undercurrent®
THE PRIVATE, EXCLUSIVE GUIDE FOR SERIOUS DIVERS

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Barbados, British West Indies

—*A Vacation With Diving, Not A Diving Vacation*

The depth was forty feet, the bottom sand, scattered with junk and a few miniature mounds of coral. Occasionally a scorpion fish would lie, unimposing, near a clump of coral. The visibility was 40 feet, but it made no difference. My eyes were only on the bottom. "Look for shapes that nature doesn't make," I told myself. "Perfectly straight lines. Certain symmetry. Look for vague outlines in the sand. For necks and bottoms." And then I saw a soft curve. I jabbed my fingers in the sand and up popped a bottle. My heart jumped. I turned and waved it at my buddy. Sure enough, this was an antique bottle, perhaps 150 years old, with raised lettering and a round bottom so it could only be laid on its side. Man, I was excited. And I was hooked. I could have spent my week digging in the sand in Georgetown Harbor.

But I didn't. For to write a review, I cannot indulge in my own narrow-minded pursuits. I must learn and experience as much as I can, so that you, our readers, will be fully informed. No doubt you sympathize with my suffering.

What I found in Barbados was a vacation of great variety--variety even in the diving. For where else can one dive for old bottles, swim through the hull of a 350-foot sunken freighter, visit splendid reefs, or dive among a mass of dead coral and tiny fish-- all in the same week?

I came to Barbados hoping to find a bottle or two, but I stayed away from the harbor because a couple of our readers have recommended the Paradise Beach Hotel and diving with Willie's Water Sports on the hotel beach. I followed their advice. There is no reason for you to do the same.

Willie's trips depart at 10 or 10:30, then again at 2:30. Their craft, a landing barge-like vessel, opened its ramp to the shore, and I climbed aboard after toting my Aluminum 80 100 feet from the dive shop. The site was the Shallow Wreck, a tugboat sunk just off shore in 35 feet. Guide Dolvin, a personable, smiling chap, gave a brief description of our tour, and away we went. This is the kind of dive a beginner would go gah gah over, but an experienced diver would yawn. I

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hadn't been in the water for months, and I yawned. There were a few fish about. Inside the hull a school of small glassy sweepers could be approached for photographs. But the coral had yet to grow on this wreck and it was all quite simple. We then swam leisurely for a good half mile. Much coral was dead. The variety of tropical fish made things a bit interesting and a well-camouflaged reef scorpion and a couple of morays--one a good five feet long who did not take a liking to my scratching his tail--added some interest. My other dives with Willie's were not a great deal better.

When Dolvin didn't lead, Rick did. He is somewhat of a laconic fellow, who offered no above-water assistance and little in the way of a plan. On one reef dive, we dropped to 70 feet. With Rick sporting his speargun, we visited a torn up wreck which had but the single distinction of having an enormous French angel inside. At times there were lovely areas of soft coral and several varieties of tropicals, but much of the reef was of questionable health. Barbados would need more than this to make it a worthwhile destination.

The hub of Barbados is Bridgetown, a bustling town complete with traffic jams, scores of pedestrians, a wharf with fishmongers and a vegetable market for the locals. Located at the southwestern end of the island, Bridgetown tends to be a dividing line for tourists. Tourists who reside on the west side of the island tend to eat and play in the parishes of St. Michael, St. James and St. Peter. Those who stay at the southern end tend to play there, in the parish of Christ Church. It needn't be that way. It just is.

Barbados has so much to offer as a vacation destination that I would be pleased to stay anywhere. There are scores of fine hotels or pleasant apartments with rates to fit any taste and any budget. The restaurants vary from classy and good, to inexpensive and nearly as good. There are sights to see and shopping to do, tennis courts and golf courses, sunset cruises and sunrise walks. And plenty of beaches. Perhaps most important is the reputation of the islanders, called "Bajans," for friendliness and honesty. I've never felt so at home on a Caribbean island. When I drove the wrong way on a one-way street, people corrected me with a smile. When I dropped my room key on the beach and it sat unnoticed, a Bajan walking the beach came over and pointed it out. It was if I had been a long-time resident in a solid Midwestern town. I worried more about the Americans than the Bajans.

My own residential preference is the western side, north of Bridgetown. The area south of Bridgetown is reminiscent of an aging, funky, New Jersey beach town. The western shore is quieter, more elegant and less crowded, though still busy. I decided to look on this side for better diving than the Paradise had to offer. My first stop was at Jolly Rogers Watersports, on a public beach, Sunset Crest. I met dive guides Steve and O'Neal, and admit being impressed with their rap. But I didn't dive here. I requested a dive on Barbados' fabled wreck, the freighter Stavronikita, but they had no plans to dive it until after my scheduled departure. If they altered their plans they would call me. I didn't hear from them. Nonetheless, after a talk with a couple of divers, my hunch is that this is a decent operation.

I made it a point to go a bit farther northward and dive with Les Wottan, an expatriot of Mother England, who has been on Barbados for 30 years. His gear looks

BARBADOS DIVING SERVICES

HEYWOODS
St. Peter 422-4900

JOLLY ROGER WATERSPORTS
Sunset Crest 432-7090

LES WOTTAN
Coral Reef Club
St. James 422-3215

WILLIE'S WATER SPORTS
Paradise Beach Hotel
St. Michael 425-1060

PAKI'S DIVE SHOP
Holiday Inn 426-9947

SANDY BEACH WATERSPORTS
Worthing
Christ Church 428-2112

SOUTHERN PALMS WATERSPORTS
St. Lawrence Gap
Christ Church 428-7171

SURF & SAIL WATERSPORTS
Hilton International Hotel
427-4350

like it came with him, especially his weight belts with the World War II quick-release buckle. Wottan works next to the Coral Reef hotel, one of Barbados' best, with beautiful units on sweeping, grassy grounds, and an elegant, yet simple outdoor dining area. What a fine place for romance. When I called Wottan to arrange a dive, he immediately launched into a two-minute description of his operation... "I don't delegate to anyone. I lead every dive myself... as far as I'm concerned there are only two ways to dive, slow and stop." I arrived at 10am for the 10:30 dive. His wife (she and he are both in their sixties, I believe) took my money and explained the setup while the white-haired Wottan scurried about directing his crew to get his scow ready. And scow it is. The African Queen would be pure luxury. No more than 18 by 10 feet, it is powered by two egg beaters of decimal horsepower. Still, it is adequate for visits to the nearby reefs. Although one diver told me that there had been no more than four people on the dives for several days, today Wottan had ten, plus two crew and himself. I still don't know how we donned and doffed our gear without beaning each other, but we did--due in part to the willingness of his two aides to help us, and Wottan's non-hurried approach. Wottan tells people to keep him in sight, but offers no other restrictions. Under water, he carries a reel of line which is attached to the scow, so he'll never lose the boat. In the 60-foot visibility we quickly lost sight of the craft, so the line surely helped. Once I arrived on the bottom I was greeted by a three-foot barracuda, who quickly split when the other divers gathered. I looked around. Surely an improvement over Willie's sites. Plenty of soft coral and gorgonia waving in the one-knot current. Among the live, healthy coral were plenty of tropicals, including a few four-eyed butterflies, an occasional long-snout butterfly, scores of sizable sanddivers and lizard fish frozen in place. I came upon the back end of a lobster under a small coral head. The lady was full of eggs, and while I gazed from no more than a foot away she used her little legs to massage the clusters continually, presumably to aerate them. All in all, a pleasant 45-minute dive, which never exceeded fifty feet. I could have stayed longer, but we had taken so long to get organized, and put to the reef, that I was afraid I might miss my afternoon dive, for which I had come here especially--to hunt bottles in the Georgetown Harbor.

On the southern edge of the Georgetown Harbor is the Holiday Inn. I dislike any hotel taller than two stories on a tropical vacation, and this is no exception. There's a tiny beach and a pier running from the hotel to a diving convention area,

which restricts the view of the boats in the harbor. This hotel is too close to the commercial, oil-skimmed waters of the harbor for my tastes, but the dive shop is a fine little operation. Run by Paki Degia, an eastern Indian who has been on the island for 20 years, the shop sends many of its boats south to the reefs not visited by those shops on the western shore. And it is Paki who, upon request, makes excursions into the harbor so divers may probe the bottom for artifacts. I got a nice bottle on each of my two dives. Not bad. Paki's 19-year-old son, Haroon, is the primary guide. He is quite capable, giving decent direction prior to the dive, helping divers on and off with equipment, and showing a great deal of responsibility under water. On one afternoon dive we anchored at Church Drop Reef for a 70-foot dive. Since I had had a morning dive I checked my tables to determine time and depth, but Haroon rattled off from memory my next profile. He led his charges at seventy feet, while I cruised at fifty.

Now this, friends, is indeed a lovely reef--not dramatic, but lush and alive. It is ripe with sea fans, corky sea fingers and other soft corals swaying in a gentle current. Great clouds of brown chromis fill the water, with durgeons and surgeons floating in and out of the mist. I ambled along, at times dropping down to the reef to get a closer look at a trunkfish or a spotted drum, and other times to rise above the reef. Once, twenty feet to my right I spotted two large eagle rays, floating above Haroon and his charges. With their noses in the reef, they had missed them. At the end of the dive, after everyone had surfaced and I was still puttering around, Haroon rapped on his tank and signaled me to follow. At the edge of the 60-foot visibility I spotted an enormous hulk. Haroon, much closer, said later, "It was a grouper, at least 200 pounds. Many of them live on the deeper reefs." My dives with Paki's Dive Shop were pleasant and easy. Their whaler pulls up on the beach, in front of the hotel, and gear is then transferred into a larger craft moored 100 yards out. Although one must negotiate a mild surf when loading and unloading the whaler, the dive is otherwise hassle-free.

But that was not the case at the Hilton, located less than half a mile away. Here I toted my gear 100 yards to the dive shop, then a couple hundred yards back over the same route to the boat anchorage. Guide Joseph volunteered little information and though competent--one diver proved to be too buoyant so wrapped him with his own weight belt and continued the dive without lead--he was the only shop person on the boat. Anchored 200 yards from shore, the boat was unmanned throughout the entire dive. At the end of the dive, while he was surfacing with the other divers--and I fiddled around on the bottom--I watched the anchor pull loose and begin, with some speed, to drag the reef. Swimming over, I grabbed the line and went for a 50-yard ride while Joseph got on board and brought the boat under control. Although I dived but once here, others told me that they too had dived here with no one remaining aboard. That's damn bad practice.

For many people, the highlight of Barbados diving may be the 356-foot World War II freighter Stavronikita, sunk six years ago just for divers. Located off the western coast, it is within ten minutes of the Paradise, and just about every shop will make trips once or twice a week. The morning of my dive, my buddy took ill, but Dolvin sent the boat with me, the only diver, Rick was the guide. On the surface, I asked the maximum depth. "Hundred feet," he said. That was the extent of our conversation. The mast begins at 40 feet, and the deck at roughly 90 feet. Massive indeed, the Stavronikita has not been below long enough to be ensconced in coral and filled with fish. But it's developing nicely, and holes blasted through the side permit easy entrance and exit, and permit one to roam at will. It's quite a treat. But you must be careful. I hit 120 feet without a thought, for that's the depth at which Rick moved through the hull, so I headed up early. At 60 feet, I hung on the mast to watch the large schools of sergeant

majors swirl about. At 10 feet, I made an eight-minute decompression stop, as did Rick. Since he had never asked for a card or verified my experience as a diver (though we had one previous dive together), he put a lot of trust into my knowing what to do when he ignored his own plan and when I exceeded the tables.

So, what about Barbados? It's an excellent place for a diver who wants a vacation with diving, not a diving vacation. With more than 350,000 tourists traveling there each year, there is indeed plenty to do in a week or two weeks. And enough variety in diving to keep one interested through eight or ten tanks, and many more if you are a photographer. (Overnight Ektachrome processing is available on the island.) Macro is especially good here (Where isn't it?) with colorful tube worms, blennies, and plenty of coral variety. And there can be some surprises. Near Church Drop Reef are other reefs, where I'm told the bigger fish appear. I saw one four-foot grey snapper--quite a sizeable critter. Over a sand bottom at 80 feet I swam up to a great school of fish I couldn't identify, but I suspect they were mullett. So, for all but the most finicky gorilla diver who can't live without three or four tanks a day Barbados diving can fill up a week quite nicely.

Where to stay? There are so many hotels, that I recommend that you study a Fielding's Guide to the Caribbean and confer carefully with your travel agent. Most have good information on Barbados. I can only tell you what I found. The Paradise Beach was pleasant, friendly, and nothing special; the beach is nice, but the failings of the shop suggest one reside elsewhere. I've already complained about the Holiday Inn. The Hilton, another highrise, is very well done, but too American for my taste. Two other hotels have diving: The Sandy Beach, on the South Coast, and Heywoods, far up the west coast. I did not dive at either. I recommend then that one find the right hotel, rent a car so that touring the island and restaurants is facilitated, and use my story as a guide. There's a great variety of diving on Barbados. If you come to vacation, you will want to sample the wreck, the south reef--a place to poke for bottles. What could be a better diving souvenir? You may not be as lucky as I, but I can assure you that just the sense that you might uncover your own personal treasure is quite a thrill.

Divers Compass: Most shops charge $30 for a single tank, $25 if you have your own gear. Most have packages for five or more dives. . . .Paki offers a two-tank trip, which includes lunch in between dives, for $45. . . .Car rentals run about $175 for a week; a moke, a jeep-like vehicle with a canvas top and no windows, is the hottest rental vehicle. . . .From December 15 to April 1 rates are anywhere from 50-75% higher--and excessive. . . .Flying fish and dolphin were plentiful in restaurants and exceptionally fresh. . . .On the west side, the Coach House is one fine pub and local hangout. Try their steakfish and sweet potato french fries at the bar for $5. . . .The flight from NY to Barbados is 4½ hours; scores of air and hotel packages exist. . . .Visibility in late March never exceeded 60 feet. Summer is much better. . . .All hotels and restaurants add a 10% government tax, many add in the service charge, but for exceptional service add a tip because not all of money reaches the hands of employees. . . .To locate rental properties try these: Caribbean Home Rentals, Box 710, Palm Beach, Florida (305/833-4454); Barbados Board of Tourism, 800 2nd Avenue, NYC (212/986-6516), or in Los Angeles, Montreal, Toronto or Calgary, call Alleyne and Aquilar, a Barbados firm, at 809/422-0840. . . .If you make any beach purchases, undertake lengthy bargaining, it's expected. . . .Taxis are easy to get, day or night, but establish the fare before climbing inside. . . . For traditional Bajan food, try the Brown Sugar restaurant. . . .Buses cover the island for the low fare of 40¢. . . .

Undercurrent editors welcome comments, suggestions, resort/travel reports and manuscripts from readers of Undercurrent.
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The Bauer Mariner D Portable Compressor

—*U.S. Navy Gives Nod Of Approval*

In August 1983, the U.S. Navy released its evaluation of the BAUER MARINER "D" high pressure portable air compressor. It was tested by the Navy Experimental Diving Unit (NEDU) to determine if the compressor discharged suitable breathing air and had a service life which satisfies the requirements for portable SCUBA diving compressors throughout the Navy.

NEDU has previously evaluated several portable high-pressure air compressors (references 2 through 5). Mechanical failures in the compressor or prime mover, low capacity, or poor quality of breathing air were cited as reasons for nonacceptance of all but one unit, the Bauer Varius G3.

Endurance Test: During the 50-hour operating period, the compressor accumulated 217 charging cycles using twin 50-cubic-foot SCUBA cylinders.

Charge Rates: Compressor charge rates for the SCUBA air cylinders used during the test were:

	Time	*# of Occurrences*	*Chg. Rate*
Average:	21,700 cu/ft	in 50 hrs 25 min	7.17 CFM
Maximum:	11 minutes	5 times	9.09 CFM
Minimum:	25 minutes	1 time	4.00 CFM

Minimum charge rate was caused by condensate valve leaks. Maximum charge rate was attributed to pressure build-up in charging lines and filter while changing bottles. Delays following disconnection of charged bottles and reconnection of an empty set of bottles allowed a pressure build-up in the compressor charging line of over 3100 psi.

Temperature: A 5.8°C temperature differential between ambient temperature and compressor discharge temperature was the maximum recorded. Most temperature differentials were at least 2°C lower. This minor carry-over of the heat of compression is not great enough to have a significant effect on tank temperature.

Fuel and Oil Consumption: The average gasoline consumption was 1 quart, 9.7 oz. per hour. The engine consumed one-third of a fluid ounce of oil per hour, an insignificant amount.

Maintenance: The Bauer Mariner D compressor unit was easily maintained by the operator, and no problems were encountered.

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RESULTS OF AIR SAMPLE ANALYSIS

			COMPRESSOR TEST RESULTS			
COMPONENT AND CONTENT MEASUREMENT	U.S. NAVY STANDARDS	TYPICAL FRESH AIR	HOUR 1	HOUR 15	HOUR 30	HOUR 51
OXYGEN %	20-22%	21.0	20.9	20.9	20.9	20.9
CARBON MONOXIDE PPM	20 PPM	1.0	2.2	1.5	2.6	1.5
METHANE PPM	N/A	1.5	1.5	1.5	1.5	1.5
TOTAL GASEOUS HYDROCARBONS, LESS METHANE PPM	25 PPM[3]	1.0	5.6	2.7	1.9	2.8
CARBON DIOXIDE PPM	1000 PM	340.0	342.1	344.3	354.4	368.4
OIL MIST AND PARTICULATES MG/M^3	5 MG/M^3	0.0	0.2	LESS THAN 0.2	LESS THAN 0.2	LESS THAN 0.2

Conclusion: The Bauer Mariner D compressor delivers acceptable breathing air at a charge rate and volume which meets the manufacturer's specifications. The charging cycle time is within manufacturer's specification, and is considered to be satisfactory. Fuel consumption of the compressor engine is satisfactory. The unit is sturdy, reliable and readily maintained. The operating and maintenance manuals for both the compressor and diesel engine are adequate. The Bauer Mariner D is suitable for use by the U.S. Navy.

The retail price of the Mariner D is $5,985. The retail price of the Varius G3 (see *Undercurrent* February, 1982 for a full review) is $1,850.

Worldwide Coral Crisis

—*A Dozen Reef Systems Near Death*

Hundreds of thousands of square kilometers of reef corals in vast portions of the eastern, central and western Pacific Ocean, and in some parts of the Caribbean Sea, are dead or dying in what appears to be one of the most widespread reef devastations of the past several hundred years. Reasons for this alarming situation are still unknown, although unusually warm water temperatures due to El Niño, the phenomenon which brought abnormal weather to large portions of the globe in 1982 and 1983, may be responsible. So says Dr. Peter W. Glynn, a biologist at the Smithsonian Tropical Research Institute who first reported on dying corals in the Gulf of Chiriqui on the Pacific Coast of Panama in early 1983.

Since those initial reports, Glynn has learned that extensive bleaching—loss of the zooxanthellae or microscopic algae, which inhibit coral—and coral mortality have occurred in the Gulf of Panama and elsewhere in the Caribbean, as well as on reefs as far north as Costa Rica and at Gorgona Island off the coast of Colombia. Massive coral death rates also have been reported to Glynn from islands in the central and western Pacific.

"This is a difficult story to unravel," Glynn says. "Most of the tropical areas of the eastern Pacific have been affected, but we also have all these other unexpected areas. The extent of reef damage, which in some locales involves perhaps a hundred species of corals, is much more severe than we previously thought."

The story began in March 1983, when Glynn noticed that large coral patches were bleached on the Uva Island reef in the Contreras Islands, located in the Gulf of Chiriqui off the Pacific coast of Panama. All corals in the islands had appeared normal in mid-December 1982, but within five weeks of Glynn's observation of the bleaching, large portions of the reefs had died and were overgrown by a green algal turf.

"Evidently, a mass expulsion or emigration of the algae—essential for reef-building corals—had occurred in the bleached corals." But Glynn could find "no signs of infestations with microorganisms or parasitic protozoans."

Meanwhile, reports had begun to reach Glynn from other areas. In April, major damage was reported on reefs in the Galapagos Islands by Gary Robinson, a U.S. Peace Corps worker there. Coincidentally, Glynn and two colleagues had studied these reefs in the 1970s. At that time, they found that coral-grazing by the abundant sea urchin, *Eucidaris thouarsii*, limited reef growth. "But the reef was still growing fast enough to offset losses from the grazing," Glynn said. "Now, however, the urchins are eating dead coral, and there is nothing there to replace it. The urchins apparently are destroying the entire study reef at Onslow Island, eating it right down to its basaltic foundations.

It soon became clear to Glynn that the coral reef deaths were not confined merely to the eastern Pacific. From researchers in the central and western Pacific, he received reports of coral bleaching and deaths in the Thousand Islands area north of Jakarta, Indonesia, in the Tokelau Islands north of Samoa, and in the Tyukyu Islands in the southern part of the Japanese archipelago. Affected areas in the Caribbean include Panama, Costa Rica, Colombia and possibly Venezuela. Recently, scientists from Florida have called to report coral bleaching in the southern Florida keys.

Some of these reports do share a common denominator, Glynn observed. "Right now, in the eastern Pacific and parts of the western Pacific, we have a very close correlation between coral deaths and higher-than-normal water temperatures. One colleague from the western Pacific reported water temperatures prior to the bleaching of 91 °F, the upper tolerance limit for many corals. It's simply a correlation for now, but it's our leading candidate for the cause of these deaths."

The higher water temperatures most likely resulted from El Niño, the warm water currents that develop around Christmas time off the west coast of South America. In 1982-1983, the exceptionally prolonged and widespread El Niño caused unseasonal flooding in South America and drought in Australia.

When Glynn made his initial find in Panama, he considered possibilities other than high water

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temperature to account for the deaths, including pollution due to mining construction activities, oil pipeline construction and pesticide use. Most of these were ruled out as direct causes. Glynn, now at the University of Miami on a year's leave of absence from the Smithsonian, hopes to study the situation in the laboratory. "Our goal is to bring some of these corals into the laboratory and try to simulate the gradual warming of water up to the temperatures where we've witnessed coral deaths and see what happens."

Glynn also has observed some pathogenic-like organisms in the tissues of affected corals. "We would like to determine if their presence is due to invasion into coral tissues weakened from stressful high temperatures or if the organisms accompanied El Niño conditions and invaded healthy corals or *zooxanthellae*. Other possibilities are also likely."

In the eastern Pacific, some 15 to 20 species of coral have been affected. "No live colonies of the hydrocoral genus, *Millepora,* (three species) were found by the end of April 1983," Glynn reported, which suggests that this group may now be locally extinct or severely reduced in abundance. In the central and western Pacific, however, hundreds of coral species have been affected.

The full consequences of the bleaching and deaths are as yet unknown, but Glynn points out that coral reefs are extremely important ecological systems in many parts of the world. The reefs are protectors and builders of land in the tropics. They also support an abundance of fish, algae and invertebrates, major sources of food in the tropics. Coral reefs act as breeding and nursery grounds for many shellfish and fin fish species, and as hiding places from predators for a number of animals. Scientists are particularly fascinated with reefs because they harbor such great numbers of diverse species co-existing in complex ways.

One scientist pointed out that "if entire forests were to disappear in the United States, people would be extremely alarmed. Well, what is happening on the coral reefs is just as serious, except in this case we have entire reefs out of view dying in a very short period of time."

"I would say that in the Galapagos, we're going to lose some whole reef structures," Glynn concludes. "In Panama, the coral damage is so extensive—80 to 90 percent of the corals are dead on numerous Pacific reefs—that it may be hundreds of years before the reefs regenerate to their pre-1983 condition. In the west and central Pacific, there appear to be enough corals alive so that the reefs may repair themselves in a few decades."

Glynn believes that the cause of the coral reef deaths will be found eventually, and that it may turn out to be a natural phenomenon. "Or it may be a case of Mother Nature offering especially harsh conditions," Glynn says, "which, when combined with man's activities, places an intolerable burden on the corals." Corals do die periodically, he pointed out, but probably nothing of this magnitude has happened in the last 200 years.

Although no long-range decline of the world's coral reefs has been observed in modern times, man's increasing encroachment on the marine environment has not helped the reefs' growth. In various small sites, accumulating silt from ocean harbor dredging, toxic runoffs from pesticide-laden streams and rivers and dumping of sewage have been determined to be the causes of coral mortality.

The only other coral reef loss of major magnitude observed in recent history occurred more than a decade ago, when a plaque of the Crown-of-Thorns, a two-foot-wide starfish that preyed on the polyps, demolished hundreds of square miles of Australia's 1200-mile-long Great Barrier Reef. The invading starfish have since retreated, for unknown reasons, and the reefs have begun slowly to restore themselves.

Scientists have observed that in a few small spots in the current reef devastation, new corals seem to be growing. The researchers say this may be an indication that these damaged corals, too, will restore themselves in time. But because the cause of the present destruction remains unknown, the future of the coral reefs is uncertain.

This article was prepared from reports by the Smithsonian Institution, The New York Times and our own interviews.

Why Divers Die: Part I

—*Too Often The Cause Is Bad Judgment*

From time to time we publish the results of the survey of diving fatalities conducted by the National Underwater Accident Data Center at the University of Rhode Island. The 1980 survey, authored by NUADC Director John McAniff, has now been completed. We take responsibility for all editorial changes from the actual report.

Our intent in publishing this information is to apprise sport divers of the causes of diver deaths.

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From the cases presented here, it should be quite obvious that an infinite number of circumstances can precede a death, but most of those circumstances are under the diver's control. Far too many of these deaths clearly represent bad judgment on the part of divers. That bad judgment leads to a situation where panic takes over and the diver is unable to save himself.

Read these cases carefully. Understand what they can mean to you and your buddies. Learn from the unfortunate and fatal errors of others. And keep diving safely.

* * * * *

In 1980, the number of nonoccupational underwater diving fatalities was 109, sixteen percent lower than the 130 in 1979, and twenty-five percent lower than the 145 in the peak year of 1976.

The NUADC estimates the nonoccupational diving population of active divers at the end of 1980 at between 2.25 and 2.27 million. Therefore the scuba fatality rate was approximately 4.84 deaths per 100,000 divers.

California recorded one-third fewer fatalities in 1980 than were recorded in 1979. Florida had twenty-three deaths in 1980, three fewer than in 1979. Nine were in caves. The NUADC recorded fourteen fatalities in Washington State during 1980, three less than 1979's total of seventeen. The U.S. Virgins had only one recorded death in the previous ten years, but five were reported for 1980. Hawaii reported five fatalities for 1980. The number of fatalities in Hawaii has varied over the past ten years between a low of three deaths and a high of eleven deaths.

The five New England states bordering on the Atlantic Ocean—Maine, New Hampshire, Massachusetts, Rhode Island, and Connecticut—recorded twelve fatalities in 1980, five more than in 1979.

Cave Deaths Decline

Most encouraging is a continual drop in the number of cave diving fatalities: ten occurred in 1980, down from 25 during the peak year of 1974. Nine of the ten cave fatalities occurred in Florida, while the tenth occurred in a cave in Georgia. Had it not been for a single incident which cost the lives of four divers, Florida might have had its best record since 1970 for cave diving fatalities.

"Seven of the nine cave diving fatalities in Florida involved divers who were visiting from out-of-state."

One cave death involved a victim who failed to make use of his J-reserve valve, and despite an attempt at buddy breathing with his partner, he panicked and was lost at a depth of 70 feet. Another cave diving victim had taken off his main tank in order to penetrate a small area, taking with him only a pony bottle. He apparently was unable to come back to his main tank before the air in the pony bottle expired. Another victim had penetrated a large cave, but apparently carried no safety line. His buddy reported that he attempted to reach him, but could not see him through the excessive silt.

Seven of the nine cave diving fatalities in Florida involved divers who were visiting from out-of-state, and all ten cave-diving victims in 1980 had little or no experience or training in cave diving.

Table I presents the depth of the fatal accident dive or the depth at which the body was recovered for eleven years, 1970 through 1980. In 1980 seventy-five percent of the cases occured in water shallower than 63 feet, and fifty percent in water shallower than 30 feet. This pattern has changed very little over the eleven years of the study.

During 1980 there were four fatalities deeper than 130 feet. The accepted limit for safe scuba is set by most training agencies at 100 feet, and by the U.S. Navy and Coast Guard at 130 feet.

The deepest of these four fatalities involved a 42-year-old instructor, who was not teaching at the time; he was diving over "the wall" at a depth of 220 feet. The body has never been recovered. The second deep diving fatality during 1980 occurred on a photography expedition to a depth of 150 feet. The victim suffered a heart attack. Both of the above cases occurred off Cozumel. The third such deep diving fatality occurred at a depth of about 140 feet. This diver was shell collecting at night in Thailand, ran out of air and passed out while buddy breathing on the way to the surface. The fourth deep diving

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Table I: Depth of Fatal Accident Dive or Depth at Which Body was Recovered, Nonoccupational Underwater Diving Fatalities, Yearly, 1970-80

Percentage of Total Cases	Depth at or Above Which Percentage Occurred (Feet)										
	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
25	17	18	15	15	18	23	17	17	16	17	15
50	30	40	48	40	43	40	30	26	29	30	30
75	60	75	90	70	78	78	65	58	54	80	63
90	130	140	250	120	125	120	100	110	101	125	120

fatality during 1980 occurred in a lake in a mountainous area of California. The victim had about seven years of diving experience.

In 22 cases weather or environmental conditions may have been the contributing factor. In six cases the wave height was probably beyond the divers' capability to handle. Three cases occurred in heavy or dangerous surf. One of these occurred in Hawaii near a "blow hole" where the volcanic rock had eroded in such a way as to allow water to rush in and out of a cone-like formation, causing extremely rough and hazardous conditions.

Two divers died in accidents related to strong currents. One diver became caught in the overflow of a dam, lost his mouthpiece, panicked and drowned. Another incident occurred when the victim was diving in a very strong outgoing tidal flow. The victim was found with his right foot wedged between rocks.

Diving under ice in 1980 cost the lives of two divers, both without safety lines to the surface. In the first incident the victim had never dived before and became lost beneath the ice. The second ice diving fatality occurred in a mountain lake in California under eighteen inches of ice. Two divers became lost, but one was able to chip a hole through the ice and stick up his arm to get assistance. The second diver was not found until one month later.

Training Deaths Drop

Of the 109 total fatalities, eleven were female; eight of the eleven were between 16 and 30 years of age. Of the 98 male victims, 75 were between 16 and 30.

Ten deaths occurred during training in 1980, the lowest number since the beginning of this study. The peak year for training fatalities was 1975 with a total of 23. Two of the ten fatalities occurred during a practice which the NUADC has continuously condemned: an attempt by one who is not certified as an instructor to teach others how to dive. In one case, the victim became entangled in weeds and panicked. The diver doing the instruction apparently was not knowledgeable enough to come to the aid of his student. In the second case, the one being instructed panicked at 45 feet, rushed to the surface, and died of a massive air embolism.

During 1980, eight fatalities took place during formal training by instructors associated with nationally recognized agencies. Two of these cases might have been avoided had there been a more intensive predive medical history available.

The first such instance involved an advanced program. A fairly experienced diver who had a bad chest cold for a number of weeks was found at autopsy to have a severe lung infection. The victim drowned after vomiting and then aspiring the vomit. In the second medically influenced training diving death, a 240-pound, 35-year-old man was found at autopsy to have died of an acute myocardial infarction.

Emergency buoyant ascent training was involved in two training deaths. In the first incident, the instructor and student were to ascend from fifteen feet. Between ten and seven feet the instructor felt that the student was proceeding properly and let him continue on his own. Moments later the student was found unconscious on the surface. The autopsy verified a massive air embolism. The second emergency ascent fatality occurred from a depth of about 20 feet; the victim experienced some sort of seizure on the way to the surface. There was a later diagnosis of mediastinal emphysema.

Of the remaining four fatalities, one occurred in a Florida sink-hole at a depth of 65 to 70 feet. It was the second open water dive for the eight students who were guided by an assistant instructor. During the dive the assistant instructor recognized that one diver was becoming panicked and fearful of being out of air. He accompanied this diver to the surface, while signaling to as many of the remaining divers as he could see to surface with him. Six, including the panicked diver, surfaced successfully. This left a father and son buddy team on the bottom. The son reached the surface unconscious and was successfully resuscitated, but the father's body was not found until some time later.

On the rugged coast of Oregon a strong surf played a role in one death. The victim was lost in 20 feet of water and was not recovered for some time.

Another training fatality occurred in a murky, silty quarry during an exercise in which the diver-victim was to follow an underwater line from one point to another. He apparently strayed from the line, became disoriented and drowned.

Obviously, conditions such as heavy or rough surf and dark or murky water should be avoided during early training dives since it is important that a diver trainee gain confidence in his or her ability to perform basic scuba skills before being subjected to more demanding environmental conditions.

The NUADC has recently noted a distinct pattern among formal diving training fatalities. In many of these incidents, the tragedy occurs during a few moments of lack of direct supervision by either an instructor or safety personnel. Typical of such an incident would be one in which the trainee has completed an exercise with or without a buddy and is told, "That's fine, you may now return to the base," whether that be a boat or the shoreline. During those next few moments in which the trainee and perhaps his buddy are without direct supervision something goes wrong, and the dive ends in tragedy. Some training fatalities could be avoided by instituting stringent requirements for the supervision of diving students even when they are not engaged in an actual exercise.

(To be continued next issue)