Underwater Speleology

Journal of the Cave Diving Section of the National Speleological Society



Volume 49, No. 2
Summer, 2022



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Underwater Speleology (UWS) is published quarterly (four times yearly) by the NSS-CDS, 295 NW Commons Loop, Suite 115-317, Lake City, FL 32005.

UWS is a membership benefit. Information about membership fees and registration can be found at https://.nsscds.org.

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a note from the chair



Thank you very much to everyone who came to the NSS-CDS International Conference over Memorial Day weekend. Over Friday and Saturday we had 265 people attending, which is probably the largest attendance in the CDS's history.

I would like to say a huge thank you to Adam Hughes, Renee Power and the Cavengers who put so much work into making such a large event run so smoothly.

Thank you also to the great line-up of speakers: Brian Kakuk, Doug Ebersole, Gus Gonzalez and Woody Alpern, Ricardo Castillo, Charlie Roberson and Jon Bernot. Paul Heinerth ably MC'ed the proceedings with his usual suave humor.

Thank you also to the sponsors: Dive Rite, Edge and HOG Dive Gear, Cave Country Dive Shop, Bahamas Underground, Ursuit, Scubaforce USA, Divesoft USA, Fathom Dive Systems, Divers Alert Network, Dive Talk. And a shout out to everyone who donated prizes to the door raffle.

We also held the annual members' meeting immediately after the conference. I have a few updates from this:

(Re-) elected Board members Sam LeFlore, Jamie Chandler and Terry DeRouin were welcomed (back) to the Board.

The Board positions for the coming year will be:

Chair: Andrew Pitkin
Vice-Chair: Charlie Roberson
Treasurer: Renee Power
Secretary: Sam LeFlore

by Andrew Pitkin

Program Director: Jamie Chandler
Program Director: Terry DeRouin

There were two notable items of business to arise from the meeting.

1. The PA system was a great success at the Conference, but the (borrowed) projection facilities were lacking. The Board voted to buy a projector and screen for next year's Conference, which will probably be held at the same venue.

2. During the last year, the Board members (who are automatically members of the separate LLCs that owned Cow Springs and School Sink) voted to transfer ownership of these two properties back to the CDS. This was because that arrangement did not provide any real legal protection for the CDS and significantly hampered our ability to manage the properties effectively so that CDS members can use them, which is one major reason for the CDS owning them. This has now been accomplished, but will not change the arrangements for diving either site.

Finally, I am happy to announce that we will have a winter workshop at Hart Spring on January 14, 2023. Save the date, and watch for more infomation

Thank you again to everyone who came to the Conference, either on Friday or Saturday, as an attendee, speaker, sponsor, or helper. I am already looking forward to next year!

Be sure not to miss CDS member Jason Gulley's New York Times story and images about the environmental disaster unfolding in Florida's underwater springs.



NSS-CDS Annual Conference Sees Vigorous Return

by Gene Page

Photos by Tom "TJ" Johnson

Some 265 cave divers gathered happily in person following a miserable two-year COVID hiatus, making this our largest-ever conference.

The main Lake City Armory Hall room was full and buzzing with cave divers by 8 am. People stood around visiting, catching up and enjoying coffee and donuts. The programs got underway following an evening of socializing and enjoying liquid refreshments compliments of DiveRite.



Brian Kakuk discusses cave conservation in the Bahamas..



It wouldn't be a proper CDS conference without Paul Heinerth as emcee.

Adam Hughes got things moving quickly at 9 am by introducing our favorite CDS workshop emcee, Paul Heinerth. Paul kept us entertained as he moved the interesting program along. Speakers were only interrupted by raffles, give aways, and a much-enjoyed Sonny's BBQ lunch.

Brian Kakuk kicked off the speakers, giving a wonderful talk about his recent cave and land conservation work. Brian cited Wes Skiles's last *National Geographic* magazine story (August 2010) as the perfect visual evidence that he and others used to convince the Bahamian government to protect its special caves, both underwater and above. It's impressive what Brian and others have been able to accomplish, but he emphasized that there's still work to be done.



Gus Gonzalez and Woody Alpern of Dive Talk.

Gus Gonzalez and Woody Alpern are two Atlanta area cave divers who have gathered a following on YouTube with their DiveTalk show. They had helpful tips and suggestions to help anyone interested in launching a social media platform.

We broke for lunch around noon and walked over to get some wonderful Sonny's BBQ. With food in hand, we went back to our tables to eat and visit during the lunch break and to walk around to visit all the vendors and sponsors.



Ricardo Castillo



Andy Pitkin updated us about recent Weeki Wachee exploration, and Paul Heinerth talked about the early exploration.

After lunch, Ricardo Castillo of Tulum, Mexico, was the first speaker up. Ricardo and friends have been using photogrammetry to document Yucatán's archaeological finds *in situ.* Ricardo described shooting around 400 to 500 images around a skull or other artifact and then using software to create a large and detailed photo map. The technique allows documentation from every angle with markers placed. The specimen can then be removed intact for study and conservation in the lab.

NSS-CDS chair Andy Pitkin updated us about the goings-on at Weeki Wachee since his last presentation. Andy highlighted his talk with stunning photos and videos of divers exploring these new passages. And before Andy started, Paul gave a quick history of the early days of his and Sheck Exley's exploration at the site. Apparently Sheck didn't want to fully enter the cave, but then returned later with reels of guideline to explore without Paul!

Finally and importantly,Jon Bernot and Charlie Roberson announced a new CDS accident analysis plan, which was well received by all and generated many questions. This talk, titled "Is Accident

Analysis Dead?" was videotaped and can be seen on the Cave Diver Forum and on Facebook.

Everyone including myself was delighted to be able to gather in person for this year's conference. I was happy to donate a photo shoot too!

We plan to have the Winter Workshop at Hart Springs on January 14, 2023. Details are being worked out, so save the date!



Jon Bernot and Charlie Roberson outline plans for accident analysis and reporting.

Gene Page is a longtime cave diver, underwater photographer, and NSS-CDS member.

Tom "TJ" Johnson is a cave diving instructor, underwater photographer, and NSS-CDS member.

view more photos on page 14...

In Memoriam

Steve Gamble

by Ken Charlesworth



courtesy of Renee Power

August 6th was a day I'll never forget. After a memorable day of wreck diving, conversation, and eats, I was on my way home and received the phone call no body ever wants to get. Steve has taken a turn for the worse and is in hospice care. He is not expected to survive the night.

He didn't make it through the night.

Steve Gamble and I developed a trusted friendship over the years that would be difficult to duplicate. Steve was an industry pioneer who cared about his customers and the quality of his work for them. He was one of the few in the industry that you would have a difficult time finding anyone who had a bad word to say about him. A true professional.

Steve and I had dinner on Thursday nights almost since the time I move here. It started with a bunch of friends and ended up over the last four or five years with just him and I. He drank beer; I drank Mountain Dew. We had wings if possible. Our location changed a couple of times through the years, but beer, Mountain Dew, and wings needed to be on the menu. We discussed world politics, science, the dive industry, and whatever came to mind.

My last conversation with Steve was difficult. A few days before his passing I made my usual couple times a week call. Steve was not Steve. He sounded tired and in pain. He seemed to have lost his will.

Steve's last words to me were " I gotta go" and hung up abruptly. That's out of character for Steve. I believe he knew the end was near.

Fair winds and following seas, my friend. You're free from the pain and suffering. Keep the wings warm till



courtesy of Fan Ping







Appreciating our Volunteers

On behalf of the membership, the NSS-CDS Board of Directors thanks our volunteers for their contributions from 2020 through 2022. Our organization depends on our members' contributions. We greatly appreciate their time, talent, and generosity.

Translation of *Basic Cave Diving—A Blueprint for Survival* to español:
***Manual Básico de Buceo En Cueva— Una Guía para la Supervivencia*:**

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Rodney Nairne and Suzie Dudas, Silent Submerge - Magnus

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Nick Anderson
Adam Weaver

Cave Diving Museum:

Mark and Annette Long - Storage of Sheck's items
Michael Poucher - Transport of items to NSS

Cave Diving Session at the 2022 NSS Convention

by Michael A.Raymond

The 2022 NSS annual convention was held in Rapid City, SD, this year. The week-long event was a great opportunity for cavers to reconnect, learn about the many things going on with caving research & expeditions, and shop for new caving gear. Multiple trips were done to local caves daily, and there were workshops on mapping, climbing, rescue, and more.

The Cave Diving Section held a half-day session so members could present their diving projects. The session had good participation with about 40 people in attendance. It started with many members doing a show-and-tell about their specialized cave diving equipment. It included talks about six projects. The session concluded with a practical exercise and discussion about sump rescue.

The talks included caves from the U.S. and Canada. Jason Richards presented about Hole-in-the-Wall Cave in British Columbia. This deep cave has marble inclusions and required a half day of underwater ropework to haul away rocks blocking the cave's entrance.

Jason and Chrissy Richards also presented about their recent work in Neal Cave in Tennessee. The system has multiple sumps, and the explorers have developed a minimalist system so they can quickly move through them without tiring from hauling lots of gear.

Charles Walker presented about the ongoing exploration of Roaring River Cave in Missouri. This system recently gained the record for the deepest underwater cave in the United States. It still has significant potential for additional depth, not to mention length.

Two members did remote presentations. Richard Jack talked about the exploration of Reappearing River Cave in British Columbia. One technique they've adopted is to use snorkels for low-airspace swims so they don't use up the gas in their cylinders.



Jason Richards discussed exploration at Hole-in-the-Wall, British Columbia. © Michael Raymond.

Ryan Hoffman discussed his team's work in Bamboo Cave in Alabama. They're able to use their Swaygo cave packs as dry bags for the short sump. They face significant risk though from unstable breakdown on the far side of the sump.

Michael Raymond concluded with a talk about the exploration of the Big Spring system in Minnesota. The spring drains the second largest drainage area in the state and is proving much easier to explore than some of the other multi-sump systems in the region.

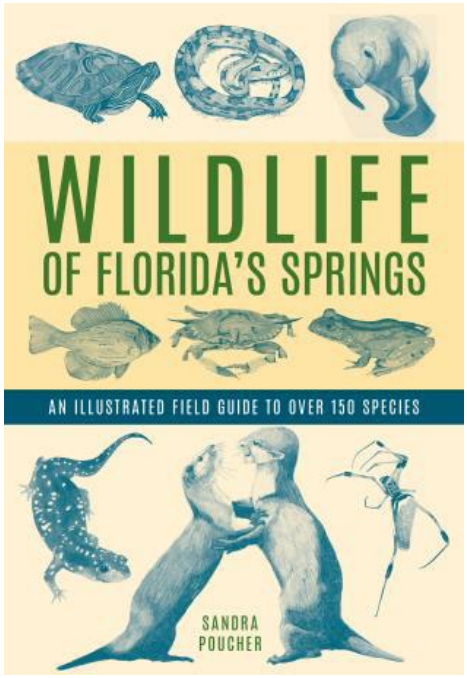


The 2022 NSS conference was well attended. © Michael Raymond.

The session concluded with a look at issues surrounding sump rescue. The participants discussed different ways to attach tanks to a patient in an Oregon Spine Splint. They also discussed using leashes to keep ahold of patients being swum in low visibility. The session concluded by initiating plans to hold a sump rescue practice event later in the year.

Next year's NSS convention will be in Elkins, WV, the last week of June. We're looking forward to seeing everyone there.

Michael Raymond is writing a series on sump diving rescue and is Underwater Speleology's *Senior Editor.*



Just published....

WILDLIFE OF FLORIDA'S SPRINGS
An Illustrated Field Guide to Over 150 Species

by SANDRA POUCHER

New for 2022, this book describes the life found in Florida's springs, spring runs, rivers, and even underwater cave systems. It features over 150 species and more than 130 original illustrations.

Available in the NSS-CDS bookstore

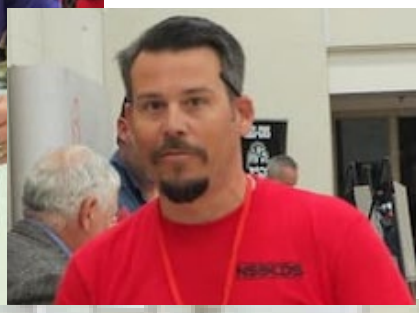
May conference photos, continued from page 9....











STOP
PREVENT YOUR DEATH
GO NO FARTHER.
FACT:
FACT:
FACT:














Cave diving fatality at Cenote Odyssey, Sistema Ox Bel Ha, on April 23, 2022

by Gustavo Buenrostro and Martin Gaspar Ramirez

A fatal accident took place at Cenote Odyssey, part of Sistema Ox Bel Ha, on Saturday, April 23, 2022.

Location:

Cenote Odyssey is part of the Ox Bel Ha cave system, south of Tulum, Quintana Roo, Mexico, and toward the sea. The cave's average depth is 12 meters/40 ft, with the downstream flow toward the ocean.

The victim:

The deceased diver was a 32-year old Russian male who was an experienced cave diver. His certifications included full cave, stage cave, and diver propulsion vehicle (DPV) cave. He had been very active in the area, training, diving, and surveying caves. He was a passionate diver who pursued exploration while working remotely as a programmer. He had been actively diving in the area over the last two years, staying for six months in 2021 and for all of 2022. He knew the cave area well and had done many dives in this cave as part of an ongoing survey project. We estimate that he had around 300-400 cave dives.

The accident:

The victim had dived frequently at Cenote Odyssey. He had become known to the neighbors, who are building a house on the property next to the cenote.

According to the neighbors, the diver arrived at around 10 am on Saturday morning, started his dive, and never came back. They became increasingly worried during the afternoon and evening. The neighbors contacted another local diver, and the alarm was raised in the community. A first search team was assembled with divers arriving from Playa del Carmen, Puerto Aventuras, and Tulum.

The search:

A team of three divers, Lanny Vogel, Kim Davidsson, and Peter Broger, conducted the first search at 02:57 on Sunday morning (Saturday night). Robbie Schmittner, Alessandra Figari, and Hitoshi Miho provided surface support. Due to the system's complexity and amount of lines, the plan was to try to retrace the missing diver's steps. The team had no information about the missing diver's dive plan.

Each recovery diver used sidemount configuration, an extra stage tank, and a DPV. We found the deceased diver after first searching some other areas of the cave. He had done three jumps (navigational decisions) from the entrance and was using REMs (line markers). He had conducted his navigation properly and consistent with safe cave diving practices and protocol.

The diver's body was located at approximately 700 ft of penetration (seven minutes' trigger time using DPVs) from the Cenote Odyssey entrance. The team photographed and documented the site and left the body and gear intact. The team exited to notify the surface support personnel and the authorities. Because the search took place in the middle of the night, the team planned to regroup the next morning (Sunday, April 24) to complete the recovery.



Figure 1. Stick map of the cave area. The entrance at Cenote Odyssey is marked by the star.

The deceased diver's equipment consisted of four aluminum 80 ft3 tanks filled with 32% nitrox as marked on the cylinders and a Blacktip brand DPV. He was diving in sidemount gear configuration and with two stages.

The diver's route:

Figure 2 (page 19) shows the victim's route.The yellow lines represent the existing lines in the cave, with the star denoting the cenote and starting point. The red lines show where the diver traveled (based on his dive computer profile and the survey data recovered from his Mnemo survey device). The green lines show the jumps that he had placed to ensure his continuous guideline to the surface. The blue circle indicates where he was found with his tanks and DPV.

The recovery:

After the call went out into the community, there was a great response among local instructors to help out and assist.

A team was selected according to readiness, experience level, and availability. The team met up at a local dive center, discussed the plan, and coordinated with the authorities. The whole operation went very smoothly. The diver and all of the equipment was recovered and brought to the surface by around 13:30 on Sunday, April 24. Local authorities then took over in combination with funeral services.

Recovery team members:

- Alex Álvarez (surface support and point of contact with the authorities)
- Arthur Nguyen-Kim (search and recovery)
- Gustavo Buenrostro (search and recovery)
- Marissa Eckert (search and recovery)
- Martin Gaspar Ramirez (search and recovery)
- Kim Davidsson (search and recovery)

Two recovery teams were formed after planning the operation.Team 1 (Martin and Kim) entered the water at 12:30 and exited at 12:53. They each used sidemount cylinders and a DPV to scooter to the victim and to recover his four tanks and DPV. Back at the surface they informed Team 2 (Arthur, Gustavo, and Marissa), who did a swimming dive with sidemount gear configuration and an extra stage tank. Marissa and Gustavo recovered the diver while Arthur recovered the jumps installed for navigation. Recovery Team 2 surfaced successfully at around 13:30.

What happened to the victim?

We found the diver's body within an arm's length of where he had "dropped"/attached his stage tanks to the line. Both sidemount tanks were attached to his body. Both of these tank valves were fully open, and both tanks were empty. He was positioned horizontally and face down. His helmet was in place, and his mask was on his face (no blood was in the mask). There were no apparent signs of struggle.

The stage tank valves' positions raise additional questions as to what may have occurred. Both tanks were attached/clipped off to the guideline per standard protocol with hoses and regulators stowed properly. One stage tank was found empty with the valve inexplicably fully open.The second stage tank's valve was closed, and the tank was pressurized with 170 bar/2500 psi of remaining gas. The DPV was clipped to the line at the same location and was functioning.

The diver had a survey slate in his pouch and a wrist slate with many sheets of information. He had most likely been working and re-surveying the lines near where he "dropped" the stages and DPV. But we have no information about his dive plan.

Equipment was functioning properly.

The recovery team checked the diver's equipment with the police investigators as witnesses. Three of the tanks were completely empty as described, and one still contained 170bar/2500 psi of gas. Analysis confirmed that the remaining gas was 32% nitrox as marked on the tank. The team checked for malfunction by connecting all of the regulators to a full tank. There were no signs of malfunction of any of the regulators, hoses, or o-rings. They were all of a high-quality brand and looked very new and well maintained.

Reconstructing the dive

Martin and Gustavo conducted two additional dives to gather more information about the diver's route and navigation. Their second dive followed the deceased's route based on the information retrieved from his dive computer profile. They were able to find the missing last piece of equipment, an Mnemo (mapping and survey device) that the diver had used. During their dives, they were able to recreate his dive profile, which matched the time, distance, and depth retrieved from his dive computer.

We believe that the diver had set up a "base camp" from which he would be exploring and mapping the lines in that section of the cave. He would have scootered in using a stage tank and may have clipped this tank off before starting a swimming dive using the other stage bottle. He would have left his DPV on site, returning to "base camp" after mapping the adjacent lines.

During one of those consecutive not-so short dives, he returned to "base camp" to leave the second stage tank. We hypothesize that he recalculated his remaining gas at this point. He continued to survey, probably because he was familiar with his surroundings. At some point, he placed the third jump (navigational decision) and proceeded to explore that section of the cave using his sidemount tanks with the goal of completing the mapping of that section of the cave.

The dive profile indicates that he had followed this jump line for about 10 minutes, during which time he found a promising crack leading to a deep unexplored section of the cave. He decided to continue to what was the end of the existing line (confirmed by the recon dives that were made). Then—using only his two sidemount tanks—he proceeded back toward the "base camp" using the Mnemo to complete the cave line map. His sidemount tanks by this time would have been at his turnaround reserved pressure.

On the return trip, he decided to take a look into the crack. In this unexplored section, he found himself in a very narrow vertical restriction (a confined space that allows room for only one diver). Contact with the cave caused a silt out and zero- visibility situation (confirmed by Gustavo and Martin on a recon dive). These stressful events would have caused him to increase his gas consumption.

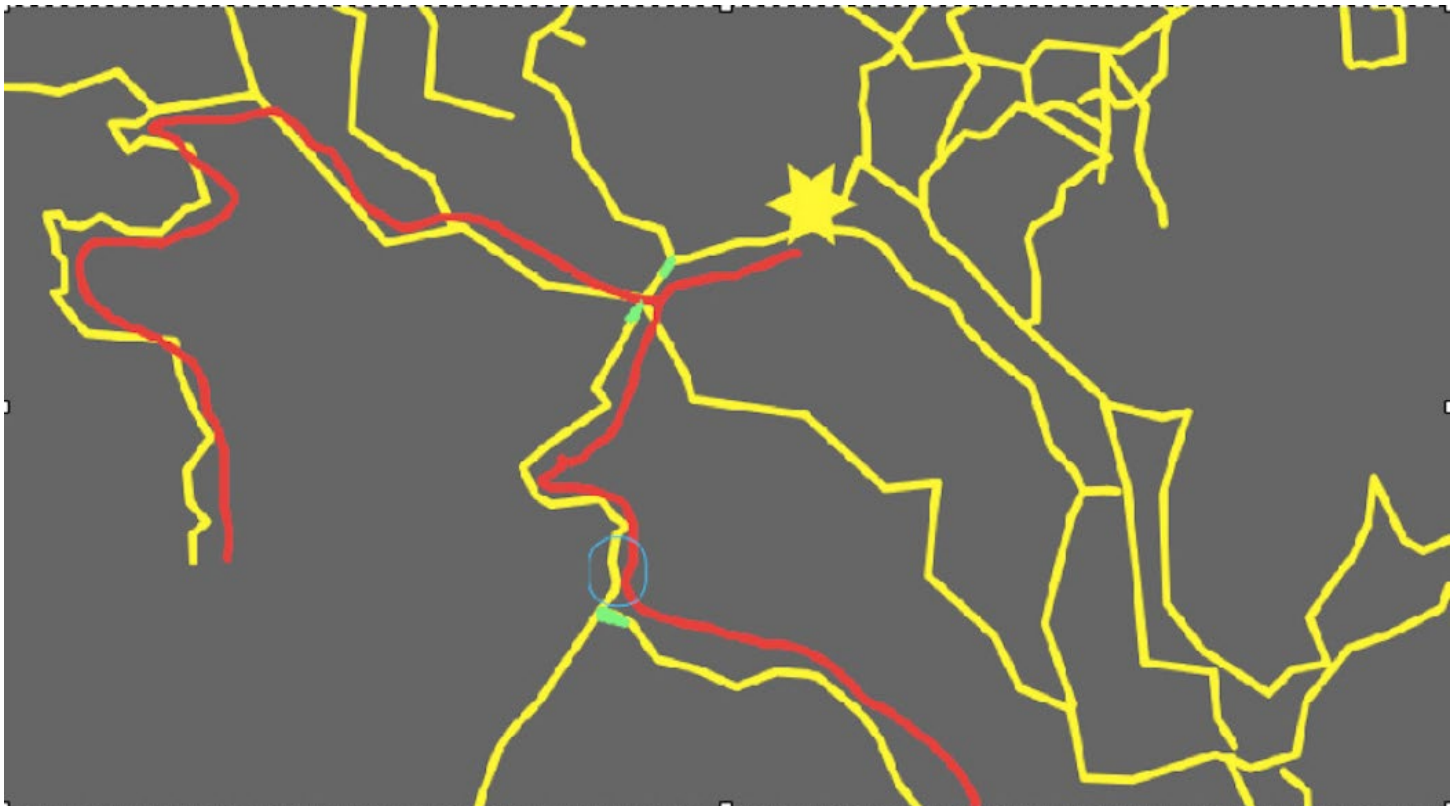


Figure 2. Stick map of Cenote Odyssey and the diver's route. Yellow lines are the explored passages with the star marking the Cenote Odyssey entrance.

Due to this unexpected situation, and in combination with the depth, the diver most likely drained one of his sidemount tanks. He managed to find his way out of the crack, rushing back toward his stage tanks and DPV. On the way he dropped his Mnemo, which was later found just a few meters from him. He drowned only one foot/30 cm from his partially full stage tank and DPV, which would have gotten him out of the cave.

Hypotheses and analysis

We hypothesize that the victim may have recalculated his available gas from the "base camp," raising the question of aggressive gas management as a contributing factor This is a not-uncommon practice to maximize bottom time for work. But recalculation requires caution and attention to managing the risk: For every recalculation and restart, the "on board" reserve gets smaller and smaller.

Why was a stage tank fully drained with the valve open but properly stowed? We knew this diver to be conscientious. He would not have drained a tank dry and risked damage to the cylinder and regulator. Possibly he used most of the gas while surveying and forgot to close the valve. Or the attached regulator may have free flowed and drained the tank. This remains one of the accident's unanswered questions.

A few words to fellow cave divers

We don't really know the events that led to this diver's situation. But what we shouldn't forget is that every time we decide to enter an underwater cave, we are accepting the risk of what cave diving implies. We are diving in a flooded overhead environment in which our lives depend on our training, gear, and our own decisions. This environment has proven many times to be ruthless and unforgiving.

One can become very comfortable and complacent in an uncomfortable and potentially dangerous environment. Just because one is comfortable doesn't mean that there is no risk.

We must always be aware of our limits and guard against overconfidence and our own egos. Saying "that will never happen to me" can lead to blind spots and distraction. Accidents happen when least expected. We kindly call upon all our fellow cave divers to review all of the cave protocols and safety

rules. Dive as if your life depends on it, because it does.

There is no shortage of exploration leads. Some of the important questions to ask ourselves are:

• Are they safe?

• Do I have enough gas?

• Do I have a support team to help me?

And there are many more.

Remember that there is always a next day to go back. It is always better to call a dive before starting to bend the rules. Caves have been there for millions of years and will be there for us tomorrow. It is well said: ***There is nothing in any cave worth dying for.***

Report made on June 14, 2022

Gustavo Buenrostro and Martin Gaspar Ramirez are cave diving instructors who live and dive in Tulum, Q.R., Mexico.

DEMA Show 2022

November 1-4, 2022 Orlando, FL

by Renée Power



DEMA 2022 is right around the corner…literally! DEMA is the Diving Equipment and Marketing Association. This year's show will be held at the Orange County Convention Center West Concourse in Orlando from November 1-4, 2022.

NSS-CDS will have a booth with new merchandise, training, and a new look. A big shout out to everyone who's volunteering time to support our organization at this annual industry event. If you go, please stop by ***Booth #2236 in the Technical Diving Resource Center.***

If you're an industry professional, this is your time to come and inquire about the latest and greatest in diving products, education, safety, and travel. Attendee registration is open—you can purchase passes at the DEMA website.

Cascade

by Sandra Poucher

Many accomplished explorers no longer dive, or dive only rarely. Their cessation once bewildered me. Why stop pursuing adventures? If asked, retired explorers mention perfectly logical reasons, such as the demands of family or work. Or they refer to a close call, an event so harrowing they stop diving altogether. They stop hanging around springs. Stop visiting dive buddies. Some sold all of their gear.

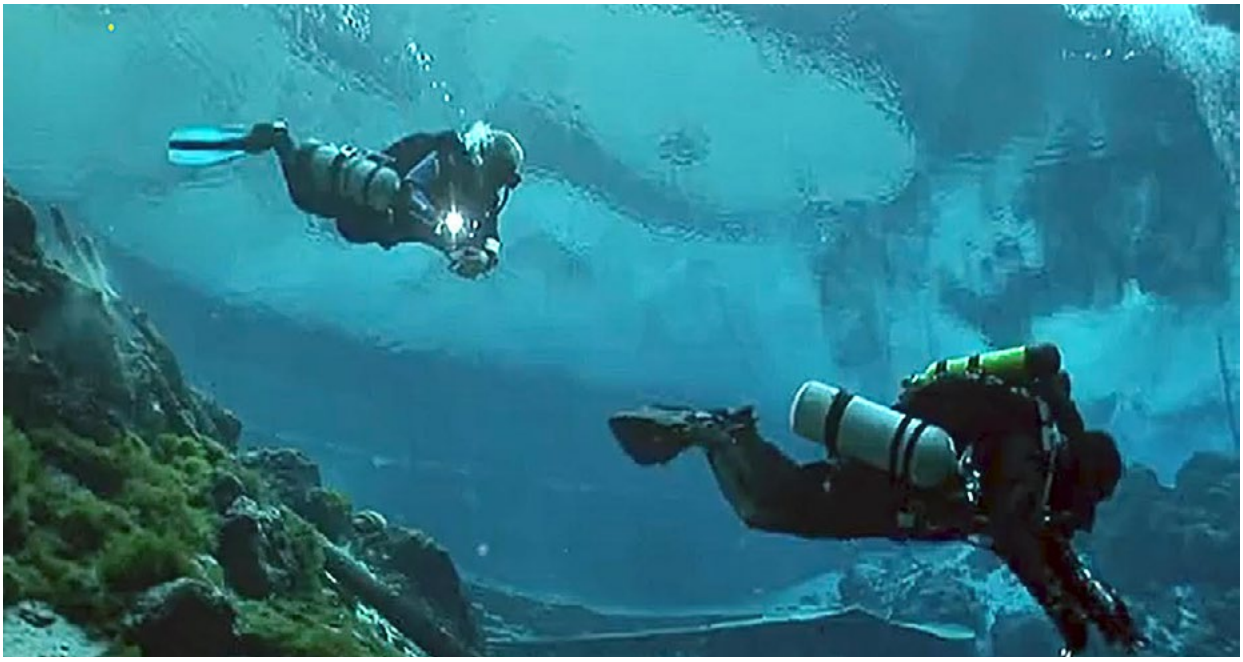
I want to ask, how close was the close call? What singular event cemented the fissure between doing and not doing? I decided with naive certainty that a dive would have to be pretty scary to convince me to hang up my fins. Ever prudent and to avoid becoming a statistic, I prepared for tight spots. I treated every dive as a training opportunity. I read accident reports. I listened to stories.

I am fortunate. I've participated in exploration diving with some of the best explorers on the planet. Among my friends are heroes of cave exploration. From being the first human to witness a vast bedding plane glit tering with tiny crystals, to sheer desperate boredom of hours of decompression, I found joy. From daunting no-mount passages to disorienting haloclines, I learned there will always be challenges; frustrating equipment issues, perplexing miscommunication, second-guessing exacerbated by depth and fatigue. Throughout the gratification of exploration, there are dives that make you wonder if you can go further. If you should. Challenging yourself under these circumstances has very serious consequences.

I am keenly interested in a new book, *Close Calls* by Stratis Kas. *Close Calls* is a unique book. Rather than a numb statistical accounting of nameless inju ries and deaths, it expresses in divers' own words how they survived. Readers have an opportunity to learn the survival mindset from those who expe rienced near-death situations in conditions most people have nightmares about to begin with: the underwater, overhead environment. I look forward to reading *Close Calls,* taking the time to consider my own date with Thanatos.

Weeki Wachee, 2006

Weeki Wachee is located in a beautiful but neglected tourist attraction just off Florida's highway 19. For six decades "real" mermaids performed acrobatic



Divers in the basin. © Karst Underwater Research

underwater shows for adoring fans. The attraction had the “Clamshell,” an underwater reverse aquarium where tourists sat in relative comfort to watch the performances. Weeki Wachee spring feeds the clear, shallow Weeki Wachee river, meandering a tranquil 12 miles to the Gulf of Mexico.

The impressive flow from Weeki Wachee deters all but the most determined divers. The last person to explore and survey from the spring was Jamie Stone, Jim Benz, and none other than Sheck Exley in the 1980s. Teams tried periodically through the 1990s, able to access the underground system from nearby Twin Dees. The incredible flow from the headspring rarely slackened.

In the summer of 2000, a team including Paul Hein erth, Bill Lester and Scott Pulliam managed to enter the headspring, but flow rebounded. Not until the summer of 2007 did the flow ebb enough that cave divers could again conceivably enter the cave.

That summer, flow dropped to 125 cubic feet per second (cfs)[1] and equals about 650,000 gallons (just over 2,000 cubic meters) per day.[2] This means that at the average 172 cfs, Weeki Wachee is discharging 111 million gallons per day.[3] One hundred and twenty-five cfs was the lowest flow measured in years and our team believed it was time for another attempt.

Dive Planning

We timed our dives carefully, mentally preparing and streamlining gear before embarking on a working" dive. We planned breathing mixtures and supply for a number of decompression schedules and bail-out contingencies. We considered the difficulty of getting in, but also safely exiting in dangerously high flow at depth. The challenge would be pulling ourselves upside down at 170 feet, pummeled by flow. Upon exit being blown out of the cave to the surface without completing decompression obligations would be deadly, the diver embolizing during ascent.

The team couldn’t afford any mistakes. Permission to dive at Weeki Wachee was a rare honor.

Divers entered the cold spring water, swimming over a white-sand basin at approximately 20 feet before descending the fissure to 170 feet. The sprint vent is an underwater canyon, walls tinted gold by tannins, decorated with fossil macroinvertebrates and algal growth. Tanks were staged on stone ledges at approximately 30, 70 and 110 feet, where divers could rest out of the flow while completing decompression obligations. A final stop at 10 feet was available at the underwater mermaid station, a tiny air-filled structure where we could remove our masks, drink water, and warm up.

On a ledge at 110-feet called "the perch" we rested, sticking our hands and masked faces into the flow to feel the current surge for the surface. The roar of the water was inescapable. At 125 cfs, the spring emitted roughly 56,100 gallons per minute. A firehose shoots 800 gallons per minute. The fissure narrows with depth, to a restriction at 170 feet. In the restriction, we would be swimming against the force of 70 fire hoses. We called the restriction the Event Horizon.

The Witches’ Den

Exhilaration at making it through the restriction turned to mortification when I found myself plum meting toward the floor at 220 feet. Once past the restriction, in the vast room of the cave, the flow ceased. I rushed to inflate my wings, narrowly avoiding a faceplant in the sediment. I righted myself, checked my gear, found my team. Once everyone was in the cave, we studied an artifact beneath the entrance. The effort to enter compelled a previous diver to use a massive cement-filled dive cylinder as weight against the flow. The tank reminded us to take advantage of this opportunity.

The room had a flat ceiling and deep ocher-orange walls. The floor was white rolling sand dunes, shades of beige on the lee sides. In my dive log I penciled the word "neat." I expected a dome ceiling like other large, deep systems, such as Jackson Blue or Indian in north Florida. One of the fascinating things about caves is the endless array of color, form, and struc ture in walls, floors, ceilings, the variety of physical features. Visibility in the cavern was 60 feet with a light gray haze of particulate suspended in the still water of the room.

I checked my pressure gauge, only 1500 lbs. because of a free-flowing back-up regulator during entry. I wasn't sure how I would manage the exit. Being cautious, I signaled to turn the dive. Back underneath the restriction, I watched my buddy Bret Wilcher remove his fins, which would be useless in the flow. He headed up, making negotiating the exit look easy. I removed one of my fins, intending to use

[1] USGS Water Data for the Nation
[2] South Florida Water Management District - Weeki Wachee
[3] Florida Department of Environmental Protection



Descending through Event Horizon. © Karst Underwater Research

the other for control. A thin white rope, our guideline through the restriction, undulated in the current. As soon as I entered the shaft, my mask flooded. My light went out. While dealing with the mask, shoved by the flow, I ended up nearly on Bert's ass.

We were in the middle of the Event Horizon. I cleared my mask. Bert looked around in surprise and I showed him my dive light. I'd slammed my fist into rock, convinced I'd shattered the bulb. Bert calmly pointed behind me. I pulled the light to me, still attached to the cord. I'd broken the handle, but the lamp head still worked. Without my mask, I'd been unable to see the detached light head. I took my regulator out of my mouth and grinned. This was something Mike and I did for fun, to reassure each other. But not being familiar with the gesture, I don't think Bert appreciated the Cheshire grin.

We proceeded to the drop at 110 feet and clipped on a stage, continuing our exit. I was thankful there wasn't much deco. The free-flowing back-up regu lator continued leaking, leaving me uncomfortably low on air - I needed to tune it and tuck it better underneath my neck. I wasn't sure what to do about my mask flooding. I later learned other divers' masks also flooded in the restriction.

On ascent, I signaled to a support diver that my air was low. Though I performed the gesture casually to indicate this wasn't an emergency, our support diver had his regulator in my face in an instant. I appreci ated his prompt response, although I didn't need a fresh tank. I showed him my gauge. We proceed to exit calmly. The first dive went well. Everyone was able to enter the system. The team knew what to expect and began to plan for future survey and exploration.

A Challenging Work Environment

The team met at the waterside pavilion to set up for a planned Saturday dive by Brett Hemphill and Dave Miner. Brett presented a fireman's cable ladder, certain to make getting into the cave far easier. I didn't want to argue with someone of Brett's diving status, but I commented that it looked like an entanglement hazard. To me, anything added to the restriction meant something else to deal with. The team installed the ladder with my reluctant agree ment. After all, it might be nice to hand-over-hand against the flow into the cave and use the rungs as breaks to slow ascent on exit.

Mike and I dropped our stages at the "perch" at 110 feet. We carried additional stages into the cave for Dave. Brett's cable ladder was attached to the

left wall, on the far side of the fissure. We made it through the restriction without needing the ladder. Once in the cave, we swam left, 200 feet to "the boulders," a gorgeous expanse covered in coarse sand and floor-strewn boulders punctuated with funnels of striated clay. The room was so large the beam of my light faded before reaching the far wall. We turned the dive inside a second large room.

Ascending, I used the same thin rope from our earlier dive. Just as I'm thinking "Bert is skinnier than I thought," I glanced up to realize I was too far left, where the walls lean together into a pinched crevice. I anticipated getting wedged, unable to descend against the flow to reposition myself. My fins, which I removed in the cave and clipped to my chest harness, beat me in the face. My hose snagged, nearly yanking my regulator out of my mouth. I felt for handholds along smooth rock, anything with which I could hold myself against the flow. An outcropping to the right hindered movement in that direction, toward the ladder where Mike was waiting.

I struggled, berating myself. We'd discussed this very scenario. Everyone had been warned to avoid this exact spot. I signaled Mike. He ascended the ladder to try shoving down on my manifold. I heard him yell, muffled by the flow. He dumped all of the air out of his BC. I did the same for mine.

Using the one good fingerhold near my right thigh, I pulled downward with every ounce of strength. Mike's hand extended to pull me to the ladder, but as I reached for him, he disappeared above me. In disbelief, I watched the ladder twist and buck in the middle of the passage.

Ascending, I thought: "I really should be on the other side of that ladder." But it was too late. The metal rungs snagged the back of my manifold and my doubles. I felt myself yanked back with the ladder, slammed against the rocky wall before steadying in the center of the flow. I struggled to free myself, reaching around my manifold and tanks, unable to feel why I was caught.

In the rush of current, I thought quickly through my options: I could wait, knowing I was unable to free myself. Or I could dump my gear, risk being cata pulted to the surface. I closed my eyes, steadied my breathing. I grew exasperated and worried after a few minutes. I reminded myself to breathe normally, not to look at my pressure gauge. I knew there must be very little air in my tanks.

One thing all cave divers and explorers keep in mind - panic kills. Divers in a state of panic make truly terrible decisions, choices running counter to any logic.

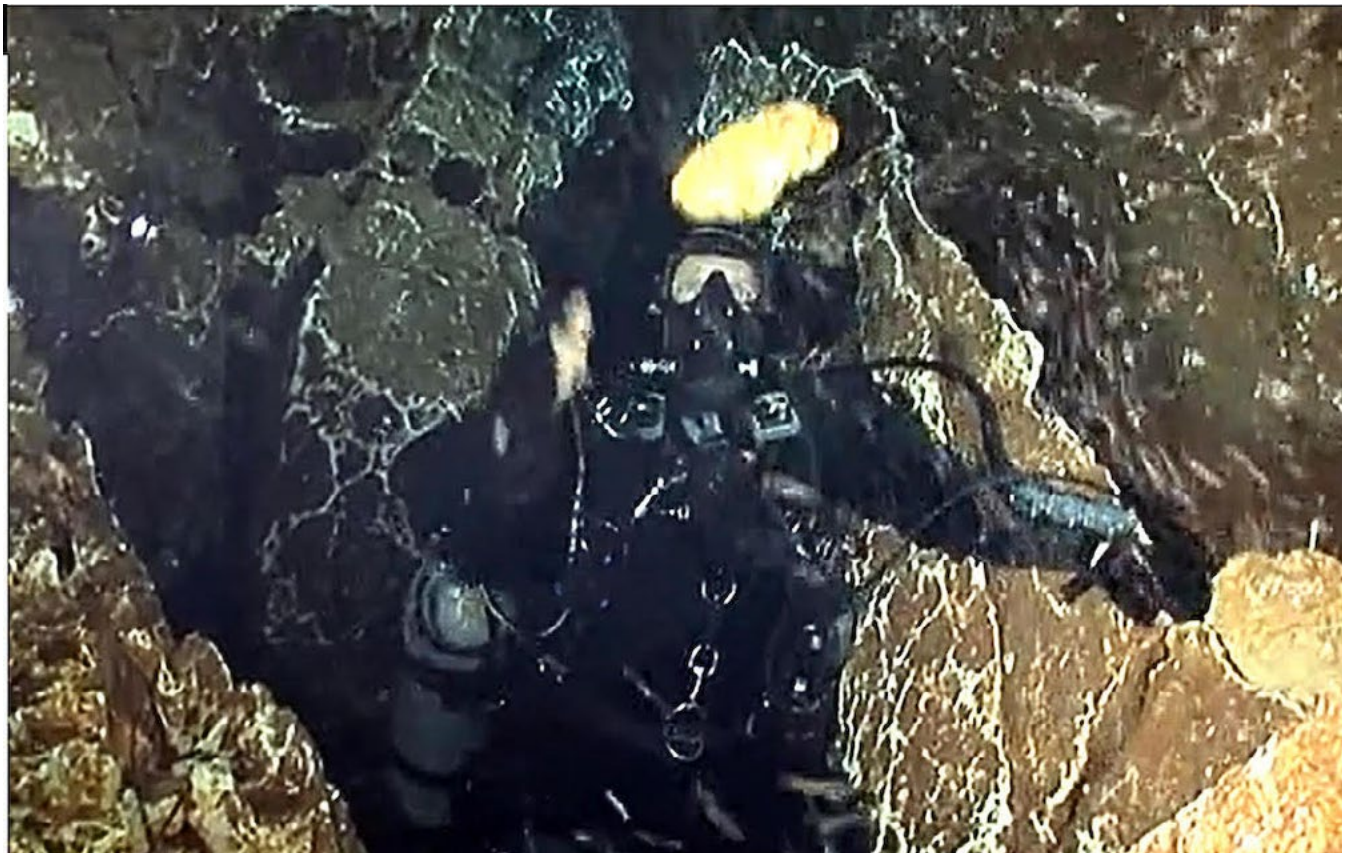
Realizing my air was running out and that I could not free myself, I began signaling by casually waving my light back and forth in the direction of the surface. I also began, for the first time since childhood, to pray. I gave thanks for the wonder of things. For the gift of life. I felt satisfaction that to that point, I'd had a great dive. I made peace with my circumstances and awaited what came next. Despite being highly energetic, I feel time slow down when emergencies happen. I've never panicked when panic would be an understandable response.

I'd love to say I had a revelation that led me to a life of higher purpose. That I stopped drinking, cursing, losing my temper. Realizing my entrapment was absolute, I resolved to remain calm. This determina tion provided me contemplation of a significantly new magnitude. Serenity overcame me. I ceaselessly resonate with nervous energy. I am never placid.

Everything around me grew quiet, the roar of the cascade drifting into a background shush, a mother hushing her child. Overcome by the most incredible sense of peace, I had the overwhelming conviction that things would turn out fine. Whether spiritual or psychosomatic, that pulse of serenity allowed me a rare moment, a hint of grace. Rather than panic and struggle, I accepted my fate with sincere gratitude. In the narrow confines of hard rock and fast water, I waited.



A diver in high flow. © Karst Underwater Research



Diver with rock suspended by high water flow. © Karst Underwater Research

Forms of Release

Someone above me was pushing down on my doubles, yelling. I felt my manifold release but was still unable to escape the ladder. Then, a tug and I was free! I headed up, thrilled to see Corey Mearns in the fissure above me, his buddy Joel Clark on the ledge at the Texaco sign. They watched as I clipped on a stage bottle and went to the first decompression stop. I suspected that I ruined their dive. They were to be the next team.

When I caught up to Mike, I backed onto the ledge next to him. I was light-headed with relief. Joyful.

Mike had experienced a reverse roll-off while being blow out of the Event Horizon (which caused the ladder to buck in the flow). In the chaos, he believed difficulty breathing meant he was out of gas. Once on deco, he realized what happened and reopened the valve. Out of deco gas, he switched to the remaining back gas. I was about to give him my regulator but noticed I only had 300 pounds in my stage bottle. In my backmounts I had nothing, the gauge on zero.

I signaled Joel, our safety escort up the fissure. He handed me his deco bottle. Because I had the lesser amount, I clipped the bottle to my harness but handed the regulator to Mike. I would finish my own bottle before switching to Joel's, making Mike go back on his back gas. The bottles held specific mixes for certain depths.

I emptied my stage, right as someone brought another bottle for Mike. Jeff Peterson was in the water with extra gas, freediving to check on us. We were able to finish our decompression obli gation and exit the water together.

I was embarrassed, ashamed, mortified, and exhilarated to be alive. On the surface my friends were crying, certain I drowned. I was so high on adrenaline; I didn't know how to respond appropriately. Afterward is a blur. I remember effusively thanking Corey and Joel, their reaction subdued. We did not discuss the event.

Later, another diver got stuck in the same place. The rope had been moved, someone admitted pulling it to the right during an earlier dive. Joel had freed my manifold; Corey realized my wings were also snagged. I have no idea how this prevented me from freeing myself. Corey explained that because I couldn't move up or down, I was effectively trapped. He also told me there was no way I would have freed myself.

No one wants to be deliriously happy to survive, only to subsequently learn they did something careless that caused their predicament. While I thought the ladder might be a hazard, I never intended to be the one entangled!

Life Goes On

After that dive, I sensed a shift in the group dynamic. I did another ten dives at Weeki Wachee, including a small amount of survey to verify earlier data. I retreated to a support role as exploration dives grew more advanced. I no longer felt like part of a team. There was no more banter about who was the fifth or tenth person through the restriction. I felt disconnected, my experience a curse. Unable to articulate my concerns, I found it easier to slip into other projects, other interests and adventures.

Exploration is a journey exposing cave divers to challenging situations. In exploration, technique is paramount, risks unavoidable. Seasoned explorers have close calls frequently enough to develop a comfortable stoicism. Their skillset allows them to lower the margin for error to a point beyond what is commonly acceptable. The reasons to cease exploration are reasonable. family and work often overshadow the thrills of exploration. Every explorer has near misses, which they rarely discuss. Every cave diver has a "come to Jesus" story, often told with lighthearted humor. Diving is no fun if you can't surface to share your experience with your team.

There are times I can conjure the serenity I felt in the restriction. But more often I lose patience with people. I want to explain that our time here is limited, we could speak more kindly, try compassion, slow down a little maybe. But we are human and flawed. Not everyone explores and until someone experiences a similar very personal and salient awakening, an interruption in daily routine as sudden as a slap in the face, these are only words.

My last cave dive? Two years later, when I became pregnant with my son.

The Weeki Wachee project continues under the direction of Karst Underwater Research (KUR). This website documents their incredible efforts at this and other dive sites.

Sandra Poucher explored and surveyed in caves in Florida, Mexico, and in the Caribbean. She is a writer and editor of several books. Her newest is *Wildlife of Florida's Springs: An Illustrated Field Guide to Over 150 Species.*

Underwater Speleology Wants Your Stories

Are you new to cave diving or an old hand? UWS wants to hear from you either way. Send us a story about exploring a cave, taking a class, a dive report, or surveying. Conservation stories always are welcome. Did you have a close call? Tell us so that we all can learn. We're interested in all things cave diving.

Send your thoughts to Barbara.

Showing Up for a Rescue

by Michael A. Raymond and Anmar Mirza

In this article we'll discuss expectations for showing up for a sump rescue. This includes what you should expect to encounter as well as what will be expected of you.

Procedures for any cave rescue

When we think of team-based activities, like sports or job assignments, we assume many things. We assume that all of our people and equipment will be present from the start. We assume a fairly complete description of the problem and a chance to make a plan before we get to work. One of the key differences in the early phases of any cave rescue is that while you'll be operating as part of a team, neither the team, the gear, nor the problem description will be complete before you have to get started.

Cave rescues are conducted by volunteers. They'll get there when they can get there. They bring their own equipment. There are regional caches of cave rescue equipment maintained by other volunteers, but they might take a full day to arrive.

Patients can't wait that long. Hypothermia presents the number one danger for the patient. The most common injuries are to the extremities and result from slips, trips, and falls. These slow the patient down, which means he or she gets cold. Being trapped on the wrong side of a sump also stops movement. Because of this, our priority is always to get a team to the patient to warm him or her up.

The first team to the cave gets dispatched for one of two reasons. Either they're responding to a group in the cave who missed their callout, or someone exited the cave to request support for a patient. In some cases, the first rescuers can go straight to the patient and bring them out. In many cases though, their job is to set things up for follow-on forces. Someone takes command of the incident and is the point of contact as others rescuers arrive. Someone else in the first group secures the cave entrance(s) so we can keep track of who is in the cave and not lose anyone else. This also handles the situation of the patient exiting the cave without the rescuers knowing it, which has definitely happened before.

When the next set of rescuers arrives, a search team is sent into the cave. Its job is to find the patient, stabilize them, and send word back to the command team on the surface. Stabilizing the patient means warming the person and doing a secondary assessment to reevaluate his or her physical and mental condition. If the patient's location is known, an Initial Response Team (IRT) is sent in to do the evaluation and stabilization.

As additional rescuers arrive, the incident commander (IC) must decide how to use them. The most common practice is to send them to support the most overwhelmed function. As an example, until we've found all the missing people in a cave, it makes more sense to send out additional search teams instead of using those personnel for rigging or passage enlargement. As another example, as more people get involved, the IC will become overwhelmed trying to manage them all. A common practice is to send someone to be an Underground Branch Manager to manage everyone underground, while the IC stays on the surface to coordinate logistics and interactions with higher authorities.

The order that teams are used does tend to follow a certain pattern. The initial work involves finding the patient(s), stabilizing them, and establishing communications between their location and the surface command post. Work can then shift to reducing obstacles to patient transport, for example by improving rigging or widening squeezes. Surface work may be needed to manage logistics, make plans, and feed hungry rescuers. Lastly, teams are used to help evacuate the patient. In some cave rescue cultures, all obstacles are addressed before the patient starts moving. In other cultures with more skilled technicians, one team is able to get the patient moving sooner, while another team stays just in front



Sump divers meet to discuss standards and future training at this year's NCRC national training in Clifton Forge, VA. © Michael Raymond

of them doing obstacle reduction. This style requires much greater individual skills.

Expectations for individual rescuers

Rescuers are expected to show up with all the personal equipment they need (helmet and knee pads at a minimum). They should expect to be joined into a small team and stay with this team for an entire shift. Shifts might last six to eight hours, depending on conditions in the cave. People can work longer, but the accident rate goes up and they need longer rest periods between shifts. Rescuers are expected to show up with all the food and water they need for their shift. The vast majority of rescues are over in a day, but some have lasted up to two weeks.

Rescue phases

Taking a wider perspective, cave rescues have six phases. Phase zero involves all the activities before the incident to train personnel and acquire special equipment. Phase 1 starts with the accident and continues until people outside the cave find out about it. Phase 2 involves gathering rescuers, finding the patients, and stabilizing them. Phase 3 involves evacuating the patients out of the cave. Phase 4 involves removing all the rescue gear from the cave and cleaning it, media wrap up, and repairing any damage to the cave property. The final phase involves after-action reviews, updating standard operating procedures, and modifying training procedures.

Expectations for sump rescues

If you show up to a sump incident as a dive specialist, be prepared for additional expectations. No one is going to let you into the water, let alone do an extraction, if it looks like you were at an explosion at a dive shop. Someone who is confident but not cocky, professional, and with well-maintained equipment is what we need to get approval from the authorities. We need this approval quickly so we can bring warmth and light to the patients. National Cave Rescue Commission (NCRC) certification helps to show your preparedness.

(continued on page 30)

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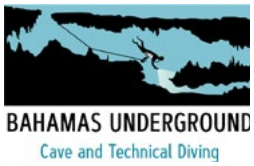














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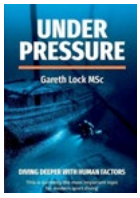


















(Rescue - continued from page 28)

Show up with the equipment needed for an underwater IRT. This includes your personal diving equipment and bags that porters can use to carry it to the sump without breaking it. You will need items for the patient that you can transport in a thigh pocket, including:

- space blankets.
- snacks.
- a light for the entrapped person to keep.
- a heat source such as HotHands or a candle.

If you're really well prepared, you'll have an adapter so you can fill your DIN tanks from the air compressors on fire trucks. Also think about how you're going to recharge your batteries between dives.

Considerations for an airborne extraction

To accomplish these rescues, the community sometimes needs to move a diver and their cylinders by air to the cave. This likely means a National Guard helicopter flight. Compressed gas cylinders and toxic materials like sorb can be flown, but special procedures must be followed. One of the author's many future projects is to gather the necessary forms and procedures to the Sump Rescue website (create hyperlink to https://www.steelclan.org/SumpRescue/.)

Be aware that you'll be asked for the total weight of your equipment, the dimensions of the largest item, and the Material Safety Data Sheets for any chemicals, including breathing gas.

Be a team player

When you are requested to support a cave rescue as a sump diver, you're going to show up to a site with many moving pieces. You can expect to encounter a group of other volunteers and emergency management personnel who are continually adjusting to meet the many challenges of a cave rescue. They're going to expect you to merge into the team and be ready to work.

Don't expect that everything is already running smoothly and that everyone you talk to has a clear picture of what is going on. The early phase of a rescue is chaos, and even once things have gotten more coordinated, it still can look like chaos from the outside. Be prepared to roll with the punches and be able to pivot on a moment's notice. You are in charge of your area of expertise, but recognize that you do not have a picture of the whole event.

Michael Raymond is writing a series on sump diving rescue and is Underwater Speleology's *Senior Editor. Anmar Mirza is the former National Coordinator for the National Cave Rescue Commission and has been a very active caver since 1983.*

The Wes Skiles Legacy Project

Tessa Skiles is creating a legacy web site to carry on with Wes' work of protecting and restoring Florida's springs. She's looking for stories, videos, and photos of Wes (especially from the '70s–'90s). If you have any, Tessa would like to include them. Send them to her and include the subject "Legacy Website Content– YOUR NAME, STORY/IMAGES." Please include dates, locations, and names.

Celebrating Sheck Exley

At the NOGI dinner at this year's DEMA, the Historical Diving Society (HDS) will posthumously bestow its prestigious Pioneer Award on legendary cave explorer and pioneer Sheck Exley (1949-1994). This award comes at an auspicious time.

The coming year marks the 50th Anniversary of the National Speleological Society-Cave Diving Section (NSS-CDS), which Sheck helped to establish in 1973. He also served as the organization's first president. Accordingly, the Historical Diving Society will honor Sheck's memory and accomplishments in a DEMA SNAP SHOT SESSION and with a short talk on Sheck's many achievements.

Michael Menduno (M2) will give a presentation about Sheck at DEMA. Michael is a member of NSS-CDS and the board of the Historical Diving Society. Other CDS members will contribute - there will be a display of "Sheck memorabilia" and a story in the Journal of Diving History. Clark Pitcairn, one of Sheck's fellow pioneers, will accept the award on his behalf.

For more information, contact Michael Menduno (OK?)

coming soon...

The Education of a Cave Diver

a book by Guy Bryant



Guy Bryant. © Gene Page

In his upcoming book, longtime NSS-CDS member Guy Bryant takes you through his early ventures into caves, scuba and, eventually, cave diving. There were no formal cave diving courses in the 1970s. One learned from others, figured things out, or survived mistakes. Guy recounts his adventures—good, bad, and dangerous—and about the mentorship of friends and more experienced cave divers he met along his journey.

The Education of a Cave Diver *will be published in October, 2022, and will be available on Amazon.*

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