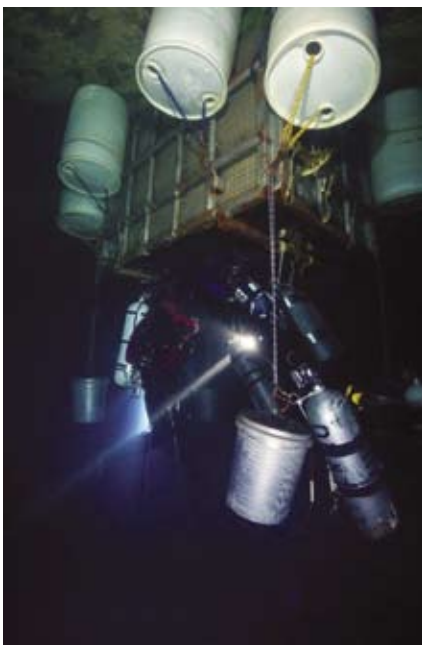
For the OCDA (Ozark Cave Diving Alliance), the issue of cold is probably at the top of the list of concerns when performing exploration involving serious lengths of deco. There are many things we cave divers do to mitigate risk, such as redundant lights, adequate gas supplies, and backup scooters, but we haven't yet found dry suit redundancy. We all know that staying warm plays a role in effective and efficient decompression, and we do all what we can to stack the deck in our favor prior to a dive. We can eat high carb foods just prior to a dive, causing the body to generate more energy and internal warmth. We buy the best under garments to promote heat retention and moisture wicking. We can implement heated vests and on and on. But…if that dry suit gets a serious leak prior to completing a lengthy deco, we can easily be faced with weighing which is worse: hypothermia or a DCI (Decompression Illness) hit. Aside from a potentially leaky dry suit, just staying in cold water for a long enough period of time, no matter how well you prepare, means you will eventually get cold.

Many years ago, before the OCDA was even a formal team, they were a group of divers exploring the various systems in the Midwest. It didn't take long to figure out they needed a way to deal with the cold and lengthy decompression times. Thus, the habitat was introduced.

As the title of this article implies, using a habitat can be habit forming. Not only does it provide an increased level of safety for long decompression, it also provides some nice comfort. But using the habitat also comes with some level of risk.

Setting up a habitat is no easy chore (maybe a future article) and entry and exit of the structure has risk, so there must be some good benefits. Not all deco warrants the use of a habitat, but for lengthy deco times, safety is of the highest concern. As already alluded to, warmth is probably the biggest benefit and the habitat is the closest thing to a redundant dry suit as you can get for safety. Habitats are generally always placed at 20–25 feet in depth, which we all know is the depth of our longest deco stop. In the case of exploration in a place like Roubidoux Spring, the 20ft stop can easily be 3+ hours in duration. If a person incurs a significant dry suit leak (and it does happen), the habitat is a godsend for sure. A diver with a dry suit leak can generally suffer through the previous stops, as there is still plenty of activity and movement up the water column helping to prevent hypothermia, but that 20ft stop can be a killer (no pun intended). Even without a leak, just remaining motionless at 20ft in cold water for hours can be very difficult and risky, thus the habitat serves a very beneficial purpose.

Other safety factors of the habitat include ease of hydration and taking in nourishment. While drinking from a container underwater is easily accomplished, it's even better in the habitat, not to mention a nice support diver might even bring in a hot liquid drink! Eating food underwater is a bit more challenging, but again in the habitat one can eat warm food and something of high carb value to replenish warmth and the energy expended on a lengthy dive.

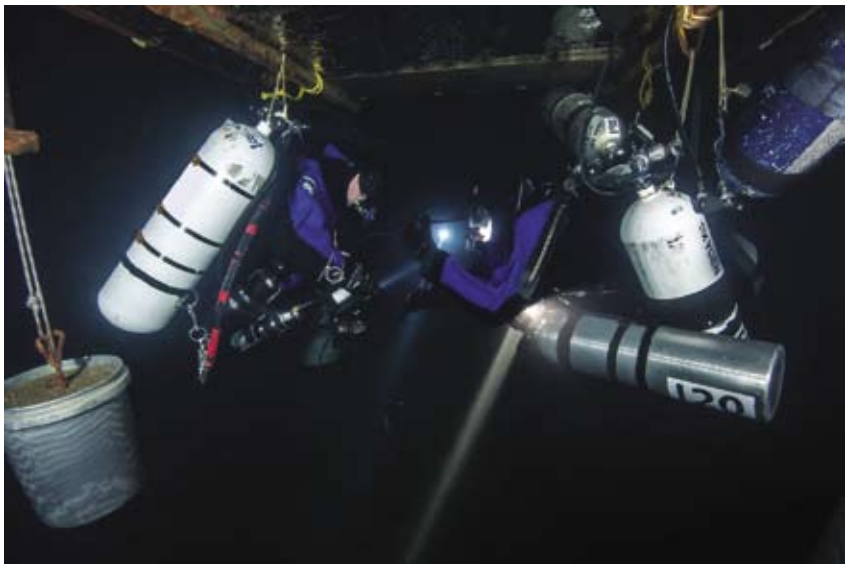


Habitat in use following Roubidoux Spring push dive.

Exploration divers and team divers are well versed in underwater communications. It may be just a solid set of hand signals, or the ability to converse by talking through a regulator, or even the mannerisms of a long time buddy, but obviously in a habitat communication is much more effective and easy, not to mention much less oppor-

tunity to misinterpret something. Additionally, when support divers are involved, it is a lot easier to convey needs and statuses to them to report to surface crews.

If you're performing dives involving decompression, then you understand the risks of using pure O2. One of those risks is getting an Oxygen Toxicity (OxTox) hit. Habitat usegreatly mitigates the issue of OxTox. As we know, OxTox is not a serious issue, except when it happens underwater where drowning can easily become the outcome – a dry habitat takes that out of the picture. Additionally, lengthy deco on O2 becomes counterproductive at a certain point and switching to a lower PO2 gas is required. Keeping track of duration on O2 and off can get tedious after a long time, therefore during OCDA dives, we use a timer in the habitat designed to assist with adhering to systematic gas breaks. A final safety benefit is just simply being able to extend deco if desired. Sometimes following a lengthy dive a diver will just not "feel" that deco is really complete or he wants that added extra margin of safety and therefore will choose to extend his time. When that person and his buddies are deco-ing in cold water, they are probably less likely to extend time.



Support diver assisting exploration diver to prepare for habitat entry. Safety requires following set procedures.

Occasionally, wired communication devices are also used with a habitat. This has the obvious benefit of being able to talk directly to the surface crews without having to wait for support divers to come check on them at some point. And just as obvious is the extra margin of safety this creates (as well as the ease of ordering up some pizza).

There is some risk in the use of habitats, primarily centered on entry and exit. In order to enter the habitat, the diver must remove his gear. As you can ascertain, once gear is removed, the diver is now very positively buoyant and therefore must be directly under the habitat opening for immediate and direct ascent into it. Missing the entry hole is not a good thing. During project dives with the OCDA, there are strict procedures to follow and involve the help of trained support divers to assist the deco divers into the habitat adding a layer of safety. Entry can be accomplished between pairs of dive buddies, but is more challenging and must be well thought out prior to ever getting in the water – once you're at the habitat and it's time for deco is no time to discover what you didn't think of ahead of time!

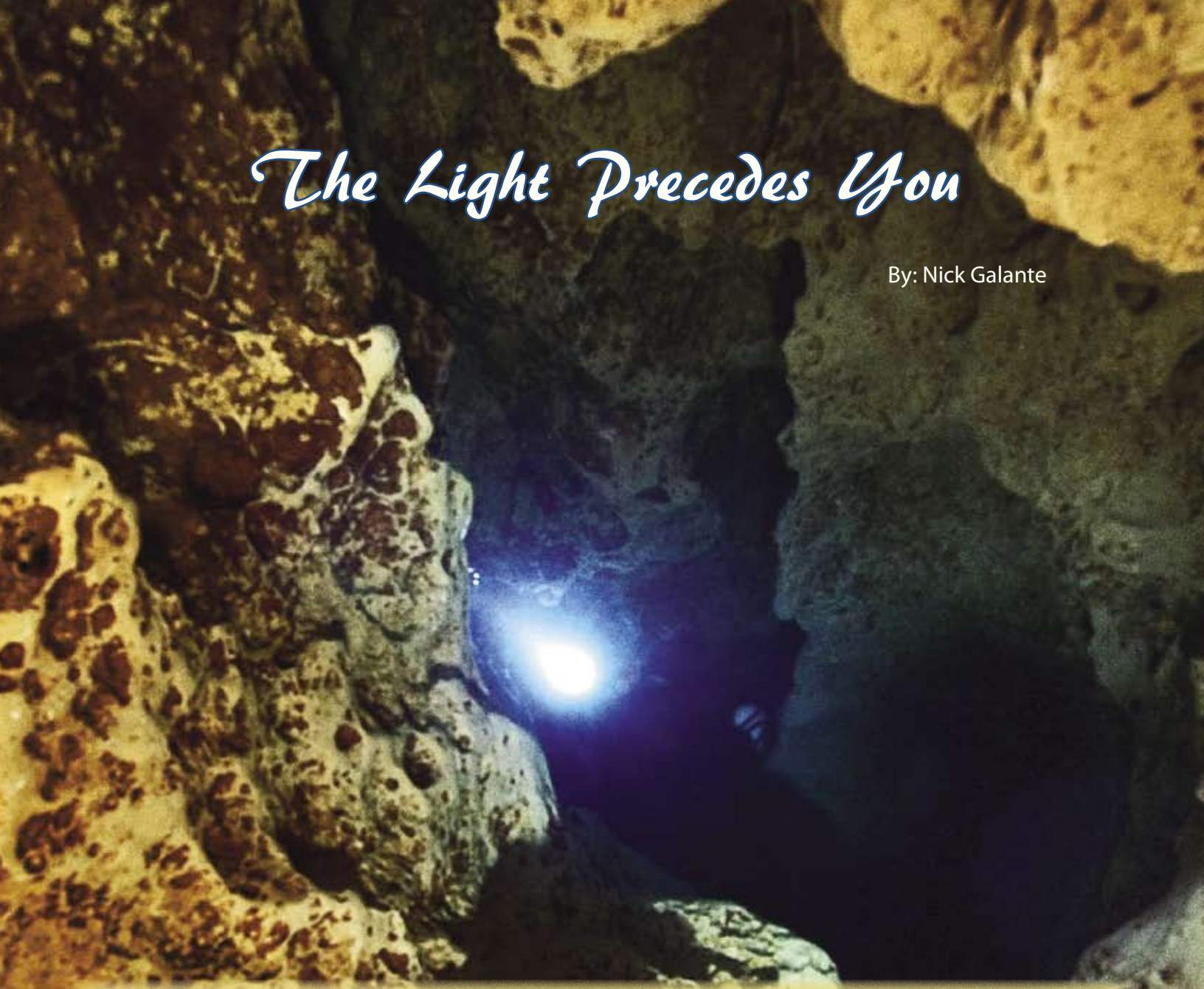
Exiting the habitat is sometimes best done with a separate setup of gear. Rather than trying to get back into a set of doubles, or worse a semi-closed circuit rebreather, a diver can simply don a weighted backplate and their deco tanks (better know ahead of time if it's enough weight to sink your dry suit). At this point, the trip from habitat to exiting the system will be short, so nothing fancy is needed; just weight and proper gas to breathe.

Like everything cave diving related, if you ever decide to utilize a habitat, just make sure you know all the proper info and procedures (which have only been touched upon in this article). And if you ever do, you'll understand why its habitat forming.

All Photos: © Jennifer Idol, The Underwater Designer 2012 (and OCDA team diver)

The Light Precedes You

By: Nick Galante



You are diving in a cave and are approaching a major restriction that you intend to pass through, such as the Lips at Ginnie Springs. You are exiting, so you figure you have the right of way. As you get within 20ft of the actual Lips you suddenly notice a light coming from in front of you, It's a diver on a scooter and he is in your face before you know it and now the two of you must negotiate the Lips together, one going in and the other (you) going out.

Has this ever happened to you? It could happen coming from Devil's Eye into the Gallery or it could happen in many different places in a cave where the openings are just big enough for one diver at a time.

We as cave divers carry a passport to get us through tight areas known as a light or torch. Where it shines signals to other divers coming from the opposite direction that we will be there soon. When you are approaching a known restriction, especially if it is behind a bend, use your passport when you're ready to go through and let it "open doors" for you. Make sure you are actually ready to pass through BEFORE shining your light through the restriction because if your light is shining on the area and another diver sees it coming from the other direction, he will figure you are coming through and will make arrangements to let you by. If your light is sporadic, that is now you see it, now you don't, you may confuse the oncoming diver about your intentions. So when you come to a tight spot, train your light on the area and keep it there until you pass through. Use your passport.

On the flip side, check to see if there is someone coming from the opposite direction by NOT shining your light into the restriction as you approach it. Look into the darkness of the hole in front of you. Can you see a glimmer of light? Is it steady or on and off. This will give you an indication of whether or not another diver is coming through the opposite way.

Cave: Rocky Horror Photographer Brandon McWilliams

OFF to tHe Side.....

By Rob Neto

This column wraps up the 4-part series discussing the tenets of the NSS-CDS. Over the last 3 issues I've written about conservation, safety, and education. Now it's time to discuss exploration. Exploration and sidemount go hand in hand as sidemount has its beginnings in exploration. The first sidemount harnesses were created in the UK by dry cavers to help explore cave systems with sumps. Those systems were adapted for use in North Florida to push past restrictions that could not be passed in backmount systems. Since sidemount started being used in cave diving, many new cave systems have not only been found and explored, but known systems have been expanded by several thousand feet.

Many have heard stories about cave divers removing their backmounted tanks and pushing them ahead of themselves to get through a restriction. Today, most cave divers wouldn't even consider this. There are better options, such as using a sidemount configuration. With sidemount, we can partially remove a tank and push it ahead of us without risking losing the tank since it still remains attached to the rig. This is not only a much safer option, but also a much easier option. If you don't believe me, try it in open water…with a safety diver of course. I have removed a set of doubles and put them back on and, while not all that difficult, it was still much more difficult than removing both sidemount tanks and pushing them out in front of me. It's much easier to control a set of sidemount tanks than a set of doubles and back plate and wing, and usually results with less contact with the cave.

Conservation should always be a consideration when cave diving and, as discussed a few issues ago, it definitely is when it comes to sidemount. Sidemount gives us the opportunity to get past restrictions that were previously impassable safely and with minimal to no contact with the cave, even without removing any tanks! And with this, the question arises of what to do when the restriction is too small, even for sidemount.

There have been discussions over the years about whether it's okay to break off cave formations to get past a restriction, especially when it is obvious that the passage is bigger on the other side of the restriction (bigger being a matter of perspective). There is evidence that this is happening in some caves in Florida and Mexico, and most likely other locations as well. This topic remains controversial. Some believe no amount of damage is acceptable and others believe if the advantages outweigh the disadvantages of damaging the cave, then it is acceptable. Who determines what is an actual advantage?

Does expanding the cave constitute an advantage? Does connecting it to another system constitute an advantage? What kind of advantage? Who benefits from the exploration and surveys we conduct? There have been instances of government agencies in Florida using survey data supplied to it by cave divers when determining whether to approve building permits in certain areas. There have also been instances of this information being used to help analyze the effects of agriculture on the water quality of the springs. In these cases, when the information can be used to make conditions for the caves better, the advantage is pretty clear to see. However, were those advantages there before the exploration was expanded through damage?

I'm not proposing that there is a correct answer here. We all have our own beliefs. What I would like for each of you to do is give this some thought. Don't ignore it because you think it doesn't directly affect you. It affects all of us. Even if you're not damaging the system, chances are you've seen damage that was caused for the "good of exploration" or will at some point. While it's nice to expand a system, is it necessary to damage it just to see it?

The Loop

By Joe Citelli

Rebreathers and Caves, An Evolution of Man and Machine

It's funny how people change over time.

In the mid to late nineties I joined what was the predecessor to Rebreather World, "the (now defunct) Rebreather List". It was hosted on a website owned by a couple of guys (Bill and Paul Elliott) who owned a CNC software company named Northwood Designs. I wanted to educate myself on this thing called a rebreather and learn all I could about the technology. You sent an email with "Subscribe Rebreathers" in the subject line to *MajorDomo@NWDesigns.com* and you joined a mailing list where you could exchange emails with those who were rebreather industry pioneers. Some went on to become what I would consider industry luminaries. To name a few, Tom Mount, Walter Starke, Leon Scamahorn, Will Smithers, Bruce Partridge, Joe Dituri, Richard Pyle, Kevin Juergenson and Tom Rose were all active on The Rebreather List.

It didn't take me long to decide that the technology had not evolved enough for my purposes and rebreathers were better left to those braver than I. Most of the equipment was cobbled together military surplus and modified by the user to fit his particular needs. Many of these divers were scientists and engineers and the rebreather was their hobby. Most were more interested in the development of sport rebreathers than the actual diving. A few successfully did both but for them the rebreather was both a vocation and an avocation.

None of this is to suggest that there were no commercially available sport units out there. There were, but they were just too costly, impractical and or unproven. I was not willing to pay to be a crash test dummy for a new product plus I realized I had neither the time nor the inclination to devote myself to using a piece of equipment that was still in the developmental stages. Once, when diving on a project I was asked by a reporter why we were not using rebreathers. My retort, with a chuckle, was "Because that would be like strapping a scorpion on your back."

Fast forward a few years to around 2004. I was at Tom Mounts place and the discussion turned to rebreathers.

Tom: "So when are you going to convert to CCR?"

Me: "When the technology evolves to where I think it is safe."

Tom: "Take a look at this."

Tom showed me a Meg. He tore the unit down and we reassembled it. Courtesy of what I had learned from the "Rebreather List" I immediately recognized that this was a well built unit. When he offered me a "try dive" in his pool I accepted and had to admit it was pretty cool. Shortly thereafter we did what was necessary to allow an open water dive and I joined him for a "mini" class. It was easy and comfortable. The electronics were simple and intuitive. But I was not hooked yet. By nature I am a skeptic so I had to study and think about this. I've always had a very healthy respect for the consequences of a rash decision in technical diving. Plus, if I was going to convert to CCR, I needed to have one of my dive buddies do it with me or it would make no sense. What good is having all of that versatility if no one else in your group has it. After about a year of thought and discussion, Mike Barnette and I decided to "go over to the dark side" and buy rebreathers. Our choice was the Meg for the reasons stated above. One of our other buddies, Steve Muslin had ordered a different rebreather at the same time. When he heard I ordered the Meg his reaction was to cancel the other unit and order a Meg also. His logic was "Citelli has been studying these things for years and is the biggest rebreather skeptic and cynic I know. If he is buying a Meg there must be a good reason for it." So we did our training and we were very intense about it, continuing to self train for well over a year after the courses ended. Every dive was mostly a training dive until the rebreather became second nature to us. We became "one with the unit". Of course, my Scorpion comment came back to bite me. During one of the training dives I ran across that same reporter who said something to the effect of "What's that Scorpion doing on your back?" I smiled sheepishly and explained that the technology has evolved enough that I now feel it is safe. I also thought, "Note to self: never say never."

So here we are in 2013 and I along with Steve, Mike and the rest of our group have been happily, and more importantly, safely diving our Megs for around eight years. During that time there has been a huge evolution towards rebreather diving. Most cave exploration, especially deep and or extreme distance exploration has shifted from the

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NSS-CDS Cave Diver Supervisor Program

By: Jim Wyatt

Jim Wyatt, Tara Rogers, Dan Halloran and Jesse Alpert

Over the week of August 22nd thru 26th, 2013 the NSS-CDS conducted the first cave diver supervisor training program. Cave diver students Dan Halloran from New York and Jesse Alpert from Miami agreed to have cave diver supervisor candidate Tara Rodgers, from Ft. White, participate in their training so Tara could attempt to qualify as a cave diver supervisor. She was successful and did qualify.

On September 2nd thru the 6th we conducted the second supervisor program and cave diver students Andrew Hill and Kate English, both from California, agreed to have cave diver supervisor candidate Tom McMillan, from Charleston, SC, participate so he too could qualify as a cave diver supervisor. He also was successful and did qualify.

During this training process all supervisor candidates must show proficiency and leadership ability in all the normally accepted cave diving skills and practices that we as cave divers must do in order to cave dive safely.

Each candidate must show proficiency in:

- Installing temporary guidelines & running reels in general
- Supervising lost line and lost buddy exercises
- Supervising gas sharing exits
- Supervising lights out/zero visibility exits
- Properly planning cavern and cave dives
- Setting the tempo and pace for the penetration and exit phase of a cave dive
- Supervising divers to “Read The Cave” so as to know how to best penetrate
- Demonstrating and explaining cave conservation, cave etiquette and landowner relations
- Demonstrating overall cave diving technique, proper student in-water control and supervisory skills
- Demonstration quality techniques are expected from all candidates.

It should be pointed out that **supervisors are not teaching cave diving**. Supervisors are working with cave divers who have already been trained and certified by a certified cave instructor.

Graduates of this program are not allowed to supervise

dives with anyone beyond their current level of supervision or the participant being supervised current level of certification.

In order to qualify to become an NSS-CDS Cave Diver Supervisor the following prerequisites must be met:

Must be a minimum of 21 years of age on the date of certification.

Must be qualified and current as a dive master or instructor through an internationally recognized training agency.

Must be certified and current in First Aid, CPR, and Oxygen Administration.

Supervisors who are supervising CCR cave divers must hold an NSS-CDS CCR Cave diver certification or equivalent through another recognized CCR cave diver training agency.

Supervisors must hold equivalent specialty certifications if supervising a cave dive during the execution of a specialty dive. i.e. DPV, Sidemount, Deep, Stage.

If you are interested in becoming a Cave Diver Supervisor/Mentor you can contact any Cave instructor with the NSS-CDS or the training chairman at **TrainingDirector@nsscds.org**.

In order to qualify to become an NSS-CDS Cave Diver Supervisor the following prerequisites must be met:

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Must be qualified and current as a dive master or instructor through an internationally recognized training agency.

Must be certified and current in First Aid, CPR, and Oxygen Administration.

Supervisors who are supervising CCR Cave Divers must hold an NSS-CDS CCR Cave Diver certification or equivalent through another recognized CCR cave diver training agency.

Supervisors must hold equivalent specialty certifications if supervising a cave dive during the execution of a specialty dive. i.e. DPV, Sidemount, Deep, Stage.

If you are interested in becoming a Cave Diver Supervisor/Mentor you can contact any Cave instructor with the NSS-CDS or the training chairman at **TrainingDirector@nsscds.org**.

Tom McMillan, Jim Wyatt, Andrew Hill and Kate English

In June 2013, the BoD unanimously approved the Cave Supervisor Program developed by the Training Committee. This program allows the NSS-CDS to provide an approved list of guides/mentors for members to choose to dive with.

All NSS-CDS instructors are qualified as guide/mentors under this program and as more guide/mentors are trained under the Cave Supervisor Program, they will be added to the list available on the NSS-CDS website:

http://nsscds.org/mentors

When you choose a mentor from this list we are representing that the mentor is properly trained not only in cave diving, but also in supervising cave divers in the overhead environment.

MILESTONES

The following are two very cool milestone stories. Our first adventure is with Gabriel Lamarre, describing his 100th Cave Dive:

This was, and still is a favorite of mine. My friends call it the Gabe circuit. It was at Ginnie Springs in December 2011. I entered the run and swam to Devil's Eye to enter the system, left a bottle of O2 by the sign and continued to the Lips. I followed the main line and put a reel to the Hill 400 line. I did a nice leasurely swim in the passage to the Bats and continued on up Hillier Tunnel, which for some reason is my absolutely favorite part of my cave diving experience (very limited at that). I continued to Double Domes and followed its line to the gold line to return back to the entrance, picking up my gap reel at Hill 400. It is a very relaxing swim of about an hour and 15 minutes and approximately 15 minutes of deco. Very nice and uneventfull morning dive.

This award is sort of a milestone to my cave diving experience. I was trained and certified as a ccr-cave diver in 2007 and fell in love with it. I am now retired and can spend half the year here in cave country to pursue my passion. Safe cave diving is a priority and preservation of these sytems a must.

Next, we share Kristi Bernot's Abe Davis story:

It's only been one short year since I was lucky enough to take my full cave course. In that year I've met a lot of other cave divers and made a lot of new friends and of course done a lot of diving. I'm seen pretty regularly out at Ginnie since I'm fortunate enough to live down the road in High Springs. It's Ginnie where I made most of my dives, mostly solo, and I'm still not bored with Ginnie. I'll continue to dive there and see something new every time. However, my story isn't about Ginnie. I was lucky enough to make my 100th post full dive while traveling in Mexico with Marissa Lasso of Cave Country Dive Shop. The epic dive was accomplished in Cenote Fenomeno, a recently explored Cenote which is part of one of the world's longest cave system, Sistema Sac Aktun (connected with Nohoch NaChich). This cenote should really be renamed Phenomenal! I truly could not have asked for a better Abe Davis dive.

I made the dive with my husband Jon, a very special treat since we have a five-year-old daughter at home and diving together is a rare event. In the system we beheld many wonders. A well dug through the surface for use by the locals was one of the first intriguing sights we encountered. This well created a window of light into the cave and a small stream of sunlight shone down through it as we passed by. It's breathtaking to see light like this pierce into the realm of darkness. All around this area were tangled mats of tree roots jutting down into the chamber. It was clear that the surface wasn't too far above our heads. All around, of course, were speleothems great and small. The decorations created in the Mexican underground are such that you could stay in one chamber for hours and still be mesmerized. We didn't stop for too long, though; we traveled slow enough that we could take in the marvels before us but swift enough that we could see a great deal of the main passage.

As we traveled up the main trunk of the cave, there were jumps to be taken, but having never been there before and being so enamored by the main branch, we decided just to keep moving forward. Before we had entered the water one of the guides had mentioned a small pit close to the line on the right with the remains of an ancient animal. After a short period of swimming we found this pit and both entered to inspect the remains. The bones were laid out where the animal had taken its last breath and remained in excellent condition. We noticed a smaller pit in the center of the one we were swimming in and decided to poke into it farther and there discovered a halocline, the only one we had run across in this cave. It was interesting to watch the waters mixing together causing the vision-altering effect as one diver dips below to be seen as a blur of colors and shape. Not noticing any further passage (though we were informed later there was indeed a jump there) we rejoined the main line.

Kristi Bernot near entrance to Cenote Fenomeno.
Photographer: Jonathan Bernot

It wasn't long before we came across the second point the guide had mentioned before our dive. A large Mayan jar sat on the floor of the cave. We swam over to inspect this artifact a little closer. I wondered about the story behind the solitary jar. Had its owner purposely thrown it there, or was it once filled with something and had fallen from its owner's hands to at last land in its current state? It was fascinating to be seeing something that not everyone had the training to go and see, an enduring piece of history captured inside the earth like a time capsule. Just beyond the jar lay a crack in the wall of speleothems where a slope of sand had spilled through. Looking up through this crack we saw there was another cenote. We followed the line a little farther past this wall to get a better view of the opening and we stopped a moment or two to take in the beauty of the light flooding into the cave there. Covering our lights with our hands, we took in the full effect with awe and appreciation.

We checked our gas and noticed we still had plenty left, so we kept swimming and eventually came to yet another cenote. This time the line went right into open water and continued back into a cave on the other side. We saw other divers in the water and decided to surface here to chat. We came up and asked the group which cenote we had surfaced in. "White River," they responded happily. We had traversed from Fenomeno to White River after 45 minutes of swimming. Seeing no point in continuing farther this time, we sunk back into the water and traveled back the way we came. We ended the dive after 91 minutes and came up with smiles and a great story to tell.

Next time I'm back in Mexico, Fenomeno will be on my list for sure. I'll forever treasure this great dive and thankfully, my husband was able to get some lovely shots of me here on my 99th dive. I will end this story with some gratitude that must be expressed. Though I did much of my diving to reach this point solo, I want to thank those that helped me accomplish this feat in just one year by diving with me from time to time. I'm very thankful for the dive buddies I have and look forward to making new ones, I believe having buddies that you can count on and communicate well with in and out of the water make for a much more enjoyable time. I also want to thank my instructors Dan Patterson, Lamar Hires and, of course, my hardest instructor and biggest supporter, my husband Jon, who got me into this amazing sport. I would certainly not be the diver I am today without their patience and guidance. I look forward to learning more, seeing more, and doing more for years to come.

Congratulations to both of you and thank you for sharing your stories!

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

NFSA 3rd Annual Advanced Skills Workshop

The NSS-CDS participated in the NFSA's 3rd Annual Advanced Skills Workshop on August 24, 2013, showing our support of a great event.

Photo: Verticle Rope Clinic
Photographer: Nikolaj Kavallar

Rock Falls Into Challenge Sink

A huge boulder sized rock has fallen into Challenge Sink, at Wes Skiles Peacock Springs State Park, Florida, blocking safe passage or exit via the sink.

Divers and geologists are working with park officials to come up with a plan to hopefully stabilize the area.

The rock is resting precariously against a small ledge in the sink and is not stable. This affects the Grand Traverse or Mile Run from Orange Grove to Peacock One and should not be included in any dive plans as an emergency exit.

Cave diver's cooperation in staying away from this area until further notice is strongly suggested and greatly appreciated

Skills, Tips & Techniques

By Georges Gawinowski

Keeping An Open Mind About Gear Configuration

The basics of a good foundation are inherent to the quality of the material or tools that are used in the building of that foundation. Gear configuration is one of the tools that will shape a cave diver's career. As I mentioned in my last column, "Gear configuration is an important factor. Remember your training. Look around and ask other divers why they use a specific type of equipment or configuration. Be open-minded."

When you have an issue, look to your instructors, mentors and other divers for ideas for improvement and keep trying until you find the one that is right for you. A confined water session is recommend when adding or changing gear configuration. It is important to be comfortable and well-adjusted before entering the cave system for safety reasons and also to reduce the impact on the fragile cave environment

One of my students had some issues with the weight of his tanks; his feet were constantly getting low. He is diving heavy doubles with a dual bladder wing and a comfort type harness with dual shoulder buckles.

The adjustments we made were:

- Switching his steel back-plate for an aluminum back-plate.

- Installing a tighter "purist" harness instead of the double buckled shoulder straps.

- Positioning the tanks a little higher and closer to the neck.

- Working on trim position, legs up and stretching.

These adjustments also allowed for reinforcement of swimming techniques and trim. With 100% positive results we have another happy cave diver!

Find your solution and dive safe, dive happy.

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INSTRUCTOR'S CORNER

By Carl Griffing

Stage Diving

You have a solid foundation of cave diving experience, which includes good buoyancy and propulsion techchniques, and have been diving your favorite caves as far as your breathing gas in your backmounted doubles or sidemount cylinders safely allow, yet you wonder what is around that bend. You've taken the time, done the dives and have become familiar with the 'front' parts of your favorite caves and have heard from more experienced cave divers about other parts of the cave which you would someday like to see. After seeing the cave maps, you want to extend your dives to areas in the cave that are beyond the distance where you are presently able to dive. You simply want to spend more time diving in the caves. Many cave divers reach a point where they decide to take additional training so they can see more of their favorite caves or extend their dive times.

I remember reaching this point and making the decision to take a stage diving course so that I could see more of the caves in both north central Florida and the Riviera Maya, Mexico. For me, it was a decision that, after gaining much experience, ultimately afforded me the opportunity to visit some of the most incredible parts of the caves. Some of the memorable places stage diving allowed me to visit include the Henkel, Sweet Surprise, the LSD Area and the Blue Abyss. Granted, some of the dives required the use of DPVs, but none of the dives would have been possible for me without the use of stage cylinders. I advise divers who want to learn to incorporate stage cylinders into their cave diving to seek proper nstruction.

For divers qualified at the Cave Diver level who wish to venture farther or spend more time in the caves, the NSS-CDS offers the Stage Diving course.

NSS-CDS Stage Diving Specialty course description:

The purpose of the Stage Diving Specialty course is to expose the trained cave diver to the basic fundamentals of the safe use of stage cylinders for extended penetration diving in underwater caves while under the direct supervision of a qualified Stage Diving Specialty Instructor. The student is able to build practical experience in the field under controlled conditions. Safety and conversation practices, procedures and techniques common while stage diving the unique environment of a cave are covered to help develop the participant's skills and knowledge in extended range penetration diving. Longer decompression obligations and more complex navigation concerns are covered.

To enroll in the course, the prospective student must have NSS-CDS Cave Diver level of training or equivalent.

Topics discussed and presented during the course include motives for stage diving, equipment, suitable rigging of stage cylinders, safe stage diving procedures and techniques, dive planning, gas analysis, tank labeling, gas management, task loading, dropping and recovering stage cylinders and decompression concerns. More topics will be covered and skills completed during the course; this list is just an overview and not all-inclusive. The instructor will present the topics and conduct the drills and stage dives so that the students understand the procedures, practice the skills and gain experience by performing at least three cave dives using a stage cylinder(s) for extended penetration. The Stage Diver course allows for a maximum of two students and at the completion of the course, the students who meet the requirements may then be qualified as an NSS-CDS Stage Diver.

Adding a stage cylinder(s) adds another level of complexity to cave diving, yet there are many tips and techniques your instructor will share to make diving with stage cylinders an enjoyable activity. Stage cave diving allows for extended penetration distances and extended run times, but it may also increase the risks and potential for impact on the caves. With proper knowledge and training gained from the Stage Diving course, being a responsible cave diver is emphasized, the impact on the caves is minimized, the risks are managed, diver safety is enhanced, and the stage cave dives are extremely fun!

If you wish to find an NSS-CDS instructor who can teach the Stage Diving course, look for the NSS-CDS Instructor Listing in this issue of Underwater Speleology or on the NSS-CDS website at www.nsscds.org/instructorlist.

In addition to learning how to safely utilize stage cylinders to extend penetrations or dive duration during the Stage Diver course, you will also get some really fun guided cave dives to some fantastic areas of the caves!

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cumbersome open circuit technology to the more logistically friendly rebreather technology. Explorers are no longer limited by how much gas they can carry in the water or by how much they can transport to a r opens up a huge window of opportunity for exploration of caves that because of the logistics involved, were previously only given a cursory exploratory “peek”. Now, a team with comparatively minimal support can safely do push dives in systems which previously required huge numbers of support personnel to ferry gear back and forth.

This evolution has also fueled a boom in the advancement of rebreather technology. There are now ISO 9001 certified manufacturers building units instead of companies operating from someones garage. “Temp sticks” to monitor CO2 are now commonplace. There are CO2 sensors being developed that will mitigate the hypercapnia risk and soon be available for use in commercially produced units. The Hollis Prism 2 has even reserved space for one in its interior design layout.

Of course, to conservation minded cave divers the most important aspect of rebreather technology is the minimization of impact on the caves. The rebreathers smaller foot print and its need for fewer “stage bottles” lessens or eliminates any negative impact diving may have on the caves. “Bubbleless” diving almost completely eliminates percolation when exploring virgin cave, especially in smaller systems. Percolation is when open circuit bubbles disturb silt on the ceiling of a submerged cave and causes it to rain down upon the divers. This creates a hazardous condition because it can seriously impair visibility. It also impacts the cave because it changes its appearance. Granted, this may sound academic because, especially in remote systems, changing the appearance of a cave by disturbing silt is akin to “if a tree falls in the woods and no one is there to hear it does it still make a noise?” But that is not really true because as conservation minded cave divers we are keepers of the caves and should never want to negatively impact them in any way, especially one that is avoidable.

It is quite telling that of the seven member NSS-CDS board of directors on which I currently sit there are five rebreather divers, two of whom dive Megs, one who dives both a Meg and an Evo, another who dives a Revo and one who dives a Kiss and two other rebreathers. Such would never have been the case even five short years ago. Times are changing for the better.

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didn't know. It is an area of diving that has had a tremendous amount of growth in recent time and unfortunately, the byproduct of that has been a lot of sidemount diving and training of varying quality, some of which I had seen and experienced myself. I remember how sloppy my bailout cylinders were until I got that sorted by some good old-fashioned mentoring late one evening at the Dive Outpost.

After thinking about it for awhile it did occur to me that the ideal way to learn how to use a piece of equipment would be to get the creator of it to teach you how, so I thought I'd give it a try. A quick Google search told me that Patrick Widman of Protec in Playa Del Carmen was the man behind the Stealth 2.0. After an expedia check revealed that I could have a week's accommodation including flight in Playa Del Carmen for less than the cost of flight alone to Jacksonville the deal was sealed. I sent Protec an email and they were really helpful in answering all my questions and setting things up for me. So now all that was left was to go and learn to dive sidemount!

I got to Mexico and was eager to get started. I picked up my Stealth and was really impressed with the build quality; it was quite a relief, having purchased it sight unseen! Nando did the gear workshop and customization with me and I was impressed with the fact that he took the time to not only help set everything up but also explain the logic behind why it was being done that way. It took the better part of the day but we got it done and I was excited to hit the water the next day. Patrick met me bright and early that morning for some academics and then by the afternoon we were off to Cenote Car Wash for the open water portion of the course. He smilingly reassured me that I shouldn't worry about the small alligator swimming around, nor the bolts of lightning and rain that were just about to get going. We worked on some of my more neglected skills such as finning backward and some of the open circuit drills that I wasn't all that familiar with as I have been diving my rebreather exclusively for the last couple of years. Then we worked on getting the gear comfortable on me and some of the drills we were going to have to do. All in all it went well but it still didn't quite feel 100% comfortable. However, Patrick reassured me that I was progressing at a suitable pace and it was coming together nicely. After a tasty dinner at El Fogon and a good night's rest I felt I was ready for the continuing adventure. The next day we went to Cenote Ponderosa, but not before I made Patrick stop at Ty-coz Express, a sandwich stand at a petrol station that makes some of my favorite sandwiches on the planet. At Ponderosa we did some more drills and I was to be introduced to my nemesis, Mr. Santi. Mr. Santi is not a person, but rather a blindfold for your mask, made by Santi (a drysuit manufacturer), hence the Santi, and anything that can blind me seemed worthy of the respectful designation of Mr. I then had to put all the drills I had covered with the addition of Mr. Santi into a stress circuit. The circuit involved being blindfolded and following a line while Mr. Santi and Patrick conspired to make various things go wrong, using such irregularities as regulator failures, burst disk failures, line entanglements, running our of air, or the loss of a fin, and all the while you must keep swimming along the line (which may or may not be being slapped out of your grasp at any moment!), while maintaining appropriate buoyancy, making all the appropriate navigational decisions, and don't forget to swap regulators!

After all that Patrick asked me if I fancied a cave dive. Quite frankly it seemed to be a relaxing alternative; surely he wouldn't be running those sorts of drills while in the cave. Alas, I had underestimated him; Mr. Santi made his fateful appearance in the cave, compounded by the fact that Patrick would run out of gas at the most inconvenient times and then insist that I was out of gas at various points as well. It all went reasonably well despite killing myself and Patrick a couple of times due to blindfolded navigational errors. After a good debriefing, some tacos and ice cream, I was all hyped up for the final day of the course.

We met bright and early; it was going to be a big day. Three dives and plenty of drills lay ahead of me as we made the drive to Cenote Tajma-Ha. I'd had three days of instruction at this point so I could ill afford to keep making the same mistakes over and over again; it was time to put it all together. Patrick kept it challenging; each dive got harder and harder with more drills and skills being added, my reel running and tie offs were improving, I was getting more comfortable in the sidemount configuration and I managed to successfully demonstrate the necessary skills. On the final dive we went to the Chinese Gardens which was spectacular; it was a great dive on the way in, just Patrick and I, but somehow on the way out we were inevitably joined by Mr. Santi, and an out of air drill. I had, despite his best efforts, still managed to kill Patrick a couple of more times before the course was over but by the end of it I felt comfortable to take my newly-found skills into the world to build on and improve them further. I also had developed a newly-found respect for the navigational difficulties that diving in the Mexican cenotes bring with them. The Stealth 2.0 performed superbly, and I look forward to keeping it in use.

There may not be one right way to dive sidemount but I think there is a right way for each individual, and if you're not having fun then chances are you're doing it wrong.

Special thanks to Paul Heinerth, Patrick Widman, and Tony Flaris, instructors, mentors and friends, without whom I would not be able to continue with this adventure, nor would I care to.

Continued from page 11

Based on new data collected from several underwater caves in the Suwannee River Basin, (chiefly Peacock, Madison Blue, and the Devil's Cave system at Ginnie Springs), my research group has been advancing a new hypothesis for cave formation in Florida. Our results, published in a series of papers in geology and hydrology research journals, suggest that it is highly unlikely that most underwater caves in Florida formed under the conditions that we have today. Instead, these caves appear to have formed under very different environmental conditions caused by the advance and retreat of continental ice sheets and the changes in sea level that were driven by these huge glaciers.

Over the last several million years, ice sheets have advanced and retreated across the Northern Hemisphere. Advances stored massive volumes of freshwater on land, causing sea levels to be as much as 150 m lower than today. During lower sea levels, the elevation of the water table in Florida was also much lower than it is today. The climate was drier and the spongey nature of the limestone allowed rainfall to flow efficiently through the rock to discharge to the ocean. During lower sea level positions, neither the Santa Fe nor the Suwannee River could have existed. Because the limestone under the Suwannee and Santa Fe rivers is so porous, the rivers would have been absorbed by the aquifer and disappeared as soon as the water table elevations decreased below the land surface.

We think that many caves in Florida that are underwater today formed at these lower water tables (Fig 3A). Later, as sea level, and hence water table, elevations increased, these caves became submerged (Fig 3B). Dissolution could have been fueled by biological processes that operate in the spongey limestone between the soil zone and the water table. In this region, carbon dioxide is exhaled into pore spaces in the limestone by tree roots as well as bacteria. This carbon dioxide could have migrated to the water table through the porous limestone, but particularly along vertically oriented fractures, to create carbonic acid. Because CO_2 would become carbonic acid once it diffused into the water table, dissolution would have been focused at the water table, providing a necessary ingredient to form caves (Fig 3A). The second ingredient, water flow, would only have had to be on the order of 10-12 meters per year in order for underwater caves to form over a few 10s of thousands of years. 10-12 m per year is an average flow velocity for water in non-conduit portions of the upper Floridan aquifer today.

Because CO_2 was delivered to the water table in gaseous form, many of these caves could have formed at lower water tables without entrances to the surface. Later, after a transition to higher sea levels and a wetter climate caused water tables to migrate very close to the surface, rivers such as the Suwannee and Santa Fe became stable as they became perched on a water table that exceeded the elevation of the ground (Fig 3B). Acidic water flowing out of the swamps that feed these rivers drove dissolution of the underlying limestone and caused the rivers to carve deeper into ground (Fig 3C). Eventually, the river carved into fractures and joints that connected into the underlying cave systems, forming the caves that we dive in today (Fig 3D).

Our hypothesis that caves formed first and rivers later cut down into these pre-existing voids provides the only plausible explanation for why underwater caves in Florida have cave passages that extend beneath rivers or discharge water via springs that are located on both sides of rivers. These observations also highlight the need to remember that many hydrological features that we observe are relicts from past climates and past geological conditions.

Gulley, J., Martin, J., Moore, P., and Murphy, J., In press, Formation of phreatic caves in an eogenetic karst aquifer by CO_2 enrichment at lower water tables and subsequent flooding by sea level rise, Earth Surface Processes and Landforms. http://onlinelibrary.wiley.com/doi/10.1002/esp.3358/abstract

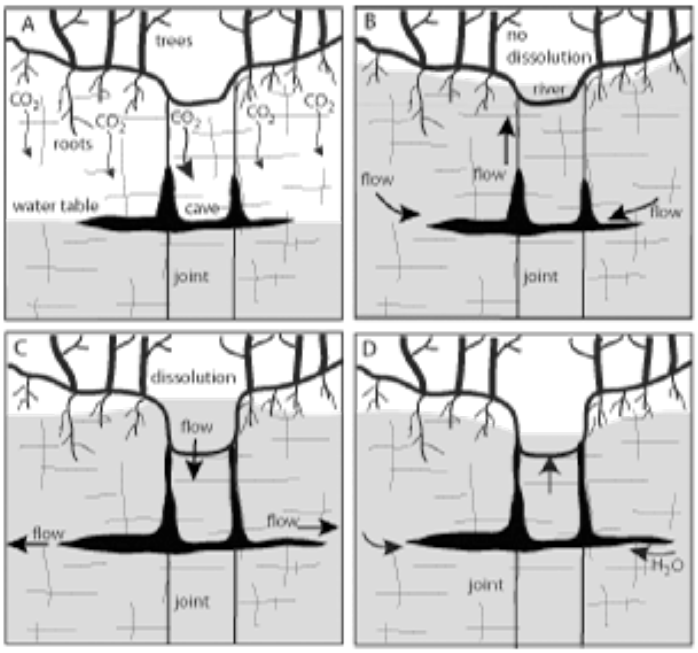

Figure 3: My research group has recently published a series of papers suggesting that underwater caves in Florida formed during lower water tables associated with lower sea level elevations. A) During lower sea levels caused by ice sheet advances in the Northern Hemisphere, water tables in Florida were lower than today. Carbon dioxide gas in the rocks between the soil and the water table could have diffused into the water table, where it would have formed carbonic acid. Because carbonic acid forms immediately after limestone dissolves in the water, dissolution would have been focused at the water table to form caves that lacked any connection to the surface. The origin of this CO_2 would have been from tree roots as well as bacterial processes. B) As the ice sheets melted and sea level increased, water tables in Florida also rose. When water tables became elevated above the land surface, rivers would have formed for the first time. During low flow conditions, when most of the water in the river came from the limestone, no dissolution would occur. C) During floods, runoff from swamps in the headwaters of the Suwannee and Santa Fe Rivers has high acidity. This water dissolved the river channel and rapid increases in river depth during floods could force acidic water down joints. D) Over time, enlargement of joints and cutting down of the river channel would have caused the river channel to become connected to the underwater cave, with entrance locations largely occurring as accidents of erosion. Such erosional accidents explain why some underwater caves have springs on both sides of the river (such as the Devil's Cave system at Ginnie Springs). Figure adapted from Gulley et al (in press).

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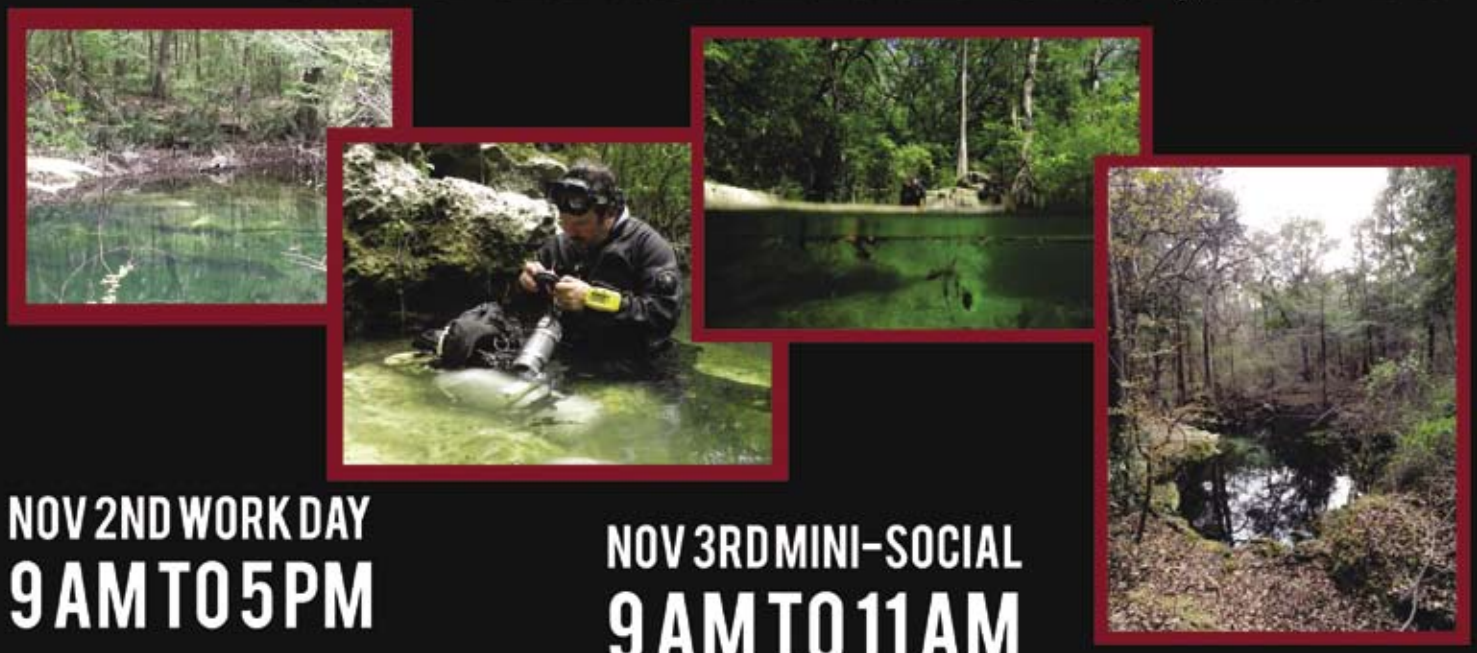

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