

undercurrent

The Private, Exclusive Guide for Serious Divers

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M/V Carpe Diem, Maldives

the abundance of fish is worth the cost and travel time

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Dear Fellow Diver:

The dinghy captain dropped me in the water in snorkel gear. For a moment, I didn't see a thing. Then emerging from the water, slightly murky from the ample plankton, I saw the whale shark swimming directly toward me, just 10 feet below. Snorkeling faster and faster, I watched in amazement for at least five minutes as the largest fish species in the world swam languidly beneath me, the sun sparkling on its polka-dotted back. Slowly, it pulled ahead of me and disappeared into deeper water. Finally, after thousands of dives, I was no longer a whale shark virgin! This trip yielded two wonderful whale shark encounters, and I'm still smiling.

There are two main reasons why the Maldives are on every diver's bucket list: the diving and the post-card perfection of the archipelago. Though not lush, the islands look like ads for "tropical islands," with snowy sand, swaying palms and crystalline waters. That the diving rocks is icing on a very beautiful cake. This curious nation, only a few feet above sea level, consists of more than 1,000 islands, of which only 200 are occupied by its 319,000 inhabitants. It isn't the center of nowhere, but you can see it from there -- 430 miles southwest of Sri Lanka and 250 miles southwest of the tip of India. It's possibly the world's most Muslim country; locals brag that 100 percent of the population practice Islam. Their customs suggest how strong beliefs run -- not only can one not bring in liquor or porn, but dogs are also disallowed. So no pocket poodles or Chihuahuas to put



M/V Carpe Diem



under your airline seat. They're unclear, you see.

M/V Carpe Diem, a liveaboard in the Blue O'Two fleet, plies a variety of routes in the Maldives. My itinerary cruised the atolls of North and South Male, North and South Ari, and Vaavu, and it featured a number of channel dives, with often powerful currents, low visibility and big animals. There were 19 divers on board, almost all from the U.K. This trip was all about diving and not so much about luxury. The boat was comfortable, and my suite was roomy and bright

with big windows, though the beds were rock-hard. The regular staterooms were smaller but looked comfortable, and no one complained about lack of storage. Meals included plenty of veggies and protein but meats were tough, and sauces lacked spice. Tuna and sailfish caught from the stern of the boat while we were in passage provided the best repasts. A mug of delicious Lion, draught beer from Sri Lanka, was \$3. Wines ranged from \$24 to \$35 a bottle, but they were also available by the glass, as were liquors.

I awoke every morning at 6:15, though one morning I climbed out of bed before dawn at 5:15 in order to go look for hammerheads. I had a banana with Nescafe (if you really like coffee, bring your own) and was in the water by 7 a.m. We dived from an updated version of the traditional Maldivian dhoni, a tender that sported a powerful engine and massive membrane nitrox system that the engineer clearly considered his baby. Most dives, usually three per day (excepting the one night dive), went down to 100 feet and lasted about an hour, so nitrox was a necessity. Those few divers on air were severely restricted by their computers. They offered aluminum 80s and magnificent steel 100s. Since I wear a heavy wetsuit, I took advantage of the added weight of steel, though it meant returning with a lot of air after every dive.

The tender was crowded with 19 divers, who were usually divided into four groups. Due to powerful currents, we were asked to stay with the guides, except for certain dives when buddy diving was okay. All divers were required to carry a surface signaling device on a reel. The boat will provide one, but currents are hairy enough that it makes sense to have your own device that you know and can use easily so you don't end up drifting off to India. The Maldivian guides spoke English decently, and at least one had a university education in marine science. Like the other Maldivians I met on the islands, they are polite, self-effacing and somewhat shy. I had to lean forward to hear briefings and often reiterated what was said to my buddy, whose hearing has suffered from years of rock and roll.

Most dives were channel dives, and the current ranged from moderate to impressively strong, like high-speed trains. The weather in January was dry and gorgeous, the water was filled with plankton and life (I have the jellyfish and siphonophore stings on my face to prove it), and visibility was usually low, but that meant big animals. At Rakeedhu, near South Ari, I saw a whale shark, a squadron of eagle rays, a manta, a leopard shark, two hawksbill turtles, tunas and gray reef, white-tip and black-tip sharks in numbers I had not seen outside of Cocos Island. Of course, not every dive was like this, but there were enough high-voltage encounters for me to become blasé when only half a dozen sharks appeared.

I delighted in the dives around South Ari Atoll. The teeming fish at sites like the Aquarium gave me hope that the oceans are not overfished yet. I hung on top of a pinnacle and watched clouds of silversides, sliced through by

trevally, jacks and snappers. The wreck at Matchafushi Island was not so much interesting as a wreck but as a site of life, with clouds of fish like batfish, unicornfish and other piscavores hunting schools of silversides. A massive green frogfish, which I hope hasn't died of fright, was tormented by photographer after photographer. (I have a rant for another day about how digital photography has spawned environmentally insensitive divers, as cheap digital cameras allows anyone, no matter how lousy their buoyancy, to do it.)

Because the Maldives are so isolated, there are a few endemic species such as anemonefishes, or as Marty Snyderman says, the fish invented by Kodak. The black-bellied Maldivian anemonefish, with its handsome white vertical head-to-belly bar, live in the tentacles of glorious heteractis anemones, which invert as the day gets later to expose vivid undersides of pink, purple, and green. The Sebae, the Maldives' other anemonefish, is quite dark with white patches near the face and caudal fin, and has a pugnacious personality that made me glad that they are tiny.

My dive buddy discovered that some eels have acquired a taste for human flesh. From time to time, we had to gecko dive, hanging on to dead corals and holes in the reef in order to pull ourselves along in the ripping currents. My buddy stuck a few fingers in a hole already occupied by a blackface eel, which proceeded to chomp down on the offending digit and hunt the poor diver for the rest of his dive. Its teeth did break right through the gloves, but the eel only grazed some knuckles. Because eels don't floss, we made sure the wound stayed clean.

Between dives, I did a prodigious amount of napping on my unyielding mattress, suggesting I was truly tired, but sometimes I watched trashy DVDs on my suite's screen. In fact, the impressive amount of between-dives napping all over the boat suggested that though most divers were fit, the currents really take it out of you.

The one dive that was a true waste of time was the pre-dawn search for hammerheads. We were in the water by 6 a.m. and spent 40 minutes in the deep blue, hoping to see the beasts, but instead, we watched little specks in the water. It was early, dark and boring, and I now know better than to go on a "maybe we'll see a hammerhead" dive. Ironically, I had seen a handsome scalloped hammerhead on a previous dive, along with a squadron of eagle rays, lots of other sharks and turtles. Maybe this was my fault for putting the idea of hammerheads in the dive guides' minds.

The one night dive was both a highlight and a little terrifying. The boat ran a line 30 feet down to Mayaa Thila in the North Ari atoll, a pinnacle that comes alive at night with hundreds of hunting white-tip sharks, marble rays and big snappers. It also comes alive with ripping current. During my dive, at least five other liveboards dumped their divers there, so I became disoriented by the lights and, despite my best efforts, could not find the line back to Carpe Diem. After half an hour of my fruitless searching, dive guide Ibu found me and my buddy among the seemingly zillions of divers there, and escorted us back to the correct line. Divers back on board were quite anxious and concerned about our late return, and it resulted in my buying a lot of Lion to repay those divers whose dinners I had held up while they fretted.

We enjoyed one evening ashore on a little island where the crew prepared a yummy barbecue. A walking tour of one

M/V Carpe Diem, Maldives

Diving (experienced)	★★★★1/2
Diving (beginner)	★
Snorkelling	★★★★
Accommodations	★★★★
Food	★★★★1/2
Service and Attitude	★★★★
Money's Worth	★★★★

★ = poor ★★★★★ = excellent

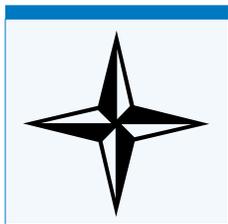
World Scale

small village in the South Ari atoll was interesting, but designed to get us into the souvenir shops. I found no impressive crafts, and prices were sky-high due to the isolation of the islands -- and the optimism of the vendors.

When the boat pulled into Male on the last afternoon to load up on supplies, I took a walking tour of the city to see its old mosque, with its minaret shaped like a lighthouse, and the produce and fish markets. Other than tourism, fishing is the Maldives' main source of income. With rising sea levels, and the Maldivians' protests about the lack of worldwide action on global warming, it's not hard to imagine that this nation will be covered by seawater at the end of the 21st century.

After the liveaboard part of my trip concluded, I booked two nights at the Bandos Island Resort before taking my return flight back via Qatar. I did two more dives but had become so spoiled by the diving in the outer islands that they seemed dull, although a green turtle the size of a VW Beetle finned past me. But it was nice to sleep in a better bed and get a massage. The food was okay, but resorts in the Maldives are impressively expensive, and I chose Bandos in part for its relatively reasonable price. The clientele was lots of Japanese, tons of Russians, folks from various parts of the former Soviet Union, plenty of Brits, and lots of families taking advantage of the kids club. My Jacuzzi villa was a hoot, shaped like a tiki-inspired beehive with a fabulous outdoor bathroom. Next time, I'll decompress at one of the remote resorts in the south atolls.

-- A.E.L.



Divers Compass: Flights to Male are long and generally involve plane changes in Europe if you're flying east, or Asia if you leave from the western U.S., so it's worth it to spend those frequent-flier miles for an upgraded seat; visas are easily issued on arrival for no fee . . . Blue O'Two got me a good price on airfare and the post-liveaboard hotel booking, and other divers said they had booked flights through them as well . . . Depending on the season and the cabin, seven-day trips

range from \$1,500 to \$2,300 per person, double occupancy, and 10-day trips range from \$2,200 to \$3,300; the tariff I paid was higher than most because I paid in U.S. dollars converted into British pounds (something to bear in mind if you book with Blue O'Two or another U.K. company), but as a returning client, I got 5 percent off the price for both me and my buddy . . . Bandos Island is around \$500 per night, double occupancy, with breakfast included; it's \$40 for house reef dives and \$50 for boat dives . . . Unless you are traveling with hungry teens, don't get the full plan because the food is all steam-table food; the a-la-carte food was best at The Harbour restaurant . . . Websites: Carpe Diem - www.blueotwo.com; Bandos Island Resort - www.bandosmaldives.com

Bonaire, Maui, Phuket...

Francis Coppola's five-star resort, a clueless Cozumel divemaster

Introducing the *Carib Dancer*. Well now, there's a new *Dancer* in the Bahamas, but better give it some time before you climb aboard. We've forever been warning about taking maiden voyages -- or trips in the first three months of any new launch -- and subscriber Michael Joest, living in Germany, enjoyed his voyage but says it had its bugs. "No transfer was provided, so I had to take a cab to the marina, walk through customs and security check, then down to the boat. *Carib Dancer* had most of the amenities of the *Turks &*

This Time, It's Not the Lionfish's Fault

From Sombrero Reef in the Florida Keys to the waters of West Palm Beach, red barrel sponges are disintegrating at worrisome rates. The culprit is unknown, and Florida's scientists are trying to figure out how widespread the disease outbreak is.

Ed Tichenor of Palm Beach County Reef Rescue first observed sponges disintegrating at the end of April. By the first week of May, he confirmed they were dying from Breakers Reef in Palm Beach south to at least Delray Beach. Similar observations have been made in Broward, Key Biscayne and the Florida Keys. Rob Ruzicka, program manager at the Fish and Wildlife

Research Institute, told the *Broward-Palm Beach New Times*, "As far as we can tell, this is the largest event we've seen so far, at least in Florida."

Scientists have dubbed the syndrome "Sponge Orange Band," which only describes the symptoms, but they haven't been able to confirm the actual pathogen responsible. "It's totally possible that whatever is causing the disease here could spread to the rest of the Caribbean in a matter of months or a year," Ruzicka says. "We need to find out if it's a widespread pandemic, and, if so, how much of the sponge population it is affecting."

Caicos Aggressor, but had less storage in the cabin. It was a maiden cruise, so all kinds of problems appeared out of nowhere. The AC didn't work well the first few days, so I slept on deck. There sometimes was a strange smell coming from the heads, but they managed to get rid of that with bleach. The nitrox compressor didn't work. Nobody wanted to look at my log book, c-card or DAN insurance, which I found a bit strange. All the guys working on the boat seemed to slowly be getting used to their jobs. The kitchen and food were three stars. The boat was fully booked, mostly U.S. citizens and three Germans. It went to the Exumas and the famous Blue Hole. They let me run on a rather long leash, so diving was enjoyable. Visibility in the shallows was sometimes poor, but stunning on the walls. Like in the Turks, most dives went along a reef wall. Lots of swim-throughs, crevices, tunnels, canyons and boulders for cruising around. We had sharks, rays and turtles, but not many. On the edge of the wall were beautiful coral, sponge, gorgonia and fan gardens with better fish population than at the Turks and Caicos. Once we did a wreck, the *Austin Smith*. Dive operators from Nassau have started shark feeding here, so some reef sharks were cruising around, hoping to grab some snacks."

Stephen Kouri (Lacey, WA), who was on the next cruise, writes, "There were several boat issues unrelated to the crew. No nitrox, leaks causing wet carpets and AC issues (some cabins were hot, while others were meat lockers). The crew worked diligently to overcome these issues that should have been dealt with in dry dock, but were playing catch-up for the entire cruise." (www.dancerfleet.com)

Buddy Dive, Bonaire. This dive operator brings interesting comments from our readers. Richard Sziede (Reston, VA) notes an advantage of using its package with a rental truck for shore diving. "The captive car rental means they won't try the 'scratched bumper' scam." That's something we get reports about on Bonaire and a few other Caribbean islands -- they often find some mark on the body that you have to pay for if you don't have insurance. As for diving, he says, "Reefs have taken a beating from overuse and/or global warming. They seem to be holding their own, compared to my last visit 10 years ago, but are sadly diminished from the abundance of 20 years back. No more storms of Creole wrasse, few big critters. But there's a new wrinkle -- a fluorescent night dive. Not phosphorescent, fluorescent. You carry a blue, polarized UV flashlight and wear a yellow polarizing filter over your mask to attenuate the polarized light. The non-polarized fluorescence from the corals, jellyfish and even fire worms comes through. Way cool light show!" (www.buddydive.com)

Steven Davidson (Midland, GA) has been to Bonaire about 10 times, and while he says you can't beat Buddy's dive operation, "The coral and fish life seemed to be lacking. Lionfish are a problem, like everywhere in the Caribbean. They have a 'lionfish catching course,' or something like that, for \$250 that allows you to wear gloves and harvest lionfish. I would be glad to help them get the lionfish off the reefs, but I'm not that interested in paying for the privilege. Security on the island continues to be a problem; several

divers lost personal items from their trucks. Our group of 20 had a regulator/computer stolen, as well as a BC from their porch. Get a second-floor room; if you are on the first floor, your stuff is not safe drying on the patio. It's probably significant that our divers had their stuff stolen on the last day. On the last night, one of our party had the battery stolen from their truck downtown." Ah, yes, the old "last night theft" trick -- you find out the next day when you're in a rush to get to the airport, so you can't wait to track it down or report it. Collusion among thieves and employees, we suspect.

Turtle Inn, Belize. There are few five-star hotel and dive operations in the Caribbean, but Francis Ford Coppola's Turtle Inn certainly fits the bill. Charlie Wright (Montgomery, OH) says, "I saw whale sharks on both full-moon trips I took in 2010 and this May -- they were on the surface, at 110 feet and everywhere in between. I recommend arriving around the full moon and staying at least a week. The resort looks east, so you see the full moon rise over the ocean. The beach is protected by the largest reef in the northern latitudes, and the whale shark diving is done outside it. There is a 45-minute ride to the dive area. I watched a hammerhead swim past 30 feet below the surface, plus loggerhead turtles, some very large. The Turtle Inn is a five-star diving experience. You stay in cottages on or around the beach, and the

Why You Might Remove Your Regulator When You Shouldn't

Many divers trying to save a buddy from drowning report afterwards that, against all reason, their buddies removed their regulators from their mouths while they struggled for air. Over the years, *Undercurrent* has reported on many drowning deaths in which divers are found on the bottom with their second stages hanging free, but plenty of air still in their tanks. In one article, we reported that many firefighters breathing from air tanks have been found dead in the aftermath, with their regulators no longer in their mouths.

Recently, I came across the book *Deep Survival* by Laurence Gonzalez, in which he reports on research by Ephimia Morphew, a psychologist and founder of the Society for Human Performance in Extreme Environments. Gonzalez writes that she has "studied a series of accidents in which scuba divers were found dead with air in their tanks and perfectly functional regulators. 'Only they had pulled the regulators out of their mouths and drowned. It took a long time for researchers to figure out what was going on.' It appears that certain people suffer an internal feeling of suffocation when their mouths are covered. That led to an overpowering impulse to uncover the mouth and nose.

"The victims had followed an emotional response that was in general a good one for the organism, to get air. But it was the wrong response under the special, non-natural, circumstances of scuba diving. It's possible that the impulse, the feeling of suffocation, was formed as an implicit memory by some previous experience that was not available to conscious (explicit) memory. And the divers had no way of knowing that the one thing that would keep them alive, covering the nose and mouth, was the one thing the organism would not

tolerate. At the critical moment of decision, reason was not enough to overcome emotion. For no one would say that those divers believed they could breathe under water without a regulator.

"Morphew and the other researchers wanted to know what divers were thinking when they removed their regulators and tried to breathe without them. The answer is: you don't need to think. That's what emotions and implicit memories are all about. By tradition, reason is regarded as the highest function. But from the point of view of an organism in desperate trouble, an organism that evolved by relying on emotions as the first line of defense, cognition is irrelevant and gets set aside. It's slow and clunky. As Remarque said, there's no time for it.

"Most of the mystifying accidents that happen in the course of risky recreation, the seemingly illogical decisions, actions, and outcomes, can be explained by the same interplay of emotions and cognition that shapes all human behavior. What the scuba divers did made perfect sense from the point of view of the organism's survival: The impulse to get air is automatic, and can be overpoweringly strong. Those who can control that impulse to survive, live. Those who can't, die. And that's the simplest way to explain survival."

As for the dead divers, says Gonzalez, "If you had magically transported them to the surface a moment before they removed their regulator and asked them about their impulse, they would have told you that it made no sense: The regulator was necessary for their survival. If you were able to ask them afterward, they would tell you that they didn't intend to take it out. They intended to live."

boat leaves from the bay side behind the resort. The value is definitely there for the dollars paid. Bertram, the dive shop manager, has been there 10 years, and his staff is excellent. The new dive boat is well laid out, with an upper deck, plus ample area to get out of the sun. Reef diving was on par with Bonaire, and you have the blue water diving with larger pelagic and fish species, and the Blue Hole for advanced divers." There's also the Belize backcountry, where Coppola has another resort, the Blancaneaux Lodge. (www.coppolaresorts.com/turtleinn)

Maldives Aggressor. Besides the *Carpe Diem*, which we profile in the previous article, this is another choice for a Maldives liveaboard. Robert Kopki (Alexandria, VA) says, "This was my third trip on the *Maldives Aggressor*, so they must be doing something right. Half the people on the boat were Americans. The crew is very customer service-oriented and will do whatever possible to make your voyage pleasant. The food was reasonably good for a liveaboard, and lots of fruits and veggies are available with meals, as well as fruit drinks. All diving was done from a 40-foot dhoni, a well-equipped, separate boat used only for diving. Four dives per day, starting at 7 a.m. I saw a wide variety of Maldives marine life, from macro to swarms of the amazing tropicals there, to sharks, rays, huge trevallies and nurse sharks. Some areas had thousands of schooling fish around us, truly amazing. In general, the coral was healthy, beautiful and impressive. We had two great manta dives to conclude our voyage." (www.aggressor.com)

"I intend to report this operation to PADI, as the lack of concern for newly-certified divers in these conditions is unacceptable."

Ed Robinson's Diving Adventures, Maui. When experienced divers go to Maui, many head for Robinson's operation. One reason: His special Adventure dives relax the rules for the hardcore so they get big experiences. Roger D. Roth (Cincinnati, OH) went in February, and says that Ed "can usually be counted on to join the experienced group for his 'Adventure X' Wednesday trip, where the group has more flexibility in their dive profiles -- do your own thing, but make sure you can see someone else's bubbles. This is super for underwater photographers and videographer. I heard whales in the water on every dive, and between dives there were usually whales nearby to watch and photograph from the surface. One diver was even fortunate enough to see a whale underwater near the dive boat. I filmed over a dozen different species of nudibranchs, including the Spanish dancer and its egg cases; plenty of frogfish; most of the species of butterflyfish found in Hawaii, including a rarer dark longnose; and the somewhat rarer bandit angelfish. There were also more than eight different species of eels, a few octopus, sponge and coral crabs, four-foot-long barracuda and plenty of turtles. Some of the dive sites have great concentrations of schools of blue-striped snappers, pyramid butterflyfish, Moorish idols, chubs and more. At the *St. Anthony* wreck, turtles can almost be guaranteed." (www.mauiscuba.com)

Scuba Club, Cozumel. Too often, we get comments from readers who find themselves in situations where the dive guides are oblivious to divers in danger, and so they step in, at some risk to themselves. While at the Scuba Club Cozumel in March, John Miller (Lubbock, TX) says the wreck diving should have been called by the divemaster, as currents "were the worst I have ever been in. I literally had to use the wreck's structure to pull myself to the mooring line to surface, and the divemaster had to tow my wife. Another lady lost her camera from her wrist." (Ah, yes, those Cozumel currents: see page 8 in this issue.) On another day, "a 14-year-old girl, who I had assisted in her PADI openwater training the week before, was on a dive with her dad and the rest of us. The plan called for a maximum bottom depth of 80 feet, drift on the wall and then go to 50 feet. I was on the wall at 85 feet and saw this girl 20 feet off the wall and below me. She did not have her depth gauge or elevator buttons in her left hand, and was slowly sinking. I kicked as hard as I could, and caught her at 104 feet to bring her up to her dad, at 80 feet. The divemaster was nowhere around. Ten minutes later, he was at 60 feet, on one side of a coral head, and the girl was nowhere to be seen. I found her on the other side, at 90 feet, and her dad was nowhere around. Finally, they began their ascent to their safety stop 10 minutes later, due to dad being at 700 psi. The divemaster was

down around 55 feet and did not see them ascend. He was not concerned that two of the group had surfaced without deploying a float, so I deployed mine, as boat traffic was heavy. As I surfaced, our boat was safely picking the girl and her dad out of the water. But I intend to report this operation to PADI, as I consider the lack of concern for newly-certified divers in these conditions unacceptable. Their position seems to be if you have your C-card, you can take care of yourself.”

Jolly Roger, Phuket. Finally, when you get to the Third World and hook up with the less expensive local boats, you may not get what you bargained for. In April, the *Jolly Roger* out of Phuket was the choice of Karl Gustinger (Monroe, LA) and, right off the bat, he found that while nitrox was offered, there was no analyzer available to check the oxygen concentration. “The dive deck was small and cramped. Divers were packed, with no room for preparation. The food tasted like it had been prepared the night before, if not earlier in the day before. This boat caters to Russian divers, probably the rudest divers I have ever been on a boat with in my life. One of our divers had their mask stolen, and another had wetsuit boots stolen on the same dive. After this one day of diving, I switched over to dive with Sea Bees Divers, and the boat crew were very attentive to everyone’s needs on the boat.” You have to be careful in Phuket, where scores upon scores of dive operators compete for the backpacker crowd, and you don’t want anything to do with them.

Truk Odyssey Discount Pays Off. Ed Leibowitz (Jersey City) sent us a nice thank you. “In the April 2012 issue, I learned about the reduction in price for the *Odyssey* in Truk for the week of April 12. Because I’m retired, I was able to go on this trip, taking advantage of the \$1,000 discount. It was a great trip, and *Odyssey* has the best and safest diving operation I’ve ever encountered in all the years that I’ve been diving. If I hadn’t subscribed to *Undercurrent*, I would not have known about the reduction in price on the *Odyssey*. Thank you.”

-- Ben Davison

Those Deadly Downcurrents

do you ride it out or react in the worst way possible?

Riding along in a current is a great diving thrill, but when it suddenly yanks you upward or downward, the thrill can become frightening, and sometimes tragic. How you react is a matter of life or death.

Subscriber Jonathan Blake (LaVerne, CA) had his first rogue current experience in the Arborek area of Raja Ampat. “I was finning along the edge of a cliff at about 45 feet, enjoying the pygmy seahorses on the sea fans. I was experiencing a little surge, when the downcurrent hit with no warning. At 90 feet, my dive guide and I managed to grab on to a small outcropping of the wall. We saw another diver, a small Japanese woman who probably weighed 100 pounds soaking wet, and her dive guide, holding on to her BC, shoot past us. I thought they were gone for good. While the downcurrent lasted less than 30 seconds, it seemed much longer. Miraculously, the other dive guide and the diver appeared. He had managed to pull her under a crevice in the wall at 120 feet and out of the downcurrent. It happened so fast there really wasn’t any time to be terrified. I think discussing during the briefing the possibility that it could happen, and how to react if it did, helped save us from disaster.”

David Hill (Ipswich, MA) got caught in a “washing machine” current in Bunaken National Park in North Sulawesi. “I was working along a wall at 40 feet, when suddenly, the current picked up strongly. For 30 seconds, it would howl in one direction, switch to the opposite direction, then howl straight down, then straight up. The current was far stronger than I could swim against. My group was instantly scattered, and I ended up clinging to the wall with two other divers. It was one of the strangest sensations of my diving experience to be looking at my buddy clinging to the wall next to me and watching his bubbles streaming

straight down. Eventually we worked our way up the wall to 20 feet, waited until the current was going sideways, and finned to the surface. But even on the surface, the currents and whirlpools were so strong, we were swept in different directions. The three dive boats ran around picking up any divers they could find, then rendezvoused. Everyone was OK, but it was a harrowing experience for some of the novice divers. We checked one poor woman's computer, and found she had started at 40 feet, been blown to 10 feet, sucked down to 90 feet, and then blown back to 20 feet. She was fine, but more than a bit shaken."

Randy Preissig was diving the south tip of Peleliu Island in Palau, which has a strong current that sweeps divers along the northern edge of the island, then makes a 90-degree turn south at the island's tip. "We were warned that the current would 'pick up' as we turned the corner, and that it would be difficult to grab a hold as we swept over the edge -- no second chances. This turned out to be an understatement. I was flying when I turned the corner, as the current went to turbo, and I barely managed to grab hold and stay on the ledge, watching huge silver-tip sharks 'surfing' the current. As they got closer, I dropped off the ledge. I began at about 50 feet, shot some air into my regulator and started gently kicking up. Then I realized I didn't seem to be getting closer to the surface. I was at 140 feet and sinking very fast! I think if I had waited even 10 more seconds to determine my depth, I might not have made it. A wave of fear grabbed me as I realized I would require a deco stop. I put an amazing amount of air into my BC and kicked strongly. When I again glanced at my gauge, I found I had barely ascended! I now kicked like Neptune wanted my ass, and I was just able to overcome the down current, as it slackened at around 70 feet. I was a strong athlete who had run marathons and exercised regularly, so I think most divers would not have survived this experience. I surfaced, fortunately on a very calm day, and the boat eventually found me, miles from the tip of Peleliu. I later learned that two Japanese divers had disappeared at that spot, and that it was no longer being dived -- well, at least for a while."

"It was a strange sensation to look at my buddy clinging to the wall and watch his bubbles streaming straight down."

Going Down Without Even Noticing

Oceans move constantly, with currents coursing through them like giant rivers. Currents are the result of winds, tides, thermally unstable water columns and seismic events, often in various combinations. Most currents run horizontally to the earth's surface, but especially dangerous ones run vertically, toward the bottom or toward the surface. Such currents are often found when a horizontal current strikes the face of a wall and then moves down, up, or both. Downcurrents can also appear when a horizontal current runs perpendicular to a drop off, or where two opposing currents run into or over each other. Marked differences in water temperature and salinity in the water column can also produce vertical currents, but these are generally sluggish and pose no threat to divers.

A downwelling can unexpectedly pull a diver deeper than his dive plan. It may happen so gradually, he may not notice it. Sometimes, however, the current will rapidly drive the diver deeper, occasionally much deeper. In Tobago several years ago, the current yanked a nearby diver from 20 feet to 85 feet in the blink of an eye. If you have air, equalize quickly enough and don't panic, you can probably ride it out uneventfully. A violent upcurrent, however, causes a diver to ascend far too rapidly, perhaps missing a safety stop if not planned, and precipitating DCS. Additionally, if a diver's surprise at the sudden ride upward results in breath-holding, an embolism is possible.

Douglas W. Peterson (Elk Grove, IL) was drifting comfortably along the top ridge of a long reef in Cozumel around sunset "when it suddenly dawned on me that I was being pushed way deeper than I liked, from the top of the berm, down over its side and into the depths. Once I hit 90 feet, I turned back into the current to fight my way back up, but I was getting nowhere. I was just stuck around 90 feet, kicking full speed for my life, all my hoses wrapped in tightly by my arms, and rapidly running out of gas.

I realized that I couldn't make it that way, so I just gave up and turned to go with the main direction of the current and let it sweep me along the berm, in line with the original dive plan. I worked to maintain my altitude and not get pushed any lower, but it was easier now because I was no longer kicking into the main current itself. A short while later, the downward push just disappeared, and I was able to slide back up to 60 feet, calm myself and resume the dive. So for God's sake, stay calm and don't fight the downcurrent. Swim to the sides till you're out of it."

Are You Experienced?

Unless you are properly trained, physically fit, and intentionally seeking out the challenges of strong vertical currents, it is best to avoid areas where they are known to be fierce. But unfortunately, many dive operators take novice divers on dives out of their depth. H. Wayne Ferguson (Lawrenceburg, IN) experienced this while diving the Galapagos Islands. "On one of the early dives, we hopped in the water and went from 10 feet to 50 feet in nothing flat. The woman who was my dive buddy became very excited and grabbed hold of me, with a wide-eyed look of panic on her face. I checked her equipment, verified that she was OK and had sufficient air, and we slowly made our way upward. There were a number of divers on this boat who had a limited number of dives and were lacking experience in a place which could cause problems." One must wonder what novice divers are doing booking the Galapagos, anyhow.

"One diver panicked and came up with a computer beeping and flashing red lights. Another diver claimed to be okay, but suffered a panic attack an hour later."

Mary Wicksten (Bryan, TX) saw the detritus of novice divers caught in a downcurrent at Palau's Blue Corner. "The current was so strong, it almost pulled my regulator out of my mouth. My group was scattered all over the top of the reef, hanging on for dear life and to hell with the coral. I signaled to the dive guide and surfaced. The chase boat

got me quickly, but the driver chewed me out for coming up alone. I agreed I was an idiot, and happily breathed fresh air. Then another guy came up, alone. He was in the downcurrent that swept the group to 80 feet plus, like an elevator out of control. He 'mountain climbed' the reef and came up with barely 100 psi. The next guy swam out to sea and got away from the current -- a long, long way from the reef in openwater. Other divers came up here and there, but at least one other diver panicked, pulled her carbon dioxide cartridge and came up with a computer beeping and flashing red lights. She was taken to the chamber in Koror. Another diver claimed to be okay, but suffered a panic attack on the boat an hour later. Mine was a very mixed group, but I strongly suspect that at least two of the divers were absolutely clueless as to what, if anything, they could do. Dive boats away from the U.S. will take just about anybody on 'adventure' dives."

Of course you expect your divemasters and guides should to be aware of problem sites, and at least advise divers about them. Stephanie Runyan (Brooks, GA) was fortunate to get a lesson from her Utila divemaster. "Before we selected the dive site, she asked our group of five divers if we had ever experienced a downcurrent situation. Only two had. She provided specific instructions, telling us that on the forward part and sides of the reef, we could stay off the mount a few feet but get close to the reef again on the downcurrent side. To get out of the current, we should swim to the side (similar to a rip current), then come up the reef if there are enough divots and overhangs. She wanted us to experience the power of the downcurrent."

Even vertical currents aren't always predictable. There may be surface manifestations, like circumscribed areas of water showing varying patterns of wave frequency, height and direction interspersed with eerie, mirror-smooth areas, but don't count on this.

Often surface conditions tell the diver nothing about currents at depth. If caught in a vertical current, one strategy is to swim out from the wall immediately, drop off or any other apparent source of the current.

Vigorously fin away, but do not exhaust yourself. It's helpful to orient yourself to bubbles or the direction and angle of any fish you observe. If you're caught in an upcurrent, swim away and down. For a down-current, swim away and upwards.

Monitor Depth, Keep a Hand on the Deflator Valve

It's best if you can make adequate upward progress without BC inflation, as an inflated BC provides more surface area for the current to push against, and raises the risk of a poorly-controlled ascent once you are released. However, you may need to inflate if rapidly descending or lacking adequate gas to ride out a downwelling that does not show rapid signs. Marc Fountain (Berkeley, CA) says he always tries to resist the urge to inflate his BC a lot in response to a throwdown. "Inflate it just a tiny bit to help stabilization, and try to swim up slowly. But be prepared for the next reverse cycle -- the coming throw upward from 150 to 50 feet that will leave you scrambling to deflate quickly if you have too much buoyancy."

PADI instructor Bob DeFeo (Novato, CA) says divers should be cautious when swimming laterally out of an up or down current. "You may run into a current going the opposite direction right next to the one you're getting out of. Keep your hands on the inflator and dump valves, and be cognizant of your body position in the water to make effective use of them."

Do monitor depth and keep a hand on the deflator valve, as you must avoid shooting to the surface when the current relents. Consequently, it is also best not to release your weights if possible, but in very serious situations when there is no other way up, it may be necessary. In any vertical current, remember to breathe normally. While caught in a downcurrent in Sipadan, Owen Babcock (Denver, CO) says his quick, automatic response was to "stop, inflate the BC and begin kicking upward with great vigor. Holding the inflator valve button in one hand and depth gauge in the other, I was out of the downcurrent in about a minute. I actually had to dump a small amount of air in about 10 seconds, then fairly steadily for an additional 30 seconds. The moral: Keep a better view of surrounding objects and check your gauges more often. A downcurrent happens incredibly quickly and without any feeling of rapid descent."

An alternate strategy if you're near something graspable is to kick to it, grab on and pull yourself in the desired direction until you are free. (We get reports of autocratic divemasters grounding divers for grabbing coral in stiff currents -- don't let them intimidate you.)

Whichever method you employ, use surge to your advantage. When it propels you in the desired direction, go with it; conserve your energy when it is working against you. While sudden vertical currents are anxiety-provoking, you can frequently negotiate them. As in other stressful scuba situations, remain calm and take rational problem-solving action.

When in doubt, don't do it, says Randy Preissig. "Know your limits. Although still 'in shape,' I'm older, and I actually aborted a strong current dive in Australia when I weighed the 'risk-to-benefit' ratio." If you do decide to do it,

Protected Marine Reserves Are Not So Safe

We're referring particularly to remote areas lacking enough funding for full-time monitoring. The *Washington Post* reported last month that authorities in Indonesian Papua caught 33 poachers at Kawe Marine Protected Area, Southeast Asia's largest no-take reserve, who had taken sharks, manta rays and sea cucumbers worth more than \$160,000. But after confiscating the illegal catch and gear, the nine patrol officers had to let the poachers go because they lacked the manpower to take over the boats.

Conservation International provides \$200,000 a year to fund patrols in the area, but this incident underscores one of the bigger challenges in protecting the ocean: Setting aside swaths of the sea from fishing only works when there's adequate enforcement. The Indonesian navy announced plans soon after to boost its presence throughout the protected area, but now that fishing stocks are on the rebound due to hands-off efforts by local fishermen, the reserve attracts fishing vessels from outside the region. "This is the only fish stock in the eastern part of Indonesia that's still healthy," says Ketut Sarjana Putra, executive director of Conservation International in Indonesia. "The only problem we see here is the outsiders."

he says, "Don't let the excitement of the minute or the newness of the experience take your mind off your routine -- that's when you need discipline the most."

A Popular Place for Downcurrents

A final note: Cozumel is notorious for its vertical currents, and nearly every dive is a drift dive. Especially in the early and middle parts of Caribbean hurricane season, it's not unusual for divers to face heavy downwellings and roller-coaster-like horizontal currents. Reader Jeffrey Raffa (Boca Raton, FL) went there last June to dive with Dressel Divers, but gave up. "The currents were just too strong. This was my fifth time there, but on this trip, they were out of control."

On YouTube, "AquariumDiver" uploaded his video (www.youtube.com/watch?v=y39SQg26z2M) of "the most intense dive of my life" while 75 feet deep at Palancar Gardens last June. He writes, "It was even worse a few moments before -- a whiteout, then it started to get dark, and the currents were whipping us back and forth ... hanging on with both hands to not be swept away! At that point, I wondered if it was a tsunami. Only after it started to calm down a bit was when I shot this video. Divemaster said it was the most intense current change he ever saw."

While the diving there is exciting, it can often be intimidating for beginners or those who lack confidence in their skills., and the results can be fatal. Christina Cassin from Acworth, GA, vanished while diving Cozumel's Santa Rosa Wall this past March. Cassin, 49, had made approximately 10 dives after getting her openwater certification. She was on an 11-day cruise with her husband, Scott Turco, and they decided

Palau's Chamber is Working Again, But Not Full-Time

What's the deal with Palau's hyperbaric chamber, reader Bob Kuhn (Palatine, IL) asked us. "I was at Palau recently and heard the chamber there has not worked in some time. Why? There are hundreds of divers coming here, but they have to go to Guam. I asked two divemasters at Sam's Tours and got two totally different answers. The first was that no one is trained, it's all private funding, and the dive shops don't communicate and work together well. The second was that there are actually two chambers, but one is broken and the doctor does not know how to operate the other one. My wife also sent an email to the hospital's information email address listed on Sam's website three days ago without a reply from the hospital. What's the real reason for a major dive destination not to have a working chamber?"

We contacted Sam's Tours and Fish n' Fins to find out what was happening. While Fish n' Fins never got back to us, Sam's Tours' managing director Dermot Keane did. He had just returned from a Memorial Day meeting arranged by the Palau Visitors Authority with medical staff at Belau National Hospital (BNH), where the three-year-old chamber is located. Here's what he wrote:

"The hyperbaric chamber at BNH is and has been fully functional since installation. There are physicians and staff at BNH with training in hyperbaric medicine, chamber operations and chamber tending, though perhaps more staff are needed. The reason hyperbaric treatment was not available last week to treat a suspected decompression sickness case was the unavailability of a full team of qualified chamber tenders/operators to support the attending physician in administering hyperbaric treatment. (The patient was treated with oxygen therapy and intravenous fluids while under evaluation and, following further examination, was determined not to have suffered DCS.)

"As of May 29, 2012, there is a physician and a full staff of qualified chamber operators/tenders on hand to provide hyperbaric chamber treatment, if needed, to a hospital patient under evaluation for DCS. The solution now in place is a short-term measure to restore availability of chamber treatment on an emergency-call basis only, as opposed to 24/7 standby. In the meantime, multilateral efforts involving dive centers, hospital administration, Palau Visitors Authority and Belau Tourism Association are underway to promptly produce solutions for a return to the previous full-service levels."

Keane says that there are only two suspected, but not official, DCS cases this year, and no cases last year. (The most recent annual high was four DCS patients in 2009.) Still, we hope the full-service level returns quickly. As you'll read in our story "Those Deadly Downcurrents," Palau has some tricky dive sites that can put divers in risky situations where they may need chamber access immediately, rather than the once-a-day, two-hour flight to Guam.

after docking in Cozumel to do some diving, but the current was so strong that day that tank bubbles were apparently pulled to the ocean bottom. Turco told news station WSBTV that during their dive he “turned to let the divemaster know we were going up, and when I turned back, I didn’t see her.” He feared she was sucked beneath a reef and didn’t survive. The Mexican Navy and Coast Guard led a land and sea search, but called it off after 72 hours with no sighting of the grandmother of four.

-- Ben Davison and Vanessa Richardson

DEMA Versus the National Ocean Policy

our trade association sides with oil companies and housing developers

What does the Diving Equipment & Marketing Association (DEMA) have in common with the American Petroleum Institute, ExxonMobil, the National Association of Homebuilders and the National Union Association? They’re all partners in the National Ocean Policy Coalition. That may sound uplifting, as if they’re joining forces to create a policy to protect our ocean. In fact, they’re actually joining forces to make sure the ocean policy proposed by the Obama administration is left on the cutting room floor. The movements made by Congress on this matter could greatly affect divers here in the U.S.

First, the background. U.S. policymakers have tried to come up with a coordinated ocean-use policy for years. The current effort started in 2000 when Congress passed the Oceans Act, which called for the formation of a U.S. Commission on Ocean Policy. The commission issued recommendations for a national ocean policy in a 2004 report, but it wasn’t until July 2010 that President Obama signed the most recent iteration of the National Ocean Policy (NOP) into place (www.whitehouse.gov/administration/eop/oceans/policy).

The Obama administration says its proposed NOP will help federal agencies better organize marine research efforts, potentially prevent conflicts between ocean users and save money for the government. The policy highlights nine goals to address pressing issues regarding the oceans and Great Lakes. They include shifting government regulators to a more ecosystem-based management perspective; better integrating scientific information in policy decisions; and creating a planning process for determining what kinds of activities should take place in different parts of U.S. waters (a concept officially known as coastal and marine spatial planning). The ultimate goal, of course, is to keep the waters clean and marine life prosperous.

The National Ocean Policy Coalition (<http://oceanpolicy.com>), in which DEMA holds a membership, is pretty much against the NOP. On its “Statement of Principles” page, it states that while it “recognizes the critical role our oceans, coastal areas and marine ecosystems play in our nation’s economy,” and it wants to conserve “the natural resources and marine habitat of our oceans and coastal regions,” it also wants to “enhance commercial and recreational activities, such as oil and gas development, minerals development, marine transport, commercial fishing, recreational fishing and boating, and tourism,” and “avoid ceding all regulatory power impacting the oceans and coastal areas to one agency.” It also wants federal authority to be “limited to federal waters and should not infringe on state authorities to manage resources and activities under state jurisdiction.” The coalition members are all companies and business-focused organizations -- there’s not a scientific or environmental group listed.

On its website earlier this year, DEMA announced that it had joined with the National Ocean Policy Coalition. “[It’s] one of the many organizations with which DEMA has been working to ensure that appropriate science exists prior to executing this sweeping National Ocean Policy, and that access to dive sites is not encumbered unnecessarily by its implementation,” DEMA executive director Tom Ingram said. “The dive industry has agreed that an ocean policy that is designed to stimulate job creation and economic growth while conserving the natural resources and marine habitat of our oceans would be of great benefit

to our nation. However, more time and appropriate scientific study is needed to adequately establish justification for many aspects of the policy, based on realities on the ground.”

When *Undercurrent* asked DEMA executive director Tom Ingram why he was with the National Ocean Policy Coalition against the NOP, he replied, “I believe the letter from Doc Hastings, Chair of the U.S. House of Representatives, states the issues for all industries very clearly.” Hastings, a Republican congressman from Washington State, wants language to be included in all appropriation bills for fiscal year 2013 to specifically prohibit the use of funds to implement the NOP. He says the policy will increase bureaucracy, hinder job creation, possibly increase the number and scope of lawsuits to stop or delay projects, and divert significant staff time at the federal agencies that must meet multiple required milestones. To *Undercurrent’s* way of thinking, that opposition is more about shrinking government than about protecting our oceans.

When we asked what “appropriate scientific studies” are needed to establish the results DEMA would approve of, Ingram replied, “We believe there is insufficient evidence at this point to conclude that the NOP as outlined is the best solution to protecting federal waters. We also believe ... there is a strong need for understanding the economic consequences of implementing the marine and coastal spatial planning -- essentially “zoning” of federal waters -- as proposed. Given the need for economic considerations, DEMA and the recreational diving industries have gone on record as recommending the following:

A clear balance must be maintained between the overall health of the aquatic resources and access and use by interested parties.

2. As is understood in many Marine Protected Areas throughout the U.S., there should be a clear recognition that scuba diving and snorkeling are not inherently consumptive activities.

3. Spatial planning should not unnecessarily include restrictions on non-consumptive activities.”

We take from those vague statements that DEMA wants to ensure that divers should not be officially classified as tourists to be kept out of protected marine areas, or charged some sort of luxury or tourism tax to do so, which could drive them away and drive dive operators out of business. However, those issues will never be resolved legislatively, and are not grounds to oppose the NOP because more science is necessary -- it smells similar to the climate-change opposition movement. Issues like diving will be up to regulatory organizations to resolve, and national ocean policy legislation won’t address it.

“While the National Ocean Policy Coalition sounds like a conservation organization, many of the members are not known for their environmental track records,” says Jacqueline Savitz, senior campaign director

South Korea Bulks Up on Dive Weapons

StrategyWorld.com reports that South Korea is buying an unspecified number of Cerberus Diver Detection Systems to protect its harbors from attack by terrorists or North Korean commandos. The Cerberus Diver Detection System is a refrigerator-sized device that is lowered to the ocean floor in the middle of the area to guard. Cerberus uses sonar to detect anything large enough to be a threat, up to 3,000 feet away. Cerberus works well in shallow water, and once in place, it can be tweaked by the operator to be even more accurate.

North Korean commandos are known to have scuba gear, and are trained for underwater attacks. South Korea is not specifying how many Cerberus systems it is

buying or where exactly it is placing them, as that kind of information would enable the North Koreans to plan attacks on port areas without Cerberus systems.

There are other types of underwater weapons in current stages of development. As we reported in our August 2007 issue, various firms are developing sonar-type devices that can locate divers or disable them. One device uses high-resolution sonar to create sound waves that are tuned to cause severe gastric distress in humans, essentially making them hurl into their regulator. But according to StrategyWorld, this system has not yet been made available for purchase, as there may not be a large enough market to justify it. For all the talk about scuba-equipped terrorists, there are no official reports about this sort of thing actually happening. Hopefully, they won’t be happening along the Korean peninsula.

for the environmental nonprofit Oceana. “Rather, many of them are known for undermining environmental protections, and doing the exact opposite, and this seems to be another effort to do that.”

On the pro-NOP side are conservationists and environment groups, obviously. But Emily Woglom, director of government relations for the Ocean Conservancy, says there are some ongoing misconceptions regarding ocean-use planning. “It’s troubling that some opponents continue to circulate misleading claims, such as President Obama “wants to ban sport fishing.” Critics fear that certain groups will be under-represented, yet the very purpose of the NOP and comprehensive ocean-use planning is to be more inclusive than the current system, where sectors are managed in isolation without coordination.”

“Say marine debris is washing onto shore. With an anti-NOP policy, does that mean agencies can’t go out and collect the debris and data? That would be detrimental to many industries, including diving.”

While DEMA’s group of opponents want the states, not the federal government, to manage ocean policy for our nation, Sandra Whitehouse, the Ocean Conservancy’s senior policy adviser, says only two states have done the smart ocean planning that’s called for in NOP -- Rhode Island and Massachusetts. “Rhode Island has a specific section about recreation diving. When the planning process was happening, it was important to the state’s dive industry to ensure that heavy activity would not be done in places listed as dive sites, such as wrecks. By putting those sites on the reference map all agencies use, it makes people make better decisions on where to put things, like wind farms. At the end of the day, the dive industry was pleased that their information was put into the plan, and the agency managers are now better informed because the data was collected and mapped in advance.”

The NOP is not a standalone piece of legislation. All the back and forth about it is being done through the appropriations process. While opponents would have to take great measures to stop the NOP from moving forward, the intent by groups like the National Ocean Policy Coalition is for Congress to follow Doc Hastings’ suggestion and attach riders to the federal budget stating that no resources can be used to implement the NOP. However, by denying the NOP any funding, the states that want to work on proactive planning will be denied the ability to do so, Whitehouse says. “So, say marine debris is washing onto shore from the Japanese tsunami. The NOP states that agencies will work together to collect data on marine debris. If we take this anti-NOP policy to the next step, does that mean the agencies can’t go out and collect the debris and the data? That would be detrimental to many industries, including diving.”

Furthermore, she says, “If you cut off funding of the NOP, does that mean government agencies can’t do the things they have been doing for a long time on the conservation front, like coastal management and scientific research on the ocean and climate? Hastings wants that language not just on appropriations bills that fund NOAA, but on all bills related to all agencies involved in those activities -- the Department of Agriculture, the Environmental Protection Agency, the Coast Guard and more.”

Shana Phelan, owner of Pura Vida Divers in West Palm Beach, FL, says she understands DEMA’s wariness somewhat. “There’s always potential for unintended consequences from well-meaning policies, but I feel like the dive community needs to engage in these conversations instead of signing on to resist a policy.”

She supports the NOP. “I read the final recommendations, and also those from the Pew Charitable Trust, which reached the same conclusions, and they show there’s definitely a need for a hard look at a national ocean policy. The dive community needs to be involved in this conversation and make sure our needs are addressed and met.”

How can divers get involved? If you read the NOP’s guidelines and agree with them, call or email your Congress representatives and let them know you support the policy’s goals. You may think your voice is

like one drop in the ocean, but when it comes to creating a national policy that benefits everyone who uses our waters -- and the marine residents living in it -- every voice counts.

DEMA is not looking at NOP from the standpoint of what's essential to save our oceans, but rather from a narrow business standpoint. We recreational divers should support a policy that's not focused on short-term profits or the financial bottom line, but rather on clean, healthy waters that support diverse life and can be used by future generations of Americans.

If you want to share your view with Tom Ingram, you can email him at info@dema.org.

-- Vanessa Richardson

Why Divers Run Low on Gas

and how one researcher found out the reasons

In 2006, I started a PhD program in diving physiology at the University of Western Australia, aiming to make a small but measurable improvement to diving safety. From the scientific literature, it was clear that running low on, or out of, gas was a common risk factor for diving injuries and deaths. It was a common theme in the annual reports that Divers Alert Network once published about North American dive incidents and fatality reports, and in the U.K. incident reports that the British Sub-Aqua Club still does publish. The Western Australian coroner's records confirmed that running out of gas was common among diving fatalities in Western Australia, too. But why do divers really run low on gas?

I invited 27 diving experts to help me out, using a Delphi survey to gather the data. I found nine diving doctors who had published research and treated countless injured divers, plus nine expert divemasters who had taken thousands of divers out on dive boats, and between them, had probably seen it go wrong in all possible combinations. Then I found nine expert divers who were well-published diving authors and who had made thousands of dives worldwide. I wrote to these experts and asked them, "Why do divers run out of gas?" I arranged all the suggestions into alphabetical order, then sent that list back out and asked each expert to rank the top five reasons they thought people might run out of gas. Once everyone had picked their five, then I gave each first-choice selection five points, each second-choice selection four points, and so on. Then I added up the points. I sent out this new list, with the reasons ranked by order of popularity, and asked the group to reconsider their top five reasons, bearing in mind the weight of the opinion of the expert panel. Some people reconsidered their reasons, and the group as a whole moved closer to consensus.

Ultimately, here were the most popular reasons that my expert panel thought led to divers running out of gas (below right). Now I knew what to look for.

Next, I bought 15 Sensus Ultra data-loggers, which estimate a depth reading every 10 seconds. I loaded them into my 1985 Nissan, which I drove all over Western Australia. Wherever I found divers, I would clip a logger onto each volunteer and fill out a four-page survey, recording their tank volumes, start and finish air pressures, the dive site, who was

Top 10 Likely Reasons Why Divers Run Out of Gas (in Order)

- | | |
|--------------------------------|--------------------------------|
| 1. Fails to monitor gauge | 6. Panic/anxiety/stress |
| 2. Inexperience | 7. Diving deeper than usual |
| 3. Overexertion/strong current | 8. Trying to match one's buddy |
| 4. Inadequate training | 9. Overweighting |

diving, the weather, and, using a Secchi disk, the underwater visibility (if you're asking what the heck a Secchi desk is, read up at http://en.wikipedia.org/wiki/Secchi_disk). I recorded more than 1,000 recreational dives over two summers.

My plan was to compare anyone who returned from a dive with less than 50-bar remaining (similar to the 500 psi you Americans use as a benchmark) to the other divers who were diving in the same place at the same time. My question was, what is the difference between someone who ran low on gas and the other divers who did not? For this analysis, I used a "conditional logistic regression," and a statistics program from SAS in North Carolina, pressed the big green button and watched the numbers roll down the screen. If it is a random answer, then no one will publish your results; if it's controversial, then you'll have to defend your methods. Years of work, and it all comes down to just a couple of seconds. And then, there it was: <0.0001. The likelihood of my data being a random finding was less than a hundredth of a percent.

The reasons adult recreational divers making organized group dives in Western Australia ran low on gas are shown at right:

What this chart means is that, taking into account all the possibilities, people who were surprised by how little gas they had left after the dive were 21.7 times more likely to have less than 500 psi than their dive buddies who were not surprised. Remember, failing to monitor the gauge was the experts' number-one reason why people run out of gas. Men were 13.3 times more likely to come back with less than 500 psi than women. For each five meters deeper someone went, they were 3.5 times more likely than their buddies to come back with less than 500 psi. Young divers were twice as likely to get low on air for every 10 years younger they were than their buddies, and so on.

Risk Factors for Running Low on Gas

Risk Factor	Times Risk
Suprised by remaning low gas	21.7
Male vs. female	13.3
Deeper average depth (per 5 meters)	3.5
Younger age (per 10 years)	2.0
Time since last dive (per year)	1.5
Fewer dives last 5 years (per 100)	1.2
Higher SAC* per kilogram (100 kg per 1 minute)	1.1

*Surface Air Consumption, the volume of air one would breathe if he was at surface pressure.

Another interesting finding was that divers on liveboards tended to get deeper each day, and come back with less and less gas.

How these results are interpreted depends largely on who is interpreting them. For example, not everyone dives in organized groups, so these results might not apply to all recreational divers. However, if I was asked for a less scientifically rigorous opinion, like if a dive operator asked me what he might want to keep an eye out for, then I would interpret our results like this:

Issue a check-your-gauge reminder. Most divers don't intend to run low on gas. Some are surprised at the end of the dive when they check their gauge. If a dive site has potential for divers to go deeper than planned, then it might be worth reminding everyone to check their pressure gauges more often.

Keep an eye on the men, especially the younger ones. Men and women reached similar average and maximum depths, but women's gas lasted longer (55 minutes versus 49 minutes). Personally, I think this might be because we're bigger, on average, so we have to do more work to move through the water, meaning we breathe more gas per minute. If a couple of young men are buddied up, then it might be worth reinforcing their need to regularly check their gauges.

Save shallower sites toward trip's end. On liveaboard trips, some people tend to dive deeper each day, perhaps as they gain confidence. It may be worth monitoring this and selecting shallower sites toward the end of a trip, especially if people need to fly home.

Get your weights right. Lastly, although the surface air consumption per kilogram and per minute only slightly increased anyone's risk of running low on gas, bear in mind that our workload during any dive is greatly reduced if we level off horizontally, which means getting our weighting and weight distribution spot on. Anything less than horizontal and your drag increases, as does your workload.

Dive safe -- and check your gauge.

Peter Buzzacott holds a PhD in diving physiology from the University of Western Australia, and is currently is a research associate at the University of Western Australia's School of Sports Science, specializing in scuba diving research. The citation for the published results is P. Buzzacott, M. Rosenberg, J. Heytworth and T. Pikora, "Risk factors for running low on gas in recreational divers in Western Australia," Diving and Hyperbaric Medicine, June 2011, pgs. 85-9).

Flotsam & Jetsam

Cameron Diaz Was, Like, Almost Swallowed by a Grouper. Being a movie star doesn't mean you'll get special treatment by fish if you pet them. While on *The Tonight Show* last month, Diaz talked about how she decided to get up and close with a Goliath grouper during a Cozumel dive. "It was probably the size of a Volkswagen bug, He has these big old lips and someone said, 'Oh, you should pet him.' I'm rubbing its lip and I'm like, 'Oh my God, this is amazing!' I'm looking into its eyes, we're having this whole moment and all of a sudden, it inhaled and I go flying inside. I'm like inside this fish . . . The only thing that stopped me was literally my neck. And he spit me out, and I'm, like, rolling backwards. So that was really good times."

More Hollywood -Goes-Diving News. The sad tale of Gabe Watson, the American who pleaded guilty to the manslaughter of his wife, Tina, during a Great Barrier Reef dive, is being turned into a movie. The producers of Australian film *Fatal Honeymoon* promise to delve deep into Watson's psychology. Harvey Keitel will play Tina's father, Tommy Thomas, "whose determined pursuit of justice will be a focus of the movie." It's unclear whether the movie will follow Thomas'

pursuit back to Alabama, where Watson was acquitted of murder in March.

Indonesian Liveaboard Corrections. In our April article "What to Do with Smoking Divers," one subscriber questioned whether the *Philippine Siren* had a smoking policy, or if crew followed it. Yes to both, says Worldwide Dive and Sail, the boat's owner. In a note to us, they wrote, "We would like to assure guests that the Siren fleet does have a smoking policy, and concerns raised by guests will always be addressed immediately by our team." Regarding our March article on portable defibrillators, in which we questioned whether any Indonesian liveaboards have them, the *Seven Seas* spoke up that it indeed does have a portable defibrillator on board. So divers, your hearts and lungs are better protected from hazards.

Don't Mess Around in California Marine Reserves. State officials are cracking down on misbehaving divers. When Marbel Para, 30, admitted to illegally taking more than three times the daily limit of lobsters in Laguna Beach State Marine Reserve in March, he had to give up all his gear, serve a seven-day jail sentence, pay fines of more than \$20,000 and promise to stay away from protected areas. The case was the first of kind prosecuted since a California law took effect on January 1 that established protected marine areas in the state.

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