Underwater Speleology

Journal of the Cave Diving Section of the National Speleological Society

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Volume 40 Number 2
April/May/June 2013

2013 NSS-CDS WORKSHOP

Crawfordville, Florida

May 24-25

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Skip Kendrick
Steve Lewis
Chris Richardson
Edd Sorrenson
Forrest Wilson

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Cover Photo: Peacock Springs
Photographer: Michael Gibby

Submission Deadlines

Issue	Deadline
Jan/Feb/Mar	December 1st
April/May/June	March 1st
July/August/Sept	June 1st
Oct/Nov/Dec	September 1st

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Editor’s Notes

Outside of a dog, a book is probably man’s best friend; inside of a dog, it’s too dark to read. ~ Groucho Marx

2013 is the 40th Anniversary Year for the NSS-CDS. We have started off strong with a Winter Workshop in February and a clean-up and social at Cathedral Sink in April followed by our 2013 Workshop in May.

Here at the UWS we plan to continue throughout the year to include articles on education, conservation, exploration, safety and history. This issue contains a little bit of each with an introduction to understanding karst, haloclines, a little Cathedral Sink history and a conversation with Edd Sorenson along with our regular columns.

Jim Wyatt will no longer be able to write the Skills and Techniques column and he will be missed. We would like to see this column continue and will be looking for someone to step in and keep it going. If you are interested, please contact me at:

uwseditor@nsscds.org

I have added a new puppy to my family, Bubba James, and he will be joining me on my trips to the springs. Maybe I can teach him to carry my tanks. So, if you see this little guy at any of the dive sites, stop and say hello.

Enjoy and safe diving,

Cheryl

from the Chairman

gene melton

God grant me the serenity to accept the things I cannot change, the courage to change the things I can, and the wisdom to know the difference. ~ Reinhold Niebuhr

A lot has transpired since my last column. Gwen Wyatt has stepped down as Administrative Manager. Thank you, Gwen, for you service and dedication to the Section. Bruce Ryan is the new NSS-CDS AM. For those that don't know Bruce, he was the first AM and defined the position. Bruce and Gwen have been working together to ensure a smooth transition. There may be a few bumps in the road but all will be smooth shortly. If you need to contact Bruce, he can be reached at the **NEW NSS-CDS TELEPHONE NUMBER - 1-850-284-1849**. Email for the AM remains the same. Contact Bruce for fax instructions. The store inventory has been moved to Tallahassee and orders are currently being shipped.

Bill Huth has stepped down from the BoD. He is being replaced by Marissa Lasso. Currently Marissa fills the position of Treasurer. Welcome aboard, Marissa.

Bill set up the recent Marianna Mini-Workshop and about 30 people braved the rain to attend. Thank you, Bill, for all of your hard work.

The workshop is on track for Wakulla High School in May. Chris Wickman has put together an excellent program. The layout is similar to Suwannee County High School with the vendors in the gym across the hall from the auditorium. Lunch will be catered and brought to the school. The location of the Friday night social is in negotiation. Check the website for details as they are confirmed. The Lodge at Wakulla Springs State Park is a great place to stay if you have not made your reservations yet.

Congratulations to Edd Sorenson for his 'saves' last year. Edd rescued not 1 but 4 misplaced cave divers on separate occasions. He has received awards from a number of organizations for the rescues and his rapid response to the alarms. Rumor has it that it took less than 20 minutes for him to receive the call, kit up, travel to the head spring and be underwater. THANK YOU EDD SORENSON.

This year the NSS-CDS celebrates its 40th anniversary. It does not seem that long ago that the Section was formed. Did you know that Steve Forman is the only active instructor from the first instructor institute? Steve celebrates his 40th year as an NSS-CDS instructor. CONGRATULATIONS STEVE.

This year there are enough candidates for a Board of Directors Election. The card you receive has a web address where you can view the platform statements. Please vote for 3 of the 4 candidates.

Also included on the ballot is a vote to approve/disapprove the revised NSS-CDS Bylaws and NSS-CDS Constitution. It cost over $700 to mail the ballots. Please vote early so your ballot will be received by May 15th. The Bylaw and Constitution Committee worked long and hard. Please do not let their efforts go to waste.

The outgoing BoD members are Forrest Wilson, Frank Ohidy and Tom McMillan. Thank you to Forrest, Frank and Tom for your dedication and efforts to help make the NSS-CDS a successful organization.

A heartfelt thank you to Kelly Jessop for a great job of chairing the Election Committee.

Texas again has a deep cave record. At this time the two deepest known cave systems in the Continental US are in Texas, Good Enough and Phantom Springs.

Dive safely,

Gene

A Trip Journal: Caves Wet And Dry

10-6-12 Arrived in London on schedule then on to Toulouse to meet up with the rest of the divers joining me on this trip.

Toulouse is a typical, small French town reminding me of the French Quarter in New Orleans. Our final destination though, was a campground in Rocamadour in the Lot area.

10-7-12 The camping area was nice with several trailers, places for tents, showers, toilets and a room with a picnic table.

It was drizzling in the morning and our first stop was a tour of a commercial cave, Le Gouffre Padirac. It laid at the bottom of a large sinkhole about 30 meters deep. One of the cave's chambers was huge. The guide said it was the largest in all of Europe.

In the afternoon, we went to Gouffry de Cabuoy (spring) to dive. The cave looked a lot like Florida, with good sized tunnels, about 25 feet wide by 15 feet high. We finned a little past the halfway point to the next entrance (Poumayssen). **DIVE 97feet (average 43 feet) 89 minutes.**

10-8-12 It was drizzling harder this morning and the plan was to dive Ressel, but the small parking area along the road was already full so we headed to Ressel 2, Emergence d' Cunhac.

It stopped drizzling, and the sun finally came out as we left the main road going a short way down a dirt track, to the river. Here we geared up and swam across the river between two small islands where the river cave entrance is a few meters out from the bank. It was a nice dive, with viz about 30 feet and the passages smaller that Cabuoy. It reminded me of Tennessee. **DIVE 143 feet (average 42 feet) 55 minutes.**

10-9-12 More drizzle. I decided to dive downstream towards Cabouy, getting some video of the outbound part of the Cabouy cave. **DIVE 94 feet (average 34 feet) 70 minutes.**

10-10-12 No drizzle, but foggy. We went to Ressell where you park in a small parking area along the road and walk down a steep trail to the river. You then swim up river a couple hundred feet to a river spring. The passage was large; 30 feet wide and 20 feet high with large breakdown blocks. We took the first T to the right and came back on the gold line at another T. Following the gold line again to the right, the passage went deeper and we turned at

Ressell

Ressell 2

almost 47 meters following the gold line all the way out. It was shallower from the 2nd T, just over 20 feet, clearing our 50, 40 and 30 foot stops on the way. Stopping just a few minutes at 20 feet, the 10 foot stop cleared by the time we got to the entrance. **DIVE 154 feet (average 47 feet) 70 minutes.**

After the dive, we went to Trou Madame, but only looked at the dry cave up to where the water starts.

(Top) Gouffry de Cabuoy
(Left) Fountaine de Truffe

10-11-12 The morning was fairly clear and I could see some stars, but a few hours later it started sprinkling again and continued throughout the rest of the day. Our dive was at Fountaine de Truffe, which has gravel slope down into a pool. We were all wearing 45s, since it was a short dive and required walking between sumps. There are two restrictions just inside about 10 feet apart, easy in sidemount with no need to remove anything, just hold the line/rope in your right hand and stay a little left. The water clears once inside and the first passage is about 6 feet wide and 4 feet high. It goes up and down some, but is fairly straight, ending in a dry passage. To continue, you climb up about 6 feet to a dry cave, continuing for 100 feet or so through a smaller, winding passage requiring a lot of stooping. When you get back to the water you have to climb down about 3 feet. It sumps pretty soon and the passage is very different; more like the dry part, changing depth often as it winds about. Turning sideways to maneuver, it ends in a small room with a vertical exit at least 10 feet high. We turned here and my dive computer broke this into three dives. **DIVE From the entrance to the first air chamber was 33 feet (average 11 feet) 9 minutes. The 2nd dive was 36 feet 16 minutes. The exit dive was 30 feet (average 12 feet) 9 minutes.**

After lunch it was off to a dry cave, le Gouffre de Reviillon and tomorrow off to London.

10-12-12 In London we had a car reserved and we headed to our first stop. I hung my gear up to dry, but it rained again. I managed to get my dry suit inside and it dried a little, but was still damp in the morning.

10-13-12 This morning we headed to Dan yr Ogoff. We geared up in the parking lot of the show cave and walked in through the side entrance. A short way down the paved trail we came to Tunnel Cave which had spot lights, a stone wall, and a mannequin dressed in dive gear. The Tunnel was smallish, even smaller than le Truff but the visibility was good, possibly 10 meters. I was only wearing 3 liter tanks and even then had to turn sideways in a couple of spots. It was so shallow that it didn't even trigger my dive computer and only took about 5 minutes each way. The passage ran for about 80 meters, ending in a small air filled room where we hung our dive gear up and climbed up to a passage somewhat larger than the underwater passage. This passage continued for another 80 meters, ending at a boulder choke which the CDG(Cave Diving Group) has been blasting. Returning to the sump, the visibility was much less on the way out.

After the dive, we drove to the local cave club "hut" for a tour. It was actually a very nice place compared to places like the Organ Cave Field House in WV. We then headed to the Clydach Valley and another cave club hut called White Walls, where we would be staying the night and diving caves in Wales in the morning.

10-14-12 Getting up at 7am, there was fog in the valley and frost on the cars and roof. The plan for today is to go to Pwll-y-Cwm in Wales although there is a chance we won't be able to dive there with all the recent rain. The stream was really rushing and the water was very tannic with viz only about half a meter. We considered skipping the dive, but decided to try anyway. When I got to the reel, I had trouble putting an

Pwll-y-Cwm

arrow on it since the line was much thicker than US line. I turned the dive with plenty of gas to negotiate the gravel choke at the entrance and it may have been a good thing, since the current turned me around in the choke so I was headed back into the cave. I managed to straighten myself out and exit with no more problems. **DIVE 77 feet (average 46 feet) 21 minutes.**

Aveline Cave

After the dive, we headed back to the "hut" to collect out gear and head back to England. Doing a little sightseeing on the way, we stopped near the "rock of ages" and met a friend who was leading archeological tours of nearby Aveline Cave. He told us the entrance was accidentally discovered by hunters looking for a lost dog in the later 1700's. The cave had been a burial ground and he showed us bits of bone still in the walls and prehistoric scratches (X marks) in the walls he thinks are 14,000 years old. I asked him about some other marks, that looked like Ws and he believed they were religious marks from the Middle Ages, meant to ward off evil spirits.

He then told us some stories about Wookey Hole where we planned to dive in the morning. It was once thought to be haunted. Downstream from an old lead mine, when it flooded chemicals from the lead tailings washed out the entrance and killed cattle. Larger floods would wash out early burial sites and skulls would tumble out of the entrance

After dinner we headed to the Wessex Cave Club "hut" where we would stay the next few of days. This place is even more "posh" than the White Walls hut in Wales.

10-15-12 I got up at 7am, put my batteries on charge and inverted my dry suit to dry the INSIDE. It hasn't been dry, since I arrived in France and they have a nice "drying room" with a dehumidifier here.

Once at Wookey Hole, we looked at the resurgence and the visibility wasn't great, less than 3 meters, and the current was rather strong. It was decided to enter from the show cave into chamber 3. Hauling gear in through the tour trail, we took a shortcut through the Wookey Hole cheese aging area, arriving in full gear while a tour was in there, so we had an audience getting into the water.

The entry pool was part of the show and had lights in it although the floor was silty as no one had dived there lately. Everything was covered in silt, even the lines, and we followed them to chamber 9.1 and then to chamber 9.2. Both chambers have lights and one has a catwalk. We continued to chamber 19/20 via the deep section and on the way back took the shallow line which still got down to over 50 feet. From 9.2 to 9.1, we took a scenic tour around the loop line and I suspect that is the way most of the water goes, because all of the silt we stirred up was in there and the viz was just inches in some places. **DIVE 69 feet (average 14 feet) for 53 minutes, which included time spent in the air chambers.**

10-16-12 It was finally clear today and we went back to Wookey Hole. This time we entered in chamber 9.2, getting a ladder from a storeroom to get down to the water. Following yesterday's rout, we didn't surface in chamber 20 but carried on to chamber 22, where we climbed out of the water and dry caved to the end of the chamber and the next sump. **DIVE 70 feet (average 28 feet) for 20 minutes.**

Cave at Cheddar Gorge

Wessex Hut

Whitewalls Hut.

We went back to 9.2 but didn't get out there. Moving straight on to chamber 3, we got out and walked with our gear to chamber 1 and exited there. **DIVE 13 feet (average 6 feet) for 1 minute.**

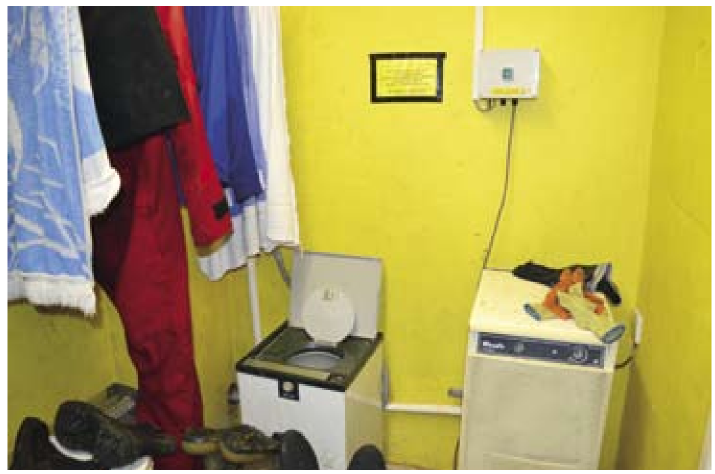
10-17-12 Today we hung our gear to dry and visited some dry caves and tourist attractions. Among them was Cheddar Gorge where we got some real cave aged cheddar cheese. We also visited Gough's cave, Cox's cave, Jacob's Tower and the Cheddar Man Museum of Prehistory.

After supper we went to meet the digging group at the Wagon and Horses Pub. They were working on at least 3 digs there where I helped pass dirt buckets out for a while, before moving on to view the other digs. At 9:30pm we headed back to the pub, which I suspect was their real motivation for the weekly digs.

10-18-12 We got up late and did some sightseeing before putting on some dry cave gear and making the short walk to Swildon's Hole. The entrance is in a small stone building, like a spring house, with a nearby second entrance through a hole in a tree that reminded me of the "Hobbit Hole". It had been raining all week, so there was a lot of water rushing down the stream and I was told the trip would be "sporting". The "sporting" part came when we had to climb back up the 20 foot wire ladder as well as several shorter pitches with names like the Lavatory Pan.

After dinner I learned a new game, Shove Half Penny. It has a smooth slate playing board with lines on it and the idea is to "shove" a half penny coin between the lines. The first person to get three marks between all the lines wins. Unfortunately, that was not me.

10-19-12 We got up, packed the remainder of our gear, collected a few souvenirs and got in a bit of last minute sightseeing before heading to the airport and home.



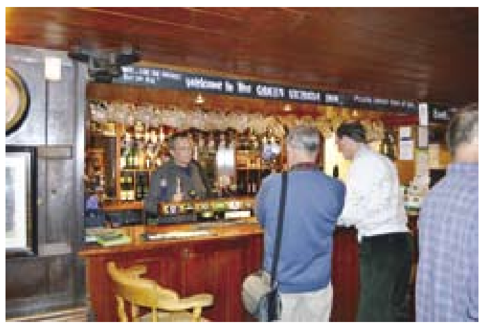
The "drying room"

Jacobs Ladder

More photographs next page

Cheddar Caves and town

Swilson



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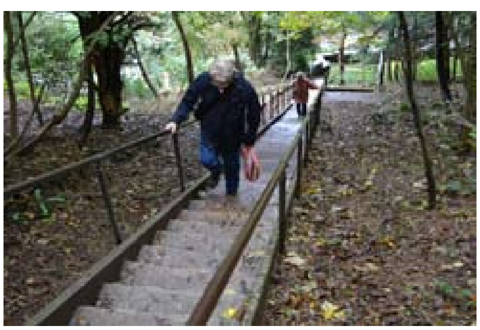

Jacobs Ladder

Cabuoy

Below: Panoramam of Lot Valley

Wookie Hole

Wookie Hole

Wookie Hole

Troumadam

truffe

museum

Avaline

truffe

Understanding The Quirks Of Karst

By Lee Boop, PhD cand.
NSS #59401

Although karst is important to us, I often find myself talking with someone who is completely unfamiliar with the term. I typically use an analogy, reminding them that a mountain range is a land form. Karst, in its broadest sense, is a land form created from soluble bedrock—bedrock that can be dissolved by acidic water. Here, we will consider karst landscapes specifically in sedimentary rocks limestone and dolomite, as well as in a metamorphic rock: marble. Karst processes can also operate in accumulations of highly soluble halite and gypsum. Given enough time (accelerated by bacteria), granite (an igneous rock) and even quartzite (metamorphosed sandstone) can form karst as well.

Karsts' Various Features

Perhaps the most striking characteristic of karst landscapes is that water encountering karst, either as rainwater or a surface stream, quickly penetrates into the subsurface. Karst landscapes typically lack surface water flow, but they have features that attest to water penetrating to subsurface rock strata.

This cover collapse sinkhole in Tennessee obviously opened quickly. Likely, sediment was carried downward by water over time, causing the formation of a void in the sediment above the bedrock. The collapse suddenly occurred when sediment above the void was no longer supported. As you may note by the rows of corn, this photo was taken well after the sinkhole opened.

Sinkholes (or dolines) are closed depressions where water enters, but does not exit, by surface flow. Most sinkholes are conical, but they can assume different shapes based on local conditions. Since sinkholes form by the downward transport of water and materials, they commonly attain a morphology that resembles a cone of depression or drawdown that surrounds an active groundwater well. These depressions do not need to be connected to navigable cave passage in order to be termed a sinkhole. Sinkholes may be broad and gently sloped, or very deep with a sharp slope.

Cover-collapse sinkholes appear dramatically at the surface when underlying materials are removed by subsurface transport. The overlying surface material collapses suddenly, and sometimes catastrophically, due to lack of support. While cover subsidence and solution sinkholes both develop over time and involve focused dissolution of bedrock, solution sinkholes develop as bedrock dissolves close to the surface, while cover subsidence sinkholes develop in bedrock covered by a thicker layer of sediment. In the latter case, sediment can migrate downward through joints in the limestone into a pre-existing void or cave system, which adds to the topographic expression of the sinkhole. Sinkholes are easily found on topographic maps: they are the inverse of a hill (closed loops), but instead of smooth lines, the lines include hashes pointing toward the low point.

Springs exist where water is discharged to the surface. They vary in magnitude from small seeps to the headwaters of major rivers. Springs may form for a variety of reasons. One type results when groundwater flows with gravity and reaches an impermeable rock layer, forcing it to move horizontally and emerging on a slope as a spring—these are contact or perched springs. Artesian springs occur where water flows at the surface because it is under pressure. The spring allows release of this pressure. Base-level springs emerge adjacent to rivers or lakes, which serve as the local water table base level

The last trickle of a stream in Alaska can be seen disappearing into the streambed. High flow maintains the streambed from soil development or being overgrown with vegetation.

or the ultimate base level: the ocean. Blue holes are a special designation for springs that emerge under the ocean. They are named for their appearance. Sometimes the term “blue hole” is used to name a land-based deep, circular spring.

Cenotes are similar to springs, but typically lack flow. They are water-filled sinkholes, often featuring steep walls. The water level typically reflects the surrounding water table. On the other hand, a karst window is exactly what it sounds like: a window into karst. It is a sinkhole that features a flowing underground stream.

Other features. Karst landscapes contain many other curious surface features. For example, surface streams flowing across karst can disappear underground (“sinking streams”). Sinking streams may develop when a stream

A blind valley exists at the upstream entrance to the Sinks of Gandy, West Virginia. Forget your dive gear: if you bring your tube, you can float through the cave.

flows into the subsurface over a distance. For example, a stream bed often dries up. In this case, the dry part may be reactivated during high flow, during rainfall or snowmelt. In other cases, a stream enters the subsurface at an obvious swallow hole, (also called ponor, insurgence, or swallet). Blind valleys may form adjacent to swallow holes, where the valley terminates when the water enters the subsurface.

Estavelles are karst features through which water can either enter or exit the subsurface. During low-flow conditions, the feature may act as a swallow hole, but under high-flow conditions, the cave system becomes inundated and the feature then acts as a spring. (I once was

A surface stream intermittently flows into the entrance sinkhole of Cave Disappointment, New York.

told: *If you think you understand karst hydrology, you are poorly mistaken!* Estavelles may be my favorite example of this).

Natural bridges, while not unique to karst, represent the last remnant of a cave system, where there is a small amount of the former passage that has not yet collapsed. Poljes are large, closed valleys, where a spring emerges on one side of the valley and meanders throughout the

Continued on page 12

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valley until it disappears into the subsurface. Despite their periodic flooding, poljes are important agricultural areas as they offer flat, fertile soils.

More Subtle Action of Water on Rock

Slightly acidic rainwater may etch bare rock, and the patterns depend partially on the exposed rock's slope. For example, rillenkarren can develop on sharply sloped or vertical rock, due to raindrops coalescing into tributaries as they run off. On flatter, bare limestone, valleys of variable size (centimeters to meters) can develop due to rainwater draining off of the surface and dissolving some of the rock with it. When mosses and other small vegetation grow on bare rock, their presence can further acidify any pooled water, strengthening the ability of the water to dissolve the rock. These features may form on bedrock or on detached boulders of highly soluble rock. Sometimes you can spot these features on breakdown that has been in the same position. In other cases, the orientation of these rills can be used to determine whether a rock has been tilted.

Rillenkarren in Mallorca, Spain.

Porosity and permeability are important characteristics of rock. These are significant factors whether discussing aquifers, petroleum reserves, hazardous waste sites, or karst. Porosity, the amount of pore space in a rock, can be primary or secondary. The primary porosity of a rock is established when the rock is first formed. Igneous or metamorphic rocks, for example, have lower porosity, while sedimentary rocks can have higher porosities depending on grain size, cement, compaction/diagenesis, and other factors. Have you ever noticed that Florida limestone looks distinctly different than Tennessee limestone? That is because of diagenesis: low-temperature and low-pressure compaction of rock, making it harder with time (higher temperatures and pressures implies metamorphism). Secondary porosity develops after rock formation (lithification), and can include faults, joints or voids created by dissolution.

Permeability, on the other hand, is a measure of how well-connected the pore spaces are within a material. Some limestones, despite being extremely porous, nevertheless have low permeabilites as the internal pores are not well-connected. A desirable aquifer, for example, features high permeability and high porosity. It has the capacity to hold large volumes of water (high porosity) and for those storage spaces to be connected (high permeability).

Vadose and phreatic are colloquial terms used to describe karst. Early in my caving career, I utilized a mnemonic: vadose implies above, whereas phreatic implies below the water table. The elevation where all pore spaces in

Speleothems appear in linear patterns in Poor Farm Cave (left, Pocahontas County, West Virginia) and Cedar Ridge Crystal Cave (right, Tennessee), testifying to the jointed nature of the bedrock. As water moves through the joints, it dissolves some of the limestone; when the water exits the joints, the speleothems are formed because of degassing of CO_2 from the solution.

a material (sediment or rock) are saturated is where one encounters the water table. The area above the water table is the vadose zone. Cave shapes reflect water trying to find the quickest path to the water table, including canyons and pits. Vadose passages often follow the dip of the bedrock, (the angle that rock strata deviates from horizontal), whereas phreatic passages can undulate laterally and vertically along the bedrock strike (perpendicular to the compass angle of the dip). Since phreatic passages are, by definition, located in the saturated zone (and therefore fully flooded), they can assume circular or elliptical cross-sectional shapes. Of course, in the context of tectonic uplift, denudation (landscape evolution by weathering and erosion), variable groundwater levels, and sea level fluctuations, phreatic passages may drain, or vadose passages may flood. Sometimes, passage shape reflect these transitions, and an observant caver can unravel the history of a passage. The presence of vadose speleothems in a flooded phreatic passage may imply that the water table was sufficiently high to create the passage, dropped, allowing for the precipitation of vadose speleothems, and then flooded again. This scenario, for example, is found in many caves where water table fluctuates with sea level.

Karst landscapes have captured the interest of explorers and scientists for thousands of years. The processes that operate in karst continue to baffle us, exceeding our expectations and surprising us around every corner. While some karst features are easy to identify, others are more subtle and demand a keen eye to spot and appreciate.

Fluvial (stream) processes create rich, flat agricultural land within this polje in Mallorca, Spain. The stream enters the large, closed depression at a spring and exits at a swallow hole.

The editors of *Underwater Speleology* invited me to contribute this article with the intent of providing a general overview of karst. This is by no means an exhaustive overview. An excellent resource for a recreational caver or student is Art Palmer's Cave Geology, which is available at nssbookstore.org and other retailers. I greatly appreciate Dean Wiseman's editorial assistance on this article.

Left: *Insoluble sediment collects in the bottom of this solution pan on San Salvador Island, Bahamas.*

Right:A cenote in Virginia? Technically, yes. Although difficult to see, the pool of water at the bottom of this sinkhole represents the water table, and has passage that divers have pushed.

Lee is a doctoral candidate at the University of South Florida, where she studies karst geochemistry and paleoclimatology primarily in Mallorca, Spain. Lee is the President of the Karst Research Group at the University of South Florida and is a member of the Social Networking Team for the National Speleological Society. She is an active member of the Central Connecticut, East Tennessee and Tampa Bay Area Grottos of the National Speleological Society. Email her at liana.m.boop@gmail.com.

Edd is awarded the first NSS-CDS Life Saving Award
Photographer: Bill Huth

Edd Speaks...

By Barbara Dwyer with Edd Sorenson

Many cave divers regard Edd Sorenson as a subaquatic "Superman." His successful rescues of four living divers from underwater caves in 2012 alone are unprecedented. For his work, Edd received PSAI's 2012 outstanding instructor trainer and three heroic merit awards and the eponymous Outstanding Achievement Award by the Aquatic Science Association in January 2013. He also received the first NSS-CDS Lifesaving Award, the first-ever Hero Award from DAN, and a meritorious service award plaque from the Jackson County, FL, Sheriff's Department. I caught up with Edd at DEMA to talk about the recovery diver's mindset, what makes the difference between a body recovery and a rescue, and what cave divers should do---or not do---when a diver is missing.-

--Editor's Note

Edd's 2012
Cave Rescues

February 25,
Jackson Blue.
Marianna, FL.

Two cave apprentice students rescued from an off line, silted out, sidemount passage. They were down to a third of their gas..

August 7,
Twin Caves,
Marianna, FL.

Open-water diver rescued after family of three attempts to enter the cave; two were turned back by cave divers.

October 15,
Jackson Blue.
Marianna, FL.

Cave diver rescued from ceiling fissure in sidemount passage. He was breathing from an air pocket and barely responsive when found.

You never know what you will do until you're in the situation. Years ago, two new open water divers were lost in a muddy cave system. An experienced recovery diver got right there and went in, and it was a complete silt out. He kept waiting for someone to attack him --- a panicked diver will kill you. Shortly he exited and told the sheriff's department, "I'll get them tomorrow when the visibility is better." I asked him what happened. And he said, "Edd, I'm not dying for anybody. I just knew that one of them was going to attack."

When I go in to look for someone, I keep checking my regulators. I have one of them in my mouth and make sure I know where the other one is, because they're gonna usually rip the one out of my mouth. The stress is huge. People who have never dealt with a panicked diver have no idea how stressful it is searching around in zero visibility for someone who's in a really bad situation and thinks he's going to die. Who knows what that person is going to do when he sees you or feels you? Your life is never more in danger than that moment when you get to a victim. You must put that completely out of your mind and get the job done. I think: What can I do to make sure that this diver gets out and gets home?

I hate it when the Monday morning quarterbacks say, "this is what I would have done." You don't know what you're gonna do until the shit hits the fan.

The Road to Hell

Divers need to know when not to attempt rescue. If you are not trained for it, it is a good way to end up dead. There was a recovery I did some years ago when I told the surviving diver: "The cave's closed. No one is to enter. I'm on my way." We knew that the victim was dead. The surviving diver said, "There are three divers on one of your boats, and they are going in." I said, "stop them." They went in anyway. Later on I asked them why they went in, and why they didn't get the diver out. They said that they were scootering along, wanting to help, till they got about 1000' in and then realized that they didn't know what they were doing. More recently, some divers tried to recover a body from Vortex Springs and punctured the victim's dry suit and BC. There were three dives there before they asked me to recover the body. He was weighed down by all the water in his gear. I had a hell of a time getting him out, a few inches at a time.

The cave divers who saw the family enter Twin Caves were newly certified and understood that they were not trained for a rescue. When they saw a family of three open-water divers swim into the cavern leaving a large plume of silt, they turned back the father and son. The daughter was leading and in clear water. She swam into the cave. Meanwhile the cave divers secured the line and exited through the silt. On the surface they accounted for their team but found only two of three open water divers.

The father said, "You've got to go back in and get my daughter." That's when the fourth cave diver, who'd stayed on the boat that day, called the shop and alerted us. The father kept trying to go back in and by this time had the whole Mill Pond silted out. When we pulled up, there was an 80' circle of mud. I couldn't even find the cave entrance; I had to follow along the bottom till I felt it drop down. As soon as I got in I found the gold line (which starts right at the entrance on the left-hand wall), then I found a reel. I tied on my safety reel next to it and started a zig-zag search pattern. I did this until I ran into the girl's feet. I came up and found her in an air pocket. She was cold and frightened but had remained calm. She tried to stay warm by kicking her feet, which had silted the cave totally. If the father and other divers had tried to search the cave, we could have had multiple fatalities that day.

What Could I Have Done Differently?

Since I started diving, my goal has always been to make the next dive better. If I miss rescuing someone by two or three minutes, I think about what I could have done to cut off that time. I got called in 2006 for a diver who was stuck in Jackson. He was an open water diver whom I had warned repeatedly that if he kept doing what he'd been doing, he was gonna die. I told him, "you see the cave as crystal clear and inviting, but I can tell you from first-hand experience that when it gets silted out, it goes to zero visibility. The walls will close in on you. And everywhere you look there will be walls and no opening." And his exact words to me were, "Edd, I've been in visibility so bad that it would make you cry."

This guy got stuck in a tunnel about 800' back. He had gas, but his buddy couldn't get him unstuck. I got into the water in 16 minutes from the time the sheriff called me, and I found him in record time because I knew where he was. I had my scooter on full blast and was haulin' ass. I got to that jump, and there was stuff coming out of that hole like someone was back there with a broom. So I assumed he was still alive.

I followed the line until I ran into a set of tanks down in the mud. When I got my hands underneath, there was nobody in the tanks. I got back on line and ran into a hand. It hit me right in the mask. The diver had ditched his tanks in panic and had died. When I looked at his pressure gauge, I saw he had 2000 psi in a set of 108s. Later we realized that the time from when his computer stopped "moving" till the time I got to him was less than two minutes. So he could have easily been alive had he not panicked.

For the girl at Twin Caves, I was at Jackson Blue with my tanks in the water, my gear on the table, and ready to put my undergarments on when the phone call came in. Now I've got to load up, drive home, load the boat, and drive out to the site. I knew that she was an open-water diver reported missing for 35-40 minutes. How much time does an open-water diver have in an aluminum 80?

I'm fortunate to have excellent staff [at Cave Adventurers] who helped with the rescues. Frank [Gonzalez] did a terrific job. He has only been cave certified for a few months. I don't usually let anyone touch my stuff, especially when I'm going into zero vis. He's young, he's gotta get everything together perfectly, and he pulled it off. If Frank hadn't been there, it would have taken an extra couple of minutes. From time I got the call, I was clocked at 11 minutes till I got into the water. With the two students at Jackson Blue, I was on site ready to teach a class. Jay Phelps helped me get in the water quickly and helped make that rescue possible.

"You've gotta stay calm." The diver who was stuck in the Jackson Blue sidemount tunnel is alive because he did not panic. He had gone in with a buddy in backmount and two other divers in sidemount. They entered a passage that they expected to loop back to the main line. One of the sidemount divers noticed that the cave was getting smaller. He looked back and saw a silt out. The

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four divers were unable to see one another in the silt, and three left the cave. The remaining [backmounted] diver was lost in a crack with the line broken. His friends searched near the cavern until their gas ran low, then surfaced and called for help.

Everything changes in zero visibility. I had to search and search. I found a little visibility above and looked up. There is a nasty tunnel that goes straight up and through a fissure. It's a sidemount tunnel - there's only one spot that a backmounted diver could get through. I saw a wall of brown and started up and couldn't find the line (I learned later that he'd broken it). I know that tunnel really well, but I just kept hitting rock everywhere. Finally I found the way up.

I couldn't find the spot where the line was, but I found a smaller spot where I could fit through. I knew coming through that I could be attacked at any moment. It started to clear a bit and I saw a tiny blue dot of a 21-watt HID hanging next to a motionless body. I thought, OK, he's dead. So just as I started to reach up for his leg, he put his head down and looked down at me from an air pocket. So I whipped my regulator off and bolted up through the pocket. It was only six or seven inches high there; I could just see him through one lens of my mask. I held the reg out to him from a couple of feet away and said "are you all right?" He was almost completely unresponsive (from rebreathing his exhaled gas), but he said, "I'm okay." And I said, do you have any gas?" and he said "no....I'm all out." I said "put this in your mouth" and that's when he took my regulator. I talked to him while he breathed and said, "It's really bad. I need you to stay calm. I will get you out but there is only one spot that you can fit through, but I've gotta find it. The line's gone. This may take awhile. I will not let go of you, I will get you out, but you've got to stay calm."

My safety reel was completely line trapped, because I'd been wandering around looking for him. To take him 8' through the hole took me 20 minutes. Normally you'd put the out of gas diver in front, but I needed to find the opening so I had him hang on to my ankle. When I finally did find the hole, I couldn't get him to go through it because he had to turn upside down. I helped him along past the hole, then grabbed his feet and pulled him through it. He got hung up. I shifted and twisted and pulled and was thinking that he was gonna panic and start tearing my stuff off. But he didn't. I started reeling up my safety reel, and he's pulling on me. He put my hand on his tanks and I feel his long hose stretched out and tangled up on some rocks. I untangled that, then we go a few more feet and he gets stuck again. He put my hand on his necklace regulator, and that's all tangled up in another line --- I just cut that. When we got to the gold line, he wouldn't swim, he's positively buoyant, and he doesn't have any energy. I had to swim him out. Then his long hose regulator got tangled again.

When we came up through the fissure, I knew his VR3 would give him a 60' stop. I'd been in the cave (at about 100') for more than an hour, and I had only 100s. I had started on my left tank and was down to about 1300 psi. I saved my right tank for him - he was down to about 600 psi by the time we started decompressing. His 40 cubic ft decompression bottle had only about 800 psi in it. We sat in the cavern for quite awhile, I could see him fidgeting. I signaled OK? and he got wide eyed. I grabbed his gauge and it said zero. We got the regs switched and I gave him my bottle, clipped it to him, and told him to stay there. I went up, told Sheriff's Department that he was alive, grabbed another bottle, and hung with him till he was done.

He didn't do what his training taught him, such as deploy a safety reel. He broke the jump line that went up through the crack, and went back and forth on the line till he ran out of gas. But he had the presence of mind to not panic. He hit the ceiling till he found a small air pocket and was there for about 2-3 minutes till he started to pass out. He felt around and found a bigger air pocket and went over there. So he probably looked for 20 minutes to a half hour. From the start of his dive, it took him only about 10 minutes to get to that point. When I got to him, he had been in there for over 160 minutes. So he had been looking for a long time without a safety reel.

The two apprentice students and their instructor got into trouble in that same passage. They'd planned to jump to the Horseshoe Tunnel but missed it and instead headed up a sidemount tunnel wearing backmounted tanks. I followed the silt trail and found the students lost off a broken line and down to a third of their gas. I had to tie in to the end of the broken line and search for them in zero visibility. I heard one of the students calling through his regulator. Sound is omnidirectional under water ---I really had to search. The students had found a jump line that goes up through a ceiling crack and had broken that. They got stuck and freed themselves but were lost in zero visibility. They had three safety spools between them and had dropped all of them (this is why I require my students to use a safety reel with a handle). They were in pretty bad shape, searching for those spools. They were about 10' from the broken line and much farther from the jump or the gold line. The students never could have found their way out. This came close to being a double fatality.

What to Do when a Diver is Missing?

That's a tough call. The first rule is don't make one body into two. If you don't look and the diver ends up perishing, you've gotta live with that. How long do you look?

Especially if you're a new cave diver, how much help will you be? Many newer divers aren't good in zero viz and make it worse. If you have multiple people in the team, it's important to send for help right away.

What's the situation? Is the diver lost? stuck? How long to look is something each person has to decide at the time: What is safe enough for me to deal with and still exit? Rescues and recoveries are like snowflakes, no two are the same.

Body recovery classes don't really train people, because every situation is different. Anyone can find a diver who is on the guideline, or the diver might have been able to get out. Some of it is knowing what to look for, but a lot of it is instinct. People think they want to do this? They don't. It's tough work. What the classes don't teach is how to get a body in rigor mortis through a restriction. You have to break bones. It's particularly gruesome. A diver seldom goes out peacefully. It's not pretty.

How do you prepare? You get ready. Because you don't know whats gonna happen. You have to have confidence in yourself and your ability to think on your feet. You need to be able to make decisions based on what's in front of you and what you feel. That's all I know.

Henry [Nicholson] said it best. There are no rescues in cave diving. It just so happens that these were close to my house. I was there. My good personnel reacted fast and did just a fantastic job. I have an ability to stay calm and an uncanny knack for diving. Or maybe I got really lucky. Divine intervention? Someone said to me, "Edd, I think you were put on this earth to do this." All I know is that a million things had to go right. But if the smallest thing goes wrong, it could delay you by several minutes. The two students at Jackson were several minutes from being dead. The last guy (October 15) had maybe 35 seconds. I am amazed he was alive.

The Black and Chrome Angel Saved Me

All the way to get the girl at Twin Caves, I didn't think she was alive. Her father kept watching the bubbles get fewer and thought, "I've killed my daughter." He told me later that he had prayed for an angel, and I showed up. That made my hair curl. And the student in Jackson Blue who had dropped his safety spool and his backup told the sheriff that he knew then he'd die. He said, "I wanted to write my wife a note telling her I loved her but I couldn't see and couldn't find my wet notes. Then the black and chrome angel appeared and took me to safety." Being able to get the two students out alive was a really good feeling.

The problem I see with a lot of divers today is that they're in a hurry. We're seeing more situations where people have been getting into trouble. We all have a little voice that says things like, "you really shouldn't [do this dive, go down this tunnel, make this one last jump]. The ones who don't listen are the ones whose bodies I pull out."

Edd's Awards and Honors 2012-13

NSS-CDS:

The first-ever Lifesaving Award

PSAI (Professional Scuba Instructors' Association):

Three Heroic Merit Awards

2012 World-Wide Instructor

Trainer of the Year Award

ASA (Aquatic Science Association):

Edd Sorenson Outstanding Achievement Award

DAN:

The first-ever Hero Award

Jackson County, FL, Sheriff's Department:

Meritorious Service Award

Edd is awarded PSAI Instructor of the Year, 2012, by president Gary Taylor.

Visit With A Cave

The cavern.

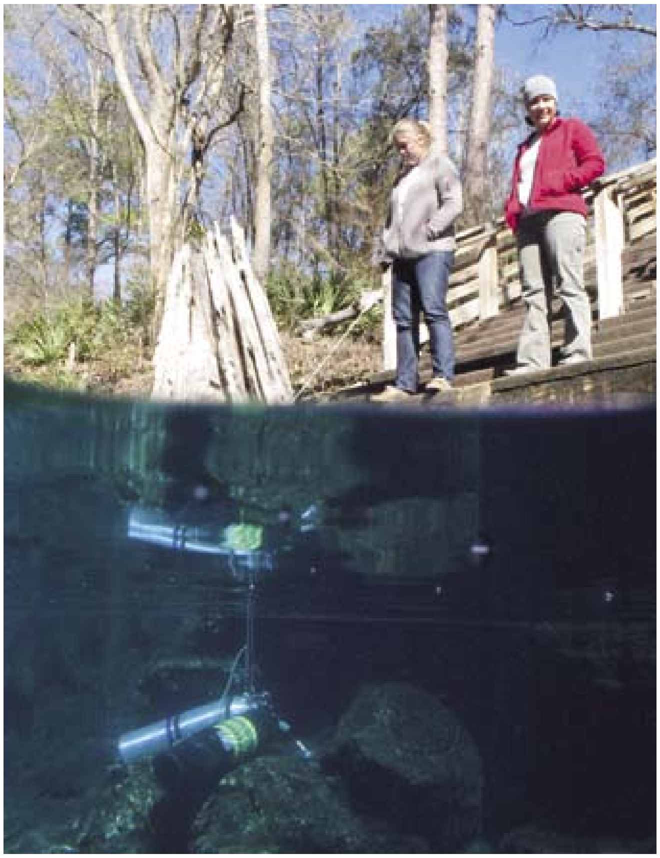
Wes Skiles Peacock Springs State Park, named in honor of the late Wes Skiles and area settler Dr. Peacock, is a popular cave diving site in North Florida. Shallow, with low flow, plenty of parking, picnic tables, tank racks and walkways to the water, it could hardly be easier to dive.

Peacock is perfect for any weekend, but with so much tunnel available, it can be hard for teams to decide where to go. One good choice is the Olsen, Nicholson and Cisteen lines, culminating in the Wishbone circuit or The Crypt. This affords tons of passage for teams of all levels to stay busy for a weekend.

Pile of bones.

The cavern is beautiful, but divers heading to The Crypt will quickly leave it behind. The vertical shaft on the right wall separates divers from daylight faster than The Peanut line to the left does. In under 500 feet, divers will pass Pothole Sink (no longer an exit), but don't get so caught up in the right-hand turn that you ignore the deer bones left on the ledge.

The Olsen Line features nice, big rooms with plenty to enjoy, from debris washed in during floods to fossils left eons before. The large tunnel is best lit by multiple teams passing each other on a weekend morning.



A winter chill has divers enjoying the sun while leaving stages in the basin.

The first marked jump after Pothole Sink is the Nicholson Line. This tunnel always seems highly populated by crayfish and amphipods which appear to rain down as divers pass.

Peacock Springs

By: Michael Gibby

Exiting the crack at the cavern.

The Nicholson Line connects to the next marked jump off the mainline, the Cisteen Tunnel, forming a triangle. The Cisteen line has large passages and gently rolling hills. It's impossible to be bored with either tunnel.

The silty entrance to the Crypt.

Cisteen Sink hosts a possibly confusing intersection. It's best to add your own personal markers to the small collection there to make sure you exit the right way. I've never heard of someone saying they enjoyed surfacing in Cisteen Sink, which is probably best enjoyed topside from the walkway down to Orange Grove. (It's the duckweed-covered muckhole in the woods to the right.)

The Olsen, Nicholson and Cisteen lines make for several years of great diving on their own. There are two great places to visit off Cisteen: the Wishbone Circuit and The Crypt. The Wishbone Tunnel is on the left as you swim into the cave before Cisteen Sink. It is named for the triangle it forms with the Cisteen line. It has very white walls and often has large pockets of tannic water and an area of bacteria growth similar to the Insulation Rooms at Ginnie.

Cisteen Tunnel hills and fossils.

The Crypt deserves caution and respect due to the inherent instabilities of the room. It's not a place to go testing your no-mount diving. The entrance is quite beautiful, if a little silty, as the passage shrinks and shrinks before suddenly opening into a huge room. While beautiful, The Crypt is also home to several small monuments to divers who are no longer with us, and warrants a pause for reflection.

Whatever you end up diving, it's hard to surface without a smile!

Midwest Underground

By: Chris Hill

Team Exploration And Safety

As divers who participate in diving in overhead environments, we frequently discuss the safety aspects of this type of activity. Go to any on-line forum or pick up about any technical diving magazine and you'll see discussions on safety. Each of us has a responsibility to ourselves, our dive partners and to our families to conduct this type of diving as safely as possible and thus, these on-going discussions play an important role. If you dive solo, you establish your own set of safety criteria to abide by. If you dive with a partner, then the two of you should lay out safety procedures prior to diving. From a team diving perspective, it is crucial to have safety incorporated into all we do.

Cave diving teams around the country are established to perform exploration at a high level. These teams provide a common focus for their members and draw upon their experience and knowledge to explore new territory or conduct specific projects for stakeholders, such as land owners or governing agencies. There is a lot of synergy that can be created within teams of people --- just look at any professional sports team. At the center of any cave diving team should be a focus on safety.

With so much gear to deal with, labeling is critical for an efficient and safe project. *Photo: Jenny Hill*

The Ozark Cave Diving Alliance (OCDA) is one such team in the Midwest that is constantly seeking to explore new passage and conduct "data gathering" projects. Some of this is done for land owners just curious to know what is on their property, and other projects are by permit from governing agencies that want some type of data for their own use, such as a survey of the system, pictures, video, creature counts, samples, etc. At the top of all that we do, however, is a constant focus on safety.

Safety within the OCDA team is accomplished by three key aspects: standardization, safety procedure practice, and continuous review of standards as they relate to safety. Occasionally, there are negative views of the standards established by teams. However, I would submit that the key importance of these standards is not that any particular group has come up with the "best" way to conduct cave diving, but rather has setup these standards for the efficiency and safety of their particular team and circumstances. Consider this: If all members of a dive team are set up with the same gear, same gases, similar training and same processes, then when they show up to conduct serious exploration their entire focus can be on safety and accomplishing the mission at hand in an efficient manner. Everyone is thinking and performing alike. When issues occur, action is immediate and swift, with little to no confusion.

It would take an entire book to write about all there is related to standards and safety on our team, but we'll discuss a few aspects within this article. Here in the Midwest (primarily Missouri, but also Arkansas and Oklahoma) the logistics of our underground water systems dictate the logistics of how we conduct projects. Our springs are often times lower visibility (10 – 20 ft), but we are fortunate to have some that are better in the 50+ foot range. Our systems are typically cold, ranging from in the 40's during mid-winter to 60's in the heat of the summer. Most exploration occurs in the fall and winter when rainfall is minimal. And, our systems tend to get deep – as much as 300 feet, with 150 feet being pretty normal. All of these characteristics and more play into our standards.

Probably the two biggest challenges the OCDA prepares for are depth and cold. These two combined create significant challenges for exploration. Depths below 120 feet require the use of mixed gases and often, prolonged decompression in cold water. The cold water presents challenges with efficient decompression and adequate thermal protection from hypothermia. As an example, a recent project was conducted just to prepare for exploration by inspecting and repairing the line in the Roubidoux system in Waynesville, MO. During that project, our long-range team spent 8 hours in the water, with roughly 2/3 of that time for decompression. Depths for most of that dive ranged from 150 feet to 260 feet in water with a temperature in the low 60's. Our mid-range teams spent 2 hours in water, with ½ that for decompression, just to set safety tanks and scooters at the 2000' penetration. And our core support divers were in and out of the water for 12 hours that day.

So how does our team prepare to safely tackle these types of challenges? What standards have we put in place to insure efficient project execution and a high degree of safety? For this article, we'll focus on depth issues as they relate to standards for stages and processes related to stage tanks.

Let's start with standard gas mixes. If you're trimix certified, you were probably taught how to calculate the percentage of oxygen and helium needed to safely conduct a dive to a particular depth. As individuals, if several of us were planning a dive to 250 feet, I'll bet there would be a variety of opinions as to which mix(es) would be best for that dive. And, if we didn't communicate ahead of time, we'd all show up to dive with different mixes and different decompression schedules. Then there would be different tank sizes and decisions on gas management. And thus the inefficiency and confusion starts.

For the OCDA and the typical depths of the Midwest, we have standardized on a few gas mixtures that best meet the needs of our typical environment. For travel gases we use standard mixtures rated for depths of 120', 190', 240', 300', and 400'. Then, for decompression, we again have standard mixes for depths of 20', 70', 120' and 190'. Does this mean that for the general cave diving public this is the "best" set of gas choices? No. But again, we're talking about team diving and exploration. Having these gases standardized provides the efficiency and safety desired for exploration.

With these standard gases, as an OCDA team member, I am able to pre-label all my cylinders permanently. I have a set of cylinders with MOD labeling for each standard depth. By doing this, I'm able to keep my tanks filled in advance and am thus prepared for projects as they come up. Because of the way weather changes in the Midwest, we don't always have weeks to prepare for a project. Additionally, having standard gases and pre-labeled tanks allows me to easily lend or borrow tanks to/from other team members. This consideration can be huge when trying to coordinate a dive plan in a short time frame without enough time to get the fills needed. The only thing a person needs to do is reanalyze any tank they've borrowed and place their name on it for proper coordination at the project site.

Hopefully, you can begin to see how this simple thing of standardizing gases lends itself to efficiency. While planning a project mission at any site, we don't have to have any discussion about gases. We're able to focus entirely on mission objectives and safety. Since we're all using the same gas mixes, we're also assured that our individual decompression planning is similar. Obviously, sometimes we have members who desire a little more deco conservatism than others, but that is easily coordinated ahead of time. The main key is that we don't have divers getting separated during deco due to being on separate schedules. Our individual dive teams stick together throughout the whole decompression process and are thinking alike in terms of dealing with any issues that may arise.

For the stage and deco tanks we have standards on how those are marked and setup. Again, does this mean this is the "best" way for everyone else to setup? Again, no. But to conduct a significant mission in an efficient and safe manner, while coordinating the activities of several people, some form of standard is required. For the OCDA, we keep tank markings specific to ONLY what is needed during the dive.

Correct diver names on tanks is a key marking. With the large number of tanks that are laying around on shore for support divers to place, correct diver names on tanks becomes crucial. It is key that the correct tanks for the correct diver be placed in the correct place in the system. We typically have a surface manager who is coordinating these activities and needs to be able to efficiently and effectively direct the placement of these tanks. Getting the system properly setup with the stages and deco tanks needs to 100% correct. Also, it's the first thing that gets done, so if it's not done efficiently that process can delay the rest of the mission. As these tanks are placed in the system, they are grouped together at each specific location. Many times there will be as many as 4–6 tanks all next to each other. When the mission divers come upon these locations, they need to be able to quickly find their personal tanks, pull them from the pile and continue on. I think you can see there is a huge safety aspect to this as well. Without the correct names on tanks it would be easy to not place or to misplace a person's tank(s). Can you imagine having a lengthy decompression ahead of you and your deco tank isn't there! As the mission divers begin their dive, their process should be to identify their individual tanks in each pile as they proceed into the system. Not having their names on the tanks and in the standard location on each tank would make this less efficient. They need to be able to simply swim over each pile and quickly note that their tank(s) is there.

MOD markings is something most people put on their stage and deco tanks and the OCDA is no different. The exception may be where we place those MOD stickers. All MOD markings for us are of a standard size to insure readability underwater and provide some consistency. The main aspect of our standard is how it coincides with our stage switch process. As a stage bottle hangs on a diver in the horizontal swimming position, the MOD markings should be easily viewed by the diver's partner. Thus, the MOD stickers are placed in specific locations to assist with this. This placement is also assuming a standard placement of stage tanks on the left side of each diver. If you and I are diving together and I'm on your left, I will see the MOD marking at the bottom of your stage tank and it will be correctly oriented such that it's not upside down. This placement is so

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Halocline visible as a white stripe in Regina cenote.

The Halocline:
A Perilous Piece of Magic

By Daniel K. Anderson
Photography: Neil Benjamin

There is a unique phenomenon one may encounter when diving in cenotes that contain areas of both fresh and salt water. It is magical, mysterious and at times unsettling. It is the halocline.

For those cave or cavern divers who have experienced this so many times as to find it mundane… theirs is a loss similar to one dismissing a beautiful sunset or a view of the aurora borealis that approaches something akin to sin.

For the uninitiated, the experience is difficult to adequately portray in words. At its most basic level it is a physical condition created by denser salt water settling below the lower density of the fresh water above. But that is like saying the sun is a ball of burning gas.

In the Yucatan, haloclines are possible because of the soluble limestone geology that makes up much of the region. The porous limestone subsurface allows water to flow in all directions, sacrificing minute particles of itself in the process. The movement of source water from rainfall and tidal flow through the porous stone creates complex cave structures in the same way that falling rainwater creates speleothems.

This breaking down and remolding of the limestone substrate gives us the complex caves of the Yucatan. As the threadlike passages of the cave penetrate the limestone, they travel up and down through the strata of salt and fresh water. One can see evidence of this on the walls of the caves themselves. Much of the fresh water cave is stained dark by tannic acid, while the lower salt water section is often white. Where the different water levels settle, one can see Neapolitan-like layers of white and dark stone marking the rising and falling tidal flow. Haloclines form at these points.

If “a picture is worth a thousand words,” a halocline is like a thousand pictures. As your dive light strikes the plane of distinct separation between the two substances, it might be reflected mirrorlike so that you are not able to visually penetrate the water just inches in front of you. Then, if the plane is disturbed, it becomes a visual gelatin-like blending that reflects light in patterns impossible to penetrate with your eyes. Another diver can be inches in front of you… or the cave line inches away… and you may not see either.

At times the phenomenon is entertaining. I have laid on my back in the cavern zone of a cenote where natural sunlight illuminates the water, and as I looked up through the salt water, I could see the fresh water above the halocline moving faster as if separated by a pane of glass. I carefully move my head upwards and slowly bring my mask into the fresh water and from above I cannot see my body below. Patience allows one to “split” the halocline with their mask, visually existing in two planes at once.

If one follows divers ascending into the fresh water through the halocline, the impression can be magical. The diver’s buoyancy must adjust to accommodate the change in water density. This means that the diver is lighter in salt water and heavier in fresh. As divers ascend above the halocline, they often dip back down into its surface until they find their proper buoyancy and again move upwards into the clear water above… as if they were floating out of the water itself and into space. These are the times when mental awareness of your physical reality must override the visual image being fed to the brain.

Some divers experience the halocline as a nuisance or obstacle that must be overcome during the dive. Certainly there are considerations that must be taken into account when diving through the halocline. Good technique calls for the lead diver to recognize that those behind may be in lower visibility as they disturb the halocline, and to slow the pace and adjust finning techniques accordingly. If the passage allows, a diver should move to one side of the cave line allowing for clear water on the other side for the divers following behind. If the passage is narrow, the diver affected by lower visibility should simply move closer to the line until the halocline is passed through. Minimizing fin movements by using buoyancy control and allowing the fins to slip behind through the water on ascent will offer better visibility for following divers. Obviously, good line awareness at all times is important.

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Conservation Corner

By: Kelly Jessop

Square Peg In A Round Hole

White crumbled limestone on the floor from diver contact with the ceiling.

Many years ago at the Ginnie Dive Shop they had the "bad technique" fly swatter in the fill station area. If you came into the fill station with the residue of limestone streaked across your tanks, the telltale sign contact was made with the cave, they would use the swatter on you in a joking manner. Enough attacks with the "bad technique" swatter would make you more aware that perhaps there is a problem that needs closer examination. But, there is no cave conservation inquisition that will find you guilty and flail you with a swatter present at the dive site. Performing an honest assessment of contact post-dive is integral to cave conservation.

Prior to the dive, make sure the dive plan includes the proper gear configuration. For example, you show up with back mount gear and the plan suggested calls for entering a sidemount passage. You could probably fit, but how much wear and tear would you cause to make the "square peg fit in the round hole?" A prudent decision may be to alter the dive plan until proper gear is available.

Drawing an analogy to basketball, when you are in 'the zone" the basketball hoop is huge and everything goes in. Then there are times when that same hoop seems smaller and nothing will go in. Sometimes we experience this in cave diving when, during a dive, we enter a passage and every movement seems to result in contact. Perhaps there is a change in our body awareness or muscle memory that day. Our best response is to stop the contact and move to a larger conduit.

After the dive, while breaking down your gear, you observe pieces of limestone in the wing and harness and white streaks on the tanks. An honest post dive debriefing is needed with your buddy who was in a position to observe where contact occurred. The adjustment needed to correct the problem may be very minimal. We can always learn from every dive and these learning opportunities will reduce cave contact and help us move our skills up to the next level of expertise.

We are very good about streamlining our gear to reduce drag and entanglement, but we need to also streamline our entire unit to reduce contact with the cave. If efforts are taken to reduce contact, then we will make sure that the round hole stays round.

OFF to the Side............

By Rob Neto

To continue on with the tenets of the NSS-CDS - conservation, safety, education, and exploration - this column will discuss safety in terms of sidemount diving.

One of the most common things sidemount proponents tend to be very quick to point out is that sidemount is safer because divers can see the valves and first stages and more easily identify bubble leaks. While this may be true, what I wish to discuss is safety when planning and executing a dive, and how a sidemount dive can differ from a backmount dive

Ask divers what they consider to be small passage and you'll get a variety of answers. Some will depend on the configuration the diver is using, but more important will be their amount of experience. Over the years I've heard sidemount divers exclaim that passages that used to look small to them when they were diving backmount now look big. As divers gain experience with sidemount and diving smaller passages, less and less passages look all that small anymore. It's all a matter of perspective.

This tells me is that divers are building their experience and getting more comfortable with smaller passages. But a question that comes up is "Are they getting more comfortable and still keeping safety in mind?" Going into smaller passages isn't just about being comfortable, a lot more goes into it in order to ensure the dive is done safely.

Sidemount dives, and by this I mean dives into passages where backmount won't fit, require more planning than your average cave dive. While an average cave dive is typically planned using a turn pressure that is more conservative than thirds (thirds is not conservative enough for any cave dive), this isn't the case with more complex dives. When you start planning jumps and T's, gas management should involve knowing what your gas consumption actually is, the average depth of the dive and how far into the cave system you'll be able to get with the gas supply you intend to bring with you. Add into this equation having to maneuver and manipulate yourself and your rig through small restrictions, some that may even require removing one or both cylinders and pushing them ahead of you, and the dive planning becomes even more complex. At this point, just cutting 100-200 psi off your penetration is not going to be enough of a buffer.

Gas management and planning for sidemount diving isn't all that different than it is for using a DPV in a cave. The gas rule you use during the portion of the dive that happens in larger passages should be different than the gas rule you use during the portion of the dive that happens in sidemount passages. Recall from my last column that most of the time you will be coming out of a sidemount passage with reduced to no visibility. Moving through a small passage with restrictions in which you can no longer see is much more different than moving through a passage with clear visibility. You need to account for the additional time it will take to exit. Some restrictions can take twice as long to exit through, or even five times as long! If it took you two minutes to get farther into the passage with visibility, it could take you ten minutes to get back out. Add a buddy into the equation and that ten minutes may end up being 15 or 20 minutes for both of you to get back through the restriction.

This may not seem like a lot initially, but when you take depth into account and add that to your decompression obligation it starts to become more of an issue.

Some of you may be thinking this doesn't apply to you because you don't dive restrictions like this...yet. Do it the correct way from the beginning; plan your dives, take gas consumption into consideration and allow for more time on the exit side than on the penetration side. Make sure you have enough gas, both bottom gas and decompression gas. If you're not sure how to do any of this, then you might want to consider taking a class from a qualified sidemount instructor.

Another consideration is emergency procedures. While highly unlikely, what is your plan if you or your buddy has an out of air situation? Do you both use long hoses so you can share air or is your plan to swap cylinders? Do you practice your emergency procedures so you are skilled enough to do them in an emergency? If your plan is to swap cylinders, can you do this in tight passages? Who's to say an out of air situation will only happen in a passage large enough to give you plenty of room?

While I have my own preferences in how to deal with various emergency situations, I will not dictate to anyone what you should do. That's a personal choice. However, you do have to practice your skills and consider all the possibilities. While some situations may be unlikely, if the possibility exists, then you should still plan for it. We can't plan for every single situation that may happen, but we should plan for most and weigh the risks. It could be a matter of life and death.

The Loop

By Joe Citelli

Was I The Student Or The Crash Test Dummy?

As reported in the last issue a good friend was opening a rebreather showroom in Pompano Beach, Florida and I was going to dive and report on each of the rebreathers in his display. Well, that friend, Peter Sotis of Add Helium, graciously invited me over to test drive the Prism 2 rebreather made by Hollis Gear, Inc. However, things took a bit of a different twist when Peter said, "I have two instructor candidates. How would you like to be their student?" Of course, as someone who can't resist the temptation to be annoying, I said, "I'd love to." Do you want me to torture them and be the student from hell or do you want me to be the serious "Poindexter" of rebreather students? Peter said, no, just be you. My empathy immediately went to the two instructor candidates.

Well, Joe and Jim of Coral Edge Adventures in Cartharpin, Virginia were at the showroom / classroom at 8:30 AM sharp. Introductions were made, and after all of the usual wisecracks were passed, we got down to business under Peter's watchful eye and all-attentive ear. Joe and Jim had a series of PowerPoint slides that were part of a comprehensive explanation of the unit and its functions. They covered all of the basics of rebreather diving and the necessary physics and math one needs to understand in order to safely dive a rebreather.

Before I could actually dive the unit, I had to do a "Build Class." A "Build Class" is one in which the student assembles the rebreather and packs the scrubber. It is also where the instructor explains all of the subtleties and nuances of the particular unit. Joe and Jim were very well informed and were able to explain everything about the unit in detail. Even when I threw a smart aleck curve ball question at them, they were able to answer quickly and accurately.

I then had to take a written exam and score a minimum of 80 points and do a confined water session in a pool before I could take the unit on a real dive. The test was fairly comprehensive and I would be comfortable stating that if you understood the answers to the questions you had a reasonably good understanding of how rebreathers worked. The pool sessions were interesting, to say the least, because they were a series of drill after drill after drill after drill. Then, just when I thought I had convinced them I could do the drills, they sprang another drill on me. My sick sense of humor really tempted me to wait until they were not looking for a second, and pretend I was dead on the bottom, just to watch their reaction. But, unfortunately, they were too diligent for me to catch them off guard. Peter knew what I was thinking and just gave me an underwater smirk. So, after classroom sessions, pool sessions and build sessions I finally got to do three real dives, the third of which I will report on.

<u>A Bit Of History</u> - The original Prism was a very nice unit designed by Peter Readey and manufactured by his company named Steam Machines, Inc. Their unit was originally called the Prism Topaz. The name Prism isan acronym for Peter Readey's Incredible Steam Machine. Although the company built a high quality unit, it was plagued with production problems and had difficulty meeting market demand. Steam Machines was subsequently sold to Hollis Gear, Inc., a major player in the dive equipment industry. Hollis used the excellent design features of the Prism Topaz as a building platform and took the unit to an entirely new level by incorporating many modern, high-tech features into it. Eventually the Prism Topaz morphed into the Prism 2 rebreather.

<u>Overview</u> - Featuring a clear acrylic scrubber canister and a state-of-the art radial scrubber design, the Prism2 has many well-thought-out improvements. Sensor placement is such that it is difficult for the cell faces to get wet and give skewed readings. Thinking towards the future, there is space reserved for a CO_2 sensor. The primary handset and setpoint controller is a Shearwater computer with gradient factor decompression software. Although there is a port for a secondary handset, the unit comes equipped with a Shearwater, Smithers Code HUD (Heads-Up Display) as a secondary. For those who don't know, an HUD is an LED mounted in your line of sight flashing colors to indicate ppO_2. The unit ships with its own frame to which the canister is secured and utilizes Velcro bands to secure tanks of any size to it. Because Hollis is a company with vast resources, they were able to design a special first stage "rebreather" regulator. With all of the hose ports on the top, hoses can easily route straight up using no swivels or severe bends. They arrive O_2-clean from the factory with an OPV (over pressure valve) already installed.

As previously mentioned, the Prism 2 utilizes a rather unique, state-of-the art radial scrubber design. Instead of the usual rigid-walled exterior with a stainless mesh inside, this scrubber has an open cage or frame which supports an otherwise exposed nylon mesh. The top of the scrubber basket has gas flow vanes built into it which create an area of increased gas velocity within the O2 sensor area of the head. This reduces the dew point of the gas around the O2 sensors and minimizes the collection of condensate (water) on the hydrophobic membrane (face) of the sensor and should result in a more stable sensor output. The sensors are also mounted sideways on the inhale side of the loop to further discourage accumulation of condensate on cell faces and the molex connector.

The Prism 2 uses OTS (over-the-shoulder) counterlungs which are constructed from a lined canvas material, similar to that of a buoyancy compensator. They are rather large at the bottom and narrow as they approach the shoulder. This design is supposed to assist divers with trim. While I do not like large volume counterlungs, I will say that the unit trimmed out nicely in the water.

The Dive - Since diving a new piece of gear such as a rebreather in a cave is abject stupidity, protocol and common sense mandated we do the initial dives in open water. Since I live in south Florida, we did a dive on a shallow wreck named the Captain Dan, but only after we went through the manufacturer-supplied pre-dive checklist. The Captain Dan rests in 110 FSW and sits upright in the sand. It was an ideal location to do the final dive of the course.

We all splashed and began our descent. At 20 feet Peter flagged me to stop. He gave me the signal that there were bubbles (a leak) coming from my canister. We both gave the thumbs-up signal and the team ascended and boarded the boat. Once on deck I separated the canister from the head and inspected the o-ring. I could not find any reason for the unit to be taking on water, but there was water in the bottom of the canister, so obviously something was wrong. I ran my finger around the o-ring surfaces in an attempt to remove anything that I could not see. I re-assembled the unit, geared up again and we were ready for a second try.

Joe, Jim, Peter and I splashed for a second time. We descended to twenty feet, stopped and did a bubble check. Success! I got the OK sign and all four of us proceeded down the line to the bottom.

Once on the bottom the drills began ad infinitum, ad nauseam. These guys were relentless and brutal. My mind kept thinking of ways to get even but, alas, I was outmaneuvered. Hypoxic, hyperoxic and hypercapnic was all I could think of for days after. The final drill was to simulate clearing a flooded loop. It crossed my mind to really flood it to get a rise out of them but then I envisioned myself on life support with chemical burns to the throat, and quickly abandoned that idea**. I cleared the loop successfully and I got the "congratulations, you passed" sign from both of my instructors. Peter appeared to be apprehensive because I suspect he was waiting for me to do something outrageous. It didn't happen because these guys were too sharp to get caught up in my antics.

About The Prism 2 - The unit trimmed out surprisingly well in the water. I was diving with two steel 19 cu. ft. (3 liter) bottles with a 5 mm wetsuit and a 7 mm hooded vest and no weights. I had no issues staying horizontal or holding a 20-foot stop. The work of breathing was quite effortless and natural. The DSV (Dive Surface Valve) opened and closed easily and its design was unique. Instead of using clamps to secure the hose to the valve it is secured with two properly weighted stainless steel nuts which offset the buoyancy of the hose and keep it perfectly neutral, reducing jaw fatigue. When you close the valve and remove it from your mouth it floats horizontally and stays in front of your face. Both counterlungs have drain tubes on the bottom. While I think you only need one on the exhale side of the loop, two can't hurt. As mentioned earlier, the sensors are located on the inhale side of the loop in a fashion which helps keep them dry. Finally, the regulators with the hose ports on top made the hose routing really clean and neat.

There were also a few features I did not like. The manual O2-add has a restrictor (orifice) in it which prevents you from adding O2 at a high rate. Unfortunately, in a rapid (runaway) ascent situation you would most likely go hypoxic if you did not bail out because I doubt the manual add would be able to provide enough O2. Also, the counter lungs do not have off-board bail out quick disconnects. You can only plug in off-board gas by disconnecting your ADV (Automatic Diluent Valve), a cumbersome process at best. In a crisis situation this could be very dangerous. I am also not a big fan of single-point calibration and the fact that it is difficult to completely flush the oversized counter lungs to get an accurate calibration. The radial scrubber design is not robust and is somewhat difficult to pack. Finally, the unit rests on its tank valves when propped upright (as do many other units).

Overall, I would say that the Prism 2 is a nice, well thought out unit that needs a few well thought out fixes. For me, the restricted O2 manual add and the lack of off-board gas quick disconnects are a deal breaker. While I do not like the large counter lungs, they are an easy fix.

In general, I would say the unit is easy to dive and in the hands of an experienced rebreather diver can be quite versatile.

*** For those not aware, a flooded loop can cause a "caustic cocktail" if the water reaches the scrubber and mixes with the soda lime. It produces a caustic solution which can inflict serious chemical burns.*

2013 Winter Workshop Marianna, FL

Photos: Bill Huth

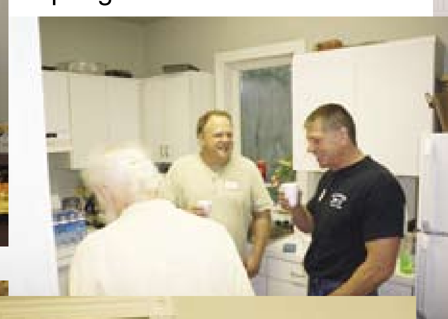





On Saturday February 23, 2023, the NSSCDS Winter Work Shop was held in Marriana, Fl.

Speakers Jason Gulley (Michigan Tech University), Craig Freeman (Northwest Florida Water Management District), Damian Menning (University of South Florida), Rodney DeHan (Florida Geological Survey) and Edd Sorenson (cave Adventurers Dive Shop) filled the morning session, followed by Edd Sorenson being presented with the NSS-CDS Life Saving Award.

Lunch was followed by clinics and diving at Jackson Blue Spring.



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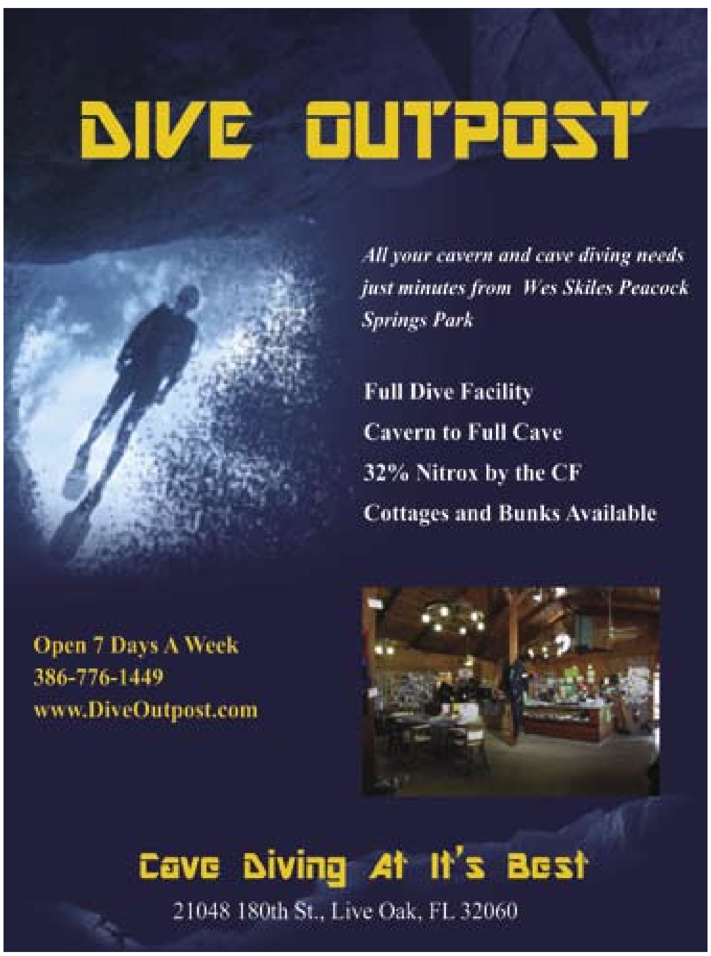
that if your elbow happens to be covering the top part of the tank, I can still see the MOD. If I'm on your right, I should be able to see the stage hanging down under you and see the MOD on the top part of the tank. Typically the bottom part of the tank will be covered by your leg.

So you might be asking why does it matter if my partner can see MY MOD stickers? Afterall, it's MY responsibility to make sure I'm breathing the correct stage, right? Wrong. Well, at least from a team exploration aspect, it's bad thinking. You'll recall I mentioned that stage markings work hand in hand with our stage switching process. From a safety aspect, one partner should pay close attention to the other person during each stage switch. Referring back to the beginning of this article, it was noted that depth is a crucial issue for the OCDA. Since depth is prevalent in our projects, then it goes without saying that we're breathing mixed gases and most dives we're breathing multiple mixed gases for the different depths. Thus, breathing the wrong mixture at the wrong depth is probably our greatest danger during projects. Are you beginning to see how this all ties together? At depth, during a stage change, it is critical that each diver pay attention to the MOD of the tank the other diver is getting ready to breath. While there is a specific process for the individual diver to go through during this change, it is a double check for the partner to verify the gas the other diver is about to breathe! Here we begin to see the whole circle of thought behind standardization on stage tanks. This is not a complete coverage of stage tanks, but hopefully serves to give a feel of how exploration is done safely in a team environment. Each aspect of equipment, markings and setup has been scrutinized as to how it fits into the overall process of exploration and how it can be made safer and more efficient. Likewise after each mission, there is a thorough review of any issues and whether adjustments to the standards are needed to make our future missions safer.

I think the following quote sums up the overall philosophy on our team quite well:

"Our group is made up of everyday people (mostly professionals) who happen to cave dive together. Although our hobby is close to the top of our list of things we enjoy doing, it is not what our lives revolve around. Therefore, we dive safely … or not at all (hence our standards)."

Steve Gridley – OCDA Team Director



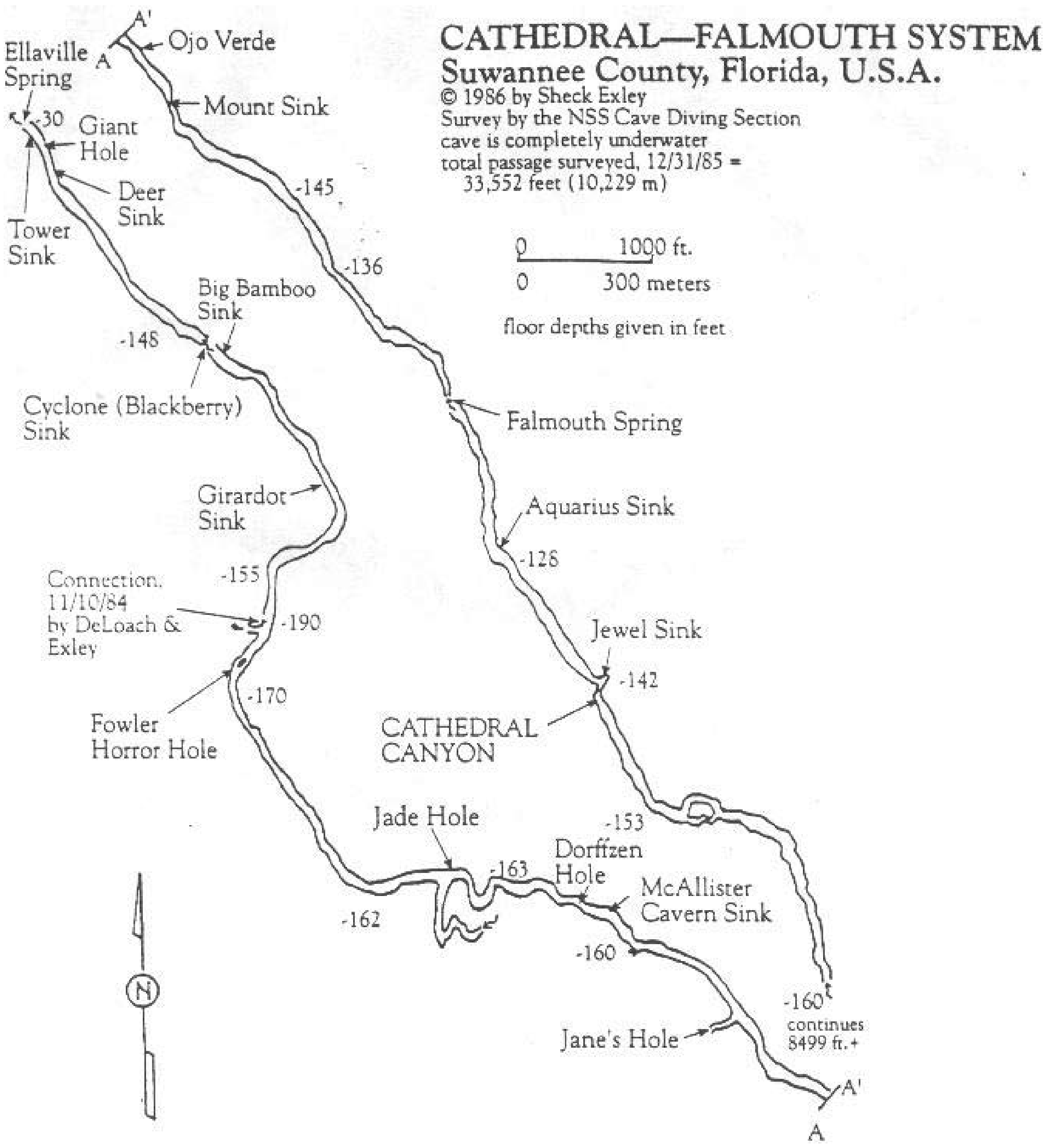
Continued from page 23

The length of the halocline depends on the grade of the passage itself through the halocline zone. A vertical passage may have a relatively brief halocline while a long gently sloping passage may extend the diver's passage through the halocline zone. Experienced divers will judge the slope and be mentally prepared for whatever period of low visibility and change in buoyancy that they may encounter.

Whatever your level of training or experience, seize the opportunity to realize that you are entering one of nature's marvels. Approach it with respect and enjoy the mystery that you share, knowing that few of the world's population will ever see what you are seeing at that moment.

Distorted view through a distrubed halocline in Regina cenote.

Author Info: The author is a Presbyterian Pastor and NSS-CDS Full Cave diver. Cave diving stories tend to make their way into his sermons.


CATHEDRAL—FALMOUTH SYSTEM
Suwannee County, Florida, U.S.A.
© 1986 by Sheck Exley
Survey by the NSS Cave Diving Section
cave is completely underwater
total passage surveyed, 12/31/85 =
33,552 feet (10,229 m)
0 1000 ft.
0 300 meters
floor depths given in feet
A'
A
Ojo Verde
Ellaville Spring
-30
Giant Hole
Mount Sink
Deer Sink
Tower Sink
-145
-136
Big Bamboo Sink
-148
Cyclone (Blackberry) Sink
Falmouth Spring
Girardot Sink
Aquarius Sink
-128
-155
Connection, 11/10/84 by DeLoach & Exley
-190
Jewel Sink
-142
-170
Fowler Horror Hole
CATHEDRAL CANYON
Jade Hole
-153
Dorffzen Hole
-163
McAllister Cavern Sink
-162
-160
N
-160
continues 8499 ft.+
Jane's Hole
A'
A

From The Back Of The Cave......

A Little Cave Diving History

Cathedral Sink

2013 is the 40th Anniversary year for the National Speleological Society Cave Diving Section. These years are filled with history and events that have seen unbelievable growth in cave diving development, exploration, safety and traing.

Cathedral Sink is rich in history and a pride of our organization as one of the NSS-CDS owned and managed properties.

In 1991, with the loss of cave diving legend, Sheck Exley, the NSS-CDS was bequeathed approximately four acres of land containing Cathedral Sink. This property harbors the furthest upstream entrance of 18 entrances into the Falmouth System, which empties into the Suwannee River at Ellaville Spring, located in the Suwannee River State Park.

Sheck originally purchased the property to gain access to the site and explore the system. His exploration is chronicled in his book ***Caverns Measureless To Man.***

He set a record penetration here of 10,939 feet in 1990, the dive lasting almost twelve hours. Since that time the upstream exploration of the system has been extended to over 17,000 feet.

When exploration first began here, visibility was often over 100 feet. Since that time, this has changed and visibility has been reduced to just a few feet most of the year. It is the first system to go under when the river floods and due to the decreased visibility, fragility of the system and depths of over 200 feet, this is considered an advanced cave dive.

While the trailer Sheck once lived in is no longer there, the karst window is accessed by wooden steps built over the course of several NSS-CDS work days at the site.

On April 20, 2013, the NSS-CDS will hold another work day at the property to do general maintenance of the decking, stairs and surrounding property, followed by a cook out and some social time.

The NSS-CDS policy for diving Cathedral is available for review on the NSS-CDS website:

http://nsscds.org/cathedralsink

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Cathedral Sink Work Day

Saturday, April 20, 2013

9am at Cathedral Sink

Contact Tony Flaris
secretary@nsscds.org
or
Cheryl Doran
uwseditor@nsscds.org
for more information and to sign up

Cave Diving Section of the
National Speleological Society, Inc.
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Crawfordville, Florida

May 24-25