

Underwater Speleology

Journal of the Cave Diving Section of the National Speleological Society

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**GAVI Consensus Regarding
In Water Recompression**

Little Place Big Fun

Cenote Chan Hol

**Mine La Motte Saves
Rainy Days**

*Volume 41 Number 4
October/November/December 2014*

NSS-CDS MIDWEST WORKSHOP



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And to all of the volunteers, thank you, thank you, thank you, job well done.

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from the

As fall and winter approach, we move into the cave diving "season," welcomed by many of us who have spent the summer diving in oceans and lakes. Cooler temperatures are "dry suit friendly" and make suiting up more tolerable. For people who've been away from the caves for several months, don't forget to freshen up any rusty skills before venturing in for the first time this year. Safety always trumps all else.

Among the things I have to report on is "The Event That Almost Didn't Happen" for a perceived lack of interest. I am referring to the Mid West Work Shop which was very successful with 32 attendees plus speakers and donor reps. The workshop netted \$1600 for the CDS. The person who was originally going to chair the workshop was not able to, and for a while it seemed as if we would not have the event due to what appeared to be a lack of interest. Nothing could have been further from the truth!

Midwest Workshop. This is also known as "The Event That Almost Didn't Happen" for a perceived lack of interest. The workshop was very successful with 32 attendees plus speakers and donor reps, and it netted \$1600 for the CDS. The originally scheduled chair was unable to fulfill that role. For a time it seemed as if the event would not happen. However, nothing could have been further from the truth! Enter Michael Angelo Gagliardi, Bill Harris, and Cheryl Doran. They stepped up to the plate, hit a home run, and saved the day. Michael Angelo, despite his already busy fall schedule, worked tirelessly on event planning and was emcee and a speaker that day. Bill Harrison is the Team Leader at Roubidoux Springs North American Underwater Cave Fauna Survey and also received the NACD Conservation Award. Cheryl Doran is a CDS Board member and UWS editor. Zelda Gagliardi and Jim Marshall stepped in with registration and t-shirt sales at the Workshop. The Board thanks these people for their efforts. Without them, the workshop probably would not have taken place. When you need to get a job done, give it to busy people!

Sponsors donated over 60 door prizes. The BOD thanks Dive Rite, Hollis, DUI, KISS, Light & Motion, Y-Kiki Divers, Dive Right In Scuba, Odyssey Scuba, Dive Outpost, Amigos Dive Center, Chipola Divers, Tech Dive Florida Keys, Capt. Tom McMillan, Jill Heinerth, OCDA and Michael Angelo Gagliardi for their generosity and support of the CDS. Without these folks many of

hese events would not occur.

School Sink Lawsuit. We have also received emails from members inquiring about the School Sink Lawsuit and wanting to know information about it before they donated to the defense fund. I answered with the brief synopsis

Two men stated they were going to clean the trash around the (School Sink) sinkhole (this is an ongoing problem with vagrants making it their "home" at times) and instead of doing same they proceeded to dive there. Both were military (one was a Colonel) so there was no reason to doubt their intent or integrity. Neither of these men were cave certified and we subsequently learned they had been repeatedly warned not to dive in caves without certification because it would undoubtedly result in something bad. One would assume that a Lt Colonel knows and respects the concept of rules. He did not and as predicted, both men died in the cave.

One of the decedents had a brother (or brother in law) who is an attorney and at the 11th hour he filed a wrongful death lawsuit against the CDS, the dive shop who allegedly gave out the key or combination and individuals who had anything to do with managing the sink.

Fast forward a few years and we are now scheduled to go to trial on Nov. 6th

Even though this is an unwarranted lawsuit and these men were clearly the cause of their own demise courtesy of their hubris, we still have to defend against it. To date, the legal fees for motions and depositions totals in excess of \$30,000 and we have not been to trial yet. If we lose the end result could mean

the end of the CDS as we know it.

Because we are in the midst of litigation, we have opted to keep specifics in the hands of the attorneys since in the court of public opinion it could serve to fuel the opposition and hurt our cause. I hope you and others understand that this is the reason why we have been relatively quiet about this.

What I have disclosed here is already public knowledge.

We were scheduled to go to trial in November, but there has now been a postponement until next May. Hopefully this will be put to rest with a favorable outcome. In the interim, we are working on implementing legal mechanisms so that this can never happen again. The CDS cannot risk being exposed to lawsuits courtesy of it owning properties. In addition to putting forth a successful defense, our primary goal is to insulate the CDS from future lawsuits of this nature. An incredible amount of time, money and energy has been wasted on this. We must ensure it can never happen again.

Your BOD is also working on streamlining our operations and making cost cutting changes which will free up resources to do more cave related conservation and education. Thanks to our Treasurer, Cheryl Doran, we have also been able to breakout and isolate the dollar amounts of the Sheck Exley Fund. It is our intention to utilize this for its intended purpose: awards for exploration and education from the fund's interest.

The wheels of progress often turn slowly but they are turning. Slowly but surely these goals will be accomplished.

Respectfully submitted,

Joe Citelli, Chairman NSSCDS

GAVI Consensus Statement Regarding In Water Recompression

On April 28-29 2014 in San Diego, CA, Richard Sadler, M.D., FACS, CDR Joseph Dituri USN (ret), M.S. Simon Mitchell, MB ChB, PhD, FANZCA, Craig Jenni, JD, Richard Moon, MD, CM, MSc, FRCP(C), FACP, FCCP; and Richard Pyle, PhD met to discuss the topic of In Water Recompression (IWR) with the intent of polling industry leading physicians and divers in the use and practice of IWR. This was hosted and funded by Gallant Aquatic Ventures International, www.gallantaquatic.com. The following is a consensus statement and list of guidelines that came from the invited speakers and input of dive industry professionals.

A consensus statement is a recommendation(s) or general guidelines developed using available evidence and expert opinion in areas where high quality clinical data is limited or does not exist for controversial clinical dilemmas. These guidelines are systematically developed recommendations that assist the practitioner and diver in making decisions. These recommendations may be adopted, modified, or rejected according to needs and constraints and are not intended to replace local institutional policies. They are NOT to be considered a standard or “best practice” for emergency response of decompression illness (DCI). Their use cannot guarantee any specific outcome. These guidelines are subject to revision as warranted by the evolution of medical knowledge, technology, and practice. They represent basic recommendations that are supported by a synthesis and analysis of the current literature, expert opinion, and open forum commentary combined with any existing data.

These statements represent the opinion, beliefs and best judgments of the aforementioned subject matter experts. As such, they are not necessarily subjected to the same level of formal scientific review as standards. Each person, institution or practice should decide individually whether to implement the principles in this statement based on a careful evaluation of risk vs. benefit, and on the sound judgment of the participants involved situation at that time.

Statements:

- The definitive emergency response of DCI continues to be a combination of pressure and oxygen in high concentrations.
- Oxygen and pressure are preferred over surface oxygen alone in the emergency response of DCI.
- It is determined that IWR is a viable methodology for first aid (an intermediate step) prior to definitive emergency response of DCI.
- Immediacy of emergency response with oxygen and pressure may be fundamental to effect optimal outcomes in selected symptomatic divers.
- The intrinsic advantage of immediacy in IWR surpasses the potential risks for appropriately selected symptomatic divers.
- IWR has potential for improving outcomes in those divers with symptoms that have rapid onset and a poor prognosis.

- IWR is rarely a complete and sole emergency response for DCI. All symptomatic divers of DCI shall, if they opt for IWR, be evaluated by a physician knowledgeable in diving and hyperbaric medicine as soon as possible following IWR.

Recommendations for implementation of IWR:

- During IWR the diver must be accompanied by a tender.
- The effectiveness of IWR will be lessened if the diver becomes cold. Maintenance of optimal thermal comfort is therefore important.
- Indications: While acknowledging the potential benefits of IWR, the potential risks of IWR limits its applications to those divers with symptoms associated with poor outcomes. (Appendix I -Tier System)-and severe pain.
- Emergency response time should extend 60 minutes after the resolution of symptoms the total emergency response time must NOT to exceed 120 minutes at depth.
- The emergency response protocol should be terminated at any time if deemed necessary by either the tender or diver-symptomatic diver.
- The breathing mixture should be as close as possible to 100% oxygen (with the goal of achieving a PPO₂ of 1.6 ATM/BAR); mixtures containing less than a minimum FIO₂ of 0.80 (80% inspired oxygen concentration) should not be used for IWR.
- Emergency response depth should not exceed 20 ft (6m), even if the breathing mixture contains less than 100% oxygen.
- Periods of breathing air (“air breaks”) are not required due to additional complexity.
- The planned ascent rate should be 1ft (0.3m) / min. if possible.
- In the event of an emergency (such as loss of consciousness in the treated diver) a rapid ascent should be made to the surface. If the diver is convulsing and the mouthpiece is retained, (eg during use of a retaining strap or if a full face mask is used) ascent should be delayed until the seizure has stopped. If the mouthpiece is not retained an ascent should be made immediately, even if the convulsion continues.
- If symptoms return during ascent from the planned IWR, the diver may return back to 20ft (6m) if the total time at 20ft (6m) has not yet exceeded 120 min.
- After exiting the water following IWR, the symptomatic diver must not re-enter the water even if symptoms recur.
- Mild activity (e.g., gentle finning movement) is acceptable and encouraged during IWR.
- For severe DCI (e.g. paralysis), judgment will be required to weigh the benefits of quicker IWR with short delay to evacuation vs. immediate evacuation to a hyperbaric facility that may be many hours away. Consultation with an offsite diving medical expert is recommended”.

Practical and logistical considerations for equipment:

Pre - emergency response informed consent of all potential IWR participants should ideally be obtained. In order to facilitate this, a webinar or video on line should be used where IWR is explained and a standard waiver is signed. Trained IWR divers should practice IWR regularly in order to maintain proficiency.

A regulator retention (gag) strap is strongly recommended to hold the regulator in place in the unlikely event of an oxygen seizure. (See Appendix II Airway Protection)

The use of a full face mask is recommended for trained users. Significant caution is advised for the untrained user. (Appendix II Airway Protection)

While rebreathers are recognized as a potential tool for administration of oxygen during IWR, their use in IWR by divers untrained in their use should only be attempted under expert supervision.

The symptomatic diver’s depth should be controlled by the use of a stable reference line.

Control of the diver symptomatic diver and in water tender should follow the principles outlined in the sidebar.

A community database of IWR incidents & outcomes will be maintained by Duke University (<http://dukedivemedicine.org/>) for Gallant Aquatic Ventures International and the general public. This information will be shared freely with all interested parties.

The group determined the most important information required during assessment of an injured diver and IWR is a timeline or chronology of events, along with key relevant data describing the symptomatic diver and circumstances of the incident. The following information should be captured:

Point of contact information for further details:

Age

Race

Gender

Symptomatic diver training level (Recreational / Technical / None).

Dive profile / Breathing gas(s)

Time of symptom onset.

Order of symptom progression

Time of symptom resolution.

Surface oxygen use and duration.

IWR Protocol / complications, Temperature / thermal protection.

Free narrative space.

Outcome/degree of recovery (Complete / Partial / None) and whether diver was referred for evaluation, hyperbaric emergency response, etc.

Name and contact information of reporter.

Diver control Principles:

1. Some form of positive contact with the diver/symptomatic diver is mandatory. The diver / symptomatic diver must never be un-tethered. Examples of Positive Control:
 - a. Diver / symptomatic diver is connected to the down line with a separate line.
 - b. Diver / symptomatic diver is tethered to the accompanying diver with a line.
 - c. The use of a quick release (snap) shackle in either case is reasonable.
2. The surface support team and tender should be prepared for a sudden deterioration of the diver/symptomatic diver.
3. If reasonably foreseeable adverse conditions cannot be mitigated, the IWR protocol should be terminated.

Appendix I: Tier System

Tier I Common non-specific symptoms that may not be DCI and do not represent a significant threat.

Lethargy

Nausea

Headache

Tier II Symptoms and signs that are likely to be DCI but which are not likely to result in permanent injury nor death.

Lymphatic obstruction (swelling under the skin)

Musculoskeletal pain (Note: When pain arises in the hip [especially both hips at once], abdomen or spine. This may be referred from spinal cord involvement. Be particularly alert for progression to Tier III symptoms in these patients).

Rash (May vary from fine red rash to blotchy bruised appearance, and may be itchy or sore. The rash is often localized to one body area, but may be more generalized).

Subjective sensory changes (Altered skin sensation and “tingling”)

Tier III Symptoms and signs that are likely to be DCI (or arterial gas embolism) and which indicate a risk of permanent injury or death.

- Changes in consciousness or obvious confusion
- Difficulty with speech
- Walking or balance disturbance
- Sensory loss (such as numbness) that is obvious to the diver or examiner
- Weakness or paralysis of limbs that is obvious to the diver or examiner
- Bladder dysfunction (inability to pass urine)
- Sphincter (bowel) dysfunction
- Loss of coordination or control in the limbs
- Shortness of breath

NOTE: This classification of DCI symptoms and signs is intended to aid selection of subjects for IWR. It is not intended as a guide to selection of divers for referral to definitive care. To be clear, all divers with symptoms in any of the tiers should be discussed with a diving medicine expert as soon as possible.

Appendix II: Airway Protection

Protection of the symptomatic diver’s airway is of paramount importance. The workshop consensus recommendation of a maximum oxygen partial pressure of 1.6 ATA minimizes but does NOT REMOVE the risk of seizure. The consequences of aspiration underwater are potentially life threatening. Options to mitigate this risk of aspiration are discussed here-in.

All previous IWR protocols require or strongly advocate the use of a full face mask (FFM), primarily to mitigate the consequences of a hyperoxia-induced seizure underwater. These previous protocols also incorporate breathing near-100% oxygen at depths in excess of 6m/20 feet, where the inspired oxygen partial pressure is in excess of 1.6 bar/atm. As advantageous as a FFM may be in the event of a seizure underwater (for reducing the probability of drowning), the use of a FFM also imposes some difficulty (and risk) for divers who are not trained in their use; particularly in terms of diver comfort level, proper fit and sealing, and (depending on the specific style of mask) techniques for clearing water from the mask and performing the Valsalva maneuver. In the context of these recommendations, a maximum depth of 6m is advocated for IWR (a depth at which near-100% oxygen is commonly breathed by technical divers for decompression). At 6M, the incidence of hyperoxia-induced seizure is extremely low and the potential net benefits of using a FFM depend on the degree of training and familiarity the afflicted diver already has with this equipment prior to attempting IWR. Therefore, a “gag strap” is recommended in cases where the symptomatic diver is not already trained in the proper use of a FFM, or when a FFM is not available.

The purpose of the gag strap is the same as the full face mask; to prevent loss of the mouthpiece / gas supply and to provide a degree of airway protection in the event of loss of consciousness. Although more controversial than a full face mask for this purpose, the gag strap is arguably supported by data. Gemp et al² reported 54 underwater loss of consciousness events in military divers leading to only 3 fatal drownings. In this series there were 26 cases of CNS oxygen toxicity with seizures, with an 11.5% major complication rate: two deaths (caught under a barge) and one

2 Gemp E, Louge P, Blatteau J-E, Hugon M. Descriptive epidemiology of 153 diving injuries with rebreathers among French military divers 1979-2009. *Mil Med* 2011;176:446-450

non-fatal moderate water aspiration. The use of the Drager-style gag strap with strap and lip sealing flange was used in all cases. Although this is an uncontrolled series, and notwithstanding the potential for other factors to influence outcome in the military setting, the unexpectedly high survival following these events suggests that gag straps are effective in most cases. Improvisation of gag straps by divers is not encouraged.

However, a recent informal survey of a few manufacturers by a former US Navy diver revealed a lack of familiarity with a regulator retention strap save for the ones that are available for specific rebreathers. It therefore does not appear that a purpose-built, commercially manufactured regulator retention strap would be readily available to divers, possibly encouraging improvisation, with mixed results. It has also been suggested that involuntary contraction of the masseter muscles during a grand mal seizure could result in damage to the mouthpiece, possibly leaving fragments in the mouth or causing a leak. It must be noted, however, that this study involved the use of the Drager gag strap which has several important design features that probably enhance efficacy. Similar straps can be purchased and are recommended

Full Face Mask: This is the traditional “best practice”.

Advantages include:

1. The airway is maximally protected (not perfectly) from ambient water in the event of a seizure.
2. Should a seizure occur, the tender has more options for a controlled ascent.
3. Allows for communication with the symptomatic diver if appropriately wired.
4. Adds additional thermal protection.
5. Lessens jaw fatigue by not requiring a mouthpiece.

Disadvantages include:

1. Minimum cost of approximately 500-750 USD
2. It may not be an adequate fit to the symptomatic diver’s face.
3. Optimal safe use requires training, including techniques on clearing, purging, and adjusting the usual five point strap system.
4. Vomitus may be difficult to clear, creating a second risk of aspiration.
5. The FFM may not be suitable for use with a rebreather.

Judgment should be used when making the decision to use a Full Face Mask.

Regulator Retention Strap (“Gag Strap”) This consists of a strap around the head/neck attached to the second stage regulator and a rubberized flexible flange around the mouth, preventing loss of regulator and a barrier to water in the event of seizure.

Advantages include:

1. Less costs than a FFM estimate less than 100 USD
2. Requires minimal training
3. Quick to set up and implement
4. Reduce jaw fatigue during long dives.
5. Acceptable effectiveness. (A published report (Gemp) demonstrated 3 deaths from 54 seizures).

Disadvantage include:

1. Not as protective of the airway as a FFM
2. Properly designed devices are not widely available.



NSS-CDS 2014 MIDWESTWORKSHOP

I was concerned. Working long-distance on an event and not being able to attend it caused me some concern. Would the rains ruin diving at Roubidoux? Would all the speakers, traveling so far to attend, get there on time? Would there be enough cookies at lunch? Would anyone ask Michael Angelo about his deco?

I worried for nothing. The scuba gods smiled on Roubidoux. Everyone arrived safe and sound, despite a flat tire in the mix. The cookies held out and....Michael Angelo.... How was your deco?

A big THANK YOU! to all the volunteers, speakers, donors and sponsors.





Little Place

Big Fun

By: Nathan Spray, RN

We load our dive gear into the back of Brandon Cook's vehicle for what is going to be another fun cave diving adventure. This time we leave the exploration reels at home, no knotted line, no stacks of bail out tanks, no huge steels, no rebreathers, only a set of sidemount 85's, two stages and our scooters. While to some this may appear like a complex "big" dive, to us a two stage dive is a short relaxing dive. We are just going out to relax and enjoy the wonderful underwater world and have some rock over our heads.

Driving to Ginnie Springs, we discuss our dive plan, encompassing the typical: gear up, scooter in, drop scooters and stages, swim around a bit, enjoy the big wet rocks, and deco out. We tend to keep our dive plans and destinations pretty loose. Don't confuse this for breaking rules, but we like to have the ability to change directions and tunnels, and enjoy whatever adventure we might run into. Brandon and I have dived together enough that we just "click" underwater. We have that communication that two dive buddies get, hard to explain but I am sure several of you know what I mean.

However, this time we do have one particular tunnel we have been eyeballing for some time now. While it is a lined passage, and not too far from the entrance of the cave, it is not the type of passage that a beginner should embark upon. We haven't avoided this tunnel because of fear, or lack of experience, but rather it was just farther down our list of things to see in Ginnie. We have spent most of our dives lately in this system in the back, the new section if you will. We figured it was about time we did a nice, short dive in the front part of the cave.

There is so much to see in the first 2000' of the Devil System at Ginnie Springs that one could spend weeks upon weeks diving and never see everything on the "front half of the map." All too often we are geared to push farther, deeper, searching for that sometimes elusive new

tunnel. Sometimes it is nice to see what is up close, to take it a little easier and don't push, push, push. Cave diving isn't about depth, or penetration, or even how far you go. To me it is about the wonder and amazement, finding peace and relaxation.

The tanks and scooters are unloaded and at water's edge. It isn't an extremely hot day, so getting into the drysuit doesn't bring on heat stroke and instant soaking. However, feeling the cool, clear spring water against my face does bring on a sense of relief and excitement. Being in the water and gearing up to me is like being a kid on Christmas morning. The anticipation of the marvelous adventure ahead gets my adrenaline going, gets me giggly with excitement and curiosity.

With 85's strapped onto our sides, two stages slung on top of them and scooters clipped off we give the "okay" sign to each other and slip under the water, knowing we won't be surfacing for at least a couple glorious hours. We scooter down the run, avoiding a few tubers, watching as a few fish eyeball us, and then drop into the Eye. Following all rules of safe cave diving we begin our dive and head up the Gallery.

I've been in this system countless times, and each time I am truly amazed at the size and beauty of the Gallery. I feel small in comparison to the walls around me, being just a speck in space, truly breathtaking.

Scooters pushed to the side, we cut sharply into the lips. The flow doesn't feel as powerful today; it could be this or maybe it is due to the fact that we have smaller tanks, and fewer than we usually carry at this point in the dive. Either way we effortlessly slip through and pass the Keyhole, working our way to Hill 400. Brandon has previously marked our course and placed our jumps on a previous dive. In a short time we take the jump toward July Spring, again making a quick transition due to the already placed jumps.

We drop a full stage bottle each on the line in anticipation of use once we exit the snug little tunnel that we plan on visiting shortly. We turn around following our already placed lines back to the main gold line. Dropping our other stage and scooters we begin our short swim to the little tunnel of fun we are planning on venturing into. I glide through the water effortlessly and I am amazed at how light I feel - no stages, no scooter, just a set of sidemount 85's. We arrive at what appears to be just a small break in the rocks; aside from the obvious white scratch marks in the once-pristine black cave, this area would be hard to spot as passible tunnel.

We had previously decided to negotiate this passage by only removing one of the 85's and pushing it ahead. Brandon, being a bit taller and slighter than me, slides

through the narrow opening with a little wiggle and twisting with his right bottle still attached. I decide for cave conservation, and my own mental well-being, that I will just take off both of my tanks and push them ahead. The passage retained some of its black beauty that once graced its walls, but years of divers passing through has exposed the soft white rock underneath. Carefully pushing my tanks ahead and slowly wiggling through I make progress inch by inch, being careful placing my tanks on the floor and ensuring they don't slip into some crack, never to be retrieved.

I am in no hurry, Brandon is well ahead of me, but this was of no concern because in this tight of a passage, buddy rescue would be hard or next to impossible anyway. Our plan is to meet on the other side and continue our dive. Enjoying the tight confines of the rock encompassing me 360 degrees gave me a sense of feeling secure, like the cave is hugging me, telling me it is all right, telling me I'm going to hold on to you shortly but will let you pass with a sense of accomplishment. I take a moment to stop at a "T" in the line sliding down to another passage, poking my head in and letting the flow of the water caress my face and body as I just took in the natural wonder that lay around me.

At this moment in time, surrounded by rock, just lying there I am at peace. I have no other worries in the world. I didn't think about work, bills, errands I had to run or things I needed to fix around the house. My mind is completely at peace; my soul is being healed by this cave, as it does so often in any cave I have the honor of diving. Once again I have found peace in a hole in the ground!

Knowing I can't stay and enjoy this feeling for long, I wiggle my way back and point my tanks and body to the exit of this tunnel some would call claustrophobic. Nearing the exit I see Brandon's light and can see the smile on his face as I emerge from this snug little tunnel. I quickly reattached my tanks and we grab our stage bottles. We exchange the universal "hang loose" or "shaka" sign to each other with smiles extending past our regulators. Granted, it only took a few minutes to negotiate this tunnel, but it is a memory that will last a lifetime. It is new cave for both of us; sure, others have been here and it isn't particularly that hard of a passage. However, to us it is to simply put it...fun!

We make a leisurely swim back to our scooters and additional stage through a shortcut in this area that Brandon once again has previously placed a line. While he swims ahead I spool up the line still smiling and reflecting on the awesome little tunnel we just passed. By the time we get back to our additional stage and scooters we have only been in the water just over 30 minutes.

Continued on page 26

Conservation Corner

By: Kelly Jessop

Cave Conservation, Education and Training

Things have changed over that last couple decades: There are now numerous organizations certifying people in cave diving, and we are seeing a turnover of cave divers approximately every 3 years. The question I was curious about is:

What is the state of current entry-level cave conservation instruction?

I developed a short survey and asked for participants from many of the popular cave diving forums. My goal was to capture people who completed training within the last year, hoping their memory would be the freshest, although we didn't eliminate anyone group. Of the 82 participants, here is the data.

How long have you been certified?

0-3 months:	16%
4-6 months:	13%
7 months to 1 year:	31%
over 1 year:	40%

I was pleased here, as 60% of the participants have been certified for less than 1 year.

What agency do you hold your certification through?

TDI	29%
NSS-CDS	23%
NACD	17%
IANTD	15%
PSAI	6%
GUE	4%
NAUI	4%
CDA	1%
PADI	1%

What is your highest level of certification?

This question yielded numerous responses such as: cavern through full cave, DPV, sidemount, trimix, etc. This was an error on my part because I should have set it up with only the ability to indicate the main cave certifications.

Was there a part of the lecture portion of your training devoted to cave conservation?

Yes: 88%
No: 12%

If yes, then how long did it last in minutes?

0-15 minutes:	44%
16-30 minutes:	42%
31- 45 minutes:	2%
46-60 minutes:	12%

While doing in water training and skills, did cave conservation training occur?

Yes: 69%
No: 31%

If yes, please describe.

The main response that was seen here was that buoyancy, trim and anti-silting were related to cave conservation. Intermittently, there was discussion about proper propulsion techniques for cave conservation. There were two respondents that indicated training on cave formations and species that live in the cave.

After training, I regard cave conservation:

Very important:	85%
Moderately important:	14%
Minimally important:	0%
Not important at all:	1%

The most prevalent paradigm for cave conservation instruction, which is a short lecture and reinforcement with in water skills, may be the best means of teaching the entry level cave diving student. 86% of the respondents expressed receiving 30 minutes or less of lecture time, which may be a good orientation until they get in the water and see the environment and get instructor reinforcement for trim, buoyancy and propulsion techniques. We did see 31% noting they didn't receive any in water education on cave conservation, but in retrospect there was a huge majority of the comments devoted to skills which have relevance to cave conservation. This group more likely got some in-water instruction on cave conservation, but it was identified as trim, buoyancy and propulsion and not overtly identified as cave conservation instruction.

In conclusion to the survey, it is good to see that 85% of the participants did consider cave conservation as "very important".

Ultimately, on the subject of cave conservation, we have a personal responsibility in knowledge and skill. Many cave divers are frequently seeking additional knowledge, which may be advancing from cavern/intro to full cave or, for the cave diver, becoming trained in DPV, survey, etc. Cave conservation is really no different. The entry-level cave class has given you the rudimentary understanding of the cave environment and conservation, but it is time for you to expand your knowledge. What is Goethite? What is stratified clay? What species live in the unconsolidated sediment? This is no different than when we became open water certified and we could name species of tropical fish; we developed a better understanding and appreciation for the environment we are in. When you understand the cave environment better, you will find the cave comes alive and you will see the cave with more detail than you've ever seen before.

Skill is of critical importance to the cave diver since everything is gear and technique intensive, but our skill level is extremely important for cave conservation. We

have to be honest with ourselves in judging our skill level and making the best decision for the cave versus our personal recreation. For example, someone may be cave certified for quite a few years, but can only dive a couple times a year. The plan may be to enter a smaller fragile tunnel, but upon entering the tunnel silt is being stirred up with incidental fin contact of the ceiling. Appropriately, this team exits this tunnel realizing that it is beyond their present skill level and continue the dive in a more appropriate sized passage. Another example would be someone who purchases a high tech, fast DPV and is planning on taking it for its maiden run. The prudent thing to do is run at a lower speed, in larger passage while learning the operation of the scooter and working on developing proficiency. One thing of caution is goal oriented diving because we are focused more on achieving the goal, and less on the cave environment. It is fun to see some unique features, but safety and good technique should be of primary concern, and arriving at the goal should be secondary.

The cave conservation training we receive in our classes is the important stimulus, but it shouldn't end there. It really needs to be a progressive thing, evolving over time, which develops as we develop with our proficiency.

Remember: Take nothing but pictures, Leave nothing but bubbles, Kill nothing but time.



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BEYOND THE PANHANDLE

Article and Photography: Jennifer Idol

Mine La Motte Saves Rainy Days

Diving in Ozark caves is dependant on the weather, but a rainy day doesn't have to cancel all dive plans. A great dive site to practice skills, enjoy looking at artifacts, and go for a dive, Mine La Motte can save the weekend. Accessible through The Off-Sets, Mine La Motte is also a popular swimming destination.

A historic lead mine that dates back to the 1600s, Mine La Motte is named after Antoine Laumet de La Mothe, sieur de Cadillac, governor of the colony of Louisiana. Extensively mined until the Civil War, the mine can be a maze of twisty passages, all of which are alike. This makes the dive a great navigational dive, with more T's than can be counted in the first 500'. Bring a number of clothespins, especially if you're planning to use a dpv, to quickly mark your direction.



How To Plan For The Dive

Aside from navigational complexities, Mine La Motte is a dive great for full cave divers and is considered an advanced dive. Any qualified diver may dive for a \$20 entrance fee and by showing their cave certification card. An average depth of 50' allows for long dives in the system, with plenty of room to explore back to 3500'.

You'll especially appreciate your dry suit in a constant 48°-50°. After spring and before fall, the surface and entrance to the mine can be very warm, so plan on how you stage your gear and stay hydrated. Algae can also limit visibility for the first 500', but as seen in the photos at 2500', clears up brilliantly. With no flow, any silt that is stirred will obscure visibility until it settles.



When the flow is up at local caves, consider visiting The Off-Sets in Mine La Motte, Missouri for a historic dive, TheOffSets.com.

Jennifer Idol, The Underwater Designer, is an underwater photographer and graphic designer.



What To See

Mine carts and other artifacts are untouched and contain ore as if awaiting someone to carry them out. Lead ore is not poisonous until it is processed, since ore contains less than 10% lead. This is also the first lead mine in Missouri and is constructed with both the older timber shoring technique and the newer rock pillar technique. Caution should be exercised as older sections may be unstable.

Ben Perkins, Dirk Bennett, Steve Praprotnik, and I explored the mine carts at 2,500' as practice dives for the OCDA dive team. There are three ways to enter the main tunnel from the pond area. The entrance on the left contains more Ts and is significantly colder than the entrance on the right, which requires some crawling. If the water is too low, the right entrance may not be accessible. The third entrance is smaller and more of a swim with the same low water sections.



CENOTE CHAN HOL

By Luis Sánchez, Ricardo Castillo and Alfonso Caballero



Located a few feet from the main highway, just south of Tulum, Quintana Roo, México, is a very small entrance to an awesome cave system that is part of sistema Toh Ha.

First explored in 2004, Chan Hol reaches depths of just 35 feet (averaging about 20 feet) and is among the richest in the area in both beauty and archeological history.

As you dive through spectacular passages with beautiful formations, you will also encounter archeological finds including pottery, fire pits, skeletons and skulls from the Mayan culture as well as the remains of people and animals dating back to the Pleistocene age (also referred to as the ice age).

In 2010, divers discovered a skeleton with a skull of a young man believed to be more than 10,000 years old. This

was the second, and better preserved, of the two skeletal remains found in this cave (the first was discovered in 2006), and was named **joven de chan hol II**. But scientists and archeologists only had the opportunity to see and photograph this skeleton before it mysteriously disappeared.

These stolen remains could be an important link in studies attempting to confirm that not all of the earliest people to inhabit the Americas may have come, as previously thought, across from the ancient land bridge in the Bering Strait.

As cave diving is becoming more popular in the Yucatán peninsula, more caves are being explored and more finds are being made which are aiding in the scientific studies of the histories of the first people to inhabit the Americas.







Cenote Chan Hol

Skills, Tips & Techniques

By Georges Gawinowski

Trajectory - Read the Cave

When galloping a horse on a small trail in the woods, balance and trajectory are important for both the rider and the horse. The rider must always look ahead, and not be distracted by what is taking place just in front or on the sides of the horse. By focusing on what is far ahead of him, the rider can anticipate changes before they happen.

A cave diver swimming in a cave should have the same mindset. He/she must keep focused on what is ahead so that they can keep the momentum needed to maintain good posture and buoyancy, anticipate changes in the environment and simply “read the cave.”

Some helpful tools and focus points can help the diver navigate smoothly in the cave system.

Trim, balance, posture and trajectory. We all have seen cave divers with well-balanced equipment, flat in the water, great trim and arms extended in front of them. It looks “good” in the water and is the first step to help with trajectory.

When a cave diver is well-adjusted, he/she has a larger field of vision in front of them. If the head and shoulders are facing down, the diver will probably have a tendency to be heavy headed, causing them to compensate with their back or fins. Even if changes in buoyancy are not greatly affected, this position will be tiring and painful to hold after a while.

Whenever I feel I am losing my posture, I extend my arms in front. Being in this position helps me see far ahead and have a better awareness and understanding of the cave. After my posture is properly recovered, I can go back to more comfortable arm and hand positions.

Pace and distance with buddies. We have learned that an average open circuit cave diver swims around 50 feet per minute. This may or may not be a comfortable pace for you. We all know that it is important to discuss swimming pace before starting any dive. The idea is to not drag your buddy or have to try to catch up with them.

Most of us use lights and shadow as a reference to distance. In fact, if my buddy is leading the dive, his light is my “first source of light”. It is like driving your car at night with headlights on high beams; it helps you see upcoming curves way before you reach them. My light is there to let my buddy know that I am following and also for me to get a better view of my surroundings and a more precise idea of the cave environment (type of sediment, silt accumulation, rugged walls, current polished walls...).

Anticipation of changes in the environment. When we see changes occurring in the cave, such as a slope, breakdown or restrictions, we should modify our posture and buoyancy to better position ourselves within the system, either close to the ceiling in a high-flow cave, or away from current polished walls or even close to the floor if needed when the area has a dense substrate of gravel or sand.

Knowing the system in case of emergency. The cave system is giving us a lot of information about how to dive it. All systems are different and different techniques should be practiced; we need to be aware of the clues given to us by the cave environment. Cave systems have their own unique clues that a diver can use to adjust and improve their techniques, but only if they “read the cave” will they assess these needs and put the proper techniques into practice.

In case of emergency (lost line, lost diver, line break, etc...), a diver should not only rely on the line, markings or their buddy, but also be aware of the natural environment.

I am still using the method of our pioneers, progressive penetration, which consists of learning the cave system by sections and, once familiar with one section of the cave, going on to the next part. In any case, a pre-dive study of a cave map is recommended before entering any cave system.

The objective is to have fun without being too “invasive” in a cave system that we do not own.

off to the side.....

By Rob Neto



Conservation – Should we dive smaller passages?

There have been some discussions recently on the social media sites dealing with cave conservation. Kelly Jessop, the NSS-CDS Conservation Chair, is doing some research to try to determine how well the topic of conservation is discussed during training. It's something instructors should always include in their classes. It should be discussed during class as well as during debriefings. Propulsion techniques and buoyancy control should be major focuses of these discussions. Personally, not only do I expect my students to maintain good trim and buoyancy and propulsion techniques while they have great visibility, but I also expect it during the zero visibility drills. I make sure to conduct these drills where the line is sufficiently above the bottom to minimize the risk of contacting the bottom. I also look to determine whether any silt is being stirred up as they continue to exit the cave in zero visibility. If trim is not as it should be, the drill is cut.



Unfortunately, not all students are swimming away from their training with either the skills or the proper mindset of cave conservation. Marks are becoming more evident in passages big and small. Whether this is the fault of in-

structors or the student is yet to be determined. Hopefully Kelly's research can help us resolve this issue. My own personal observations during recent dives are that the smaller passages seem to be more pristine than larger passages. One of the reasons for this may be that smaller passages are not visited as frequently or by as many divers as are the larger passages. But these smaller passages are visited. So why is it that some of us can move through these smaller passages without leaving a mark while others have a difficult time moving through larger passages without leaving marks?

Cave conservation is one thing I stress in my cave sidemount classes. Just because we're in sidemount configuration and have to remove cylinders to get through restrictions doesn't mean that we should make contact with the cave. We still need to observe conservation guidelines and have minimal to no contact. We should be able to move through passages without making marks on the limestone or creating indentations in the silt. There are some divers who think that breaking formations in the name of exploration is okay. That's an entirely different article. What about those passages that are small but not too small to get through?

Silt will often be stirred up simply because we are moving through these small passages. Just the movement of the water displaced by divers as we move through the passage is often enough to stir things up a little. And then add to that the silt coming off the ceiling due to disturbance

from our bubbles, something we refer to as percolation. This sometimes cannot be avoided short of just not going into that passage, but here are some tips to minimize the disturbance and keep the passage looking pristine:

- **Move slowly.** The slower you move the less you'll stir up the water and the less impact you'll have on the silt. Moving quickly, even at what is considered a normal rate of speed in larger passage, will stir up lots of silt. While this may not create marks on the floor, it does disturb the environment and may affect the fauna that live there.

- **Minimize fin movements.** Big paddles waving around in water cause a disturbance. Even with your fins properly pointed behind you, the bottom is not far from the fins in small passage. Sometimes a carefully placed fingertip on limestone to pull yourself along will do more to conserve the passage than trying to fin your way through. But this decision should not be made lightly. Only the touch should be made lightly. You need to be certain what you touch is



not fragile and will just crumble under your touch.

- **Keep in mind that even with minimal disturbance, you will most likely be returning in limited visibility.** Learn the passage. Use progressive penetration if necessary. You don't want to just barrel your way out of the passage in zero visibility. It is still your responsibility to conserve the passage even if you can't see it.

- **Know your limits.** You may not be ready to go into all small passages. Make certain your skill level is where it needs to be to penetrate that passage. It shouldn't be a matter of ego. The better diver will make a decision to not push on if it means damaging the cave.

- **We all need to make the commitment to conserve and preserve our caves by being better divers** so the caves can be something other cave divers, both current and future, can enjoy.

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MILESTONES

By: Shirley Kasser

Following is a very cool Abe Davis milestone story from Doug Bzotte:

I have been diving since 2008 and spent most of my time in the waters of south Florida wreck diving, spearfishing and observing the local aquatic life. I first started diving because my best friend wanted to get certified so naturally I agreed to do the same. The experience was not what I expected and it honestly took me a while to get to the point where I was comfortable with being in a foreign environment and trusting my life support gear to function. As time passed I was able to enjoy the dives that we were making and could not be kept out of the water. I remember watching the Planet Earth series on television when it aired later that year on Discovery and was exposed to cave diving for the first time. I was hooked from that point and knew that it was just a matter of time before I would learn to become a cave diver. Several hundred dives and a few years later I decided to finally get certified to cave dive.

I had no idea at the time but my decision to learn to cave dive would change my life in ways that I never thought possible. My cave instructor did more than just teach me how to cave dive and survive when things go wrong. He also taught me a lot about how to de-stress and enjoy everything that life has to offer. My cave diving education did not stop after I received my certification for full cave, but continued with every dive I have made since I was mentored by some of the best divers I know. Without them I do not think I would be half the diver I am today. While working toward achieving my Abe Davis award I have had to deal with just about every combination of gear failure and possible problems that one can experience in a cave. At first it was unsettling, but after awhile it was just an inconvenience for the failures to occur. I look back now and wonder if I did not have the training I did, would I have been able to deal

with these failures as quickly and effectively as I did when they happened? I strongly feel that the proper training and mentoring should be a must in the community.

When It was time for me to plan and make my milestone dive the original plan was to dive Rock Bluff Spring, but due to the high river levels all winter we ended up going to Peacock Springs to swim the traverse. Since my normal dive buddy Joe and I have never done this dive before we were concerned on how much gas we should bring. I was diving 95's and he was on 85's; we did the calculations and decided that this would be more than enough gas but also decided to bring along a safety bottle as well. The park was surprisingly empty for a Saturday morning but we were enjoying the peacefulness of the park. We geared up at Orange Grove, did a final check of all of our systems and descended to start our dive. The water was clear and comforting and the cave was as inviting as ever. We decided to take it easy and enjoy the sights so we set the pace nice and slow. The one thing that sticks out most about making the traverse was how much variety the cave system offered in terms of formation. I have not really spent much time diving at Peacock Springs so the cave was still relatively new to me at the time of this dive. I just enjoyed the many little pleasant surprises that the cave had to offer. The walls and ceiling were littered with fossils and we did see some crawfish and a few millipedes on our swim from Orange Grove to Challenge Sink. Once we reached Challenge we surfaced and chatted a bit about the dive. Joe and I were both enjoying ourselves and were surprised at how little gas we used so far.

After a few minutes on the surface we descended again and headed toward Peacock One. Once we arrived at the Peanut Tunnel we decided to explore a bit since we had plenty of gas and had

not even touched our safety bottles. We did some exploration toward Waterhole and then decided to call the dive. We also followed a small crawfish toward the sidemount tunnel in the Breakdown Room on the way back to the Peanut Tunnel. When we entered the cavern zone and we could see that blue-green glow I just smiled. Exiting into the cavern zone after a relaxing dive has always been my favorite part of the dive and one thing that I will always love about cave diving. The view was as amazing as ever and it was lights-out the rest of the way out. The dive was almost two hours in duration and we enjoyed every minute of it. After surfacing we debriefed and spent the rest of the day taking pictures of some local scenery and abandoned structures.

Congratulations to Doug and thank you for sharing your story!

What's your story? Email your milestone stories and photographs to me at abedavis@nsscads.org, or snail mail them to me at 665 County Road 625, Coffee Springs, AL 36318.

Shirley Kasser
NSS-CDS Awards Coordinator



What we plant in the soil of contemplation, we shall reap in the harvest of action. ~ Meister Eckhart ~

I, along with a few other NSS-CDS members, had the opportunity to take part in an IWR (in-water recompression) Study in September.

While the diving wasn't exactly exciting, hovering on a deep water platform and the ensuing deco and recompression does give you some time to contemplate.

I contemplated painting my ceilings and poking some fish... but there were no fish around, so I contemplated poking my study partner. I am sure he appreciates I thought better of it and am just painting my ceilings instead,

The process was impressive and some of the immediately known results were quite interesting. We hope to report the findings in the next issue

of UWS.

The cooler Florida weather is approaching, and I am contemplating seeing my favorite cave monster, catching up with cave friends and having one of Cathy's deco cookies before I head north to see family and friends.

I know, timing is everything and mine is kind of backwards.

Time to stop contemplating and start doing. Ceilings, caves and kids.... here I come.

Dive safe,

Cheryl

Continued from page 13

We decide that we will take a quick scooter tour of some places in the front half of the cave we haven't seen for some time. While the other tunnels are equally as beautiful in their own way, that gnarly little tunnel topped our dive.

Still high on the dive we decide to head for home after playing around for a while. The flow pushing us and the scooters set on high, we exit the cave feeling like fighter pilots. Enjoying the big tunnel and our light weight we are on top of the world. A good soul-cleansing dive is about to end and only a short deco lay ahead. We have not gone farther than 1200' from the entrance and it was a truly amazing dive, proving again that it doesn't matter how far or how deep you go. What matters is the adventure and who you share it with.

We exit the marvelous natural wonder and proceed back up the run. Our heads breaking the water, breathing non-compressed air is always somewhat of a letdown and relief, relief being we are home safe, letdown being the dive is over for now. Removing our hoods and masks we exchange huge smiles.

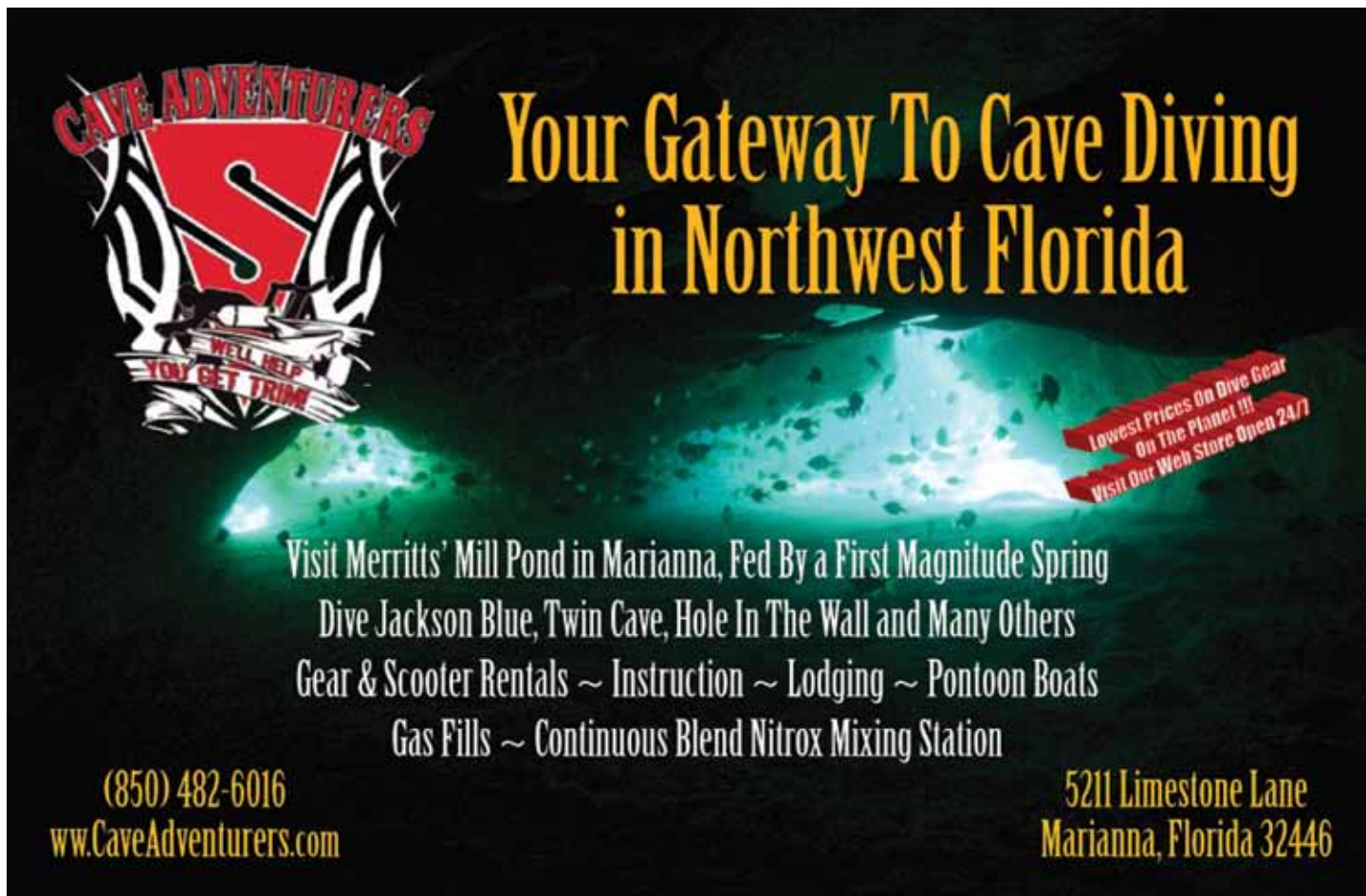
A large group of people are gathered on the shore. How deep does it go? How far back did you go? Is it dark in the cave? What did you see? Are there fish in there? The standard answers: it goes all the way to the bottom, all

the way back, no, we have Christmas lights strung, big wet rocks, and nope, no fish, but several cave monsters. Those are fun and joking answers we like to give, but in reality people are genuinely curious. We answer all the questions as best we can, not even trying to hide our sense of pride and excitement.

We have an amazing hobby, an amazing sport, and I am honored to share it with those who are not fortunate enough to enjoy the cave. I am even more honored that I get to share the experience with such a great dive buddy.

In fact, I feel we as cave divers have a duty to educate those who don't dive. Educate them on the wonders and joy of cave diving, and even the conservation and protection of our springs. For those people we run into that may dive, but not necessarily cave dive, we have an extra duty to be stewards of our underground world. These are the people who we can have an impact on if they choose to further their education and training into the wonderful world of cave diving.

What it really all comes down to is educating others, protecting our natural resources and defending what we love to do. I once again encourage everyone to leave the politics behind and just go dive! Enjoy what nature has given us and thank your God that you have the honor and ability to visit something this sacred.



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