UNDERWATER SPELEOLOGY

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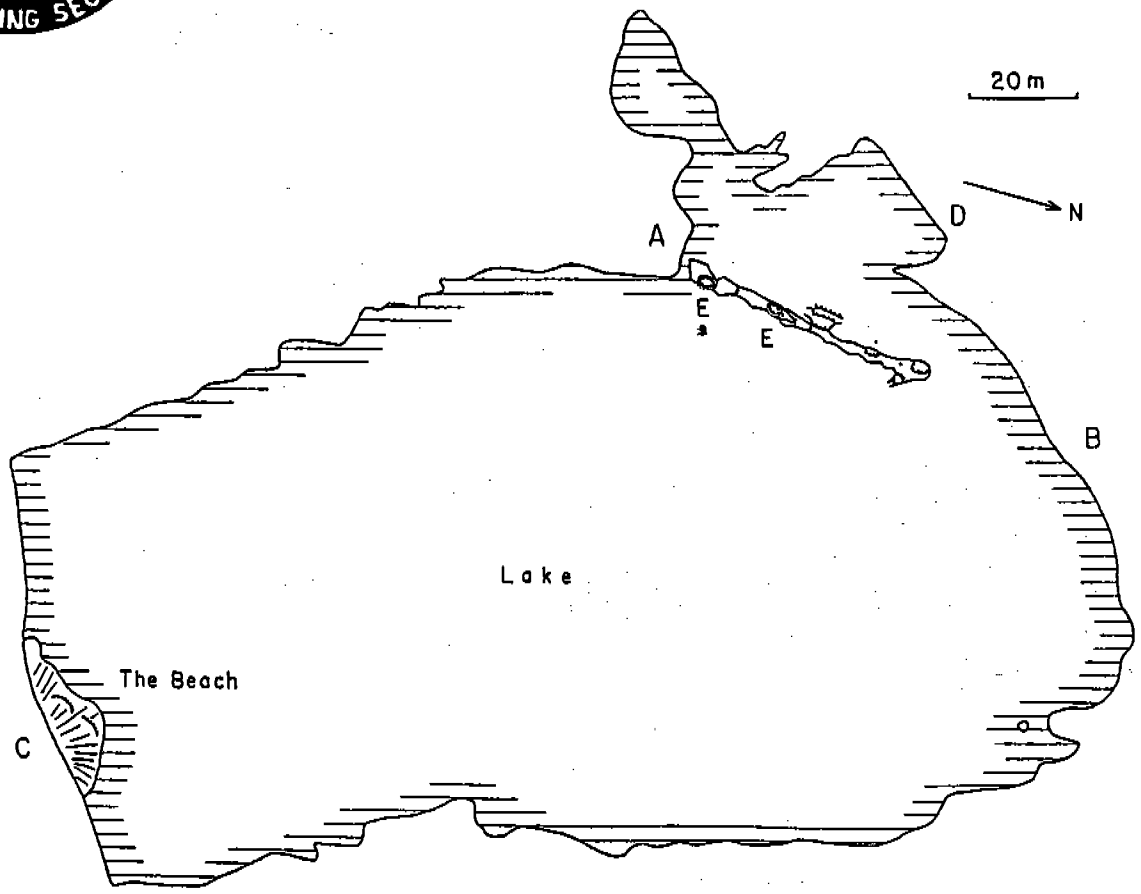
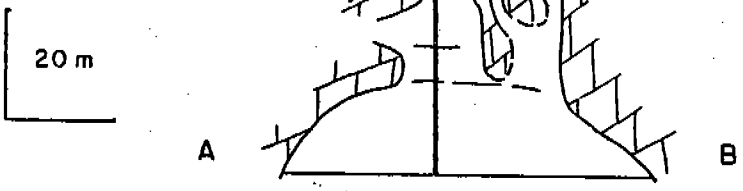
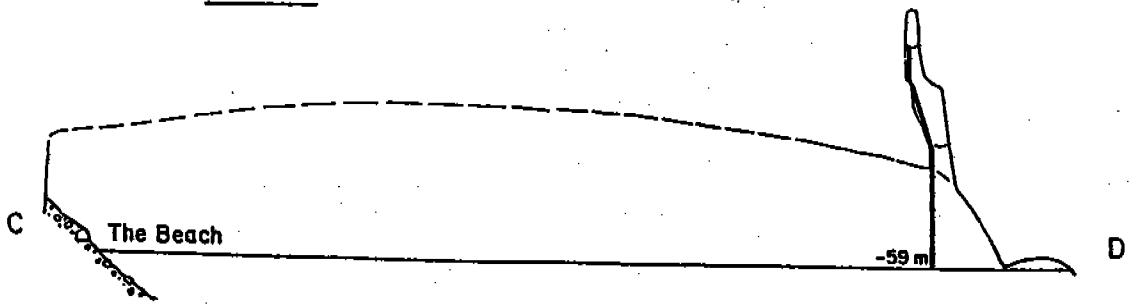
NUMBER THREE



Exploration and Survey Map (M Class 4) of DRACHENHAUCHLOCH (Dragon's Breath Hole) in Namibia, Africa. See article beginning page 6.



Sections



Underwater Speleology is the official newsletter of the

CAVE DIVING SECTION OF THE NATIONAL SPELEOLOGICAL SOCIETY, INC.

P.O. Box 950, Branford, Florida 32008-0950

CALENDAR

June 17-22, 1988 - The 4th Symposium on the Geology of the Bahamas. College Center of the Finger Lakes Bahamian Field Station, San Salvador Island. See announcement, p. 3.

July, 1988 - Congresso de Espeleologia da America Latine e Caribe. Belo Horizonte, Mias Gerais, Brazil.

July 15-17, 1988 - NSS-CDS Instructor Institute. To be held in Florida. For additional information, contact the Section or Training Chairman. (Additional non-Florida Instructor Institutes are planned and will be announced.)

Sept. 30 - Oct. 2, 1988 - FADO (Florida Assoc. of Dive Operators) "International Dive and Travel Show." Orange City Convention Center, Orlando, Florida. Contact Russ Teall, 111 Saguaro Ln., Marathon, FL 33050, (305) 743-3942.

Nov. 18-20, 1988 - NSS-CDS Instructor Institute. To be held in Florida. For additional information, contact the Section or Training Chairman.

Dec. 1988 - NSS-CDS Winter Cave Diving Workshop. Branford, Florida.

Feb. 3-5, 1989 - NSS-CDS Instructor Institute. To be held in Florida. For additional information, contact the Section or Training Chairman.

May 1989 - NSS-CDS Spring Cave Diving Workshop. Branford, Florida.

Nov. 17-19, 1989 - NSS-CDS Instructor Institute. To be held in Florida. For additional information, contact the Section or Training Chairman.

THE NSS AND CAVE DIVING. Founded in 1941, the National Speleological Society joins together thousands of individuals dedicated to the safe study, exploration, and conservation of caves. The first cave-diving information ever published in the U.S. was in a 1947 *NSS Bulletin*. In 1948, NSS divers were responsible for the first cave dives in the U.S. using scuba. Prior to 1973, cave diving within the NSS was on a purely local level. That year saw the creation of the NSS Cave Diving Section to provide a vehicle for information exchange. Today, with over 400 members, the Cave Diving Section promotes safe cave diving through semi-annual workshops; cavern- and cave-diving training programs; warning-sign installation; search, rescue, and recovery through the National Cave Rescue Commission; cave exploration and mapping; several texts and publications on cave diving; and the bi-monthly newsletter-journal, *Underwater Speleology*, that you are presently reading.

MEMBERSHIP. The National Speleological Society welcomes the interest of anyone who has a sincere concern in the safe study, exploration, and conservation of caves, wet or dry. You may join the NSS either by writing to the NSS main office directly (National Speleological Society, Inc., Cave Avenue, Huntsville, AL 35810) or to the Cave Diving Section (NSS Cave Diving Section, P.O. Box 950, Branford, FL 32008-0950.). Regular NSS Membership is now $22.50 per year, and entitles the member to monthly issues of *NSS News* and a semi-annual technical journal on speleology, voting privileges, and discounts on publications, convention fees, etc.

As a sub-organization or "section" of the NSS, the Cave Diving Section is subject to the by-laws and ethics of the NSS. Membership in the Cave Diving Section is open to anyone who is a member in good standing of the NSS. Regular membership is $5.00 per year, and we also offer a CDS Family Membership for $1.00 for family members (who are also NSS members) of regular CDS members. Membership in the Cave Diving Section includes subscription to our bi-monthly (6 issues/year) newsletter, *Underwater Speleology*, voting privileges, discounts on publications items, workshop registration fees, etc.

NEWSLETTER SUBSCRIPTION. If you do not wish to join the Cave Diving Section, but would like to keep current on cave- diving events, exploration, and technology, you are invited to subscribe to *Underwater Speleology* for $10.00 per year.

WHAT THE NSS-CDS HAS TO OFFER. The NSS Cave Diving Section sponsors two Safety and Information Exchange Workshops each year, traditionally held in Branford, Florida over the Memorial Day and New Year's Day weekends, although exact dates and formats vary. Information and pre- registration materials are published in the newsletter and can be obtained by writing to the NSS Cave Diving Section (P.O. Box 950, Branford, FL 32008-0950).

Information on cave-diving books, back issues of *Underwater Speleology*, T-shirts, Maps (available only to people with a cave-diving certification from an accredited agency such as NSS-CDS, NACD, YMCA, or NAUI), and free safety brochures may be obtained by writing to NSS-CDS Publications Coordinator (NSS Cave Diving Section, P.O. Box 950, Branford, FL 32008-0950).

The NSS-CDS offers a comprehensive Cavern, Basic Cave, and Cave dive-training program, and has certified more than 6000 divers. Complete information on cavern- and cave-diving training can be obtained by writing to the NSS-CDS Training Director (NSS Cave Diving Section, P.O. Box 950, Branford, FL 32008-0950).

IMPORTANT! - CHANGES OF ADDRESS. Members and subscribers are urged to report any change of address or address corrections in writing immediately to the Section in order to insure continuity of newsletter receipt. Membership/subscription status, applications, and general information may be obtained by writing to the Secretary-Treasurer c/o the Section's permanent address:

Secretary/Treasurer
NSS Cave Diving Section
P.O. Box 950
Branford, FL 32008-0950

NEWSLETTER SUBMISSIONS. We welcome all current news items, reports, articles, photographs, negatives, slides, cartoons, notices for gear wanted/for sale (individuals only), or other submissions of relevance or potential interest for publication in this newsletter. We can now accept textual information on computer diskette if it is in an IBM-XT-compatible standard ASCII text format or WordStar version 3.3 or lower, using 5-1/4" 360K floppies; however, all computer diskettes must be accompanied by a complete paper printout. All newsletter submissions should be sent in directly to the Editor:

H.V. Grey, Editor, UWS
P.O. Box 575
Venice, FL 34284-0575

RESCUE/RECOVERY TEAM MEMBERS. . .

Report any change of address or telephone immediately to your Area Coordinator!

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Lenny Kolczynksl
1000 Broward Rd., #1106
Jacksonville, FL 32218
(H) 904-765-1940
(W) 904-771-6207

AREA TWO: Northwest Florida
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5429 Hamilton Bridge Rd.
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(H) 904-994-6062
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AREA THREE: Central Florida
Joe S. Harrell
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Brooksville, FL 34613
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AREA FOUR: South Florida & Caribbean
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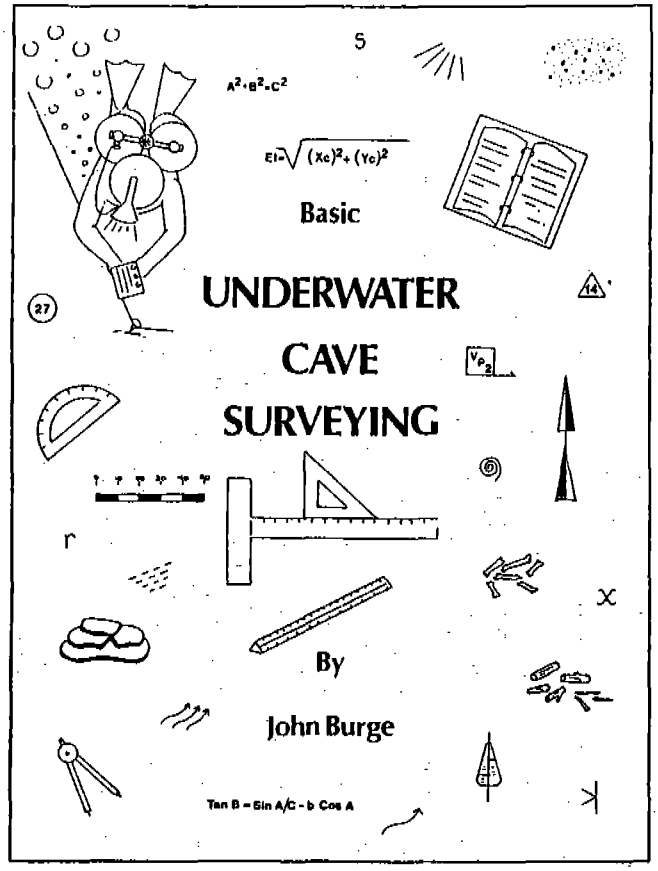


BASIC UNDERWATER CAVE SURVEYING by John Burge

The NSS-CDS is pleased to announce the introduction of our second manual for 1988. The subject matter is underwater-cave surveying techniques and procedures. The manual is 134 pages in length and is presented in a 7" x 9-1/2" format. Subjects covered include the Survey Process, Techniques, Accuracy, Special Tools, Safety, Symbology, Cartography, etc. The manual is completely illustrated.

The author, NSS-CDS Board Member John Burge, is considered an expert in this field by his peers. He was the first to ever published a Class 5 underwater-cave survey, the most accurate survey possible. Mr. Burge is a cave-diving instructor and conducts regular seminars at NSS-CDS Safety Workshops on the surveying process.

The book sells for $10.00 for NSS members and $12.00 for non-members. Order by sending a check or money order to: NSS Cave Diving Section, P.O. Box 950, Branford, FL 32008-0950.

NOTE: There is a special introductory combined price of $18.00 for members and $21.00 for non-members if both *Basic Underwater Cave Surveying* and the *NSS Cavern Manual* (see below) are ordered at the same time.

Dive shops should call Joe Prosser at his office (305-592-3146) for bulk information.

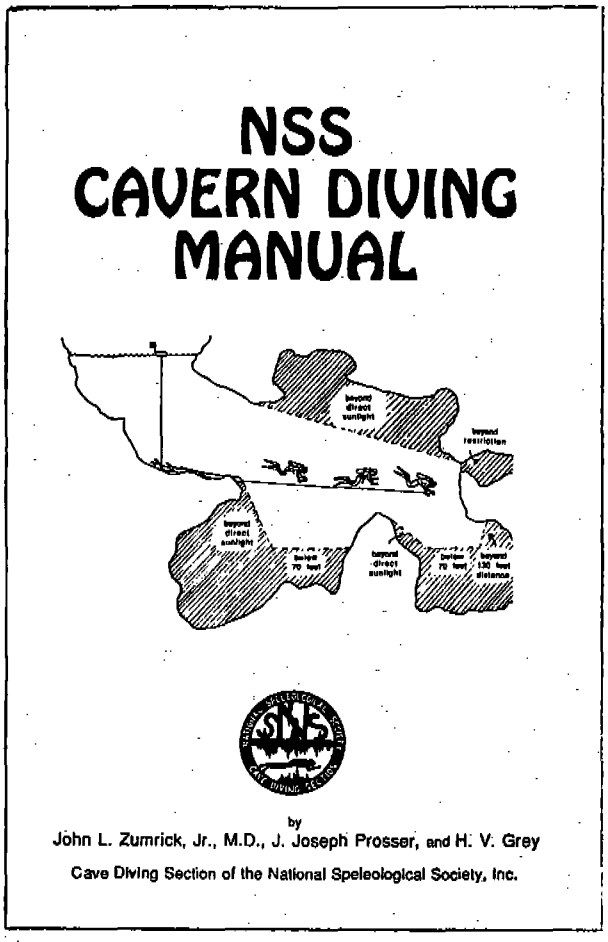
NSS CAVERN DIVING MANUAL

The *NSS Cavern Diving Manual* is now available. It is 5-1/2" x 8-1/2", 127 pages long, with a soft cover. The book was authored by Dr. John L. Zumrick, Joe Prosser, and H. V. Grey, with generous assistance from William L. Wilson (of the Florida Sinkhole Research Institute) on the chapter dealing with cave formation, and critical reviews returned by Jeff Bozanic, Pete Butt, and Steve Gerrard. The book contains more than 80 illustrations (line drawings), provided by Wayne McKinnon and H. V. Grey, with hand signals used by permission from the NACD's *Hand Signals for Diving*. Computer equipment for the production of the camera-ready layout of the book was provided entirely by Joe Prosser.

The book comprises eleven chapters (Introduction, Cave Formation and Terminology, Cave Hazards, Equipment, Buoyancy Control and Propulsion Techniques, Use of Lines and Reels, Underwater Communications, Dive Planning, Psychological Aspects, Emergency Procedures, and an Open Letter [Accident Analysis]) and seven appendices (NSS, NACD, and Universal Cavern Diver Course Descriptions, Course Student Guide Outline, Field Exercises, NSS and NACD Histories, and Publications). There is also a statement of the NSS Conservation Policy and a complete Index with over 250 entries.

The book sells for $9.00 for NSS members and $11.00 for non-members. Order by sending a check or money order to: NSS Cave Diving Section, P.O. Box 950, Branford, FL 32008-0950.

Dive shops should call Joe Prosser at his office (305-592-3146) for bulk information.



CONGRESSO DE ESPELEOLOGIA DA AMERICA LATINA E CARIBE

Second Circular Letter

Pre-Congress programs will begin July 1, 1988; the Congress itself will begin on July 10; and Post-Congress Programs will being July 18 and end July 27. The Congress will be held at the Instituto de Educacao de Mias Gerais in Belo Horizonte, Mias Gerais, Brazil. The cost for the Congress is $100 US, with subsidized lodging at $7.00 US per diem. Payment must be made at the time of pre-registration.

Congress participants may chose from several very interesting pre- and post-congress caving trips:

1) North Bahia area (Brejoes Cave, Convento Cave, Pontos do Sumidouro Cave, and Boa Vista Cave), site of one of the most important fossiliferous beds found in a cave, besides having a matchless archaeological potential; most caves are horizontal and easy to explore, many with big lakes and rivers, and exquisitely beautiful and uncommon speleothems. 9 days; cost $520 US.

2) Mias Gerais area, featuring exceptional karstic relief, with beautiful canyons, dolinas up to 170 m high, towers, pitons and hums; many caverns with massive speleothems; 70 archaeological sites, presenting magnificent panels of repestrian art with polychromic geometric composition; Itacolomy's pseudo-karst with silica speleothems. 9 days; cost $450 US.

3) Sao Paulo - Parana area, including the Touristic State Park of Alto Ribeira (Petar), one of the most important natural areas in southern Brazil, featuring rough karstic relief with a great many beautifully decorated caves; also the Vila Velha region (Parana), with interesting sandstone pseudo-karst. 9 days, $420 US.

4) Goias-Distrito Federal area: Ecos Cave, with rock matrix of mica schist, making it quite unique), and the dolina system of Buraco das Araras, characterized by horizontal development, and attractive, diversified decoration. 9 days; cost $400 US.

5) West Bahia area, boasting the biggest known Brazilian caves; Diamantina Plateau National Park, with beautiful geological monuments and quartzite and carbonitic caves; the cave/church of Bom Jesus da Lapa, center for religious pilgrimage; Gruta do Padre (Priest's Cave), the biggest cave in Brazil, in a region presenting speleological, archaeological, and paleontological potential. 9 days; cost $480 US.

For copies of complete information and registration forms, write the Editor, H. V. Grey, immediately (address on inside cover).

MEXICO ALERT UPDATE - by Jill Yager

In the last issue of *Underwater Speleology* an "alert" sheet was enclosed, describing a potential ecological problem in the Akumal area of Quintana Roo, Mexico. Since that alert was published, more has been learned about the situation.

I talked to Parker Turner, who says that an environmental-impact study was done by Alberto Rodriguez, a hydrologist working for SEDUE, a governmental agency. There were several caves on the gravel-quarry site. These caves were dived by Parker and John Zumrick. Parker described the caves as very chalky and unstable, the kind of cave typically found at the very coastal edge of the aquifer. No significant animal life was observed by the divers. In addition, there are supposedly no reefs in the immediate area that would be affected by the silt produced as a result of quarrying activities. Based on this information, and the fact that it would be an economic aid for the area, the project was given approval.

Since the study, Alberto Rodriguez has become a trained cave diver, and is very interested in the conservation of cenotes in Quintana Roo. With cave-diving training and his knowledge of karst hydrology, Alberto will be an asset to both the cave-diving and scientific communities.

Although I may have "over-reacted" to the original alert, I did so out of caring for the fabulous Akumal caves and their amazing community of cave-adapted animals. Any letters which were written by Section members to the Office of Tourism in Cancun will only serve to reinforce the fact that there is concern for environmental sacrifices being made in the name of rapid development of a beautiful, pristine part of our planet.

As cave divers we are attracted to an environment virtually unheard of by most people. We have a responsibility to educate the public not only in foreign countries, but in our own localities, about the underground water which we explore. What happens on the surface affects the water quality below. The threats to the submerged-cave environment are many: pollution on the land above, septic systems which are not properly constructed, development projects which clear all the vegetation from the land above a cave.

A statement made on the original alert said: "The area is already being exploited very quietly." As visitors to this beautiful spot of the world, we ourselves are causing quiet exploitation. With our Western ways we are slowly eroding the culture of the gentle Mayan people, as well as the environment. We expect to stay in air-conditioned hotels, eat local seafood, and have all the comforts of home. One example: there is such a demand for thatched roofing material for hotels and condos in Cancun, that many Mayan people cannot find enough to thatch their own homes in the traditional manner. I could write on for hours, but suffice it to say, we, as cave divers, can help at least slow down the environmental degradation of some of our favorite places.

[The Editor wishes to thank Parker Turner for his prompt efforts to disabuse UWS readership concerning this matter, and to encourage any reader detecting any misleading inaccuracies to report them in writing immediately so that a printed correction or retraction can be made.]

JEFFREY BOZANIC ELECTED TO NAUI BOARD

NSS-CDS Chairman Jeffrey Bozanic has been elected to serve on the Board of Directors of the National Association of Underwater Instructors (NAUI). His four-year term runs from 1988-1991. Congratulations, Jeff!

BLUE GROTTO REOPENS

The Blue Grotto two miles out of Williston, Florida has been reopened to the public for diving and camping. The beautiful Blue Grotto has a large natural basin with a big wooden dock for easy access to the water. The large cavern entrance allows divers to safely swim 50 ft. into the cavern to a depth of 60 ft., or for the more experienced diver, to drop down to a second ledge at 80 ft., or to continue down to the horse-shoe shaped bottom of about 100 ft. for a more advanced dive. The Grotto is an open cavern with no tunnel maze.

The cavern offers beautiful cobalt-blue water with 200-foot-plus visibility and 72-degree temperatures year round. There is a fresh-air bell at 30 ft. and an underwater platform at 35 ft. in open water. Facilities include picnic tables beneath shady oak trees, dressing rooms and restrooms, hot showers, RV and tent sites with water and electricity, air fills to 5000 psi, scuba and snorkel rental equipment, and custom underwater video taping.

There will be a Blue Grotto Manager on duty to fill tanks and give helpful information. Upon request, a guide will be available to provide an escort dive. All divers will be required to sign a release form. All divers and campers will be considered on a first-come, first-served basis. Reservations can also be made

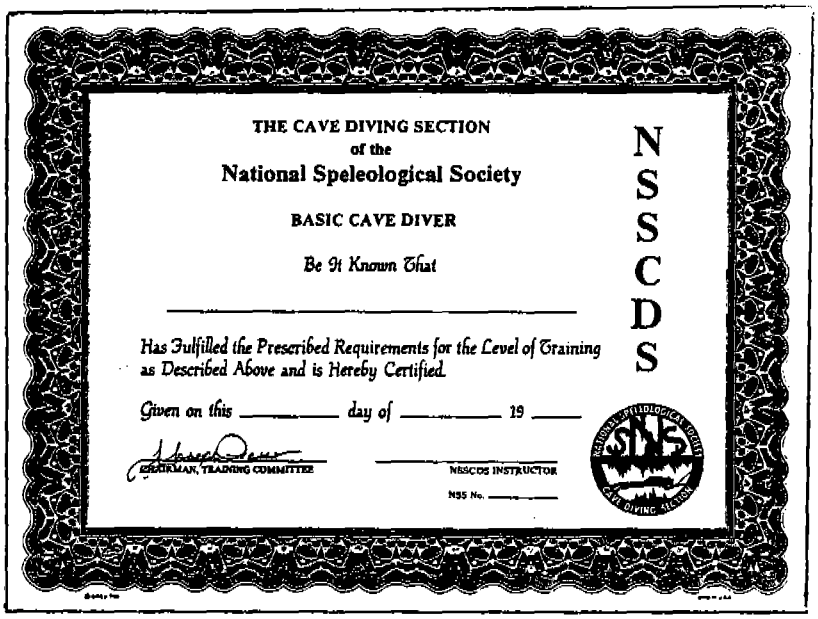
through the Blue Grotto Manager for night dives or available camp sites. The dive fee is $20 per person.

For more information or reservations call or write: Blue Grotto, Rt. 2, Box 2790, Williston, FL 32696, (904) 528-5770.

TRAINING CERTIFICATES

Handsome wall certificates suitable for framing, which recognize completion of an NSS-CDS Cavern, Basic Cave, or Cave Diving Course, are now available. Each level of certificate is in a different color. Certificates are $10.00 each.

To order, send check or money order to: NSS Cave Diving Section, P.O. Box 950, Branford, FL 32008-0950, along with a photo copy of your certification card(s) for each training level certificate desired.



TEKNA SCOOTER SAFETY BULLETIN

Tekna announces the following important safety information concerning the "Tekna DV-3X Diver Vehicle":

Catalyst systems are used within the Tekna Diver Vehicle to eliminate gas which may occasionally be released from the batteries. These systems contain a catalyst material capable of causing hydrogen gas to combine with available oxygen to form water vapor. Gas accumulation within the vehicle can endanger you, and therefore it is extremely important that you follow the recommendations set forth in this bulletin.

Prior to January, 1986, Tekna manufactured catalyst elements in capsule form. Effective January, 1986 the catalyst system was assembled in the form of belts, allowing increased dessicant capacity and improved catalyst distribution. Only catalyst belts will be provided for replacement systems by Tekna and our authorized dealers.

We strongly recommend that you take your vehicle in to an authorized Tekna dealer to determine whether it contains the capsule or belt form of catalyst system. If your vehicle has the catalyst system, it should be replaced immediately with the catalyst belts (for a nominal charge). Be sure to observe the recommended replacement intervals (annually). The belt type of catalyst system will have a longer life, and therefore an increased margin of safety.

You should have your catalyst belts changed under the following circumstances: 1) annually, 2) if the vehicle is flooded or has water damage, and 3) with every battery change.

Failure to maintain or replace the catalyst system as recommended may allow dangerous levels of gas accumulation within the vehicle and could lead to personal injury. If you have questions or problems concerning a Tekna Diver Vehicle, or require immediate maintenance information, please contact your local Tekna dealer or the Tekna Customer Service Dept., 101 Twin Dolphin Dr., Redwood City, CA 94065, (800) 225-2705 or (415) 593-1410.

WARM MINERAL SPRINGS

[May 18, 1988 Letter to Editor from Wilburn A. "Sonny" Cockrell, Project Manager of the Warm Mineral Springs Archaeological Research Project concerning an NSS-CDS emergency first-class mailing to Florida NSS and NSS-CDS residents urging them to write to their state legislators asking them to support current state legislation that would ban deep-injection sewage wells within a 25-mile radius of any Florida spring. Warm Mineral Springs in south Sarasota County is immediately threatened by a test sewage well only 3-1/2 miles away from the spring. At presstime, the Bill was under review by the House Committee on Natural Resources and had not yet gone before the legislature for voting.]

We at the Florida State University's Warm Mineral Springs Archaeological Research Project would like to express our appreciation to you and the NSS-CDS for providing your support in the effort of Senator Bob Johnson and Representative David Thomas to protect the Floridan Aquifer from the adverse consequences of deep well injection through Senate Bill 799 and Companion House Bill 1284. Support from your organization, which has long stood for the protection and preservation of the environment, both above and below the earth, is essential to the legislative efforts.

Again, thanks to you, and the NSS-CDS for your timely assistance. Hopefully, our combined efforts will have some effect.

SINKHOLE FORMS IN SEBRING, FLORIDA

The Associated Press reported that a 20-foot deep, "acre-sized" sinkhole swallowed a $70,000 house in a quiet, middle-class housing development in Sebring, Florida on Friday, April 29. Over the weekend water began to seep into the depression and created a pond.

According to the owner, Bill Pivnick, at 6 pm Friday, "the house was groaning, the studs were popping, and the ground in the yard started to shift"; they could only run out and warn neighbors. "I knew what it was as soon as it occurred and I knew how dangerous it could be," he said. "I was afraid the walls were going to come tumbling down and the ceiling was going to collapse.

By Saturday the sinkhole had stabilized with the Pivnick house at the bottom and the evacuated house of a neighbor on one side, off its cracked foundation and bowed in the center. The garden of another neighbor also slipped into the pit and his foundation also cracked.

William L. Wilson of the Florida Sinkhole Research Institute at the University of Central Florida in Orlando, was quoted as saying that the sinkhole was no longer growing and there appeared to be no other underground cavities that could collapse. He said that the neighborhood appeared to be safe.

DRACHENHAUCHLOCH - THE ULTIMATE CAVE - DIVING ADVENTURE

- by Charles Maxwell

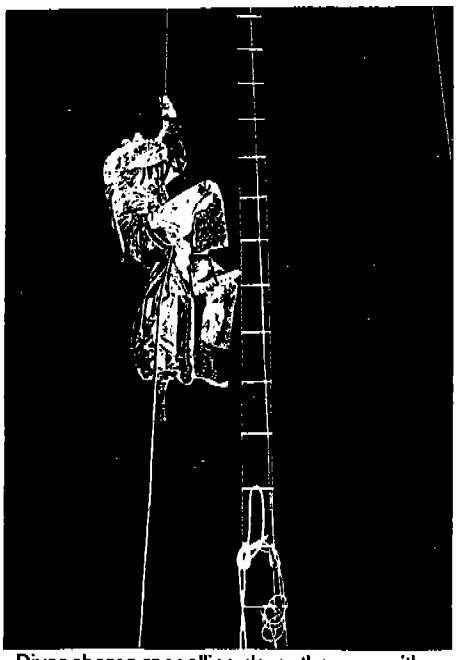
"Suddenly the ground disappeared from beneath his feet, he fell down a vertical shaft, his head hitting a sharp rock, he lost consciousness. On opening his eyes he found himself next to an ocean stretching as far as the eye could see. He lay on a deeply indented shore of golden sands strewn with shells, strange clouds hung overhead. For a moment he thought he was back on the surface of the Earth, but he soon realized that he had reached a world within a world." - So wrote the pen of Jules Verne in his novel, *Journey to the Center of the Earth.*

So much has happened since that August day in 1986 when I received a letter from Dick Howell, an old diving buddy of mine, telling me of a massive underground lake that had been discovered a few weeks previously while members of the South African Spelaeological Association (SASA) were on a caving trip to the far northern reaches of Namibia. I realized he was onto something big, even before I read his ten-page description of the cave, as he was not usually one to indulge in such lengthy correspondence.

Dick began by reminiscing over some caves in the area in which we had dived on an expedition some 15 years previously and he had revisited on this occasion, and then, with my appetite whetted, hit me with the big one. "One of the holes investigated led to a very deep fissure about 5 feet wide consisting of a number of pitches totaling a 130-foot drop to a final 65-foot drop into a huge black LAKE, some 200 feet below ground level. This lake is the well known, crystal clear cave water, blue, warm, and VERY DIVEABLE! From the bottom of the ladder our torches barely picked up the closest wall and the echo was unreal."

The letter went on to describe the lake as measuring about 675 by 330 feet, with a dome-shaped roof and what appeared to be a number of overhangs. Dick's greatest regret must have been that he had brought no diving equipment with him, so the cave remained virgin territory beneath the water surface. A survey tape was lowered on a weight to a depth of 150 feet and it could be seen clearly all the way, a very tantalizing sight to say the least! At the entrance to the cave could be felt a strong updraft caused by the immense mass of warm water and air beneath and so the cave was named "Drachenhauchloch" or "Dragon's Breath Hole" although, after two weeks on camp provisions, there was some stiff competition!

A return trip with a team of divers was inevitable and the plans were soon underway. My responsibility as SASA's Cave Diving Officer and NAUI Dive Master meant many months of planning. I had to get a team of about 15 experienced divers and give them some caving training. I had to collect equipment and devise a quick and efficient method of underwater cave survey. The traditional method using a survey tape was soon dropped and a special combination flow meter, compass and depth - gauge swim board, similar to those used in scuba competitions, was designed, built and calibrated.



Diver sherpa rappelling down the rope with a gear bag.

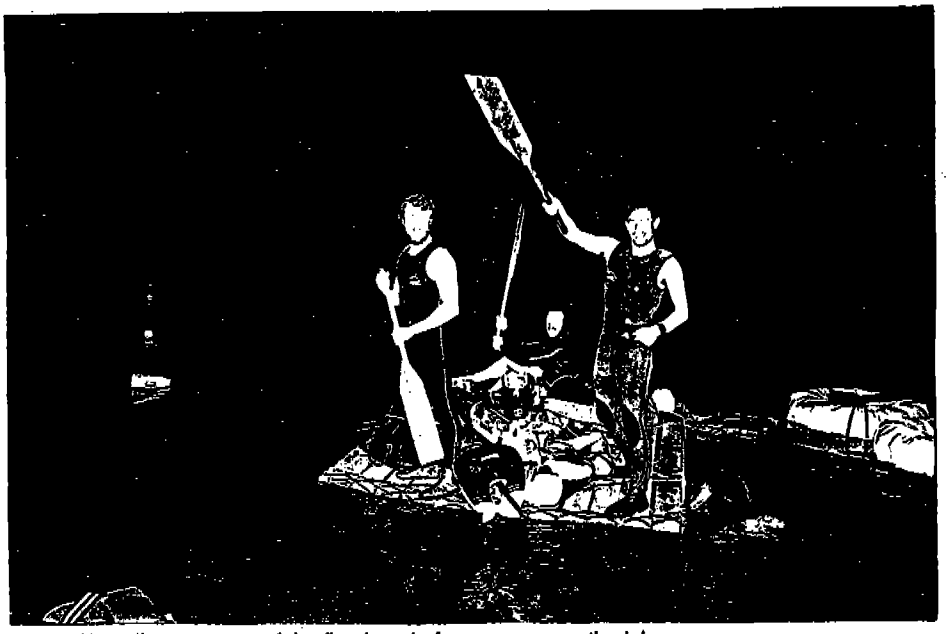
As the surface of the lake was at an altitude of 5000 feet above sea level the standard U.S. Navy decompression tables had to be adjusted using the Cross Correction Method. A dive in say 165 feet of water, for example, had to be treated as if it were to 210 feet at sea level, increasing the decompression time considerably. As this would impose obvious limitations on the working depth and time of the dives, additional methods of depth and distance measurement were sought to complement the underwater survey. The idea of using a portable echo sounder aimed either vertically or horizontally seemed to be the most practical and an underwater clinometer was made to assist in the accurate aiming of the transducer.

The expedition also grew in size from the original concept of a small, manageable team to a full-scale expedition consisting of 30 divers, cavers, and underwater film makers. Sponsorship was sought for such things as a decompression chamber, compressors, generators, an echo sounder, an inflatable boat, helium, oxygen, and a four-wheel-drive vehicle to get some 3 tons of equipment to the cave. The support received from a number of companies was very generous and this helped tremendously in making the expedition such a success. A team of Swiss film makers, led by well-known speleologist Gerald Favre, was invited to make a documentary of the expedition. While the diving plans were being formulated by the diving team, the cavers were busy planning the rigging of the cave above the water, as well as constructing three diving platforms.

To be able to claim a world record for the largest underground lake (i.e., surface area), the cave had to be surveyed as accurately as possible and a detailed survey drawing produced. The possibility that existed of the divers breaking through into further chambers leading off from the main lake, either totally water filled or with air spaces, added extra incentive to explore the cave in a methodical manner. The diving work would be predominantly deep and would be done in total darkness, so each diver needed helmet-mounted twin diving lights. All dives would be done on life lines, using specially constructed lightweight diving reels. While all the divers selected were highly experienced open-water divers, only a few of them had specific cave-diving experience under their weight belts. As far as training was concerned, we practiced deep diving in the sea off the picturesque fishing

The base camp on the farm.

harbor of Hout Bay in the cold South Atlantic Ocean using the special lights, lines, reels, and survey equipment that we would be using in the cave. In order to complete the training a group of wet and bedraggled divers was seen, on a cold and raining winter morning, setting out for the slopes of Table Mountain near Cape Town, with an impressive array of ropes, caving ladders, carabiners, descenders and ascenders to practice abseiling and ladder-climbing techniques under Dick's watchful eye. I was happy to note that nobody suffered from incurable vertigo!



Two divers on one of the floating platforms set up on the lake.

Besides the cave survey and documentary film, the other objectives of the expedition were to ascertain whether the cave contained any aquatic fauna, to estimate the volume of water, to investigate the underwater geology of the cave, to find any indication of previous water-level fluctuations, to investigate the cave's potential for tourism, and to locate a suitable place for the land owner, Leon Pretorius, to sink a bore hole.

At last we were ready to depart and our overloaded vehicles strained out of Cape Town one July morning in the pouring rain, complete with diving equipment, compressors and decompression chamber, for the 1300-mile trip north via Windhoek, the capital of Namibia, to meet up with the rest of the expedition members. A geologist from Water Affairs and an entomologist from the Windhoek Museum joined our ranks of scientists and other professional people.

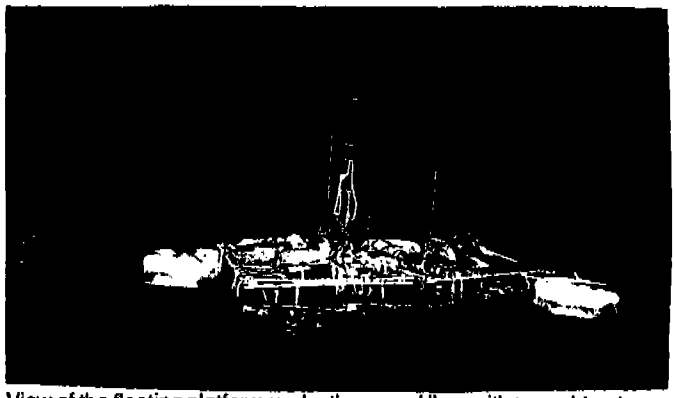
The next day we left en masse for the farm of "Harasib." The road was long and very dusty, the countryside so devoid of people that it was hard to comprehend that 1987 was the year that the world's population reached five billion. On arrival at the farm we made a large clearing in the bush, set up camp, and strolled off to peruse the cave entrance. By cave-entrance standards it was most unpresumptuous, consisting of a pile of well weathered dolomite boulders and a small crack--the key to things to come. As promised, a draft of hot cave air mixed with the cold evening air outside.

The next five days were spent hard at work rigging the cave and preparing the diving equipment and the one-man decompression chamber. A substantial tent town, reminiscent of the gold-rush days of yore, quickly sprung up between the thorn trees, complete with three large HQ tents, a field kitchen, toilets, showers, and a shortwave radio transmitter, our only link with the outside world in this isolated land. A helicopter from the nearby town of Grootfontein was put on standby together with a doctor who was fully conversant with the treatment of diving-related injuries. Life in the bush was proving to be more civilized than we ever imagined possible. The normal tranquility of the farm was broken by the roar of compressors and generators and a continuous stream of vehicles and people coming and going.

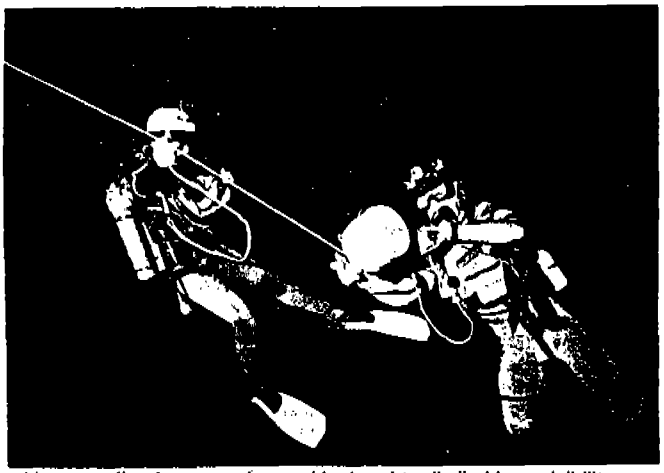
Finally I had the chance to see the lake for myself. I stood above the final pitch sweating profusely in the hot humid breath of the dragon. I fed the abseil line into my descender, muttered a quick prayer for forgiveness and jumped. The was not quite vertical to start with, but once over the lip I was hanging below a huge domed roof, surrounded by a void so black that even my powerful miner's lamp could not penetrate it. I hung there for a few moments savoring the feeling, a serious case of total sensory overload, and then let out a scream that reverberated around the chamber with perfect acoustics.

I descended further into the humid blackness until the lake surface became visible. The lead-weighted climbing rope continued well below the water surface, but where did the air end and the water begin? The water was clear beyond all comprehension, with a mysterious blue tinge. Someone had tied an inner tube to the rope onto which I landed. Once I unhooked from the line I was very aware of my vulnerability. Here I was with a heavy torch battery fixed to my waist with enough weight to send me straight to the bottom of the lake . . . I held on for dear life.

Soon the diving rafts, telephones, oxygen resuscitators, diving equipment, and even an inflatable boat were taken down to the lake and assembled. One of the single most important items of equipment was a 500-foot length of high-pressure hose complete with fittings and pressure gauge to enable us to fill the diving cylinders on the rafts from a diving compressor outside the cave. This was supplied by the Swiss divers and saved us from the immense task of taking the cylinders to the surface after each dive. Two powerful surface lights and a submersible mercury-vapor light were installed, illuminating the entire cave and giving us a better idea of the immensity of this subterranean chamber. The roof was magnificent, a near perfect unsupported dome of massive dolomite, giving one the



View of the floating platform under the rappel line, with two rubber boats moored alongside.



Divers reeling in a massive reel in the virtually limitless visibility.

impression of being in a Gothic cathedral. The walls carried on down into the blue-tinted water. In some places were crevices and fissures; in other places extensive overhangs waited exploration. At one end of the lake was a steeply sloping beach festooned with impressive calcite formations. A paddle around the lake gave one a feeling of isolation and tranquility in a total silence that was broken only by the gentle lapping of water on the cave walls.

"Grab onto my arm now. Hold tight. We are going into a number of dark places but I think I know the way." (From *The Skeleton Crew* by Stephen King.)

Finally, nine days after leaving Cape Town, we were ready to dive and my partner, Dave Roux, and I kitted up. The entry into the water was a fairly unobtrusive affair considering the months of hard work and mental buildup. No speeches or applause, just two splashes that sent an echo reverberating around the cave. The water was warm, even in my thin surfing wetsuit, 75 degrees Fahrenheit all the way to the bottom with no thermocline. Our diving platform, one of three, consisting of wooden planks lashed together with rope and attached to four large truck inner tubes, was tied to a convenient outcrop of rock on the western section of the wall. My logbook reads:"Started with gently sloping roof to a depth of 40 feet and then an amazing vertical wall of pure white calcite drawn from the dolomite by chemical reaction with the water descending to a bottom of massive silt-laden boulders at a depth of 130 feet. The underwater visibility is truly amazing... Dave is suspended in water as clear as air, his bubbles sparkling their eager passage to the surface. The mercury-vapor light, far away in the middle of the lake, is clearly visible, a comforting beacon for orientation."

Each team of divers took their turn, one team descending past the previous pair hanging onto the decompression line. A survey profile was done every 60 feet along the wall and the results written on plastic paper attached to the survey board. With each dive the excitement mounted, an example of which was a big "WOW" written on a survey sheet next to the depth of 230 feet. As we progressed around the wall to each pre-marked survey station, so the depth increased until we could not safely reach the bottom.

The Northern Overhang, as it was named, carried on past 260 feet of depth with a horizontal penetration of over 330 feet in a line directly under another cave nearby, aptly named "Small Beginnings," as it had been explored first, shortly before the big find the previous year. In speleological terms, this was very exciting as this passage could lead into another large cave system. However, as the days progressed, it became apparent that our underwater survey would end up with some question marks due to the excessive depths and distances under the overhang that we were encountering.

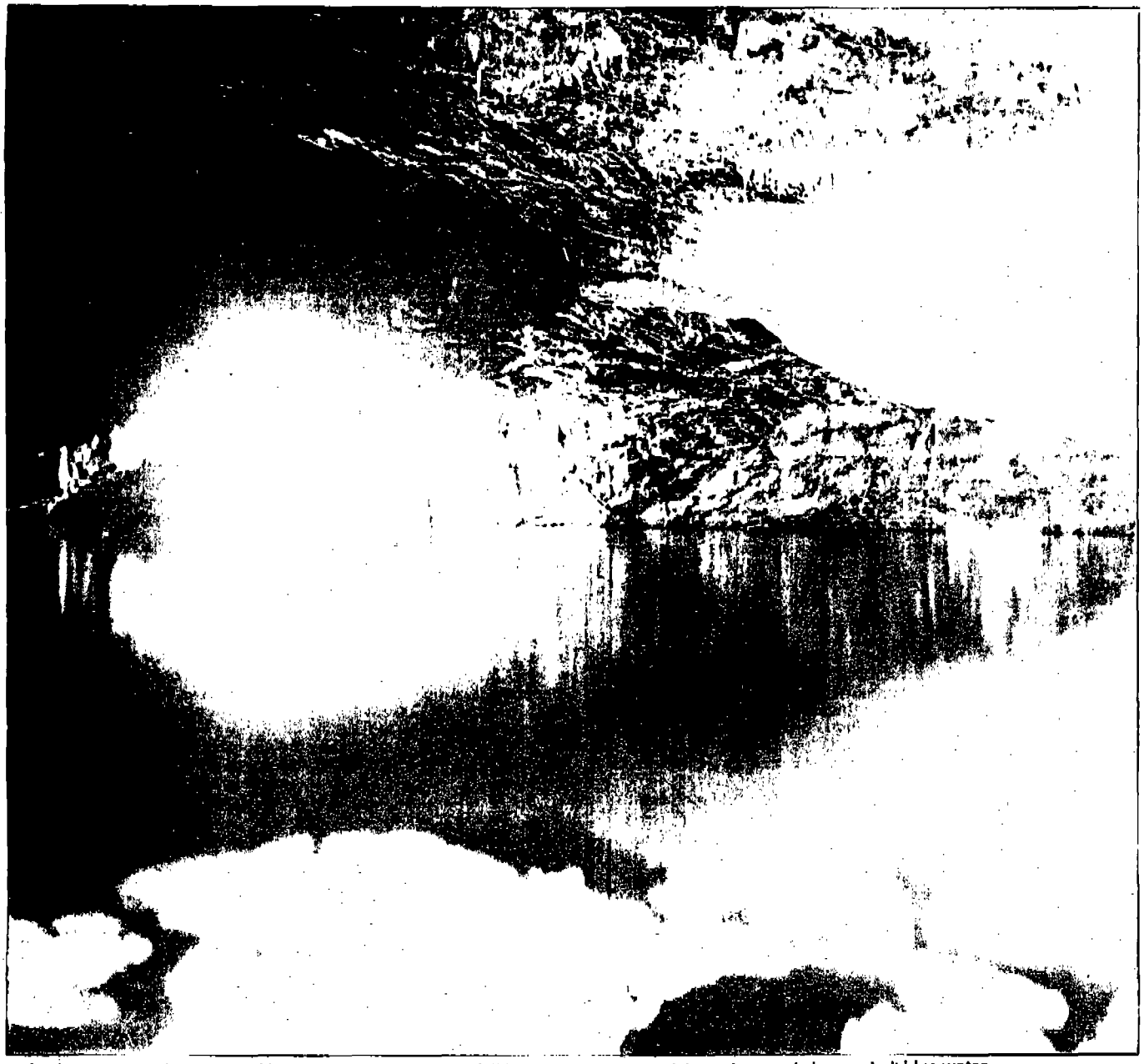
How does one assess the degree of safety that should be exercised on an expedition such as this one? There are two extremes: the ultra-conservative approach where you virtually decompress after bathing, and the cowboy approach that we had to avoid at all costs. We had a job to do under the difficult circumstances but could not risk even a minor decompression accident. Just imagine having to lift a bent diver through 200 feet of sheer drops and tight cracks before you can get him to the decompression chamber . . . a sobering thought and one that crossed my mind every day. Even if the diver surfaced and felt fine, what would the heavy exertion of the climb up in the hot sweaty environment do to the diver? Hard work and dehydration after a deep dive are both bad news. The divers would have to relax on the raft for at least an hour before climbing out.

If the diver felt strange in any way on surfacing or omitted any part of his decompression he would be sent straight down to 40 feet on pure oxygen for 30 minutes and then, if all seemed clear, he would be brought up very slowly at a rate of 3.6 minutes per foot as prescribed in Carl Edmonds' Australian wet therapeutic oxygen tables. This was obviously safer than trying to get the diver to the decompression chamber on the surface.

For such eventualities we rigged up two large oxygen cylinders on the main diving raft with reducers and hoses to a bosun's chair at 40 feet where a second diver, breathing compressed air, could keep a careful watch on the patient. Thanks to the generosity of one of our sponsors we had an unlimited supply of oxygen at hand. Also on the raft we had a diving first-aid kit containing the standard diving drugs and an oxygen resuscitator. We were not taking any chances! The use of life lines was mandatory at all times as well as the standard cave-diving rule of 1/3 air in, 1/3 air out, and 1/3 air for reserve. All the main diving cylinders were fitted with separate pony or emergency cylinders with their own regulators and contents gauges. It is accepted practice in cave-diving circles to give preference to self-help in an emergency rather than placing too much reliance on the buddy system.

The closest that we got to having a serious accident was from a totally unexpected source. We were performing a practice dive in an underwater passage at the bottom of a huge sinkhole named "Gross Harasib" a few miles from the camp. While one of the divers was filling a pony bottle for his buoyancy compensator from his main diving cylinder, he heard the noise of escaping air. On closer inspection he noticed that a crack had appeared on the neck of the pony bottle from where the air was escaping. To make matters worse, on trying to remove the pony bottle from the main diving cylinder so that he could empty it, he found that the pressure release valve had seized up and

Diver with big reel inspecting stalactites hanging down from the ceiling.



A view across the lake, with underwater boulders visible in the foreground through crystal clear, cobalt blue water.

that the pressure could not be released. The divers were now in the unenviable position of being in the confines of a small chamber, some five feet across, with a potential high-pressure bomb that could go off any moment, bringing the rubble slope above them crashing down. The still-coupled cylinders were placed gingerly in a corner of the chamber and the divers beat a hasty retreat, waiting until all the air had escaped from the pony bottle before venturing back.

While the divers worked below, a surface gravimetric survey was underway to estimate the extent of the cave where the divers could not venture. The results of this survey did not indicate the existence of a large cave system extending past where the divers had penetrated, but as the instrument was working through solid rock of up to 500 feet thick, the possibility of the system carrying on could not be overlooked. However, we found no grounds to substantiate the theory that the numerous known water-filled caves in the area were interconnected, as it has been established that the water in each cave system is at a different level. However, there may be a very slow percolation of water between some of them. The positive identification of identical cave-dwelling aquatic fauna in two adjacent systems would also be a good indication as to the possibility of there having been a good connection in geological history, but such a discovery has not as yet been made.

Ironically, the day that John Irish, an entomologist from the Windhoek Museum left the farm, one of the divers chanced to dive directly below the entrance to the chamber where the bottom was only about 120 feet deep. On the silt-laden bottom, gently sloping toward the abyss, he spied some strange, pure white shrimp-like crustaceans moving around in the mud. The game was on, the hunting instinct rekindled, Phil Church surfaced happily clutching a small bottle full of "Philipus Aquaspaeleologicus," a rare and suddenly threatened species! On further dives in the area a number of different crustaceans were collected for identification. These specimens were sent to the University of Cape Town where it was ascertained that three

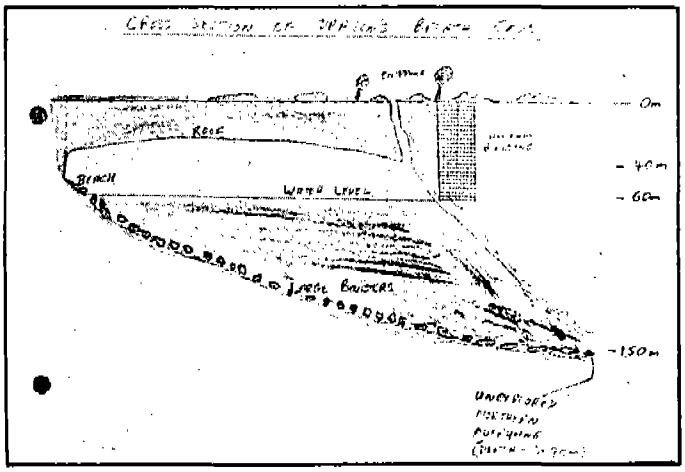
new species of cave-dwelling crustaceans had been discovered, being totally adapted to the cave environment.

To complement the underwater survey, a bathymetric survey, using the inflatable boat and an echo sounder, was performed and the bottom profile contoured. Unfortunately this could only be done from the lake surface so that the most interesting area beneath the Northern Overhang could not be covered in this way. One of the most interesting areas that we found underwater was near the beach where we found impressive submerged stalactites. As these calcite formations can only form in air, their presence is a good indication of previous water levels in the cave. These particular formations were found as deep as 50 feet below the surface of the water. The bottom of the lake was strewn with broken formations, the pure white of the calcite contrasting radically with the dark, silt-laden background. The resulting effect was to give the impression of a strange and alien landscape in this crystal clear water.

Two members of the Swiss team performed the deepest dive of the expedition to a depth of 300 feet. Continental cave divers are generally brought up on working in extensive horizontal cave systems, sometimes several miles in length, and as a result their scuba rigs were, to say the least, impressive. Each diver had four 130-cubic-foot steel cylinders strapped to his back, each with its own regulator and contents gauge, necessitating the most amazing array of hoses. One cylinder contained compressed air, another contained nitrox with 50% oxygen, and the other two contained trimix with 20% helium. Pure oxygen was left on the decompression line at 40 feet for the shallower decompression stops. As a breath of pure oxygen at a depth of 300 feet would have a catastrophic effect on a diver, the regulators were carefully color-coded for obvious reasons! The total rig weighed a back-breaking 260 pounds.

This amazing plethora of diving equipment required to get the divers to the very core of the earth, was check and rechecked in nervous anticipation. Eventually they left the surface in an explosion of silver bubbles and quickly sunk to the bottom. When they were 300 feet below the surface we could see them clearly, looking like diminutive ants crawling along the bottom, their powerful underwater lights illuminating the cave floor in deep blue. There was one thing that nobody complained about . . . the visibility.

Continental cave divers are far from newcomers to living in the fast lane, but it was a British cave diver who once said, "Life at the frontier is fragile." For example, take Hasenmayer's incredible solo dive to a depth of 660 feet in Vaucluse Cave in France, hanging onto the raft of tanks full of heliox, or Leger's 1400-foot penetration into the Grotto de Thais at a depth of 285 feet. (From *Descent Magazine*, Dec. 1986.)



Notebook sketch of a vertical profile of the cave, showing the underwater portion not pictured on the cover map.

Diver kitting up on a floating platform. Note the helmet-mounted lights.

One of the highlights of the trip for me was a 265-foot dive to try to ascertain the extent of the elusive Northern Overhang. As we had built up slowly to this depth, the effects of nitrogen narcosis were becoming minimal and we therefore opted for compressed air as trimix extends the time spent on decompression considerably. At 265 feet I experienced a feeling of isolation mixed with the euphoric sensation of nitrogen under pressure. I was now 460 feet below ground level, equivalent to the height of a 40-story building, in a place never seen before by human eyes. Our pure white lifeline snaked reassuringly away toward the surface . . . our one link with safety. Incredibly, the submerged mercury-vapor light, some 650 feet away, was still visible, be it appearing only as a pin prick of dark blue light, having travelled through such a vast expanse of water. Would I be exagerating if I were to estimate the visibility to be at least 800 feet? It it were possible to have the sun shine onto the surface of this lake the sight would be absolutely amazing, but it is in fact this very lack of sunlight that inhibits the grow of algae and keeps the water so clear.

I looked up from the base of a huge silt-festooned boulder where I was looking for any form of life, to see Dave perched cheeckily upon the boulder diligently scribbling on his note slate. To the north the cave carried on as if in defiance of our puny efforts, continuing under the overhang, a tempting sight in spite of the fact that the distance from roof to floor was diminishing quickly. My decompression computer was telling me that it was time to leave the bottom, but the scene was so totally amazing that I was sorely tempted to stay a few minutes longer to savor the sensation. Common sense prevailed, however, and I signalled to Dave to start the long ascent to the first decompression stop. This dive was equivalent to a sealevel dive to 330 feet and even a few more minutes spent at the bottom would carry the penalty of an extended time spent on the decompression line. In spite of the depth of this particular dive, we had only achieved a horizontal penetration of 315 feet due to the steep slope of the roof in this area.

The two questions asked of me most frequently about the expedition are, "Was it fun?" and "Was it a success?" To the first question I must confess that "fun" is probably a misleading description of my stay on Harasib Farm. It was very hard work with some working days stretching to 16 hours nonstop. In addition, with such a responsibility on my shoulders, it was not easy to relax. I feel that the expedition was totally successful with all the objectives having been accomplished and most important, no accidents having occurred. The merging of two specialized disciplines, that of vertical speleology and deep diving, was done to obvious advantage and I, for one, benefitted tremendously from the experience of leading such a diving team. Futhermore, if the Guinness Book of Records is anything to go by, we have established a new world record for an

underground lake. The Lost Lake of Tennessee is given as 4.9 acres and our Dragon's Breath survey indicates a lake of 5.2 acres . . . close, but nonetheless a record.

As far as the future of Dragon's Breath is concerned, we have established a good friend in farmer Leon Pretorius, who is fully aware of the dangers of allowing inexperienced people into his cave. Maybe one day he will open the cave to tourists and again the echo of excited voices will reverberate from the very heart of this subterranean world. In the meantime, the valuable water will be pumped up to irrigate his dry and dusty land, but always with the conservation of the cave in mind.

"I am forever walking upon these shores
Betwixt the sand and the foam
The high tide will erase my footprints
And the wind will blow away the foam
But the sea and the shore remain . . .
Forever."

(From *Sand and Foam* by Kahlil Gibran)

WAKULLA SPRINGS

"God, Uranium, & Wakulla Springs"
- by Wes Skiles

[Reprinted from *Florida Environments*, Oct. 1987]

It was raining hard the first day I ever dove Wakulla Springs--the granddaddy of all Florida springs. Just before I descended, I stood on the bank of the spring remembering clearly all the times I had wanted to crash right through the glass bottom of the boats that would cruise out over the forbiding depths of the spring.

I was there now, drifting effortlessly down toward the large gaping entrance, its size, too much for me to comprehend. My heart pounded with excitement, one of my life's goals about to be fulfilled. In the past 25 years, only a handful of divers had been allowed into this most awesome of Florida's aquifer vents.

My head was swimming with visions of what I thought I would see. Quickly those thoughts were being replaced with reality of finally being there. No words can describe the mystique, the power, that this chamber of the ancients held. Its size alone is enough to humble any man, its history as rich as the creation of earth itself, its significant to man's future, still a mystery.

I slowed my descent at 140 feet to check my gear and to turn back and gaze at the entrance. The view, one I will never forget, was that of a giant, open, gaping mouth with no emotion, just there, thrusting out 400 cubic feet of water per second. Its entrance a mere 150 feet wide by over 70 feet tall is large enough to fly a 747 jet through. Trying to calm my breathing down before penetrating further, I took time to roll off some film knowing that the results would not equal the moment.

Deeper into the cave was the unknown for me. For Stanley Olsen, Gary Salsman and a handful of others, there was a world they cherished, honored and protected for over 25 years. Their desire: to see to it that no man would ever disturb or destroy the previous history that was strewn randomly across the floor like lims from trees in a virgin forest. I turned and headed in, confident that if Stanley, Gary and his friends truly knew me they would know the fate of the cave was in good hands.

Caves are one of the Lord's greatest natural museums. The cave diver is therefore a highly privileged visitor to this most unique environment. To touch or remove anything from its place would be as great a crime as stealing a previous stone from the Smithsonian. All I wanted to do was look, and what I saw sent chills through me. There directly in front of me were the remains of a great mastadon. Its large bones lying scattered in an area about 20 feet in diameter. I lifted my camera in slow motion feeling the effects of narcosis at 190 feet. After filming the bones I looked deeper into the cave, its total dimension escaping the powerful illumination of my huge aircraft landing light.

For the first time that I can remember in a long time, I felt the urge to turn around and escape from a cave. It was as if the cave was too powerful for my mortal soul, and maybe it was. I again checked my instrumentation and decided it wouldn't hurt to exit at this point. On the way out I began to feel an almost overwhelming urge to turn around and go back, to go further this time. I banished the idea, knowing well the fate of others who have given in to such temptations.

The Seminole-Creek Indians gave Wakulla its first name: "Tah-ille-ya-aha-n." Translated it meant: "Where water flows upward like the rays of heavenly light out of the shadow of the hill." Through time the spring's name eventually evolved to "Wakulla," which simply means "Mystery." I guess the Seminole- Creeks even had a rough time with the original given name.

In late October of this year [1987] the single most important co-op effort between the State of Florida and Wakulla Project Exploration team will begin. Our goal, a symbiotic one, to attempt to better understand the nature and characteristics of the Florida aquifer. It's very important that readers of this column understand that until the minds of the scientific community hook up with tresearch/explorers of the aquifer, we will never reach the potential of what we could learn together. Can you imagine where we would be right now if space exploration was purely sought out and funded only by adventurous explorers with no scientific interest being involved?

A prime example of this most needed symbiosis has just occurred. Dr. J. K. Osmond of Florida State University contacted me on the possibility of collecting samples for a study on disequilibrium of uranium isotopes U-234 and U-238 as an isotope- dilution approach in hydrologic investigation. For over 30 years Dr. Osmond and his associates have been attempting to understand the origin of waters found in varying aquifers by studying the activity ratios of uranium isotopes. Ironically, much of their reserach must be treated in a semi-quantitative manner because of missing pieces of data that the cave diver/technician can easily gather.

This example, as well as many others, is the prime reason we need to continue to push for a better understanding of Florida's most precious resource. The Wakulla Project is the first real step in bringing scientists, engineers, environmentalist, politicians, and th research/explorer together, to exmaine the potential of what we might learn together.

After I surfaced from my encounter in the grandfather of all springs, I was stunned by the experience. I could hardly believe I was there, saw the things that I did, and felt the power of the place. Later that night at my home I went to my library and pulled out everything that I had collected on the spring. I re-read every piece with renewed fascination and excitement. I was there and my life will never be quite the same.

"Wakulla Springs Diving Finished"

[Reprinted from *Charlotte Herald-News*, Dec. 5, 1987

The Space Age met the Ice Age in rural north Florida during an ambitious underwater exploration porject that participants compare to walking on the moon.

Project Director Bill Stone emerged from Wakulla Springs Friday afternoon after spending 24 straight hours underwater, dependent solely on a prototype rebreather that could dramatically expand the range of scuba divers. A few yards out and 185 down, beneath the surface of the crystal-clear spring, lay the bones of mastodons and other Ice Age mammals that once called the area home.

The rebreather test was the final success of the six-week project. Project members planned to begin disassembling their

gear today, and will leave the springs early next week.

Stone's computer-regulated rebreather removed the carbon dioxide from his exhalations, allowing him to breathe the same air over and over again. The rebreather, reminiscent of the backpacks astronauts wore on space walks, could someday allow divers to stay underwater for almost unlimited stretches.

Stone, who designed the rebreather, had expected it would allow a person to stay under about 24 hours.

"Wakulla Exploration Answers Some Questions, Asks even more" - by Wes Skiles

[Reprinted from *Florida Environments*, Feb. 1988]

In October and November of 1987 a select team of specialist cave divers in conjunction with the Dept. of Natural Resources entered into an agreement that would allow scientific investigations and exploration in Wakulla Springs to take place. The objectives, though wide and varied, were focused on collecting as much data from the spring as possible. One of the principal goals: to attempt to define the total picture of what is without a doubt one of the largest and deepest networks of underwater conduits in the world.

Of our many goals during the project, most were successfully completed. Major successes included: testing a revolutionary new computer-controlled mixed-gas re-breathing system, building and living inside an underwater habitat, exploring and mapping as much of the vast underground system as we could safely explore, and finally, completing a series of scientific experiments on the hydrogeology of the area. This last area of inquiry has spawned questions about the groundwater's long-term purity. More on that in a minute.

Dives into the cave were made on a synthetic gas known as heliox. This eliminated the problem of narcosis which I referred to in my last column. Breathing heliox, my mental image of the cave transcended from what I had previously remembered. Using sonar, cave dimensions were taken to add cross-sectional data to the map.

It's sometimes difficult to describe tunnel size to people who have never seen an underground passage, but let me assure you Wakulla's size is impressive. In one of the average areas the dimensions of the cave were 117 feet wide and 47 feet tall. That's big enough to build a four-story building with 40,000 square feet of floor space, and still have room to park a car.

897 feet into the cave was an enormous room that was formed from the cross-jointing of a series of fractures. From this point the cave fragmented, splitting into three distinct passages heading further into the cave.

Each tunnel had its own character. The largest of which was dubbed "The River Sink" passage, carried various levels of tannic water which could change the spring's water visibility daily. The other two tunnels, though not quite as large, discharged pure, clean, clear water; the kind of water that I like to refer to as "air clear." Plans were to explore all three of these tunnels, penetrating them as far as our vehicles and gas supply would safely permit.

As the project continued the cave grew both in size and complexity. This was quite the opposite of what most people hypothesized would occur. Another big surprise was the directions the various passages chose to run.

Although caves never have seemed to follow any one set of man's applied rules, Wakulla's sinuous networds seemed to defy all of what would be considered logical hydraulic patterns. From the Grand Junction Depot Room, two tunnels departed heading south and one headed east.

In review of available potentiometric data, tunnels lying in a north-south trend should have water flowing to the south. This was obviously not the case, at least not within the zone we were able to explore. So what has caused these giant passages to form 180 degree opposite of the potentiometric surface?

Possibly the most intriguing theory is that the Wakulla System formed initially not as a spring, but instead as a large swallow hole or sinking point. This would have occurred some time during the early Pleistocene when high volumes of surface water draining south came in contact with the Woodville Karst Plain. Here acid-charged waters could easily cut into the limestone dissolving an underground network which would extend all the way to the Gulf.

If this theory was indeed the case, it would account for several phenomena which have never fully been accounted for. One of these is the subject of how the large number of Pleistocene bones have come to be scattered through the Wakulla Cave as far back as 1200 feet. Another is associated with a nearby cave system, the River Sink System, which has just recently become the World's longest underwater cave, measuring in at 48,000 feet and still going.

The River Sink Cave System, along with several other large systems nearby, all have the same characteristics as Wakulla: large deep conduits trending north/south. Should man's exploration techniques continue to excel, these systems will be physically connected within the next decade. The fact these systems may be all interconnected is really no surprise to those of us that have been exploring them.

When exposed to the right elements, karst terrain, like the Woodville Karst Plain, forms underground rivers of magnificent proportions. Should this be the case--and I'm confident it is--then the Woodville Karst Plain has a series of interconnected underground rivers that extend from its northernmost flank (just south of Tallahassee) all the way to the Gulf of Mexico. This has raised questions concerning the ultimate disoposition of Tallahassee's stormwater runoff.

Data collected and discoveries made during the Wakulla Springs project are presently being studied in an attempt to better understand a system which may extend out beyond our wildest dreams. Several things we now know conclusively will have a great impact on the region's water supply,.

"Wakulla Springs' Project Featured Many Scientific Studies, State Agencies Cooperation" - by Wes Skiles

[Reprinted from *Florida Environments*, Mar. 1988]

Wakulla is a spring rich in hydrological, geological, biological, archaeological and paleontological history. Few of these areas have been explored and none completely studied. The Wakulla Springs Project presented an excellent opportunity for research divers to work with scientists in studies relating to the spring and cave. Prior to the start of the project, a meeting took place with members of state agencies and universities to outline possible study areas.

The following briefly describe the processes undertaken to complete the scientific objectives and the preliminary results of the project's findings.

Stratigraphy and Lithology. Stratigraphy and lithology studies were performed in conjuction with the Florida Bureau of Geology. Justification for having divers collect the samples rather than coring from the surface was based on the fact that divers could make vital observations about the formations of the cave in relation to its stratigraphy. The primary goal of this type of rock sampling is to determine the specific zonation of the various rock groups and their relationship to the formation of the cave. The age of the rock in which the cave was formed and the original life forms can also be identified.

Sampling took place from 9 feet in the spring basin and extended down deep within the cave to a maximum depth of 307 feet. Samples were taken at 10-foot intervals with the exception of the shallowest and deepest samples. The results of the stratigraphy study indicated that the Saint Marks formation was found lying atop the Suwannee formation, the

contact zone being at 90 feet. The predominant cave zone is formed in the Suwannee formation within a strata of rock approximately 24 million years in age.

Important observations about stratigraphic structure were made by team members, including the positive identification of an ancient reef zone. At a depth of 307 feet a dolomite bed was identified and sampled. This form of limestone is far less permeable and represents the basement rock which is partially responsible for where and why the Wakulla Springs cave system formed.

Bottom Core and Sediment Sampling. The history of Florida's water-filled caves is still a great mystery waiting to be probed, explored, and understood. One method of chronologging the history of these caves is to evaluate core samples from cave- floor sediments. Identifying layers found within these cores helps give clues as to events that have occurred during the past. Differentiating between clays, sands, and organic layerings points to various cycles that the cave has experienced. Another possible study to consider is pollen dating. This technique is used to date sediments by locating well-preserved pollens within the sediments and correlating them to trees and plants of a specific period. Since Florida has experienced a variety of climate conditions over the past 40,000 years, many trees and plants no longer exist here that may have been abundant during the Pleistocene.

Five cores were successfully extracted during the Wakulla Project, each taken from a different region within the cave. Special attention was given to sampling one of the principal bone beds found within the cave. Although the results are not final, it is hoped that by knowing the age of the sediments better understanding of how the bones came to lie within the cave can be gained.

Water Quality Sample. The future of Florida's water quality is becoming one of the State's top issues. The North Florida Water Management District, in conjunction with the Wakulla Project, established a plan to study the overall water quality of the Wakulla System. By sampling and testing waters discharged from the individual tributaries found within the system, a date base can be established to monitor changes which may occur in the future.

Five such samples were taken within the system and have gone through complete analysis. 105 categories were tested including metals and organics. Although several smaples were found to be nearly identical, one was distinctly different. This tributary will be closely monitored in the future for signs of change.

Uranium Isoptope Sampling. Uranium is a trace element that is rather ubiquitously distributed in nature. The level of occurrences of uranium in rocks and soils of the area is sufficient to produce measurable concentrations of uranium isotopes in groundwater. When factors such as weathering and surface-water intrusion occur, certain uranium isotopes are forced to separate from their parent isotopes causing a form of isotope disequilibrium. This sets up a unique situation in which waters sampled and identified as having a certain ratio or signature can be traced over great distances.

Applying these concepts to Wakulla Springs, Dr. Ken Osmond, Geo-Chemist at Florida State University, has been conducting a long-term study of Wakulla Springs and the surrounding region. The results of his study indicate that waters surfacing in the spring come from a variety of areas, one as far as 27 km from the spring.

The Wakulla Projuect presented the opportunity to take Dr. Osmond's study one step further by pinpointing individual water sources and collecting representative samples from those sources. This allowed for a more specific determination as to the ultimate source of these individual tributaries.

By penetrating various tributaries within the cave, project team members were successful in collecting all samples necessary to complete a full battery of isotope studies. Data from these studies are presently undergoing analysis to determine their relationship to the region's watershed.

Dye-tracing Experiments. By using non-toxic dyes, a variety of studies can effectively be performed to understand travel speed, volume, and dispersal rates of water moving through a system. In addition, dyes can be used as a means of tracing water movement when it moves from one area to another underground.

Both forms of dye studies were successfully completed by team members in conjunction with the Florida Sinkhole Research Institute and the United States Geological Survey. A positive connection between two caves (Indian Springs siphon tunnel and Wakulla Springs) 1.5 miles apart was established as a result of the qualitative study.

Biological Collecting of Troglobyltes. It is hypothesized that the entire Woodville Karst Plain is interconnected by a complex network of deep passages formed during the early Pleistocene. If this hypothesis is true, then generations of life forms as old as the caves themselves have become distributed through this vast system by a process of natural migration. Prior to the Wakulla Project no formal collecting of troglobytic life forms had ever taken place within the Wakulla system. Therefore, the purpose of our biological dive team, in conjunction with the Dept. of Natural Resources and Dr. Bruce Means, was to observe, collect, and study these rare and unusual life forms.

Studies are presently underway to determine if DNA chains of troglobytes collected within the Wakulla system match up with the DNA chains of other troglobytes within the Woodville Karst Plain. Future results of these efforts will yield a far greater understanding of these life forms and their relationship to the physiographic setting.

WILD WELL PROJECT, IOWA
- by Mike Nelson and Doug Schmuecker

Trip report: 11-15-87; Lowell Burkhead, Aaron Nelson, Mike Nelson, and Doug Schmuecker; Doug Schmuecker reporting.

We met Sunday morning and spoke to the landowners. Mike had obtained prior permission. It was disucssed and we decided to make short solo, check-out dives, looking for old lines and other hazards, not going any further than one reel length (about 300 feet).

Mike wanted me to dive first, since I've looked forward to a dive like this in Iowa for years. We worked out our plan, and proceeded.

We each had Y-valve tanks with an extra tank and regulator. I carred three lights, and an extra mask and reel-- the proper set-up for a solo dive of this type.

A 20-minute dive was planned. After a couple of minutes I cam up in an air-filled joint. Form this joint I went left, as the chamber appeared to turn here. Going from here, I saw what appeared to be the end of the old line, and came up into another air-filled joint. The water was 10 feet deep and about 20-25 feet wide.

Things were going great; the water was clear and wasn't getting too stirred up. I was only five minutes into the dive and was confident I'd be at the end of the reel shortly. But this all change: my back tank worked loose and fell. To use this tank I had to change to my long hose and drop to the bottom. This created an unavoidable silting problem. When the tank dropped, the line wrapped around the regulator. There were several other problems to take care of. After several minutes I decided to tie off the reel and leave it, and to follow the line out with my tank under my arm. I considered coming up in an air

chamber and waiting for Mike, but felt that self-rescue was I surfaced after 35 minutes, long past the planned 20 minutes. Mike and Lowell were concerned, and Mike was going to come in to see what my problem was.

The set-up I used has worked well in the past, in caves, shipwrecks, and under the ice. The break-down would have been serious even in open water.

Mike waited about an hour for the water to clear, but with no flow, he found the visiblity near zero and wisely decided to abort his dive.

Lowell, Mike and I talked over future diving plans. We all felt that future trips were needed. The four of us then took a hike down the valley. Lowell showed us some interesting places. In looking back at the dive problem . . . if you follow all safety rules, you can take care of a major problem--and end up with only your feelings hurt.

Trip report: 1-2-88; Lowell Burkhead, Randy Kwiatkowski, Art Dahms, Mike Nelson; Mike Nelson reporting.

On 11-15-87, Doug Schmuecker make the first dive into Wild Well in eight years, and opened what we hope to be a new era in Iowa cave diving. The primary result of his first effort was the discovery of a left-hand passage to the left of the "T" Room, the first air bell. A secondary result was my having to reconsider my qualifications to join him in this large cave passage. I didn't believe my cave-diving skills had evolved to the level required for virgin pushes in underwater cave of this magnitude. At this point I was considering recruiting more experienced help to join Doug. As pure luck would have it, I got a call from Randy concerning Coldwater Cave, after which we discussed this project. Randy was so willing to help in the diving and provided so much logistical help that it only seemed fair to give credit where it was due, and declare this a joint Iowa Grotto/Wisconsin Speleological Society project. When Doug found that he would not be able to make this dive as planned, he gave us his blessing to proceed without him, so Randy brought along his friend Art. They ahd plenty of experience together, which would make for the safest imaginable team, another consideration Dough and I had discussed.

We all met at the appointed place and time and got out expedition under way. Randy had secured a snowmobile and spent some time building a sled. The 14' of snow we had the week before made it seem unlikely that we could get to the site any other way. He and I drove it down and found that we should be able to bring in the 4x4's and save ourselves a lot of messing around with transferring all of the scuba gear a couple of times.

Things started to move swiftly now, as Lowell and I helped the "Pros from Plover" (Wisconsin) don their drysuits and cave-diving gear and back-up gears: dual 100-cubic-foot tanks, lights and more lights, primary and secondary reels, line markers (called "dorfs"), regulator retainers, etc. They must have each been carrying 150 lbs. when fully decked out.

I got a few photos while they dressed and walked down to the Well, and a couple more as they entered the water. Soon they were gone and there was nothing for Lowell and me to do but B.S. and kill time. They ahd assured us that they could get out of anything they got into and that there was no reason to set a time limit, though Randy had mentioned that his primary light was only good for an hour and a half. he had also offhandedly mentioned that should they encounter air-filled passage they would come out and switch to their wetsuits to push it out (to avoid damage to the drysuits). This gave us a framework to use to decide when to start worrying.

After a half hour, we knew there had to be cave; after a full hour we decided things were getting interesting; and right at one and a half hours, the intrepid explorers reappeared.

They had laid out 540 feet of line (left in cave) through five air spaces, to a 30-square-foot breakdown room. After the second air bell (previously reached by only one diver, Al Swenson), the cave departed from the large open expanse described by all who had dived it, to a more typical cave. Randy and Art had to lay line over, under, around, and through breakdown and close spots to continue pushing it out. Upon reaching the breakdown room, Randy removed his tanks to climb across it and observe passage disappearing into water again on the other side. Deciding that this obstacle would require them to rethink their gear a little for smooth, safe progress, they called it a dive and followed the line back out in zero visibility.

They had experienced adequate visibility on the way in and had spotted two fish of a species they were not able to identify, and one crustacean. They had also seen one bat in the entrance area. They did not notice Doug's left-hand side passage, but I'm still convinced by his description of it that it is not anything that was entered either this day or previously.

I am convinced that this cave has been waiting for the state of the art of cave diving to evolve. I believe it will yield to modern techniques and equipment. I also believe it will demand a much more determined effort than it has seen in the past. I am patiently waiting for Randy and Art to hash over their thoughts on this and come up with plans for Stage 2 of the Wild Well Project. Good work, you two.

Trip report: 1-30-88; Lowell Burkhead, Randy Kwiatkowski, Art Dahms, Mike Nelson, Larry Welch, Mike Lace, Aaron Nelson, Steve Moon; Mike Nelson reporting.

Randy and Art fixed themselves up with side-mounted 80-cubic-foot tanks, to better cross the breakdown room discovered on their first dive. We assisted them as best we could and saw them into the cave at 1:46 pm. They intended to be in three hours this time. They used wetsuits this time around.

Once they were in, we did a thorough inspection of most of the property to the south of the Well and found all of the sinks and crevices the landowner had told us about. One of the sinks will be worth a look after the snow melts.

It was an unusually warm day for this time of year, and we saw more than a few mosquitoes that must have slipped out of the cave to fly about over the snow. It was an odd sight. Luckily, the water only rose 9-12" while they were in, and Randy and Art came bubbling out of the submerged passageway exactly three hours after entering! They had a question between themselves about one of the last measurements on the way out and returned to recount, making for a total dive time of 3:20.

Art left his gear on one side of the breakdown room and helped Randy with the slippery job of getting his gear across the room to dive the continuing sump beyond. This was no small task, as the room was somewhaty longer than Randy's original estimate, more like 95' than 35'. Randy soloed into this sump for another 240' (they tied back onto the line on the entrance side of the 95'-breakdown room; distance includes this line also), laying line through one more room and tying off in yet another before reaching his thirds on both tanks. He spent 24 minutes on this solo dive. The cave was free of breakdown, and in the area of 12' wide and 3-4' tall and going. The passage trends in the general direction of 80 degrees.

The fish mentioned in the previous report were spotted again this trip, and photographed with a camera Steve Moon had sent along for just that purpose. Theyw ere identified as being a cariety of sucker with mottled skin. Randy and ARt got other pictures of themselves that we are waiting on pins and needles for Steve to develop. Unfortunately, they missed a shot of what may have been a freshwater shrimp.

According to Randy's notes, the cave now extends approximatley 794' through eight crevice airbells and the one large breakdown room. The crevices run nearly parallel to the passage, so that they seemed to enter the crevices on one end and leave on the other. They are diving in only a few feet of water.

Though they didn't visually verify Doug Schmuecker's left-hand side passage, the figures seem to bear it out. Doug was in less than 150' when he reached his second room; Randy's figures show their second room at 184'.

Trip report: 2-6-88; Lowell Burkhead, Randy Kwiatkowski, Art Dahms, Mike Nelson,Delores Nelson; Mike Nelson reporting.

After reading the last trip report on the project and checking for accuracy, Randy suggested that I explain the Thirds Rule for the benefit of those unfamiliar with cave diving and its strict rules. The thirds mentioned in the previous report refer to 1/3 of the are being used up, at which point the diver turns around. VThis gives him 2/3's of his air supply to exit the cave on. Theoretically, he should have 1/3 left upon completion of the dive. This is his backup or emergency allotment, his safety margin in the event of the unforeseeable or to share with his buddy should he experience a total air failure. Randy had used 1/3 in only one of his two bottles on that dive.

This dive was very successful, not just in passage that was pushed, but in short cuts that saved time and energy. Speaking of time, this dive got underway at 11:40 am and ended at precisely 3:40 pm. how they magane to time things right to the minute is beyond me, but I'm beginning to think that they hold up in the first air bell and kill a few minutes if need be to accomplish this.

In the breakdown room, Art discovered a way to skirt the pile, saving about 45 minutes in carrying the tanks over and back. They could wear their side-mount tanks and stay in the water, also saving previous energy. They then dived the area soloed by Randy and laid another 110' of new line before coming up in "dry" stream passage. This was the first flow detected, aside from the very minor trickle audible to the left side of the entrance. This stream passage was pushed for 315' before "going under" again. The sump continue--5' tall, 12' wide, and is unobstructed.

They dry area had a loop passage that could not be fully traversed, adding about 80' to the known length of the Wild Well, and Art added another 30' in a side-lead climb to a small dome. Art also commented that there appear to be side leads along the way that will need inspection. This brings the distance from the entrance to over 1200' and the total pushed passageway to well over 1300'. The cave eveidently made a radical turn in the alst sump, as it had been trending roughly 80 degrees up to the breakdown room, but Randy observed that the stream room was running about 330 degrees.

The project will be on hold for a while, until Randy and Art can both get time off together again. When that day comes, though, we all feel that the Well will yield much more passage.

LITTLE DISMAL DROWNING

Just before presstime it was reported that over the weekend of May 14-15, NSS- and NACD-certified cave diver Bill McFaden died in an accident in Little Dismal Sink in Tallahassee, Florida.

Bill McFaden and certified cave-diving buddies Bill Gavin and Bill Main were diving under written permission from State authorities to complete the final stages of a complex underwater survey of Little Dismal Sink involving depths between 220-240'.

Though cave certified only last year, McFaden, a professional land surveyor and enthusiastic dry caver as well as diver, had accumulated significant exerience in advanced and extended penetrations, diver propulsion vehicles, and deep diving, including mixed-gas diving. He was involved in the recent extensive deep explorations in the Sullivan System and had done more than 40 dives in Little Dismal for this survey project alone.

The basic facts, according to Parker Turner, who was on the scene and provided additional decompression tanks and oxygen, are that as Main and McFaden were on their way out after completing a deep (220'), tight, silty section of survey, McFaden got lost off the line, and had an out-of-air failure shortly after being rescued. During air sharing with Gavin, he experienced significant buoyancy problems with his drysuit that greatly complicated air sharing on the way out of the cave and resulted in an uncontrolled ascent to the ceiling of the cave. It is possible that it may have been during this ascent that McFaden suffered the air embolism discovered in his brain during post-mortem examination. This injury may well have contributed to McFaden's inability to deal with air-sharing procedures after a second out- of-air emergency occurred on the far side of the entrance restriction, at which point he drowned.

Recovery was performed by certified cave divers, and a full report is being prepared by Steve Gerrard, which will be printed in the next issues of both *Underwater Speleology and NACD News.*

SECOND CHANCE - by Bill McFaden

[Reprinted in memoriam from *Florida State Caver, Oct. 1987.]*

Sixteen years. Half my lifetime. My mind replayed those thoughts again and again. Standing in the warm stillness of an early August morning on the bank overlooking the clear blue, pristine waters of Peacock Springs, the events of that day long ago when I first stood on that spot came sharply into focus. Perhaps because so little had changed. Or because so much had changed. Or perhaps it was because many of the emotions I felt were the same as the ones I experienced on that first visit. Maybe it was all those things.

The SCUBA boom of the early 1970's reached even into the sleepy little southwestern Georgia town of Bainbridge, where I grew up. As many of my boyhood friends became certified in basic SCUBA training, it was inevitable that I would be drawn into the sport. A summer snorkeling trip to nearby Yate's Springs and I was hooked. Yate's Spring is a large basin on Spring Creek near Brinson, Georgia, containing three spring boils which feed a large run with crystal clear water. Only one of those boils was open to swimmers and snorkelers; the others provided drinking water for the owners.

Free diving to a depth of 30 feet in the spring, I was fascinated by a small cave opening from which issued a powerful flow of water. Where did it come from? Why? I began reading everything I could get my hands on about springs, sinkholes, limestone caves, and other karst phenomena. It was no time at all before I became completely obsessed with underwater caves. A summer job bagging groceries provided funds to pursue this compulsion, paying for SCUBA instruction (in Tallahassee, Florida) and in trips following to Morrison Spring, the Wacissa River, and other local springs and sinks. I was further introduced to the beautiful variety of freshwater springs. This served to further fuel the fire of curiosity which burned inside my head. I became aware of the NAtional Association of Cave Divers (NACD) and learned of their safety practices. I dreamed of becoming an NACD-certified cave diver, to dare to swim into these mysterious beckoning openings into the earth and to learn their secrets. Due to my tender age and limited resources, it was a dream I could not realize.

With the increasing number of divers in the Bainbridge area, it was a natural progression to organize these new, inexperienced divers into a local diving club. These efforts were spearheaded by a local businessman (who will remain nameless) who proclaimed himself a cave diver, even though he lacked even basic SCUBA certification. At our first official gathering, he elaborated on his many "cave-diving"

experiences, some of which included his 13-year-old son. He proposed to call our group a cave-diving club. My friends and I, realizing that we were not cave divers, and despite his tales, knowing he was most certainly not a cave diver, resisted these efforts, and were successful. We were, however, not unaffected by his stories. He told us of his visits to the Peacock Springs System, of diving into one spring entrance and traveling through breathtaking passages to emerge from yet another opening. Nothing to it, he said, perfectly safe. He and his son (who also lacked SCUBA training) had made the dive on several occasions. By the time he proposed a club trip to make the traverse from Peacock Springs to Pot Hole Sink we had succumbed to the lure, and despite some reservations, we all agreed.

So it came to pass that we travelled to Luraville on that August morning in 1971. Sixteen years ago. Half my lifetime. It very nearly became my entire lifetime. There were six of us that morning. All had single 71.2-cubic-foot tanks except myself. I wore twin 40-cubic-foot tanks. There were no submersible pressure gauges; there were no reels and guidelines; there were no dual-valves or octopus regulators; and we each carried one light. Our leader's son carried as his only light source a plastic Ray-o-vac 6-volt lantern, which we learned later, imploded early on, rendering him lightless for the majority of the dive. There was no discussion of air reserves. Without tank pressure gauges, it would have been pointless anyway.

We entered the water and began our descent into the spring. Into the Blue Room we swam, with my growing excitement overriding my feelings of insecurity or reluctance that may have stopped me. I was cave diving! I was doing what I desired to do more than anything else. We dropped through the slot to the permanent line, my depth gauge reading 65 feet, already exceeding my previous deep dive. What a cave this was! Our plan was to travel in pairs, staying within sight of those ahead and behind, with my closest friend Dennis and myself bringing up the rear. Our leader and his son were in front, and they were to wait at the exit area to direct us out of the Pot Hole Sink, since we did not have his familiarity with the cave. After looking back up for a last glimpse of the bright blue skies and sunshine of the early Florida morning, we started down the corridor as planned. We dived and soared through the passage at a leisurely pace, taking time to enjoy and examine the unusual shapes of the limestone sculptures. My equipment (fortunately) worked flawlessly, and my confidence was on the rise. We could easily see the divers ahead of us, and our depth remained at approximately 65 feet. Time seemed to stand still for our exploration.

Suddenly I realized that we had not seen the group ahead in some time. Had they gone up? Had Dennis and I, in our captivation with the cave, swam past our planned exit? Weren't they supposed to way for us? Many thoughts raced through my mind as we swam ahead at a quicker pace. We had been told the exit would not be obvious. We came to a high ceilinged area of the cave and both looked up anxiously, but there was no visible exit to be seen. Suspended vertically in the "liquid air" we looked at each other wide eyed. Dennis pointed back in the direction we came and I thought, "We know that way will get us out!"

I nodded approval and we set out quickly to retrace our swim in. But did we have enough air? With no gauges there was only one way to find out. Drowning had now become a very real possibility. The fast swimming, in combination with the rising level of concern, made my breathing rate skyrocket. I tried to calm the approaching panic by concentrating on keeping up with Dennis, who was proving himself to be a much faster swimmer than I. My air was drawing hard when at last we came to the initial tie-off of the permanent line. Daylight, wonderful daylight! We were going to make it! Up through the slot and through the Blue Room to the surface we flew. We surfaced to the yells of our leader, who was running up to the bank frantically searching for us. As difficult as it was, I resisted the urge to drag him down the bank and drown him. Instead, I climbed out of the water and immediately found our lone pressure gauge (non-submersible) and checked my tanks. The gauge read 100 psig. There isn't much difference between 71.2 cubic feet of air and 80 cubic feet, but on that day it was the difference between life and death for me.

We made another dive later that day in Jenny (now Ginnie) Springs. Still shaken from my previous near tragedy, I never ventured far beyond the entrance. As far as I was concerned, my cave-diving days were over. Likewise for the "cave-diving" club.

But my dream endured, tucked away in the recesses of my mind. After leaving Bainbridge a year later and moving to Tallahassee in pursuit of a career in land surveying, I gradually lost touch with my diving buddies, leaving my gear in the care of a friend. I expected to one day hear news of our fearless leader's untimely demise in a water-filled cavern, but I never did. He must have given up the sport, or maybe he was just one of those fools God supposedly watches over.

I eventually moved to Panama City, Florida, where I met and married my wife at age 23. After travelling in Tennessee and Kentucky surveying for the U.S. Army Corps of Engineers, I finally settled again in Tallahassee.

Once more I began to visit the south Tallahassee diving spots. My diving bug was rekindled and I got some gear together and began exploring these springs and sinks again. But the frustration of not being able to enter the caves rendered my diving activities sporadic, at best.

Then I became aware of the existence of the Florida State Caving Club (FSCC), the local grotto (club) of the National Speleological Society (NSS). I attended a meeting and discovered, to my delight, that I could satisfy my addiction to cave exploration without the danger or expense of cave diving.

In the two years that followed, I became a hardcore dry caver. I discovered new passages and pushed myself to the limit of my endurance in trips deep into Climax Cave, near Climax, Georgia, with some survey trips lasting as long as 18 hours. I became accustomed to the darkness and mud, and even began to enjoy squirming through passages so tight I could not even fully expand my lungs. My marriage ended in divorce after eight years, and I found myself with a void in my life that I filled with outdoor activities I really enjoyed.

A few months ago, on the weekend of July r, 1987, after a canoe and diving trip down the Santa Fe River in north-central Florida, I came to the conclusion that I would either have to become a certified cave diver or give up diving completely. A few weeks after that, while visiting Barry's Dive Center in Tallahassee for an air fill, a chance meeting with Steve Gerrard changed my life. Steve, an NACD and NSS Cave Diving Instructor, as well as NACD President, persuaded me to take his upcoming cavern-diving course. (He didn't exactly have to twist my arm.) Before it was over, I knew I had to continue toward full cave certification.

So I arrived at Peacock Springs on a warm summer day last weekend, for the first time since that frightening day so long ago, with a ton of new diving gear and Instructor Steve Gerrard for the first installment of my cave-diving course. A pause for some equipment repair allowed me to observe a wide variety of SCUBA divers gearing up to dive Peacock. Many of them would be in over their heads soon after entering the water, as I was sixteen years ago. I hoped they would be as fortunate as I had been. The cave divers among the hordes there were truly a breed apart, with their massive amounts of gear laid out and carefully donned. From the water below I heard two of them calling out their safety checks, and I couldn't help feeling a surge of pride to be among them. As Steve and I entered the water and did our own checks, the nervous apprehension I expected

was not there. Confidence and excitement were my predominant emotions. So we were tied off to the permanent line and I was following Steve through the majestic corridors. I admired Steve's fluid motions ahead of me and hoped someday to be half as good as he. On we went to the rhythmic sounds of exhalations until we arrived at a termination of the line. Steve pointed upward and I saw the blue glow that I knew was Pot Hole Sink. We had found what I could not find sixteen years ago. I had also found something that had eluded me for too long. Safe cave diving. This was my first, but there will be many more to come. I will become proficient. I will work hard at it. As we crossed the sink bottom and proceeded deeper into the winding passage beyond, I knew that I had at long last exorcised the demons of my youth, and a smile curled around the mouthpiece of my regulator.

One seldom realizes a lifelong dream without help from others, and I have had more than my share. By the time this article is published (if Steve Gerrard's patience holds out--I have little doubt it will, for it is obviously drawn from a deep well), I will hopefully have completed my cave-diving certification and will join others in the cave-diving community, exploring, discovering, and mapping underwater caves. Thanks, Steve, for recognizing the spark inside of me and urging me to pursue my goals. I feel privileged indeed to learn under your watchful eye. Thanks also to Mike Sasnett of Barry's Dive Center, one of Steve's former students and a SCUBA and cavern instructor, for your extra mile to help me get my gear together, and making it affordable for me to dive with the very best equipment. He is a professional in the very best sense of the word. And thanks to John Malik, Tallahassee cave diver and master light builder, for his craftsmanship and advice, which made everything much easier. Last but not least, thanks to all the veteran cave divers out there whose innovations in equipment and techniques have made cave diving safe and responsible, so that neophytes like myself can pursue and enjoy it. You have, and always will have, my utmost respect an admiration.

NSS-CDS INSTRUCTORS - as of 3-9-88

RON ABNER
ROBERT ANDERSON
HARRY H. AVERILL
LLOYD W. BAILEY, JR.
STEVEN J. BERMAN
JEFFREY E. BOZANIC
KELLY BRADY
JAY BROMENSCHENKEL
DANIEL P. BUTLER
JOHN W. BURGE, JR.
PETER L. BUTT
J. W. "TEX" CHALKLEY
DUSTIN M. CLESI
JAMES G. COKE, IV
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JOE DABBS
JOHANNA DE GROOT
STANLEY J. DOVIAT, JR.
WILLIAM DUNN
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SHECK EXLEY
STEVEN D. FORMAN
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STEVE GERRARD
KEVIN L. GONZALEZ
WILLIAM HAY
PAUL HEINERTH
JAMIE HEMPSTEAD
LAMAR HIRES, JR.
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PAUL HEINERTH
JAMIE HEMPSTEAD
LAMAR HIRES, JR.
PETER S. JUBB
LEONARD J. KOLCZYNSKI
MARK D. LEONARD
J. A. "MARTY" MARTINEZ
PORTIA M. MARTINEZ
ROBERT B. MAUFROY
WAYNE MCKINNON
RONALD G. MENKE
SONDRA MOHRMAN
MILLEDGE MURPHEY
HENRY W. NICHOLSON
MICHAEL F. O'CONNELL
STEPHEN C. ORMEROID
ROBERT A. POWER
JOE PROSSER
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GLEN TALLEY
DENNIS W. WILLIAMS
FORREST WILSON
J. BILLY YOUNG
THOMAS M. YOUNG
JOHN L. ZUMRICK, M.D.

UNIQUE OXYGEN TRAINING COURSE DEVELOPED BY DIVING COMMUNITY

- James A. Corry

[James Corry is the Training and Standards Coordinator of the Search and Rescue Water Committee of the National Association for Search and Rescue (NASAR), and Instructor-Trainer with the National Association of Underwater Instrucotrs (NAUI), and an Associate Coordinator of the Divers Alert Network (DAN).]

Diving medical experts have long advocated the administration of 100% oxygen to patients suffering from decompression sickness, air embolism, or drowning. The problem until recently has been that a comprehensive oxygen-administration training program has not been available to the diving community.

This problem started to improve about three years ago when the National Association for Search and Rescue (NASAR) and the National Association of Underwater Instructors (NAUI) decided to join forces and develop such a program. Turning to the Emergency Medical Services (EMS) community, both NASAR and NAUI realized that the national EMS community was not adequately training emergency medical technicians in such skills. In fact, oxygen administration is probably the most highly used skill by EMS personnel, but very possible the one skill which they are least prepared to perform. It has been estimated that up to 85% of this nation's paramedics do not know how to properly administer oxygen.

With the help of the such companies as Hudson Oxygen Therapy Sales Company, Laerdal Medical Corporation, and Life Support Products, NASAR and NAUI undertook a three-year project to develop a comprehensive training program which they call the "Emergency Oxygen Administration Workshop." In cooperation with the national Divers Alert Network (DAN) based at Duke University Medical Center, project personnel who developed this program researched countless references on oxygen and interviewed numerous pulmonary experts, diving-medicine authorities, paramedic and EMT educators, emergency-medicine physicians, respiratory therapists, and hyperbaric-oxygen experts. Judging from the comments of paramedic, nurse, and physician attendees, this NASAR/NAUI effort is shaping up to the be the most comprehensive and best organized oxygen training program that this country has ever seen. Although primarily considered a continuing education program, several EMS educators believe the course should be implemented as a basic core of instruction at all levels of EMT training.

Approved by both the Council for Continuing Education Units and the National Registry of Emergency Medical Technicians for continuing education credits, the program's major appeal is the hands-on skill sessions that NASAR and NAUI are able to provide with a $12,000 traveling equipment package of resuscitators, airways, mannequins, and backboards. The basics of oxygen administration; equipment selection, use, and application; basic maintenance; and patient transport are taught during 90 minutes of initial lecture. An easy-to-use workshop filled with lots of reference material nicely follows a well- prepared slide presentation. Proceeds from the sale of the workbooks benefit the Divers Alert Network, the National Underwater Accident Data Center, and the Our World-Underwater Scholarship Society. Lecture is followed by three hours of skill sessions that require one resuscitator for every two students and culminate with realistic scenarios requiring participants to "return to the ambulance" at the other end of the building to obtain an oxygen unit that has been rigged for failure and requires minor trouble shooting for it to function properly. The only pre-requisite for the course is CPR certification and an ability to perform both one-rescuer and

two-rescuer CPR.

National acceptance of this program came slowly to NASAR and NAUI, who eventually offered the program to a very interested British Sub-Aqua Club (BS-AC). The BS-AC liked the program so much that they invited NASAR and NAUI personnel to London to conduct an instructor training course for 38 of their BS-AC top international instructors. Now conducting nearly 30 oxygen workshops a year in the United Kingdom alone, the BS-AC is increasingly expanding the program to make it available to all 1100 of their international branches.

NASAR and NAUI did not just stop with the development of an oxygen training program. For scuba-diving educators such as instructors, divemasters, and assistant instructors, as well as scientific and public-safety (police and fire) diving programs, they expanded the basic program into an 8-10-hour workshop entitled "Emergency Oxygen Administration and Field Management of Scuba Diving Accidents." Advertised as "everything you need to know from the water's edge to the recompression-chamber door," the expanded course has drawn nothing but positive reviews from participants. Everything in the basic oxygen workshop is included in this program. What has been added is comprehensive information regarding the causes, symptom, prevention, and basic physiology of both air embolism and decompression sickness. Everything you ever wanted to know about hyperbaric chambers, drowning, and field evaluation and care of the compressed-gas injured victim is included in this expansion of the original oxygen workshop. NASAR and NAUI authorities emphasize the prevention philosophy of this program. They would much rather have workshop graduates armed with better knowledge prevent such accidents than have to use the emergency skills taught within the program.

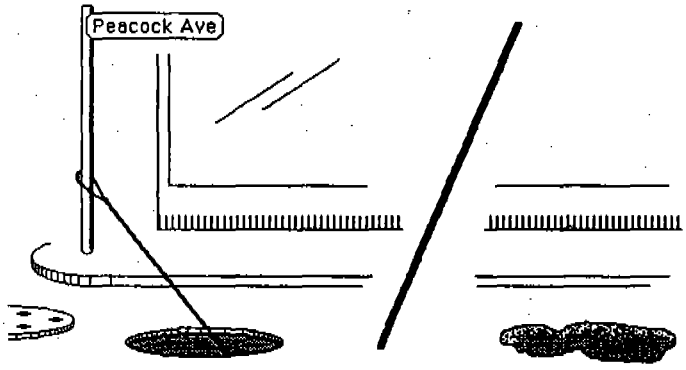
These two agencies conducted their firsty American Instructor Training Course (ITC) in Santa Ana, California in November, 1987, and have more scheduled in the future. Requirements for admission to this three-day ITC are stiff. Candidates must be certified, teaching, and insured diving instructors; EMT-Basic or equivalent; and certified, teaching CPR instructors affiliated with either the American Heart Association or American Red Cross. EMS instrucotrs wishing to take such an ITC would probably not be required to be diving instructors but would only be certified to teach the basic oxygen course.

NASAR and NAUI representatives emphasize that these two programs are not just for their own membership. Their hope is that the entire diving community will follow their lead and accept the expanded program for presentation to the diving leadership of all the certification agencies.

In addition, they hope that the EMS community will accept and embrace the gift of the basic oxygen training course that NASAR and NAUI have to offer. Regardless of your medical background, skills, or experience, this program is for you if you currently are required to administer oxygen or ever anticipate being placed in that position.

Further information regarding both courses, as well as instructor training is available from:

National Association for Search and Rescue (NASAR), 11621 Jones St., P.O. Box 3709, Fairfax, VA 22038, (703) 352-1349, and National Association of Underwater Instructors (NAUI), P.O. Box 14650, Montclair, California 91763-1150, (714) 621-5801.



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