

underwater speleology

GREEN BAY CAVE SYSTEM

(Hamilton Parish, Bermuda)

Max. Depth 67 ft.

Surveyed Passage 4405 ft. or 1.34 km.

Explored Passage 800 ft. or 243 m.

Total Passage 5205 ft. or 1.58 km.

North Shore



North Shore
Passage

Connection
Passage

Green Bay
Passage

Green Bay
Entrance

Green
Bay

Trunk
Passage

Harrington
Sound
Passage

Cliff Pool
Entrance

Harrington Sound

Surveyed by: Paul Hobbs
Tom Iliffe
Paul Meng
Rob Power
Barry Warner

0 1 2 3 4 5

Scale 1cm. = 100 ft.

Sketched & Plotted by Barry Warner

UNDERWATER SPELEOLOGY

*Published Bi-monthly
Beginning in February*

By

**The Cave Diving Section of
The National Speleological Society**

Membership in the NSS Cave Diving Section is open to any NSS member in good standing who is interested in cave diving and has paid the dues (\$3.00 for 1980). Persons not wishing to join may subscribe for \$5.00 per year. Checks should be made payable to "NSS Cave Diving Section" and sent to Stephen Maegerlein, P.O. Box 60, Williams, IN 47470.

Deadline is the second Friday of the preceding month. Send articles and correspondence to the Editor, Gene Melton, P.O. Box 2353, Titusville, FL 32780.

Opinions expressed herein are not necessarily those of the NSS Cave Diving Section.

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COVER

Map of Green Bay Cave System
Hamilton Parish, Bermuda, was
drawn by Barry Warner. After
reading the article you will
also want to go to Bermuda
cave diving.

EDITORIAL

This issue contains the Cave
Protection Act for Florida. For
more information write: "Cave
Protection Act", c/o Florida State
Cave Club, U-Box 6885, Tallahassee,
FL 32313. Next we go to Bermuda
for some underwater exploration.
Tom Iliffe's article is excellent.
Dennis Williams has provided some
insight into Bahamian karst with a
summary of one of his presentations
at the NSS Convention in July. As
you can determine from the
newspaper interview with India
Young and Paul DeLoach, reporters
still make their living selling
stories.

CALENDAR

Nov 27-30 NSS Instructors Institute,
Branford, Fla.

Dec, 1980 CDS Workshop, Branford, Fla.

Jul 12-16 5th International Cave Diving
1981 Camp, Branford, Fla.

Jul 18-24 8th International Congress
1981 of Speleology, Bowling Green,
Ky.

CAVE PROTECTION ACT

A bill to be entitled

An act relating to natural geological formations; prohibiting any person from defacing, damaging, or disturbing the surface of any cave or similar formation, from disturbing any obstruction designed to control or prevent access thereto; and from tampering with certain signs relating thereto; prohibiting any person from selling, offering for sale, or exporting speleothems; prohibiting any person from storing or dumping in caves or other formations certain chemicals or materials; prohibiting any person from removing, killing, harming, or otherwise disturbing certain organisms within a cave or other formation; providing exceptions; providing penalties; providing an effective date.

Be It Enacted by the Legislature of the State of Florida:

Section 1. Definitions.--As used in this act:

(1) "Cave" means any void, cavity, recess, or system of inter-connecting passages which naturally occurs beneath the surface of the earth or within a cliff or ledge, including natural subsurface water and drainage systems but not including any mine, tunnel, aquaduct, or other man-made excavation, and which is large enough to permit a person to enter. The word "cave" includes any cavern, sinkhole, natural pit, grotto, or rock shelter.

(2) "Gate" means any structure or device located to limit or prohibit access or entry to any cave.

(3) "Sinkhole" means a closed topographic depression or basin, generally draining underground, including, but not restricted to, a doline, limesink, or sink.

(4) "Person" means any individual, partnership, firm, association, trust, corporation, or other legal entity.

(5) "Owner" means a person who owns title to land where a cave is located, including a person who holds a leasehold estate in such land, the state or any of its agencies, departments, boards, bureaus, commissions, or authorities, or any county, municipality, or other political subdivision of the state.

(6) "Speleothem" means a natural mineral formation or deposit occurring in a cave, including, but not restricted to, stalagmite, stalactite, helictite, anthodite, gypsum flower, gypsum needle, angel hair, soda straw, drapery, bacon, cave pearl, popcorn (coral), rimstone dam, column, or flowstone. Speleothems are commonly composed of calcite, epsomite, gypsum, aragonite, celestite, or other similar minerals.

(7) "Speleogen" means an erosional feature of the cave boundary, including, but not restricted to, anastomoses, scallops, rills, flutes, spongework, or pendants.

(8) "Cave life" means any life form which normally occurs in, uses, visits, or inhabits any cave or subterranean water system.

Section 2. Vandalism.--It is unlawful for any person, without the prior, expressed, written permission of the owner, to:

(1) Break, break off, crack, carve upon, write, burn, or otherwise mark upon, remove, or in any manner destroy, disturb, deface, mar or harm the surfaces of any cave or any natural material which may be found therein, whether attached or broken, including speleothems, speleogens, or sedimentary deposits. This subsection does not prohibit minimal disturbance or removal for scientific inquiry.

(2) Break, force, tamper with, or otherwise disturb a lock, gate, door, or other obstruction designed to control or prevent access to any cave, even though entrance thereto may not be gained.

(3) Remove, deface, or tamper with a sign stating that a cave is posted or citing provisions of this act.

Section 3. Sale of speleothems.--It is unlawful for any person to sell or offer for sale any speleothems in this state, or to export them for sale outside this state.

Section 4. Pollution and littering.--It is unlawful to store in any cave any chemical or other material which may be detrimental or hazardous to the cave, to the mineral deposits therein, to the cave life therein, to the waters of the state, or to the persons using such cave for any purposes. It is also unlawful to dump, litter, dispose of, or otherwise place any refuse, garbage, dead animal, sewage, trash, or other similar waste materials in any cave.

Section 5. Cave life.--It is unlawful to remove, kill, harm, or otherwise disturb any naturally occurring organism within any cave, except for safety or health reasons. The provisions of this section do not prohibit minimal disturbance or removal of organisms for scientific inquiry.

Section 6. Penalties.--Any person who violates section 2, 3, 4, or 5 is guilty of a misdemeanor of the first degree, punishable as provided in s. 775.082 or s. 775.083, Florida Statutes.

Section 7. This act shall take effect October 1, 1980.

SENATE SUMMARY

Prohibits any person, without the prior, expressed, written permission of the owner, from damaging any cave or similar natural geological formation, from disturbing any obstruction designed to control access thereto, or from removing any sign stating that the cave or formation is posted. Prohibits the selling or exporting of speleothems. Prohibits the pollution of and littering within caves or other similar formations. Prohibits the disturbing of cave life. Provides certain exceptions. Makes violation a first degree misdemeanor.

MID OCEAN CAVE DIVING

BY TOM ILLIFFE

The mid-ocean islands of Bermuda are among the most remote in the world, located over 600 miles from the nearest land. The Bermuda seamount was formed by submarine volcanic eruptions on the Mid Atlantic Ridge and later completely capped with a dune-derived carbonate sandstone. Caves developed in this limestone during the Ice Ages when sea levels were as low as 300 feet below their present day levels and the large amounts of fresh water necessary for cave formation were present on the island. As sea levels rose, many of the caves were flooded with seawater so that today most of Bermuda's inland caves contain tidal sea-level pools.

The first comprehensive cave diving explorations began in September, 1979 with the visit of NACD/NSS cave divers Paul Meng, Barry Warner and Mark Ciaravella. In addition to exploratory dives in 20 different caves, local divers Tom Iliffe and Paul Hobbs were certified as cave divers. Most sections of the caves explored during that period were very similar to the air-filled portions of the caves, characterized by fissure passages and large collapse rooms. Little actual solutional passage was observed and consequently penetrations were on the order of tens to hundreds of feet. The submerged portions of the caves were extremely well decorated with large speleothems formed when the caves were dry. In many of the underwater caves, fragile helectites and soda straws were found perfectly preserved despite their long submergence.

Abundant marine life was found in many of the caves, especially in those with more direct connections with the sea. In a faunal survey conducted by Dr. Tom Iliffe of the Bermuda Biological Station, 17 new species of marine organisms have so far been identified from the caves. These include three new species of troglobitic shrimp, an isopod representing a new family whose closest relatives are known only from fresh water and a new marine algae from the sunlit entrance pools. Coastal caves acting as alternating tidal spring-syphons contained a profusion of sponges and other encrusting organisms covering nearly 100% of the available wall space. In some caves it was possible to qualitatively determine the magnitude of tidal flow and hence connections with the open sea by the amount of marine growth on the cave walls.

The most interesting find has been the discovery in November, 1979 of an extensive cave containing true passage which probably acted as to carry tidal flow between the nearly enclosed inshore basin of Harrington Sound and Bermuda's North Shore. Reference to the cave pool, known as Cliff Pool, had been made by Collins and Harvey in 1921 in their paper on Marine Algae of Bermuda. Shortly after reading this description of the cave and subsequently locating it on a topographic map, Tom Iliffe and Paul Hobbs made their first dive in the cave on November 13, 1979. From the entrance pool at the base of a 20 foot high limestone bluff, the cave steeply descends into a large room, the Foyer, from which a major passage, the Trunk Passage

extends. The Trunk Passage averaging 50 feet wide by 20 feet high continues for 500 feet before apparently ending in breakdown. On the left side of the Trunk Passage, is the longest single passage in the cave, the North Shore Passage. This passage begins with dimensions similar to the Trunk Passage but towards the back it tapers down to an average of 15 feet wide and 5 feet high. The North Shore Passage is characterized by crystal clear water and many large prominent formations.

Another interesting find was nearby Green Bay cave with direct access to Harrington Sound. This large cave contains vast varieties of marine life throughout its extent. Since Green Bay acts as a true tidal cave alternating between a spring and a syphon, visibility is generally limited. Tom Iliffe and Paul Hobbs made the initial dive in Green Bay Cave on November 24, 1979, going from the entrance to a large breakdown room in the back approximately 500 feet. Four additional dives in Green Bay by Tom and Paul yielded no major breakthroughs so the emphasis was shifted back to Cliff Pool where subsequent dives led to the discovery of several side passages and loops extending the cave to 2283 feet of surveyed passage as of April 26, 1980.

In August of this year, Paul Meng and Barry Warner returned to Bermuda to help continue the explorations.

On August 12, Paul and Barry dove with Tom for their first time in Cliff Pool and went to the termination of the line in the North Shore Passage while installing 300 feet plus in a right loop tunnel. All three were in unanimous agreement that the physical characteristics of Cliff Pool were different and more promising than any cave previously explored in Bermuda.

August 15, Tom and Barry returned to the end of the line in the North Shore Passage and extended the line 115 feet through some delicate formations to its end in a small breakdown room 27 feet deep.

Paul Meng, Paul Hobbs and Tom Iliffe returned to Cliff Pool on August 17 and dove through the Trunk Passage and added 200 feet of line down a passage near the breakdown at the Terminus of the Trunk Passage.

August 16, Paul and Barry dove Green Bay Cave with Rob Power and Paul Hobbs to the terminus of the large passage into the breakdown room. No leads were found out of the breakdown room. Green Bay and Cliff Pool were less than 300 meters apart but a connection between the two that Tom Iliffe and Paul Hobbs had earlier looked for, before their discovery of the North Shore Passage, wasn't found.

On August 18, Tom, Paul and Barry checked out side passages on the North Shore line and through several small tunnels with hanging breakdown and a major restriction, they managed to add an additional 580 feet of line.

Paul Hobbs, Paul Meng and Barry Warner completed the North Shore line survey on August 19 while adding more line down a delicate side passage in the back. Total surveyed passage now reached 3565 feet but it appeared the North Shore section was nearly walled out and the last

major lead would have to come from the breakdown at the end of the Trunk Passage.

On August 23, Tom and Barry planned a dive in Cliff Pool down the Trunk Passage to try to add on to the Harrington Sound line and resurvey the Trunk Passage coming out. As a secondary objective, Tom suggested to look through the breakdown for any leads. Swimming in to the terminus of the Trunk Passage to the breakdown area, Barry tied off to the Trunk Passage line and proceeded up over the breakdown. After picking their way through the breakdown for some 50 feet, they both noticed a large opening to their left in the floor. Dropping down the opening they came into a large passage. There was an immediately noticeable difference in this passage from the rest of those passages previously seen in Cliff Pool as there were sea cucumbers and starfish on the sandy floor of this passage, also visibility was markedly reduced, the water was warmer and there was a noticeable current. Swimming upstream they encountered a passage in which they could only see the floor and occasionally one wall. After reeling out approximately 300 feet of line down the passage, they encountered a wide room with a low ceiling and reduced current. Taking a guess and swimming to their right through the larger section for about 75 feet, they encountered crystal clear water devoid of any marine life and a noticeable thermocline. Turning around they came back to the middle of the room and went ahead to the left where after a few short feet a moderate current was again noticeable. Now beginning to near the end of the line on the reel, they swam through a small passage full of stalactites and heavily encrusted in sponges until they reached a point where the passage slightly widened and the ceiling came down even lower. Barry began to tie off the line and end it since there were only a few feet of line left and tie offs were getting scarce, but they decided to swim a few feet further into the room and look around to see where they would go when they returned. Reaching the end of the line on the reel after 10 feet, Barry signalled Tom he was tying off to a rock in the sand. Just as Barry was cutting the line he noticed approximately 15 feet ahead, at the limits of visibility, a nylon line running along the wall. Tom swam up and observed the line also. Taking an extra gap reel and connecting the lines together they swam against the current along the line until 150 feet later they emerged from Green Bay via Cliff Pool.

The connection was significant in that it linked two of Bermuda's largest and most interesting caves, geologically and biologically. Surveyed passage length climbed in excess of 4400 feet and when combined with 800-1000 feet of measured yet unsurveyed passage the total passage length reach the 1 mile figure making this system Bermuda's largest, underwater or in air.

In less than a years time, cave diving in Bermuda has gone from nil to the discovery of an extensive cave system still growing. And yet, Bermuda cave diving is still in its infant stage as there are several dozen caves still awaiting their first cave divers. With four certified cave divers in Bermuda now as a result of another cave course taught by Paul Meng, even greater and more rapid progress should be made on the caves plus a return trip by the "Southerners" is already in the plans for this winter.

THE GLACIAL ORIGINS OF THE BAHAMIAN KARST

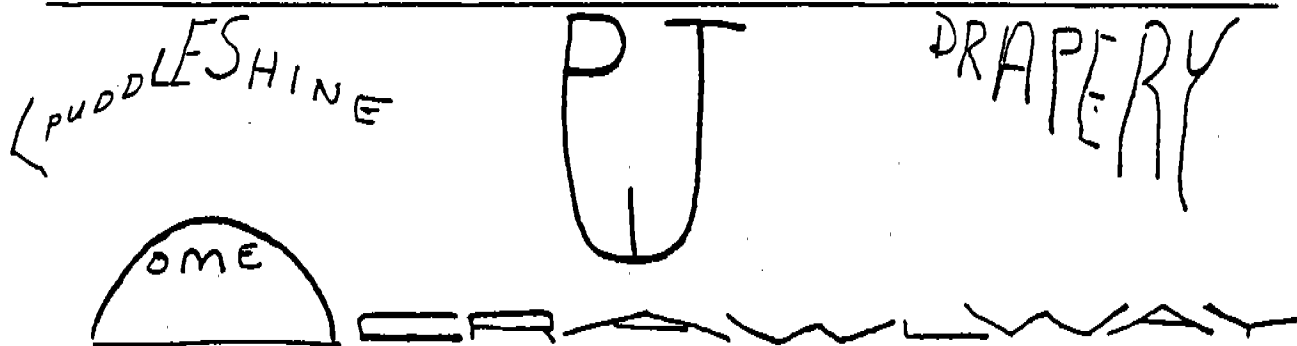
BY DENNIS WILLIAMS

The geological history of the string of shallow-water carbonate banks that stretches southeast from Florida 1,400 km to the island of Hispaniola is tied to the repeated changes in sea level that resulted from the alternate storage and release of great quantities of water held on land as glacial ice.

The northwestern Bahamas consist of two large flat-topped banks (Great Bahama Bank and Little Bahama Bank) that were flooded near the end of the melting cycle of the most recent glacial period. The islands of the present day Bahamas are the exposed margins of these banks and this dry area represents less than 10% of the banks total area. During interglacial periods when the level of the ocean covers most of the Bahamian banks, additional carbonate material is added through several sources. The most important of these sources in terms of volume is a result of the banks unique topography and the close proximity of the Gulf Stream. As relatively cool seawater from the Gulf Stream spills onto the shallow banks its calcium carbonate solubility is decreased causing CaCO_3 to precipitate in the form of ooids.

In the past sufficient quantities of these ooids have been precipitated to form the bulk of the carbonate materials found in the Bahama Banks. Mounds of these unconsolidated ooids pile up on the sea floor during interglacial periods. Then as the level of the ocean is again lowered by the accumulation of glacial ice the newly dry dunes are redistributed by the wind before being cemented together to form oolitic limestone. This process has been successfully repeated throughout the many glacial epochs and has been able to maintain the tops of these banks coincident with the average maximum height of interglacial sea level despite an extensive subsidence of the Bahamian Platform.

In islands of an adequate size and in the entire bank when a lowered sea level permits it, a fresh water lens forms by displacing sea water that has entered the aquifer laterally. Rain is the source for this fresh water and a distinct haloclyne is maintained by density and temperature gradients. Present day annual rainfall rates of less than 1.5 meters are capable of maintaining a maximum lens thickness exceeding 20 meters.



Cave Diving For Vets Only

Reprinted from an article appearing
in the Albany Herald - Wednesday,
April 16, 1980

ATLANTA (AP) - Only a few hardy and well-trained divers venture into underwater caves, where a mistake can leave even a veteran trapped in rock-roofed darkness and gasping for a last breath of air.

One diver who faces that challenge is India Young of Byron, Ga.

"My personal challenge in cave diving is the independence, not really being dependent on anyone else," Mrs. Young said. "You achieve a weightlessness that few things feel as good as, and you can go in places virtually untouched by man.

Don't try diving in a cave unless you have expert training and the air tanks, lights and other special equipment needed to keep you alive.

Four Texans ran out of air and died in a north Florida cave during the weekend because of improper air tanks, according to Holmes County Sheriff's investigator John Ard. "They were carrying single tanks and simply didn't have the capacity to get that far and return.

An Atlanta doctor died in late March when he apparently panicked in north Florida's Blue Grotto, said Levy County Sheriff Horace Moody. His air tank was almost full when the body was recovered.

Nearly 200 cave divers have lost their lives in Florida alone in the past 20 years, and some caves have claimed two dozen known victims.

South Georgia and Florida share the title of national cave diving capital because of their many springs and underwater caves.

More people died in Florida than in Georgia because "Georgia's caves are more remote, they're hard to get to," said cave diver Paul DeLoach of Albany, Ga.

Diving in a cave is "having a roof over your head in a hostile environment where there is no surface light," DeLoach said. "One little rock knocked to the bottom of it stirs up silt, turns the whole thing black. What was perfectly clear water, when one fin stirs up the silt, suddenly has no visibility at all.

"Most deaths in a cave are novices, down to try it for the first or second or third time, ill prepared, with improper equipment, not knowing to stay off the bottom" and not stir up blinding silt, he said.

Then, "we generally get a telephone call from the sheriff: 'We have a missing person. Would you come and extricate him,' DeLoach said. "I guess the hardest part is explaining to mom and dad that this person had no business being there. My admonition to people who are interested in cave diving is: 'Don't do it'."

In Albany, DeLoach said "there's a fairly large spring, Radium Springs. I think the first cave diving deaths in America were recorded here, I think in 1955."

There are two major organizations which provide training for cave divers: The Cave Diving Section of the National Speleological Society, of which Mrs. Young is president, and the National Association of Cave Divers.

There are about 130 active cave divers certified by the two groups, she said.

She began diving in the ocean after earning her basic certification in 1972. An expert friend took her on a cavern dive - to the mouth of a cave and not in total darkness - "and I fell slap-dab in love with it."

"I needed 30 open water dives to get into the cave diving class, and got my NACD certification in 1974; No. 64," she said in a telephone interview. All states except Rhode Island have caves for divers, but most of the diving is in the Georgia-Florida area, she said.

In addition to enjoying the fun of diving, DeLoach said he has worked with the U. S. Geological Survey and helped with studies of pollution and drainage and their effects on the aquifer.

For sport divers, two particularly deadly Florida caves are Ginnie Springs and Morrison Springs. Both have been altered in an attempt to end the fatalities.

"Ginnie Springs is a beautiful spring, like going into an auditorium. They call it 'The Ballroom'," Mrs. Young said. "Almost anywhere in there you can see surface light."

"At the bottom was the little, bitty tunnel. Novice divers got in there, stirred up silt, lost their way and never got out."

Since then a strong grate has been bolted over the opening.

Morrison Springs cave has three rooms and has claimed 21 lives, according to the sign posted over it.

"It's better since they dynamited the entrance to the third room which, I understand, is where most of the deaths occurred," she said.

She and DeLoach stressed that almost all deaths in cave diving can be traced to breaking one of the sport's three crucial rules. They are:

- 1 - Always have a continuous line leading back to the surface;
- 2 - Never dive below 130 feet, and
- 3 - Plan your dive to use only one-third of your air supply going into the cave. Leave one-third to get back out and the final third in case of an emergency.

"We dive with fairly sophisticated equipment," DeLoach said. "We use double tanks, dual valve manifolds, two regulators, two primary lights and two to three backup lights."

"It's always intriguing to me, to go a little farther, to see what's around the next bend," he said. "But we have rules, and you just don't violate those rules."



YOU'RE INVITED!

15th CAVE DIVING WORKSHOP

DECEMBER 27-28
1980

BRANFORD WOMEN'S CLUB
BRANFORD, FL

SCHEDULE OF EVENTS: Sat., Dec. 27, 1980: 8:00 AM coffee & registration
9:00 AM - 12:00 PM: lectures & discussions
2:00 PM 1st Annual "Speleolympics"
Safety Project
Dry Caving
7:00 PM slide show "Cave Diving in Belize"
8:30 PM NSS Cave Diving Section Membership Meeting (open to the public)

Sun., Dec. 28, 1980: 8:30 AM coffee
9:00 AM - 12:00 PM: lectures & discussions
2:00 PM guided local cave dives

Lecture topics to include: Cave Diving in Virginia, Cave Diving in Indiana, Cave Rescue Equipment, Cave Protection Laws, Repairing Plexiglass, etc.

REGISTRATION: Enclosed is a money order/check made payable to NSS CAVE DIVING SECTION for \$_____ for:

Name _____ Address _____

Fee for both days and all events or any portion thereof: pre-registration received before December 15, 1980: NSS CD Section members-\$3.00; all others \$5.00. Registration at door: NSS CD Section members-\$5.00, all others-\$7.00. Mail to William K. Fehring, Workshop Chairman, 3508 Hollow Oak Place, Brandon, Florida 33511.

