
ADVANCED
DIVER
MAGAZINE
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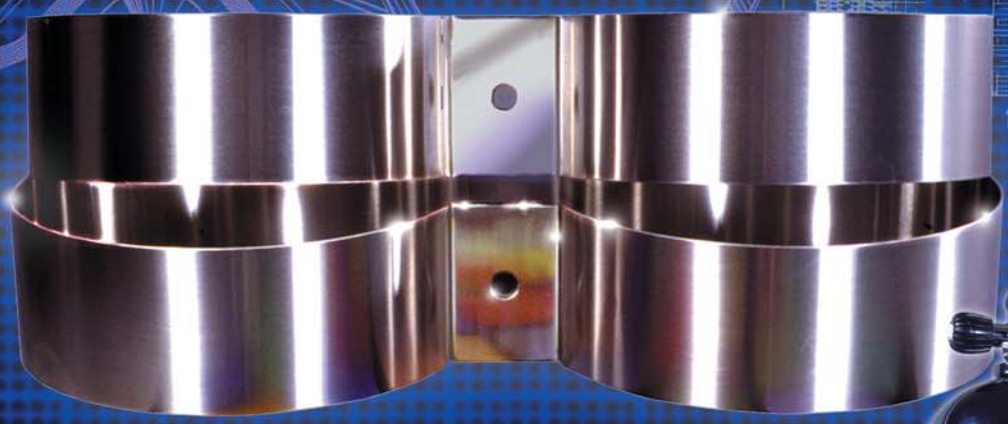

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For 2005/2006 OMS® introduces a newly engineered (2) part Phantom 10w HID light (canister and battery) and the smallest 10w HID Flashlight in the world!

The new Phantom (2) part dive light has a completely redesigned Ultra Compact, mil spec hard coat anodized head with a new captured O-Ring assembly in the lens area and (4) Titanium screws to hold down the bezel. The light head can be held in your hand or you can affix the optional Goodman Handle (Fig. 1) Perhaps one of the biggest changes is implementation of a patent pending PCB that is easily field repairable, incorporates a high reliability magnetic reed switch and a 50 degree C thermal cutoff switch. The actuation switch now has a replaceable high strength Nylon lockdown screw to prevent accidental turn-on. The high reliability abrasion resistant cord system with captured O-Rings has been implemented to dramatically reduce the possibility of seal or cord failure.

Fig.1

The new 10w HID Mil Spec hard coat anodized flashlight (Fig. 2) is the smallest of its kind in the world and incorporates (6) High energy density Li Ion non-rechargeable batteries. The overall length is only 7.58" and maximum diameter is 2.45". This light like the (2) part Phantom incorporates a similar PCB, magnetic reed switch and thermal cutoff.

Both lights incorporate new high energy density Lithium Ion battery technology designed for underwater applications.

Fig.2

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Cover: Kim Smith of Jetsam Technologies and KISS rebreathers poses by a giant red plate coral during Innerspace 2005, Grand Cayman. Divetech & Cobalt Coast

Photo by Curt Bowen

TIRED OF FOULED REELS?

Dive Rite

Dive Rite introduces the new 5-series reels— all 5-series reels feature the latest anti-fouling design.

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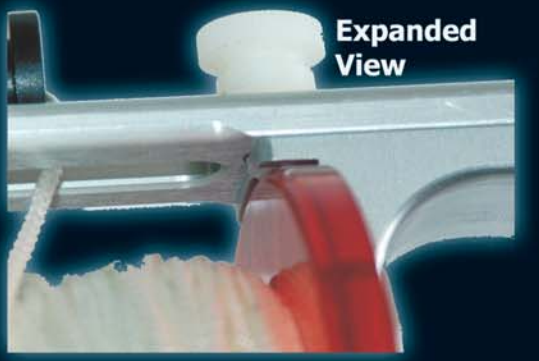

The RE50400 (cave) comes standard with 400′ of #24 line and stainless double-dog.
The RE50250 (wreck) comes standard with 250′ of #36 line and stainless double-dog.

This anti-fouling design is available in the larger Explorer models too.
The RE51900 comes standard with 900′ of #24 line and stainless double-dog.
The RE51560 comes standard with 560′ of #36 line and stainless double-dog.

it all...Dive it all...Dive it all...Dive it all...Dive it all...Dive it all...Dive it all...Dive it all...Dive it all... Dive it all...Dive

Publisher's Notes

For the past 19 issues of ADM, Curt has written the Publisher's Notes. For a change of pace, I thought that you would like to hear from me, the person REALLY running the show around here! LOL!

While Curt is continuously in the spotlight – out there diving, gathering editorial and taking photos – I am here holding down the fort, answering the phones, responding to e-mails, and taking care of the daily activities.

In this hectic world of overnight deliveries, instant Internet access, and three minute drive-through windows, I strive for the old school of personable customer service.....WOW! What a concept! It may take a little longer to answer each and every one of you, but I feel that the results are superior. Those of you that have needed assistance know that I have normally gone overboard to try to keep our customers satisfied.

Because of you, our readers, ADM has grown from a small black and white magazine to the world's largest advanced and technical dive publication. Even though we have quadrupled in size, each and every subscriber is just as important to us today as they were in the very beginning. I would like to thank each and every one of our readers, contributors and advertisers for their overwhelming continued support.

ADM the hard copy magazine and ADM On-Line will continue to expand into new venues, such as on-line forums, rebreather expeditions, and video productions. All these sources will bring you, our readers, more dive related material, diving opportunities, and news from the underwater world.

How about the size of that big fish on page 62!

Linda Bowen
Co-Publisher ADM

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Co-Publisher **Linda Bowen**

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The Vandal & the Jury

Text and Photography by Leigh Bishop

For a team of Technical divers unlocking the truth of a lost submarine was a challenge in itself even more so at depth of 330ft, Leigh Bishop was with the team as events unfolded deep in the Clyde off Scotland's west coast.

Lochranza, north of the Isle of Arran, is blessed in August sunshine, as is Kilbrannan Sound where one man eagerly awaits the return of a team of British technical divers 330ft below. When the Submarine HMS Vandal was lost with all hands during WWII Larry Gaines should have been in the engine room. An unwelcome ear infection had laid Gaines up and a young inexperienced hand had replaced his position. His conscience is about to be cleared. For the last 60 years Gaines has believed that had he been aboard the Vandal on 22nd Feb 1943 she would never have been lost.

Deep in the Clyde off Scotland's west coast is not the most glamorous place to go diving, neither is it renowned for its visibility. The first divers to surface report that the working conditions are relatively poor. These divers are working on a very different kind of project, as they tackle perhaps the worst conditions they will ever work under, their objective is to positively identify the last resting place of Vandal. In addition, they intend to make a full analysis of the wreck in order to determine exactly why she was lost. They won't know it until the project begins to unfold, although as it does they will soon discover various clues that will broaden the picture of the entire Vandal affair. The diver's observations, photographs and video will also allow Gaines to live the rest of his life without blaming himself for the submarine's loss when it sank along with 37 officers and men.

Expedition divers return after the first successful dive to the wreck

Backdrop Photo: A rare aerial capture of the Vandal taken by a British reconnaissance aircraft

Together, the divers have conducted painstaking research and have compiled a vast amount of information on the loss of HMS Vandal. The Vandal was a group II U class submarine, a submarine shipwreck the team intended to positively identify. HMS Hurworth discovered the whereabouts of Vandal in 1995 after the Scottish branch of the Submariners Association had persuaded the Navy to search an area where trawler nets had reported being snagged. ROV footage later confirmed the site as that of a British Submarine believed to be HMS Vandal, although the images were of poor quality and identification and reasons of loss were never exactly clear.

After much liaison with the Ministry of Defence and the backing of the Submariners Association, the divers approached Larry Gaines and the families of those lost to grant consent for a full diving analysis of the Vandal. The team's vision was now in full swing and it was during team selection that I would receive my phone call to join the team as a stills cameraman. My objective, alongside the videographer's, was to pinpoint evidence as to her loss. In my case, I would do the best I could at the bottom of the Clyde using 35mm film.

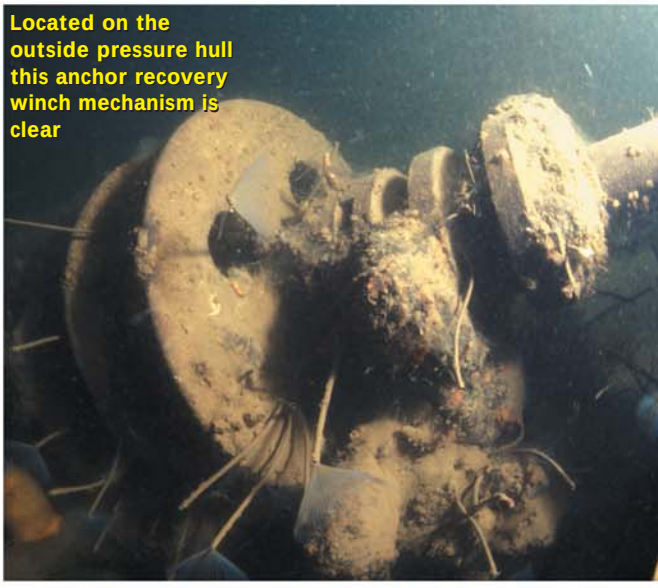
The descent down to HMS Vandal is like no other. Nature is quick to put her lights out and any rumors of visibility were quickly put to right as my torch beam picked out just two meters of shotline as I descended down. I dived alone as I knew that the only images I would be able to capture, if any at all, would be close ups. The one-two meter visibility Vandal lies in won't stretch to allow me to frame a diver as well! Still, to this day I can't think up a better or more insane excuse for being at the bottom of the Clyde on my own! The first divers down the anchor line did an excellent job of securing the line to the wreck from which we would continue subsequent dives. In doing so the pair would be the first to touch down on the wreck since the day she was lost.

The Vandal lies in pitch darkness and in cold water on a mud slope of exactly 330ft depth, with a 35° list to port, which falls in relation to the slope itself. After a change in set point my rebreather's oxygen cells settle and I'm happy to steadily move on and orientate myself. Having been involved in the exploration of other significant Naval submarines I thought I was well up for the job to be completed in a single dive, although I soon found out this wasn't going to be the case. The shotline had been carefully secured to a strong section of an attack periscope, but as I moved down into deeper water it was clear that the conning tower was no longer in the way which she should be. As the weather topside was in our favor the visibility on this project was indeed our main enemy and making heads and tails of any damage across large areas was difficult indeed. My rebreather's loop contains 8/60 trimix (8% Oxygen & 60% Helium) specifically mixed to give me the benefit of diving to an equivalent depth of just 115ft.

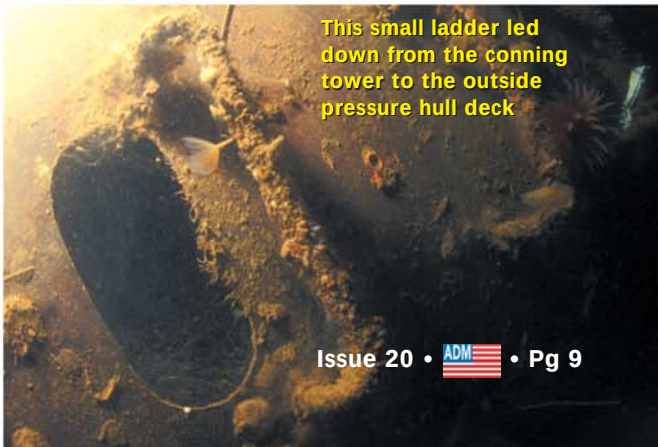
With the absence of narcosis I can make mental notes as to my route of direction in order to re-track the line leading to the surface where shallow water support diver Eddie Girvan will greet us. The mud seabed is obvious and it is here that sections of the conning tower have either collapsed down to or been broken off by snagged trawl nets. In order to identify the wreck a good examination as to her design would have been sufficient, although the only positive identification would indeed be her name. When a small ladder comes into view my torch beam follows each rung. This ladder would have allowed the men to climb down from the tower onto the outside pressure hull. The ladder leads to what was the top of the

The forward open escapehatch wher e the investigating divers saw no evidence of internal ladder suggesting that a hasty attempt to escape may have taken place here.

This port navigation lamp image was taken directly below the port side of the conning tower on the 100m/330ft deep seabed



Located on the outside pressure hull this anchor recovery winch mechanism is clear



This small ladder led down from the conning tower to the outside pressure hull deck

tower, now lying at a right angle and somewhat twisted. Then into view comes a large letter L. As I follow the top of the conning tower along the entire name “Vandal” in classic naval brass letters comes into view. Positive identification of the Vandal is with the team on day one. This area of the wreck will need the lens of the video and as I begin to terminate my dive I flash a light beam to a nearby team who move in to film what I have just found. My VR3 dive computer indicates how much time I have left before I reach the surface and the backlight I’ve programmed to stay on comes into its own on dives such as this. It will still be some time before I leave the darkness even in my decompression phase.

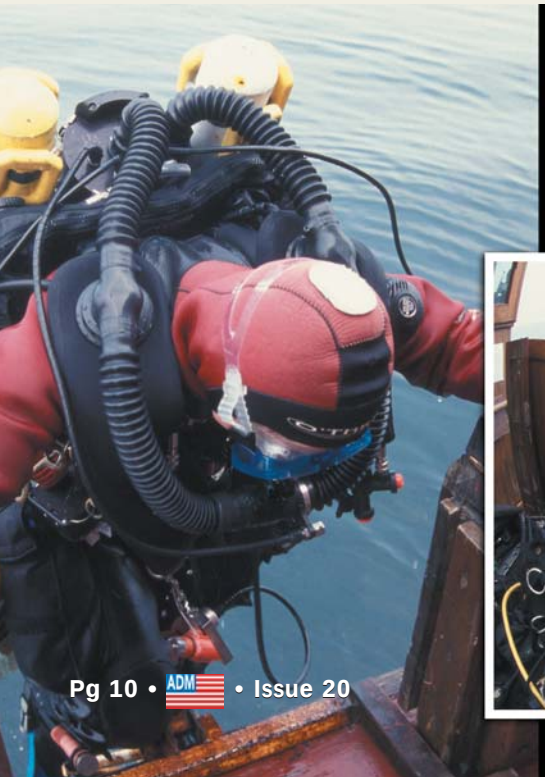
As we all break the surface after a lengthy decompression, skipper Jim Queen awaits aboard his dive charter Spinaway Isle. It’s Queen himself that has also contributed heavily to the ‘true’ location of Vandal for this project. During the build up to the project Jim Queen spent countless hours searching for Vandal after the so-called official position turned out to be nothing more than a 200ft blank seabed! Maybe someone didn’t wish for this project to be a successful as it was? Spinaway Isle proves to be the perfect platform to work from and Queen’s enthusiasm for the project blends well with the team.

Each night the video teams of Kevin Pickering & Chris Hutchison would run through their film with survivor Larry Gaines in an attempt to piece together the story of the last moments of Vandal. Bryan Thomas and Sandy Young of the Submariners Association have also joined us and are equally thrilled to see for the first time quality digital film of the wreck.

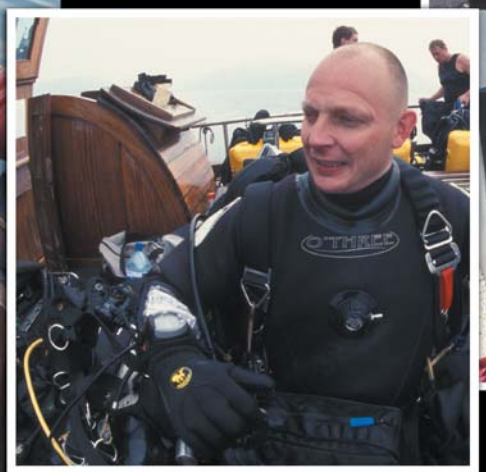
After the second day’s diving and with a clearer picture of the wreck emerging the dive team was now in a position to suggest evidence regarding Vandal’s final fatal moments. Expedition leader Nick Gilbert gathers the team together and begins to make sense of clues from the film against his build plans of the boat. His research and knowledge of U-class submarines is clearly obvious as he guides the team through what he believes happened to the Vandal.

A smile is evident on the face of Mr. Larry Gaines. The divers have informed him that the aft engine room hatch is securely closed. It was this hatch that Gaines believed his inexperienced replacement had failed to close. The 12 pdr gun still remains on its pedestal forward of the tower covered completely by a fisherman’s trawl net - all that is visible is the pedestal base itself. The team has also made progressive movement to the very bow and stern of the wreck, filming the entire pressure hull as they go. At the very stern a four-foot long section known as the ‘Ducks tail’ is completely missing and, although missing, is it not part of the pressure hull or the reason why she sank. Again at the stern the divers identified scuffing on the starboard propeller tips, which could indicate that some running of the engines may have taken place in an attempt to drive the submarine off the seabed. Approaching the bow section the divers are given a grim reminder to what actually occurred here as they are confronted by the forward escape hatch wide open! While this appears to have been opened from the inside a glance inside reveals no ladder in situ, which later adds to the final conclusion. Some of the outer plating has rotted away from the bow, revealing more of the torpedo tubes. The torpedo-loading hatch itself is closed and partially buried in silt. Again forward Steve Parker and Guy Middleton report that the boat’s hydroplanes are in the stowed position, yet another clue to the story’s final outcome.

As the project comes to a close one last dive remains. All but two of the team are closed circuit divers and all are keen to see for the last time the key features that have been noted. As a layer of silt lightly covers the wreck each diver is careful as not to reduce the visibility



Below:
Guy Middleton prepares to share his findings after the first dive to the wreck



A memorial to those sailors lost at Lochranza West Scotland

to less that what we are given. It was on this final dive that that the ultimate clue to her loss was discovered, photographs and film show manila rope still lashed to the ships mooring bollards. While this discovery floated in our minds it was made prominent at a later date when team members approached specific authorities on submarines. An official from the accident investigation board and several ex-serving submariners themselves all picked up on the bollards, stating that the submarine would not have dived under any circumstances with the rope still lashed around them. Submarine mooring lines are always taken below before a dive, which clearly suggests Vandal was not lost during a dive but from the surface.

As further research and expert opinions are collectively gathered we can now point towards a strong theory as to her loss. The area in which Vandal lies is known as area 'Quebec' and is still used today by submarines performing log calibrations over a 'measured mile'. Vandal would have taken a line between two transit points and a calibration would have been performed on the surface. The rope still across the mooring bollards provides further evidence to her being on the surface where she was last seen at around 10am. Some of her crew may have been raising the log to perform maintenance or rectifying a defect. The boat's log consisted of a transducer with a small impeller that was lowered through a hole in the bottom of the boat. Housed in a watertight container called the log tank the flow of water past the transducer would drive an impeller giving an electrical signal proportional to the speed of the boat. To raise or remove the log it would be retracted into its tank and then the sluice closed to seal the opening. Once closed the log tank could be opened and the transducer removed. This has always been considered a hazardous activity and was the main contributing factor to the loss of Vandal's sister ship, HMS Untamed, 3 months later. If the sluice jammed against the transducer, which was still protruding through the bottom, and the log tank opened the outside water could rush in as much as 2 tonnes per minute. In this situation the compartment would have been evacuated and sealed using the watertight bulkhead door to the rear of the torpedo stowage. However, it seems that a number of ratings were trapped in the compartment, and as alarm took hold some may have tried to save themselves, whilst the boat was still on the surface by opening the forward escape hatch. This hatch was of course found fully open by the divers although the absence of a ladder leading up to it could indicate that it was opened in a hurry, causing further problems. With the hatch open a crucial salvage blow of compressed air would have become ineffective and the flooding of the compartment would have continued unchecked, taking the boat to the seabed in 100 meters of water.

Since HMS Vandal has now been listed for British Ministry of Defense designation our timing may have been just right, for now we have the missing parts of this tragic story finally in place. Vandal may never see another visiting diver, but survivor Larry Gaines and the families of those lost can thank the technical dive team for bringing the previously uncovered truth to light.

The team can be contacted through DeepImage where more detailed information can also be found www.deepimage.co.uk

Nick Gilbert and Adina Ochert led the Vandal project team with accompanying divers Teresa Telus, Kevin Pickering, Eddie Girvan, Christina Campbell, Chris Hutchison, Guy Middleton, Steve Parker and Leigh Bishop.

Survivor of the Vandal sinking the now late Larry Gaines

Bryan Thomas joined the team from the Scottish Branch Submariners Association.

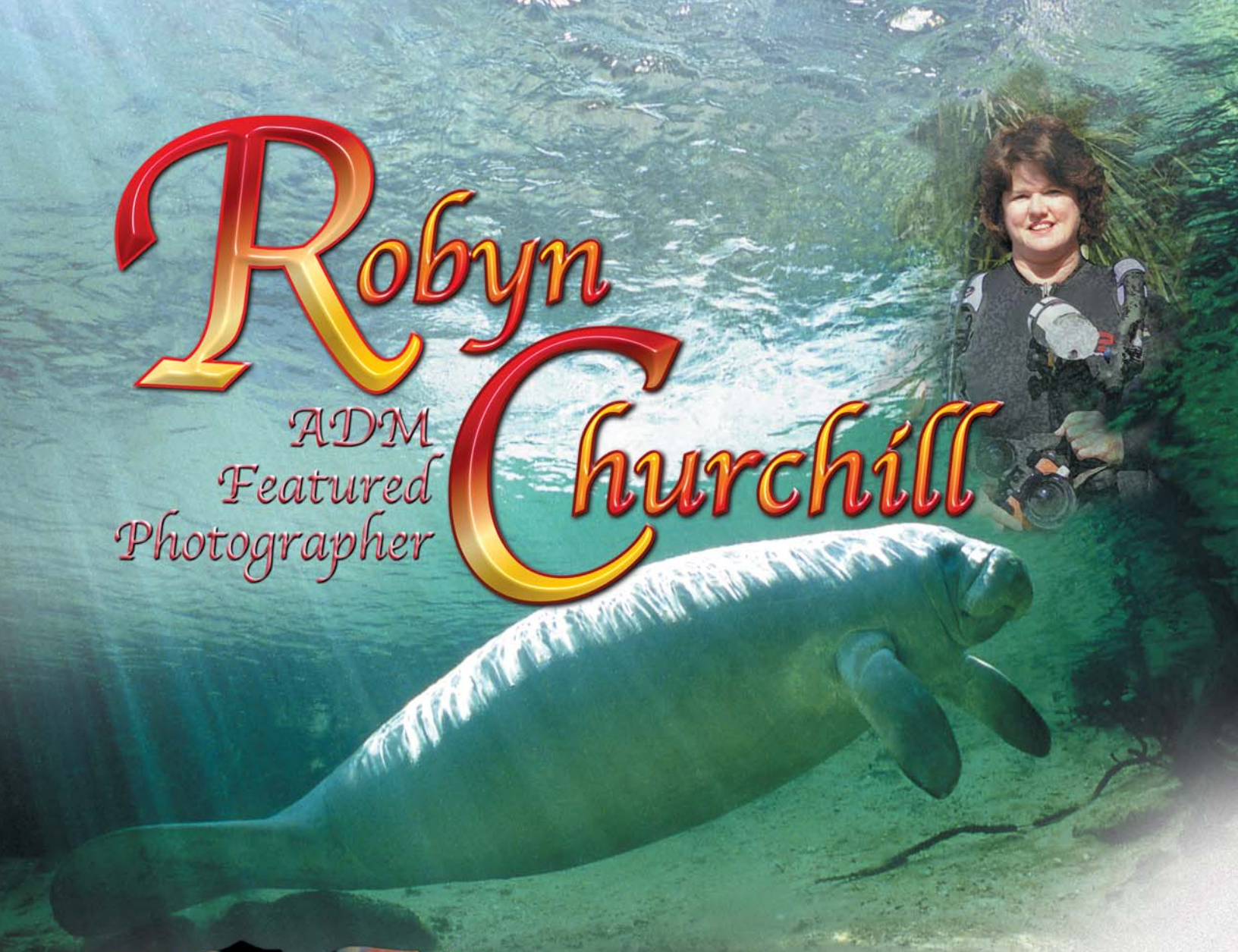
HMS Vandal expedition team

A diver looks on at the attack periscope which was the highest point of the wreck site.

IN MEMORY
This feature is in memory of Eddie Girvan, who unfortuanlty lost his life during a diving incident shortly after this expedition.

Robyn Churchill

ADM Featured Photographer



Ever since childhood, I've been enchanted by the sea. I grew up in south Florida where the beach was my play ground. Outfitted with my junior mask and snorkel, I would peer beneath the water's surface and marvel at what I saw. There were sprightly young tropicals splashing from head to tail in rich neon splendor. There were schools of silvery minnows darting swiftly from place to place in uniform procession. Once in a while, a graceful stingray would wing its way beneath me on a magical journey across the ocean floor.

Snorkeling was fun, but I wanted to get even closer to the creatures that intrigued me. In 1994, I signed up for scuba lessons and earned my SSI Open Water Certification. I was thrilled with my newfound ability to float freely in the open ocean and become one with such a captivating world! I continued with my dive training, and in 1996, I earned my SSI Master Diver Certification.

I currently live in Dania Beach, Florida where I work at a nearby hospital as a Registered Nurse. On my days off, I try to dive every chance I get. I'm a member of South Florida Women Divers (www.sfwd.net), which is a very active and truly wonderful dive club. I've had the opportunity to experience many incredible dives all over the world with fellow club members.

Portrait shot taken by Randy Olson

I think that most people don't realize how amazing the undersea world is, so I take pictures to show them what it's all about. Shortly after I received my Open Water Certification, I purchased a small Reefmaster camera, and my passion for underwater photography took off. Taking good pictures was challenging at first, but I practiced whenever I could and slowly things started to change. I tried to perfect my buoyancy skills and to always remember the saying, "get close and then get closer." Little by little, my pictures started to show better exposure and sharper focus.

In 1999, I signed up for my first big overseas trip to Micronesia, so I decided to upgrade my camera to a Sea & Sea MX-10. The MX-10 allowed me to try a variety of add-on lenses and to practice shooting with different F-stop settings. I continued to see a steady improvement in the quality of my images. In fact, I used my MX-10 to capture a Green Turtle shot, which placed first in the 'It's A Snap' photo contest sponsored by Sea & Sea in November 2003. Later, the same photo was chosen by Kodak as 'Picture of the Day' and was displayed on Kodak's Times Square Gallery in New York City.

At present, I'm using a Nikonos system, which has allowed me to capture some of the most eye-pleasing shots ever. Over the past several months, my images have been published in Alert Diver magazine and Florida Scuba News.

Prior to last year, my knowledge of underwater photography was mostly acquired through articles I had read and through much trial and error. Then in May 2004, I participated in a one-week photo workshop aboard the Cayman Aggressor. During the workshop, I was mentored by accomplished photographers Mike Haber and Mike Mesgleski from the Jim Church School of Underwater Photography. This was an invaluable experience, and the two Mikes helped me to greatly expand my knowledge of all aspects of underwater photography—plus their antics kept me laughing the whole time I was learning!

Right now, I have some very exciting things happening. In April 2005, I'll be exhibiting a collection of my best images at the International Game Fishing Association Museum in Dania Beach, Florida. The exhibit, entitled 'Wonders of the Aquatic World,' will also be displayed at the Elliott Museum in Stuart, Florida throughout the entire summer. In addition, I have a trip to the Galapagos Islands planned for this coming summer where I know the photo opportunities will abound!

As my passion for the undersea world continues to flourish, so does my desire to share my sentiment with others. It's often been said, "Every picture tells a story." If this is so, then I hope my images will continue to extol the wonders of the deep to all who view them.

Contact info:Website: **http://www.churchillunderwaterphotography.com**

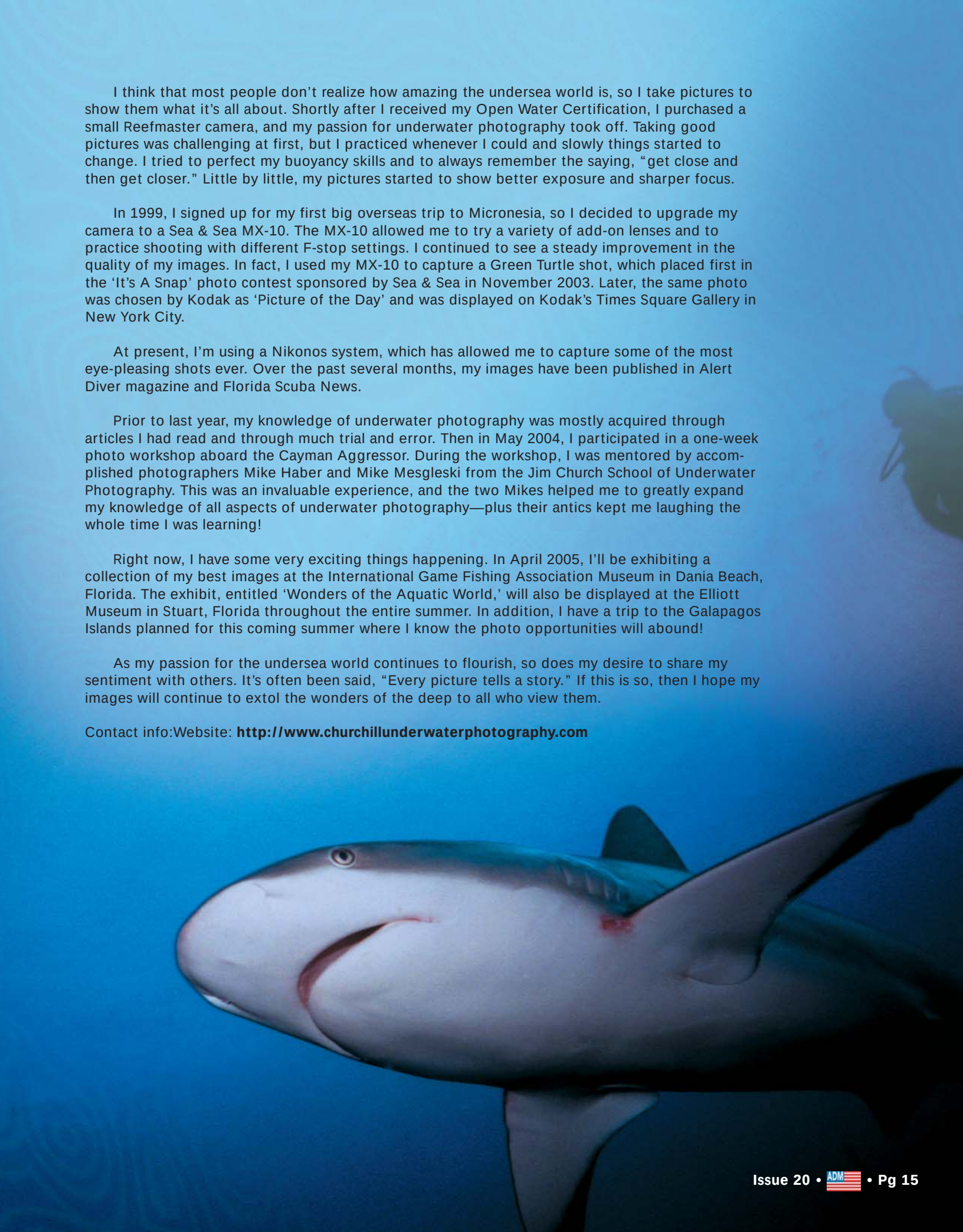
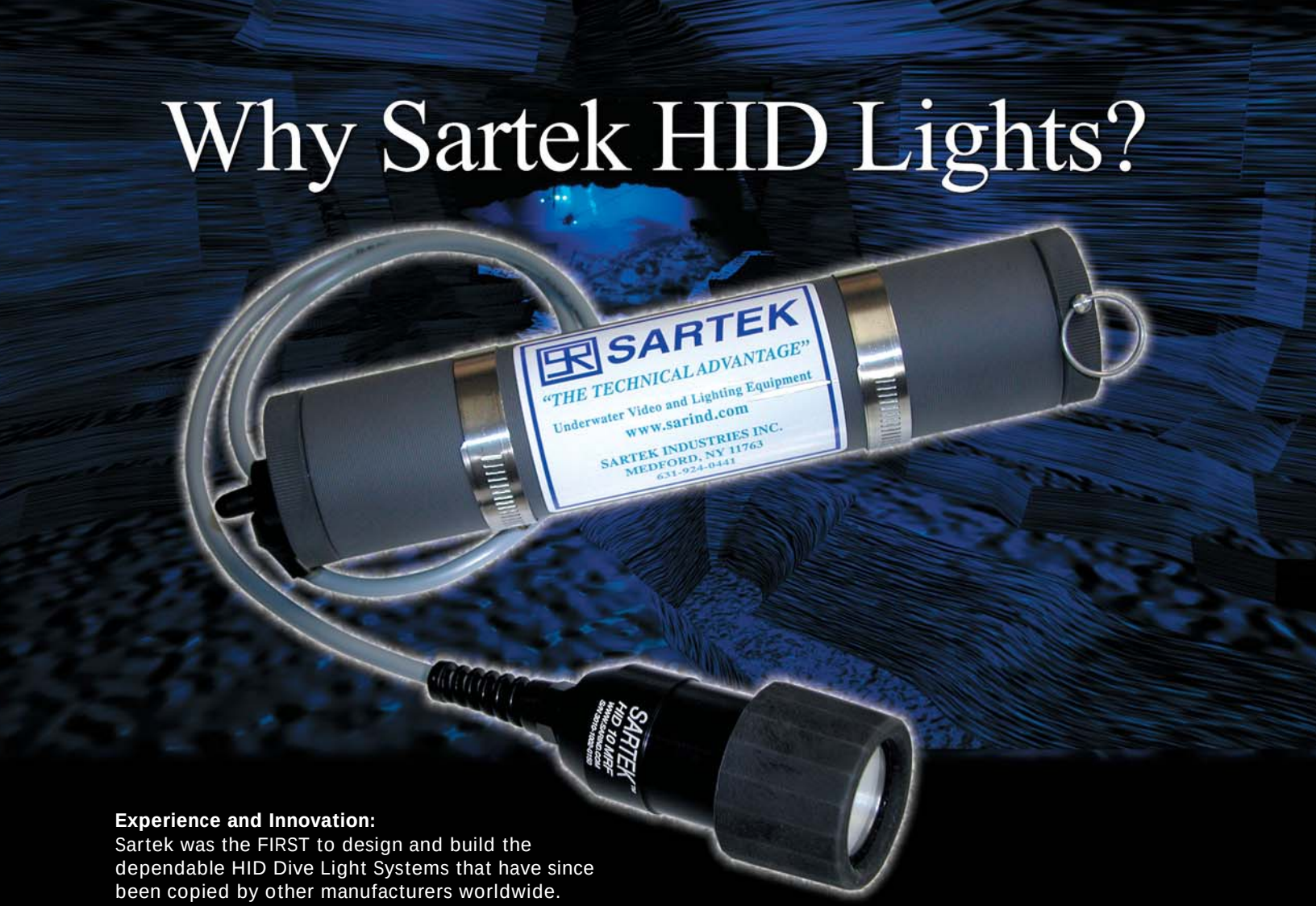


photo: Rudi Asseer
diver: Terry German, training session for *Empress of Ireland* Expedition 2004

Why Sartek HID Lights?



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Nautilus Explorer

Manta City, Mexico.

Text and Photography by Cass Lawson

'Hang on,' I said into my cell phone. 'I'm sorry, I think I misheard you. You want me to play soccer and regurgitate?'

'No, do you want to go to Socorro Island in the Revillagigedo Archipelago?' This is pronounced reh-vee-yah-ghee-hay-do, hence my mistake. It sounds strange.

Either way, the question didn't make sense. I did not want to appear too dumb, but I wasn't in the position to ask too many questions as I was driving my truck back home after teaching a pool session.

'Great, I'd love to go, but can I call you when I get home?' That will give me time to think this one through and find out about this strange sounding place.

What I learned was this. The Revillagigedo Archipelago consists of four volcanic islands; San Benedicto, Socorro, Roca Partida, and Clarion. They appear to be in isolation in the Pacific, about 250 miles south west of Cabo San Lucas Baja and 400 miles west of Guadilahara. These islands are uninhabited except for a very small naval base on Socorro.

Since video footage of local fishermen impaling a manta in the head with a metal pole was aired in the U.S.A., the area has been designated as a Marine Park with absolutely no fishing. The park is patrolled by the Mexican Navy, and they are strict. Each dive boat has to report to the Naval Station and declare its intentions as well as to submit to a search for fishing lures, rods, and other prohibited items. Since the Navy has been patrolling the area, the dive boats have been reporting that the large pelagics are returning in bigger numbers. Currently, the park covers approximately 1,120 square miles.

We were diving with Captain Mike Lever and his crew on the 116-foot long Nautilus Explorer. Although based in Vancouver, the boat spends most of the winter months cruising the Revillagigedo Archipelago, around La Paz, the Sea of Cortez and later this year, the Channel Islands to dive with the great white sharks. The boat picked us up near La Paz in Baja California and we steamed overnight and most of the next day to San Benedicto Island. Once there, we moored off the beach area and after a dive briefing from Captain Mike, we stepped off the large dive platform and spent the best part of 90 minutes exploring

the steep walls, watching the huge mantas glide overhead and keeping out of the way of the white tip sharks that cruise the waters.

Most of the divers on board were either semi-closed rebreather (SCR) or closed circuit rebreather (CCR) divers. Consequently, our dives were usually over an hour long and full of encounters with a wide range of stunning animals. It has to be said that of them all, the huge mantas, some of them over 18 feet wide, were outstanding. We managed to get close to these magnificent beasts, often so close that we were able to stroke them as they glided overhead. There are remoras on just about every manta, attached by their sucker. This strange fish has a large suction cup (a modified spiny dorsal fin) on top of the head. This fin has been reduced to a series of about twenty plates made of cartilage that is able to stick to the skin of the mantas. Each plate can move independently of the others, similar to the slats of a Venetian blind. Clarion angelfish also seemed to be in attendance on the mantas; they clean the remoras of parasites and add a splash of color to the dark mantas and grayish brown remoras.

The mantas were present on every dive, seeming to arrive about thirty minutes into the dive. First one would cruise overhead and seem to check us out, then it would glide in to inspect us; a few minutes later the others would arrive, sometimes swimming in formation like a wing of stealth bombers. Hammerheads were scarce with only a few sightings — only once did one approach anywhere near me and he had a quick inspection of me then shied away quickly. We were told that the long-line fishermen caught large numbers of them before the Marine Park was designated, but now the numbers of hammerheads are increasing, we just didn't see many.

On the other hand, we had the opportunity to dive with the Galapagos sharks as well as numerous silkys and white tips. The white tips are sociable animals, often swimming around in groups of five or six, sometimes even more. We were advised by the Nautilus Explorer crew not to dive at night because of the large number of predatory sharks that feed at night. The diving in this area is not for the faint-hearted; there are strong currents and great upwellings that can lift you 25 feet higher and then deposit you back to your original depth a minute or two later. But boy, is it great wall diving.

On one particularly strenuous dive, I witnessed a colleague swim into a small gulley in a wall and evict three white tip sharks and several lobsters so that he could lie on the rocky ledge and take a breather. Now, on the subject of lobsters, they were everywhere! They are not too big but they seem to congregate in groups like kids at the local shopping mall. The local lobsters have blue rings around their eyes making them look like they attended the Mary Quant 1960 make-up school. No doubt they are aware that they are protected in the Marine Reserve, but do they know they're tasty? On any large

rock face that had access to a sandy or shingle area, there are lobsters defending their own little area and looking very smug.

Diving from the Nautilus Explorer was a total joy. Often on live-aboards, when everyone wants to get in the water at the same time, divers are falling over each other. Not so on the Nautilus Explorer. The dive deck has individual stations for divers and on the first day, you are allocated a station number that corresponds with a DAN tag, to keep track of who is on board and who is in the water. In the center of the dive deck is a sloping section, which houses the 38-foot (11.5m) aluminum skiff that delivers and collects divers. When diving, this is launched, leaving a huge area for divers to kit up and enter the water. This makes for an easy walk down to the dive platform. Here there are two dive ladders, grab rails, and always at least one Divemaster on duty. The camera tables are not too far away and big enough to accommodate a lot of cameras. Add to that, there is usually a descent rope along with a granny line to the anchor cable and life doesn't get much easier. If you don't have a surface sausage or surface marker buoy, the boat has plenty they can lend you. You might need one as the boat operates 'open pool' days when they moor at one site for 24 hours. In essence, this means that you can dive as many times as you like during the day and the dive master takes you in the skiff and collects you when you surface at your marker buoy or sausage. It's a good system they operate.

And last, but certainly not least, how's the grub? As it happens, it's pretty damn good. There's plenty of it and a great variety. There are always at least two and often three choices of entrees for dinner and plenty of vegetables and bread rolls. Breakfast is hot and if you want a really early dive, you can get a pre-breakfast snack as well. In fact, it's a bit like the hobbit way of eating in Lord of the Rings; pre-breakfast, breakfast, 11 o'clock snack, lunch, second lunch, well, you get my drift. There are also thirty different types of bottled beer at the bar. The crew members are all efficient and experienced; it's like living in a five star hotel.

So what did I like most? Certainly the diving with the mantas, and as I was diving the Inspiration rebreather, I was able to get 'up close and personal' with these magnificent beasts. Dislikes — the long boat ride both to and from Socorro Island. Once the dive gear was assembled on the way out and washed, dried and put away on the way back, I had nothing to do but try some of the thirty beers. But that's another article.

The Nautilus Explorer www.nautilusexplorer.com.
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Picture: Rudy Van Geldere

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Lake Michigan's Wreck

SS WISCONSIN

Text by Keith Meverden and Tamara Thomsen
Photography by Tamara Thomsen

The *SS Wisconsin* was launched on October 11, 1881 for the Goodrich Steamboat Line, one of the largest and longest-lasting shipping lines on the Great Lakes. Built for the lucrative cross-lake bulk trade between Ludington, Michigan, and Milwaukee, Wisconsin, the *Wisconsin* was a prime example of how Great Lakes shipping adapted to increasing railroad competition during the latter half of the eighteenth century. Designed for year-round transport of passengers and package freight to fulfill a contract with the Flint and Pere Marquette Railway, the *Wisconsin* was one of three iron-hulled vessels built for Goodrich, the first non-wood vessels ever to carry the Goodrich name.

The *City of Milwaukee*, *Michigan*, and *Wisconsin* were launched in 1881 as the most lavish, expensive, and technologically advanced Goodrich steamers to date. With the change to iron hulls, Goodrich had to abandon his long-standing friendship with the Burger Boat Yard in Manitowoc, which had built nearly all previous Goodrich vessels. The Burger Yard was not equipped to build with the new material, and the contract for the three iron hulls went to the progressive Detroit Dry Dock Company in Wyandotte, Michigan. *Wisconsin* was built for $159,212, two and a half times the cost of the comparable wooden vessels build by Burger.

The *Wisconsin* (and her identical sister ship, *Michigan*) were not only advanced by Goodrich standards, but were also two of the most innovative vessels on the Great Lakes. In addition to a rounded forefoot designed to ride up on, and crush, thick Lake Michigan ice, the *Wisconsin* had a double iron bottom with a water ballast system. Three feet deep and equipped with a steam pump, this "double bottom" could be filled with water to steady the vessel when running light or with a heavy deck load. The *Wisconsin* and *Michigan* were the first Great Lake vessels with an iron, rather than wooden deck. Notably, Henry Ford served as a machinist's apprentice at the Detroit Dry Dock Company from 1879 to 1882, making it likely that Henry Ford was involved in the *Wisconsin*'s construction.

Following her launch, the *Wisconsin* was taken to Milwaukee to have her cabins installed and her final fitting out. By the end of December 1881, *Wisconsin* was employed carrying rail freight and passengers across Lake Michigan, eliminating the long rail route around southern Lake Michigan and the Chicago chokepoint. Following two years servicing this route, the Goodrich Line lost the contract to new steamers purchased by the Flint and Pere Marquette Railway. With no other profitable routes available for the expensive vessels, Goodrich sold his three iron vessels to the Detroit, Grand Haven & Milwaukee Railway Company and recouped the entire construction cost.

The *Wisconsin* began running between Grand Haven and Milwaukee in a year-round cross-lake service. In March 1885, the *Wisconsin* became locked in a large ice field while attempting to enter Grand Haven, Michigan. Immobilized for over two weeks, her iron hull was battered by the pressure of the ice. Despite shoring her hull with heavy oak timers, she suffered severe hull damage and required extensive shipyard repairs costing over $40,000. The *Michigan* was less fortunate, having sunk after a four-week battle with the ice.

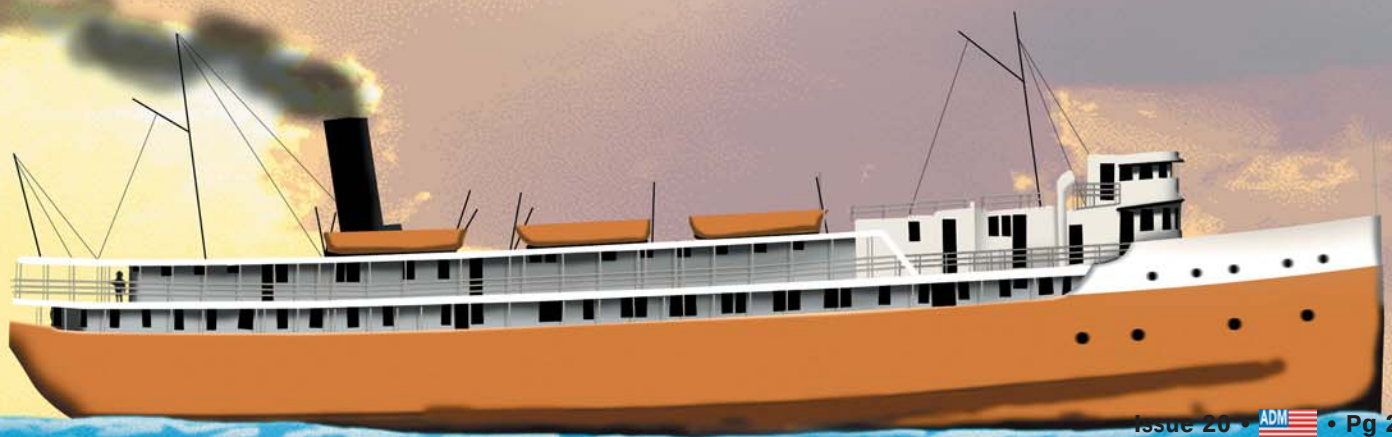


Illustration C. Bowen

Following repairs, the *Wisconsin* continued in the cross-lake service until 1896, when she was sold to Edward Gifford Crosby for the Crosby Line in Muskegon, Michigan, but continued the Grand Haven to Milwaukee route. In 1898 Crosby changed her name to the *SS Naomi* in honor of his daughter. While servicing the Crosby Line, a fire swept the *Naomi* while in mid-lake on May 21, 1907. The *SS Curry* was able to rescue all but four crewmembers, which were trapped below decks by the flames. After burning out, the *Naomi* was towed to Grand Haven, and then to the Manitowoc shipyard for a complete rebuilding that cost over $200,000. Her hull was widened six feet by the addition of a bustle along her entire length, and an all-steel superstructure with one hundred cabins, two decks, and elegant decorations with wood paneling throughout. She was again considered one of the finest steamers on Lake Michigan when she returned to service.

On April 10, 1912, Mr. Crosby, accompanied by his wife Catherine and daughter Harriette, boarded the ill-fated *Titanic* in Southampton, England. Despite Mr. Crosby's cold declaration to Catherine that "you will lie there and drown" before his departure from their first class cabin, Catherine and Harriette were amongst the first passengers to board lifeboats. Mr. Crosby's body was pulled from the icy waters by the *Mackey-Bennet*, a cable-layer chartered by the White Star Line to recover bodies. *Naomi* was soon renamed the *SS E. G. Crosby* in his memory (Naomi Crosby may have died during childhood, as it is reported that the Crosby's had two children in 1912, Harriette and Fred, who did not sail aboard the *Titanic*). The *E. G. Crosby* continued the cross-lake run until July of 1918, when the United States Shipping board requisitioned her. She was renamed the *General Robert M. O'Reilly*, and served as a convalescent hospital ship during World War I.

At war's end, the *O'Reilly* was surplused and purchased by the Seymour Line, renamed the *SS Pilgrim* and returned to Lake Michigan to run the Milwaukee, Racine, and Chicago route. The Seymour Line soon failed, becoming the Chicago, Milwaukee, and Racine Steamship Company, which was purchased by the Goodrich Line in 1922. Two days after Goodrich's acquisition, the *Pilgrim* revisited the Manitowoc shipyard for overhaul, and then returned to the Chicago – Milwaukee route running as a night boat opposite her Goodrich running mate, the *Illinois*.

In 1923, while enroute to Milwaukee, Wisconsin, the *Pilgrim* labored in a heavy sea, having abandoning her regular stop at Racine, Wisconsin, due to the sea conditions. By morning, it was discovered she was taking on water, and by the time she reached Milwaukee, Wisconsin she was listing heavily to port. The cause of this near disaster was an opening near the starboard bow in the bustle installed sixteen years prior. The opening was repaired with extensive welding, and *Pilgrim* returned to service. In 1924, Goodrich returned the original name to the forty-three year old vessel, *SS Wisconsin*.

The fall of 1929 was a stormy one. On the night of October 27, *Wisconsin*'s cargo shifted and she once again reached Milwaukee, Wisconsin, with a terrible list to port. Two nights later, on October 29, *Wisconsin* was bound for Milwaukee in a heavy gale when she began taking on water. The water gained on the pumps. Captain Morrison dropped anchor southeast of Kenosha, Wisconsin, and shut down the engines to divert all steam to the pumps. With the water still rising, the fires were pulled from the boilers to avoid explosion. A passenger gangway then gave away, allowing large amounts of water to enter the ship. Radio calls for help soon had Coast Guard surfboats and fishing tugs alongside. All but nine crew abandoned ship before *Wisconsin* slipped beneath the waves. Captain Morrison was pulled alive from the water, but died soon afterwards from exposure.

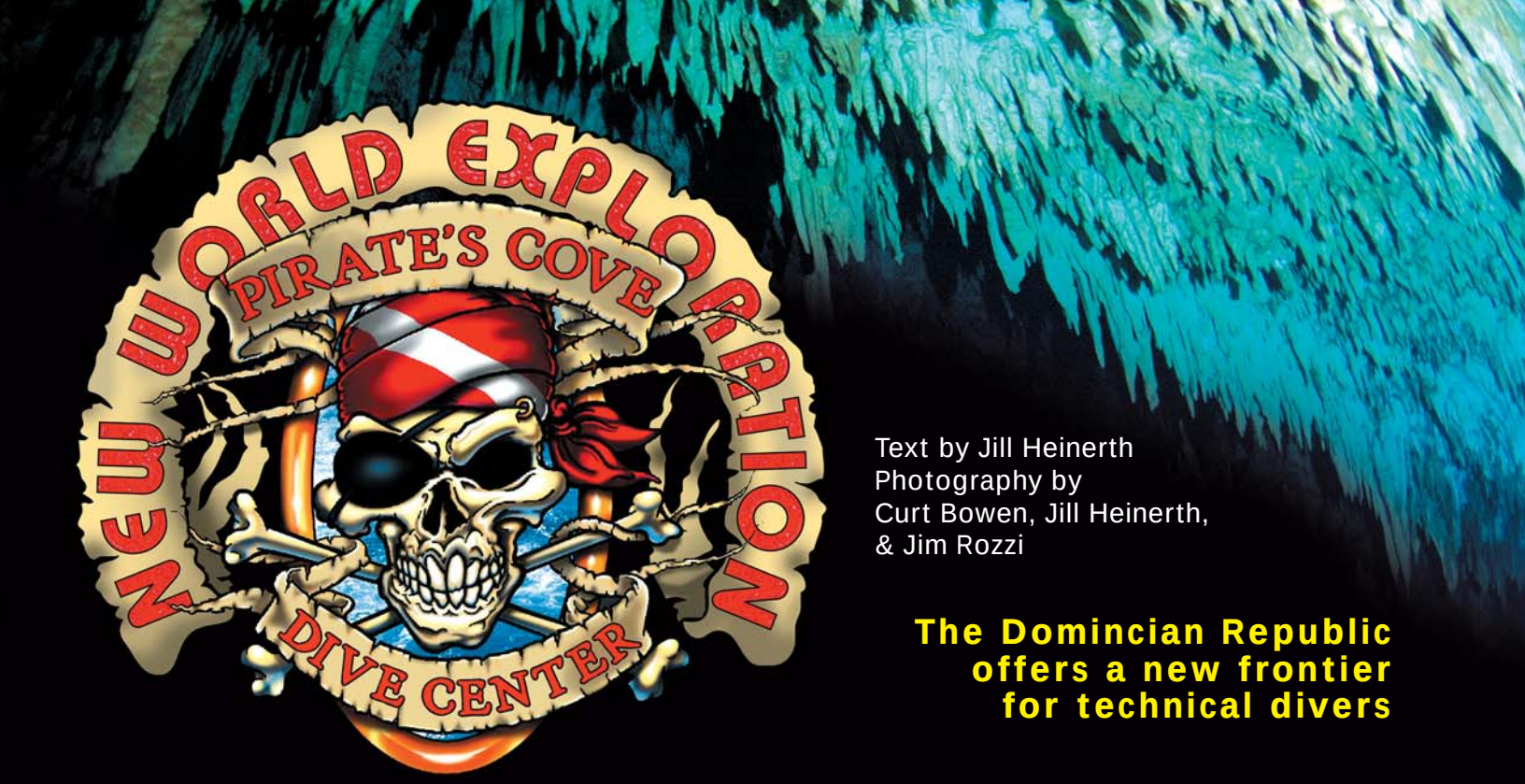
Today, the *Wisconsin* lies upright on the bottom in 130 feet of water seven miles southeast of Kenosha, Wisconsin. Water temperature in summer months varies between 39 and 48 degrees Fahrenheit. Visibility ranges from 40 to 60 feet with mild currents typically running down her hull. Her port anchor chain is bent around the bow, running to the northeast where her anchor is still firmly embedded in the clay bottom. The upper cabins were blown off at the time of her sinking, but her main deck beams are still intact with the stack lying along her engine tops. The ship's capstan remains perched at the bow upon the deck beams. The bright red paint of the Goodrich Lines was visible until recently being covered by zebra mussels.

Her starboard anchor, ship's wheel, main whistle, the purser's safe, engine room clock and gauges, and many other items were recovered during the 1960s to 1980s. Three cars, a Hudson, Essex, and Chevrolet are still parked in her hold, visible through a portside gangway. Her immense triple-expansion steam engine is visible from the main deck. Ornately carved wooden crown molding lines the ceiling in the engine room. Remnants of the passenger cabins, such as porcelain sinks, and portions of cabin walls can be found strewn about the deck. There is a blast hole near the starboard bow from commercial salvage attempts during the early 1930s. This blast hole allows easy access to lower cargo holds where the bulkheads are still painted white. Boxes of the package freight of general merchandise are strewn about the deck. A cargo tractor and cargo carts are visible in the hold. Although the wreck is showing signs of deterioration, divers can carefully make their way through the passageways of the ship from bow to stern. A small debris field along the vessel's portside includes chairs, cabin walls, and the engine room funnel. Human remains of three people were reported in the early 1960's but are no longer present.

Tamara Thomsen manages the U.S. office for Delta P Technology, Ltd., makers of the VR2/VR3 Dive Computers (www.vr3.co.uk) and owns Diversions Scuba in Madison, WI. www.diversions-scuba.com

Keith Meverden works as an underwater archaeologist with the Wisconsin Historical Society and owns Points North Diving, a dive charter operation on the Great Lakes. www.diversions-scuba.com/pointsnorth

Photo courtesy of the Milwaukee Public Library



Text by Jill Heinerth
Photography by
Curt Bowen, Jill Heinerth,
& Jim Rozzi

The Domincian Republic offers a new frontier for technical divers

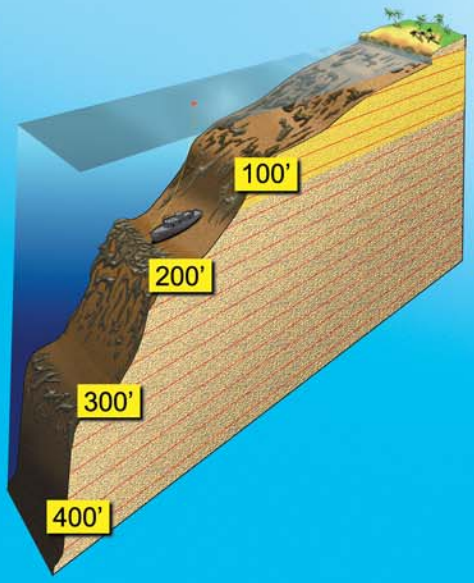
The front of the crew shirt says, "Established 1492." The backside, sports a mischievous skull and cross bones with dive flag bandana. I can't help but notice the resemblance to my diving partner Curt Bowen. We haven't even seen the diving operation yet, but I can tell Curt's already feeling connected with our hosts from Pirate's Point.

When Uwe Rath smiles, you can see the sparkle of excitement in his eyes. "Anything that you need,... I mean ***anything***,... we can get for you," he says as we are ushered rapidly through Airport Customs. He shrugs in a matter of fact sort of way that makes his crow's feet look a little devilish. We try hard to think of something he can't deliver... oxygen?... doubles?... virgin cave?... untouched wrecks?... Burger King? Yes, he can get you anything you desire.

This affable strong German is General Manager of Pirate's Point - a new technical diving operation that delivers the impossible. Attracted to the island by the diving almost 15 years ago, it's the adventure of cave exploration that fuels his fire now... that and the excitement of running the new technical diving center owned by John Mattera.

Mattera doesn't care much for caves though. He's far more interested in the history of the Dominican Republic as the location of the first landing in the New World. As an avid wreck diver from the Northeast, Mattera salivates over the potential that lies just offshore.

Cave explorer Curt Bowen cruises over an ancient formation that had once fallen from the ceiling



And it's these contrasting ambitions that assure an intriguing future for Pirate's Point and the Dominican Republic. With guidance from SDI/TDI Instructor Trainer Jeff Schwartz, Mattera and Rath are building a technical diving facility that will be unequalled in the Caribbean. From their private harbor, they will berth 10 vessels on a magnificent 210-foot pier. A 12,000 square foot technical diving facility will offer classrooms, repair services, retail store and an onsite spa.

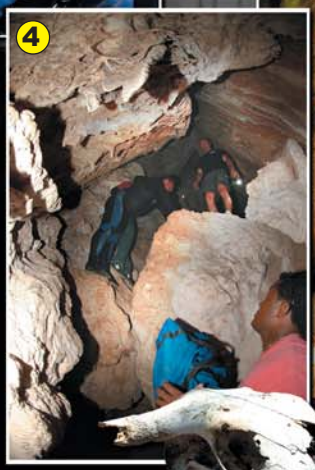
While construction is being completed on this opulent facility in Juan Dolio, we operate out of a temporary shop in the village of Guyacanes next door. For a short-term facility, there is no shortage of everything we need. We have brought along our Megalodon rebreathers, with hopes to sample a taste of everything the island has to offer. With only a week to visit, it's a tall order, but Uwe lays out the schedule for our approval.

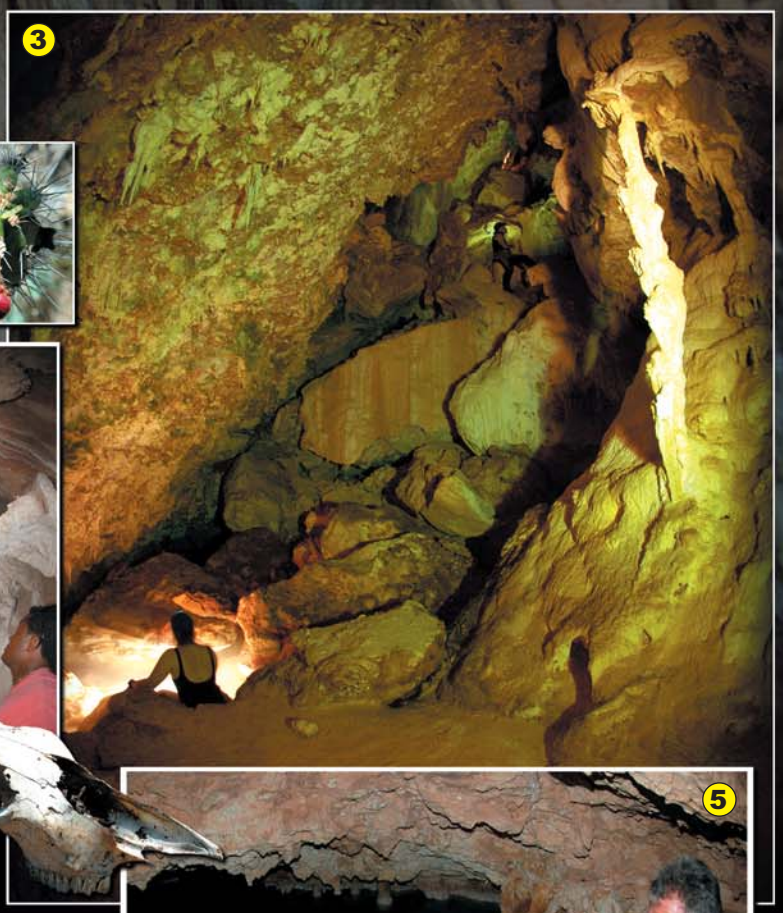
On our first day, we visit a local cave system called La Sirena. It's a mere 15 kilometers east of the capitol city Santo Domingo and is privately owned by Victoria Cantera. We drive through a slightly questionable looking barrio to arrive at red wrought iron gates disguising an exquisite little fruit tree garden and the entrance to the cave. An elegant spiral ladder descends to the floor of the cavern area where ample space is available for gearing up.

Once in the water we enter a large submerged cavern zone filled with massive breakdown boulders. The morning light streams into the room in shafts of blue that illuminate the almost transparent water. But there is something different about the rock in this cave. There are glittering crystal deposits on the walls that catch your light as you swim. In places where the passages rise to an air bell, we witness explosions of crystal clouds hanging delicately near the air interface. They are simply indescribable.

La Sirena undulates in shallow passages near the entrance but reaches a maximum depth of 145 feet. The halocline hangs at about 45 feet, and it is there that we see scientist Tom Iliffe busily gathering samples for later examination.

Over 2700 feet of line has been laid in this cave and a second entrance called Cueva del Indio can be reached just downstream. But there is plenty more opportunity in this breakdown cave for exploration of new passages and new species like the remipedes that Tom has carefully stashed in his zippered pouch.





1. Equipment is trucked in using small trucks
2. Crew leader Francisco a Garcia carries a small 40 cu ft cylinder for the 2 hour desert walk to the new cave entrance
3. Dry cave zone in desert cenotes
4. Crew members shift equipment through the rugged dry passages before the sump
5. Uwe prepares for a dive within the desert cenotes
6. A dirty t-shirt and rag protects Curt Bowen's head from the beating heat from the desert sun

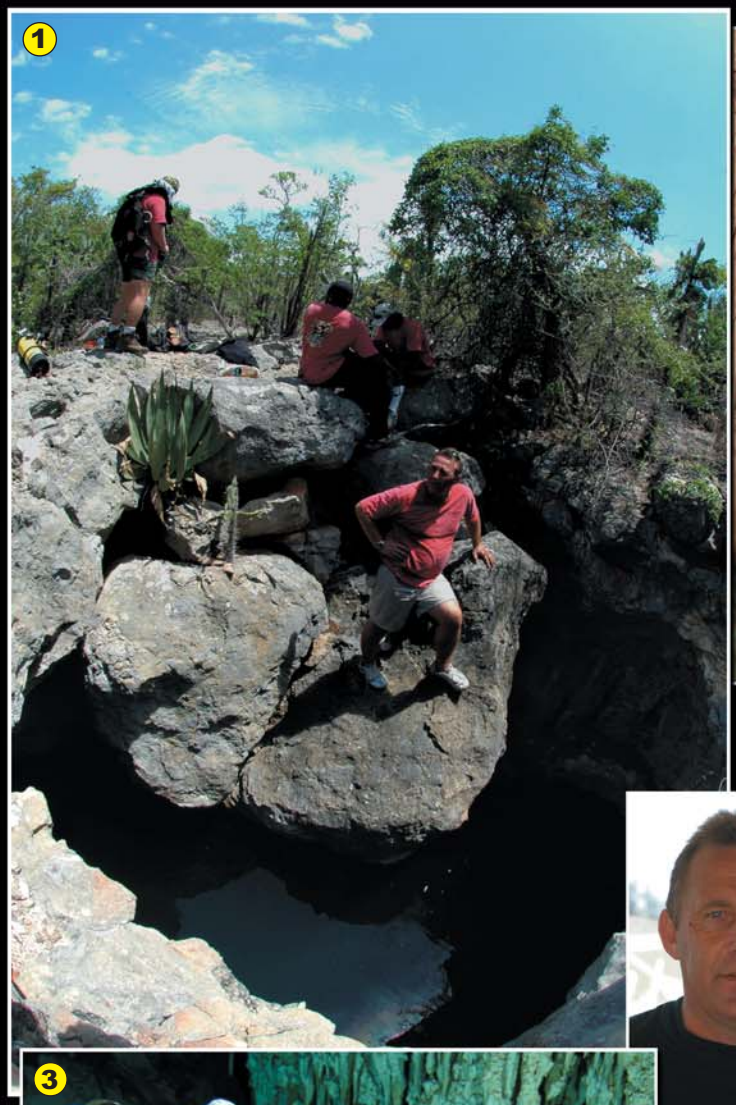
La Sirena is one of several caves in the region east of Santo Domingo, but we were itching to lay line. Uwe had already arranged to take us to the true frontier, close to the Haitian border.

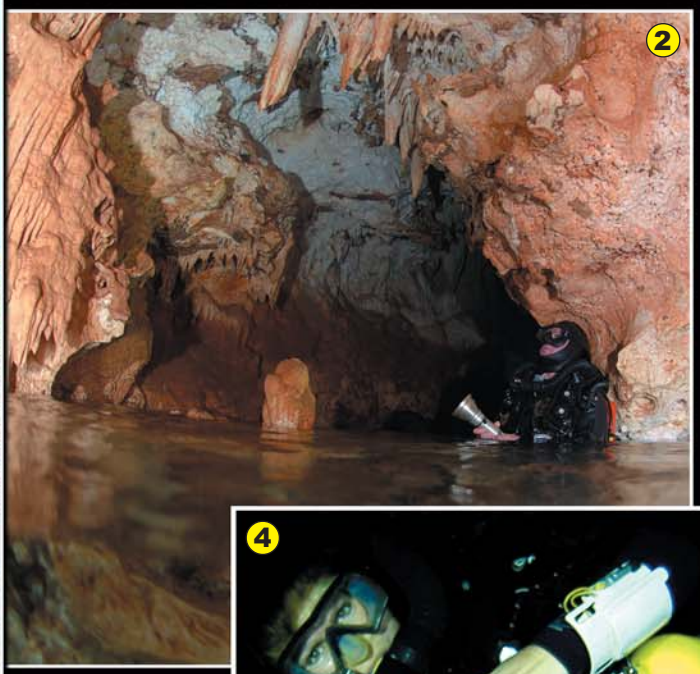
We pass through several different climatic zones as we head west. Sheer coastal mountains, lush tropical rain forest, and tilled agricultural lands - it's a mosaic quilt of geography. Beyond Barahona we enter a lightly populated region that I can't believe has gone unnoticed by resort developers. It's a stunning landscape where waterfalls cascade down sheer cliffs to the sea.

It's a fleeting pass through Paradiso, where rolling waves of cicadas mix their cacophony with crashing waves on the rocky seashore. And as we leave this tranquil village in our taillights, we begin to realize that we are heading into the antithesis of paradise.

Spear, spike, spicule, prickle, barb, and skewer all describe the residents of the thorny forest we've entered near Pedernales.

It is hard to believe that anyone could go diving in this cactus forest. It is about 100 degrees and there isn't a single piece of vegetation without nasty spines trying to leap out and grab me. Even the ground is piercing iron rock, but that's what excites us. It's full of holes – small and large. Holes that promise caves to our experienced eyes.



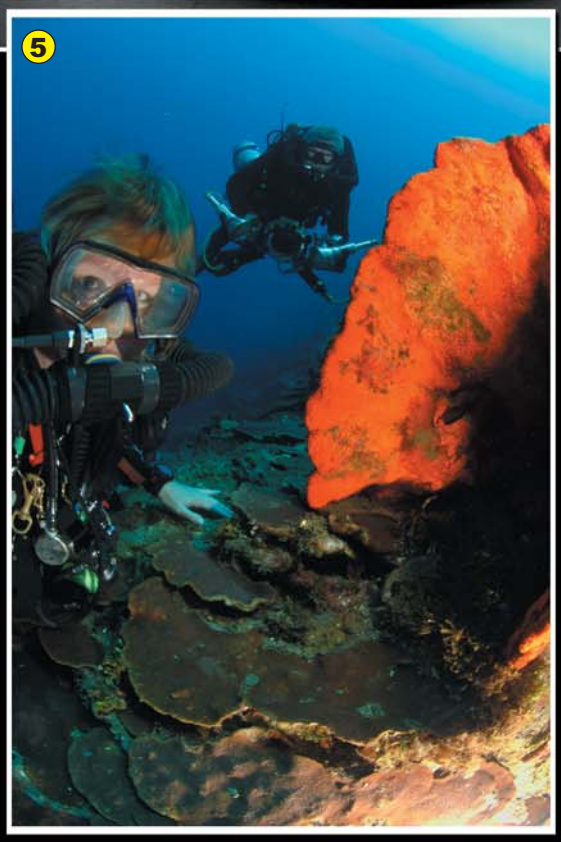


1. A two-hour trek through the rough desert terrain reveals a virgin cave entrance. Discovered by Uwe on a previous expedition, our team returns for a recon dive. What we found is still a secret.
2. Curt Bowen illuminates a dry chamber located a thousand feet back into the desert cenote
3. Thomas Iliffe seeks for new life within the depths of the desert cave
4. Explorer Jill Heinerth descends into the darkness

"Donde esta el pozo, hoyo, manantial, laguna, ojo, y cueva," I practice for my future visits. [Along with bathroom and beer, my favorite new words in any foreign language are the ones that describe caves.]

Uwe obliges and takes us to a special cave – its one that he last dived when Lamar Hires visited him several years ago. The geology is fascinating. The cave entrance appears to be a river resurgence, but the ridgeline that we climb has obvious ties to ancient sea stands which cut grooves into the rock.

Without the assistance of sherpas, we would have taken a solid day to get all of our gear into the cave, but Uwe's crew rapidly ushers our equipment though a 300-foot roller coaster trek of dry caverns. A small pool of limpid blue water greets us inside, and it is worth the sweat.



1 & 2. Dominican deep tug wreck sets secluded on the sloping sands (184 feet)
3. Pirates Cove large dive vessel
4. Inspiration diver hovers over a sea of plate corals
5. Meg diver, Jill Heinerth takes a self-portrait as Curt Bowen sneaks into the shoot

This is a very different cave than La Sirena. Its delicate formations remind me of some of the most beautiful Yucatan caves. Uwe and a friend found this site when directed by locals to water sources. The shallow cave is a mere 35 feet deep allowing lots of time for exploration. We quickly run to the end of Uwe's line and start spooling out new line to 2400 feet. There is plenty more passage here to explore, but if we are to get a full sample of the island, we can't dwell too long.

Despite the potential we have found in Pedernales, we are due back in Boca Chica to meet with John Mattera. Mattera calls himself a commercial archaeologist. As I examine his plans for exploring some of the more than1600 magnetometer hits he's already registered, I can understand. He is not sparing a penny to bring the best technology and equipment here to peel away the layers of history.

The Taino Indians were likely the first westerners to meet Christopher Columbus. Although the natives didn't survive long after the Spanish arrived, they would have witnessed the first of many wrecks to founder and sink in these waters. Over 480 wrecks of historical significance lie on the island's reefs. 136 of

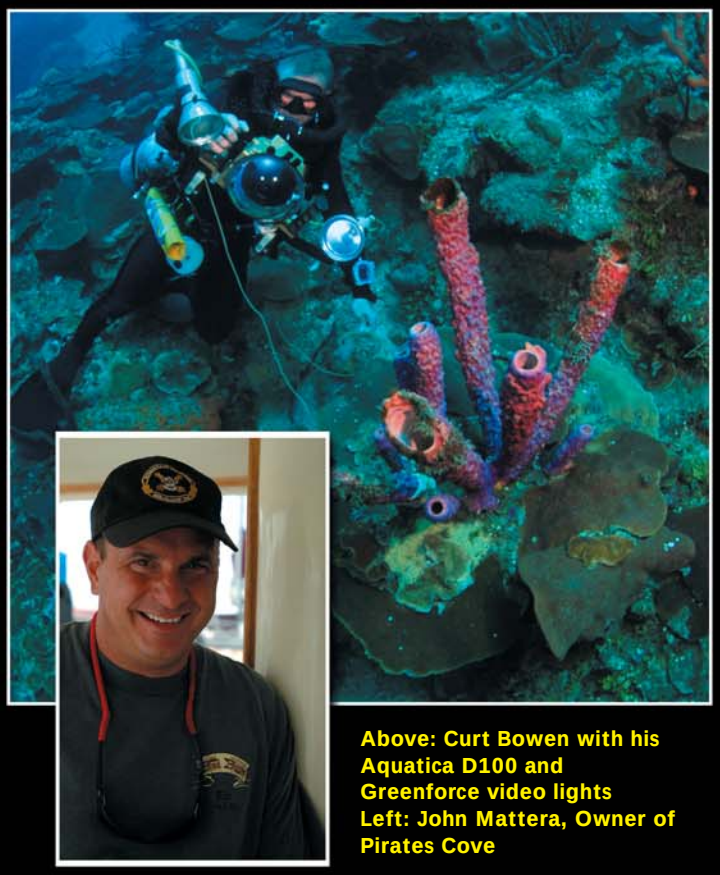
those wrecks are lost treasure ships. Only two have been discovered. That's enough to light any wrecker's blood on fire and Mattera's enthusiasm is infectious.

In 1981, he saw his first cannons underwater and hasn't been able to get them out of his mind. Now he's bringing in the really big guns, with aerial magnetometers, a fleet of boats and state of the art detection equipment. He's building a preservation facility and an educational program for locals who will be his next generation of divers. To top it off, he maintains the salvage rights to a large stretch of the southern coast from Santo Domingo to Saona Island. "The fun is in the search," he tells me. And as we leave the harbor, I can't help but feel like I am about to win a lottery.

We head to La Caleta, a national marine park just offshore from the International Airport. Several known wrecks await us - El Limon, El Hickory, Capitan Alsina, and Don Quico. But Curt and I are more interested in watching the bottom finder. As local fishermen try to line us up on a deep wreck, we pass over a huge hit in 318 feet of water. Nobody has ever cruised the deeper zones below 200 feet here and there appears to be plenty to see. There is no mistaking the silhouette we see as a vessel.

We spend our day diving on a few tugs, but can't shake the vision of the deeper hit. It is added to the list 1600 strikes long.

We spend our last day on Isla Catalina. This pristine little island is an hour's boat ride from their new facility, but it is well worth the trip. The dives begin in 15 feet of water where healthy coral reefs dotted with colorful sponges sway in the surge. It is a macro photographer's Heaven. The wall quickly descends in steps of cascading corals resplendent with life. Although the fish populations are more scarce than other islands, there is plenty to see. The wall makes for an ideal deco tour with our rebreathers and only that lack of frames in our cameras get us out of the water after 90 minutes.



Above: Curt Bowen with his Aquatica D100 and Greenforce video lights
Left: John Mattera, Owner of Pirates Cove

With such a complete offering of convenient caves, wrecks and walls, Pirate's Cove is likely to be a great success as a training location. Inexpensive direct flights from the US and excellent facilities will make it easy for instructors to run the gamut of technical programs with ease. Considering the exploration potential for wreckers and cavers, it is a one-stop destination for those looking for a new frontier… Build it and they will come, John…

Stayed tuned for future updates as Curt Bowen, Jim Rozzi and I intend to be present as they "unveil the carpet of gold" on future wreck diving expeditions.

About the Author

Jill Heinerth is an award-winning photojournalist and filmmaker. She was inducted into the Women Diver's Hall of Fame in 2000 and is known for bringing technology to expeditions that have taken her to extreme environments including the inside of icebergs in Antarctica. She has participated in several projects with National Geographic Magazine and Television and recently coordinated the underwater unit for a large Hollywood feature. She can be contacted at jillheinerth@mac.com

Sunrise over the Dominican Republic offers a peaceful moment for personal reflections

Pirates Cove staff not shown:
José de Jesús Peña
Francisco a Garcia
Oscar Andres Calzado
José Manuel Rosado

INNER SPACE

IMAGES FROM THE DEEP

Text and Photography by Curt Bowen

Grand Cayman offers some of the best deep wall diving and photography available. With standard two hundred foot plus visibility, giant deepwater coral formations, white sand shoots and an abundance of light, even below 200 feet.

Kim and Gordon Smith, owners of Jetsam Technologies, the maker of the KISS rebreather, contacted me about shooting photographs for their up-coming product manuals.

It just so happened that Divetech, Grand Cayman's premier technical diving and training facility, sponsors a rebreather-only week each year called Inner Space. Designed for the deep rebreather enthusiast, Inner Space provides a week of unlimited deep diving with the proper surface support and helium gas mixtures.

This year's Inner Space had an impressive cast of attendants bringing their different rebreathers for the participants to review and test dive. This list included Kevin Gurr and his impressive Ouroborous CCR, Silent Diving Systems with their standard and mini Inspiration and Dive Rite's new CCR, the Optima. As luck would have it, Jetsam Technologies with their Classic and Sport KISS rebreathers was also scheduled to attend.

What better opportunity to kill two, three, or even four birds with one stone? Shoot photos for the KISS product manual, provide shots for Divetech, have multiple rebreathers at my fingertips, and gather enough information and photography for multiple articles in ADM. I immediately contacted Nancy Easterbrook, owner of Divetech and coordinator for Inner Space, about joining the week and offering my photographic skills.

May 21, 2005 I found myself back in the Tampa International airport and on Cayman Airlines headed for a week of deep wall and reef diving. Once on the island, I was quickly transported to Divetech located at Cobalt Coast resort along Cayman's northwest shore.

DIVETECH @ COBALT COAST • GRAND CAYMAN

Left: Nancy Easterbrook, coordinator of Innerspace
Below: Tom Mount, founder of I.A.N.T.D.
Right: Ron Micjan pets his Cis Canaster

Above: Sun rays dance across the white Cayman sand.
(Inspiration Rebreather)

Right: Hidden colors below a coral overhang spring to life with the photographers strobe. KISS Rebreather

Below: Inspiration divers enjoy the peace and quite as they decompress below the Divetech boat.

Below: KISS diver, Kim Smith quietly cruises along the Cayman walls.

Each day's activities included a standard morning boat dive with a maximum depth of 300 feet and a run time not to exceed three hours. I found the best wall photography opportunities between 120 and 210 feet including ample amounts of interesting reef formations, overhangs, giant barrel and tube sponges, sand shoots, tunnels, and a variety of marine life. In the afternoon, you could either do a beach dive from the dock at Cobalt Coast, test dive a different rebreather in the pool, or relax at the resort lounge. Each evening, Divetech organized a different speaker to present their rebreather or rebreather related products, coupled with a gourmet style dinner and relaxation. This was then followed by a good night sleep or a jaunt on the town if you desired.

To capture giant wall photography, you need more than awesome coral life, crystal blue water, and impressive cliffs and overhangs. You need two or more inspired models in each photo for size perspective and content. A giant barrel sponge at 210 feet on a shear vertical wall is hard to picture without something or someone for size scale. Luckily, I had a secret weapon. Kim was her name. Kim Smith, not only half owner of Jetsam Technologies, but also an experienced rebreather diver along with an impressive female figure any supermodel would be jealous of. Her burly husband, Gordon, and U.K. diver Kevin Gurr, quickly became the distant, blue water silhouette models for obvious reasons.

Shooting super wide-angle photography is a skill all its own. With an almost 160 degree field of view, the Nikon 10.5 mm DX is my choice of lens. Fitted on a


Ghost Mountain

Nikon D100 in an Aquatica housing and dome port, I am able to get even closer to my subject reducing the amount of suspended particles between it and my lens. The main problem with super wide-angle shots is the wide range of contrast in lights and darks within most frames. Typically, the reef or subject matter is dark and the water's surface bright. If you meter on the subject you blow out the surface, and vise versa if you meter on the surface your subject will be silhouetted. The answer is to meter on the lighter section of the photo, such as the water's surface and sunlight, then fill the subject with the proper strobe power or fill flash. This technique provides awesome results as long as you have ample strobe power. Experiment with over and under exposing the waters surface and sunrays for unique and exciting results. Use single or multiple strobes to light up your subject or the surrounding reef/wreck.

I always shoot my D100 on manual mode along with manual strobe settings. This allows me the widest range of exposure changes possible along with the ability to under or over power my artificial light sources, in the end capturing the results that I see in my head.

Moving into the 21st century we are increasingly seeing the use of rebreathers for outstanding underwater photography. Increased bottom times, reduced gas supplies and the absence of bubbles make a rebreather the photographers dream. I have found that the reduced noise from exhaled bubbles allows me to approach or be approached by skittish marine life much easier and more frequently. Shooting upwards or in an overhead environment is cleaner with no bubbles. No surface percolation rains down into the picture frame and there are no expanding bubbles in the sunshine above.

Inner Space 2006 will be here before you know it. Don't miss the perfect opportunity for a week of no limits, hands on diving with some of the most experienced rebreather manufacturers and divers in the world. If you're not a rebreather diver, you can arrange for the starter courses during Inner Space. Divetech also offers many open water week activities for all levels of divers. Check out their schedule and up-coming events at www.divetech.com.

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Jewel of Roatan
Anthony's Key Resort

Text and Photography by John Rawlings

When I *used* to daydream about the isle of Roatan, my mind raced with thoughts of the Spanish Main, Henry Morgan, buccaneers, colossal treasure galleons, and the titanic struggle between Spain and England for the vast wealth of the "New World." Now, although those thoughts remain, (after all, I will always be a history nut!), they're permanently linked with dreams of luxury, comfort, and some of the finest diving in the Caribbean. The cause of this is quite simple — a week spent basking in the sun like a contented sea lion, treated like family, and catered to hand and foot at Anthony's Key Resort.

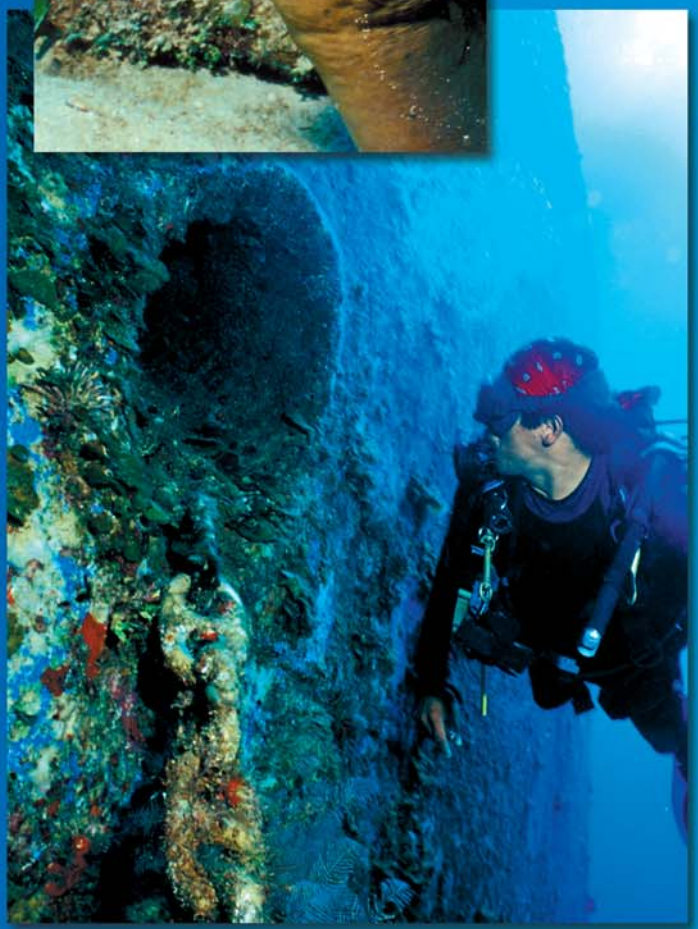
For years, I've noticed the ads for Anthony's Key Resort in various dive magazines and their booth has managed to catch my eye at DEMA and other shows — always because of the wonderful, idyllic scenes depicting seaside bungalows perched out over jade-blue water and surrounded by mangroves. There's nothing like a wee bit of tropical luxury to get my attention! I'd also heard that wonderful opportunities for underwater photography existed there, a sure-fire draw for those of us bitten by the bite of the shutterbug! When the opportunity finally arose for me to visit "AKR," I began packing my camera equipment before even telling my wife I was going! (Memo to self – DON'T do that again!)

A month later, I found myself aboard a small prop plane howling its way over a seemingly endless green jungle from San Pedro Sula on the final leg of my journey to Roatan, the only signs of habitation below the occasional dirt road or wisp of smoke emerging from the bright green forest canopy. As the plane's engines hummed next to my head, I heard something else that immediately caught my attention — somehow, deep in Central America, I found myself surrounded by New York accents! Before we landed on Roatan, I had several new friends — all of them, like myself, enroute to AKR.

Roatan is part of the Bay Islands group and is by far the largest. Located off the northern coast of Honduras, the other main islands in the group are Utila and Guanaja, although there are dozens of smaller islets and cays. The islands themselves are actually the peaks of the colossal subterranean Bonacca Ridge. What this means for the diver and photographer is *walls* — lots

and lots of deep walls. Seen from the air, Roatan looks like a long thin finger in the sea — only about 30 miles long and no more than 2 _ miles wide at any point. Whereas the ancient Mayan civilization dominated the Honduran mainland, their influence barely extended to the Bay Islands, where the Paya Indian culture held sway for thousands of years. Claimed at various times by both the Spaniards and the English, both languages are spoken on the island, with most islanders being bilingual. The Bay Islands have a rich and colorful history — Columbus landed on Guanaja in 1502 and later, Buccaneers used the islands as bases to raid the mainland and attack passing galleons. The famous pirate Henry Morgan was based for a time at Port Royal on Roatan and to this day, several sites on the island bear the names of infamous sea-dogs from that era, such as the town of Coxen Hole, named for pirate John Coxen. Over the centuries, Roatan has seen waves of vastly differing peoples arrive – Spaniards from the mainland, British buccaneers, Puritan colonists, black Caribe exiles from St. Thomas, immigrants from the Cayman Islands, and a smattering of Americans in the mid-1800s — each group adding a new "flavor" to the vibrant and rich cultural mix found on the island.

Anthony's Key Resort was founded in 1970 smack dab in the middle of this beautiful richness, designed to give traveling divers and photographers an opportunity to seize everything that Roatan had to offer. In 1974, manager Julio Galindo took over as full owner. "AKR" remains a family concern to this day — his two sons, Julio, Jr. and Samir, actively manage the resort while his daughter, Haydee, handles publicity and booking through Bahia Tours in Florida. Seventy-eight percent of the resort's guests are returning customers — and it doesn't take long to understand why. From the moment you arrive, you sense the family atmosphere and caring from each and every employee. Following my arrival, I sauntered down to the water and wandered along the dock examining the dive boats, equipment locker, and other facilities. I met a pleasant gentleman who looked



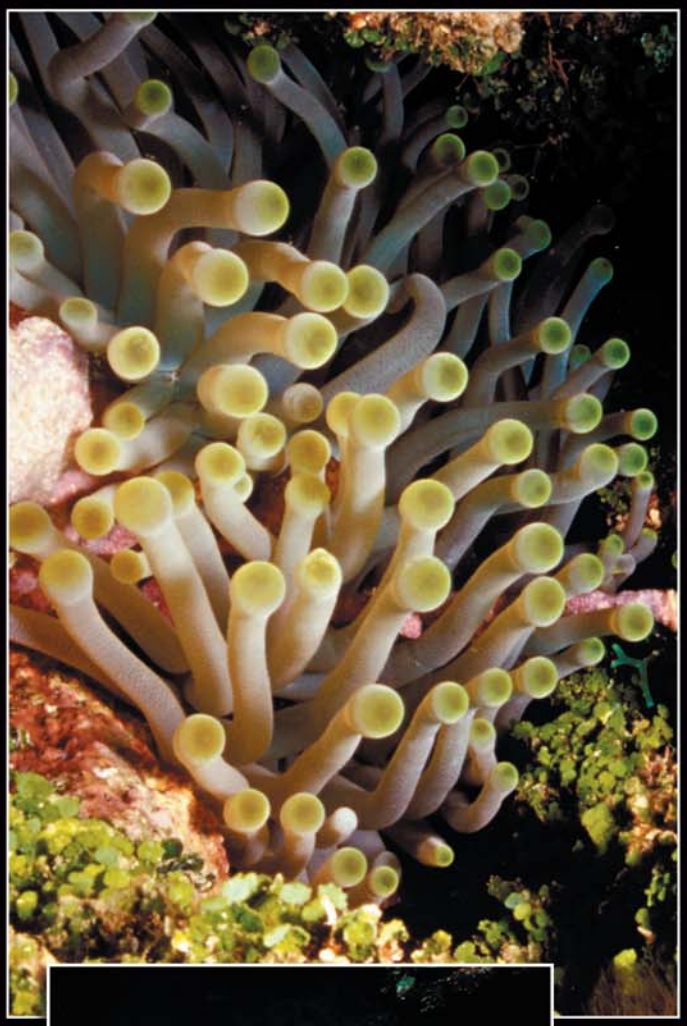
like he belonged there, so I asked him a few questions about when the photo shop would open in the morning, and we had an enjoyable conversation. Imagine my surprise when I was introduced formerly to him later at dinner and discovered that I had been happily chatting earlier with the patriarch of the Galindo family!

This caring extends to the health and welfare of both guests and the surrounding community. Several years ago, following an incident in which a guest had to be flown out for medical attention, the Galindo family decided that such a thing wouldn't happen again. A large and modern medical clinic was established *on site* along with a 54-inch double-lock recompression chamber designed to treat up to four divers at a time. Prior to this, the closest chamber was in Panama. The resort also has three Medical Doctors and one EMT on staff. The well-maintained clinic serves the local community as well as guests of the resort, the chamber being mostly utilized to treat Miskito lobster divers – around 130 of them a year – who will often arrive at the chamber *days* after being bent and in horrible condition requiring multiple treatments and long term rehabilitation. The bottom line is that this chamber is both *well maintained* and well used — its staff is probably among the *most* experienced in the Caribbean. This is certainly something to ponder when considering a dive destination.

Everyone knows the big draw for me is photography. Roatan is quite literally an underwater photographer's dream, with spectacular drop-offs, wall vistas covered with black corals, sunken vessels of all sizes and types, and a spectacular array of underwater life rarely equaled anywhere in the Caribbean. I have heard it said that 99% of the species found in the Caribbean can be found in the waters off Roatan, and I now believe it! I arrived hoping to link up with a kindred soul, and the water-gods chose to smile on me — on day one I met Richard "Pete" Peterson. Pete is both a technical

diver and an avid underwater photographer who also is co-owner of Tech Scuba Divers of Michigan. It was almost surreal — meeting a great buddy out of nowhere! Like me, Pete is an avid technical diver (myself in the Pacific Northwest and he in the Great Lakes) that also enjoys recreational diving, especially when it can be tied into photography. This was Pete's fifth trip to AKR, and as the days passed, I tapped his brain about why this was so. He returns regularly to Roatan to relax, unwind, and watch other divers discover what he has known and loved for years, catching that spirit of excitement and discovery on film. He, too, has felt that feeling of "family" at AKR and likes it — likes it a LOT. Together, Pete and I hit every dive site we could and helped each other find good subjects, setting up good angles, and shots.

One of the most popular sites is Mary's Place, where deep, sheer fissures lance their way down through the reef wall like mighty cracks. Caused by prehistoric volcanic activity, the fissures feed out onto a sheer wall that is sometimes clouded with black corals of all shapes, sizes, and hues. A classic "wide-angle" photo dive. Once you emerge from one of the huge fissures, the photo vistas simply open themselves up before your eyes. Many of the other dive sites have similar walls, but the deep cracks at Mary's Place give it a flavor that shouldn't be missed. Dive sites such as The Keyhole, Herbie's Place, and Overheat Reef also have excellent wall vistas for wide-angle photography as well as thousands of tiny critters for the macro photographer, while a site called The Bear's Den features a tunnel created by volcanic activity and a large cave containing a variety of unique animals hidden in the folds of its rocky walls. AKR also offers both shark and dolphin dives for those wishing to dive with and closely photograph those species. Whale Sharks appear seasonally, mostly from February through March and from September through October. In terms of "wreck" photography, we dived two sunken ships during the week – both of them



artificial reefs. One, the 230-foot freighter, *Aquila*, was sunk in 1997. She in turn was torn asunder by Hurricane Mitch and now lies in three large pieces near the base of a reef wall, enshrouded with invertebrate life of all types, sizes, and colors. The second vessel, the *Odyssey*, is a 300-foot freighter sunk in 2003. Completely intact and her sinking fairly recent, she is just beginning to accumulate the diverse marine life that will make her an astonishingly colorful dive in years to come.

My final night on Roatan provided a sunset that took my breath away. I knew that my New York friends were probably already at "our" table and that soon we would all be sitting down to yet another fine meal and never-ending tales of daring-do that would only get "deeper" as the evening wore on. I stood on the veranda of the dining area with Pete, talking about our dives that week, the sights we had seen, and the photographs we had taken. As we spoke, my eyes kept drifting out to sea, watching the last of the sun's rays dance on the water. Pete just looked at me with a knowing grin..."You're thinking about coming back, aren't you?"

Contacts

I flew American Airlines from Miami to San Pedro Sula and caught connections on Atlantic Air to Roatan. Some other airlines fly directly into Roatan from the USA. Reservations at Anthony's Key Resort as well as flights within Honduras can be arranged through Bahia Tours at 1-800-227-3483. For additional information about Anthony's Key Resort please see their web site at: www.anthonyskey.com.

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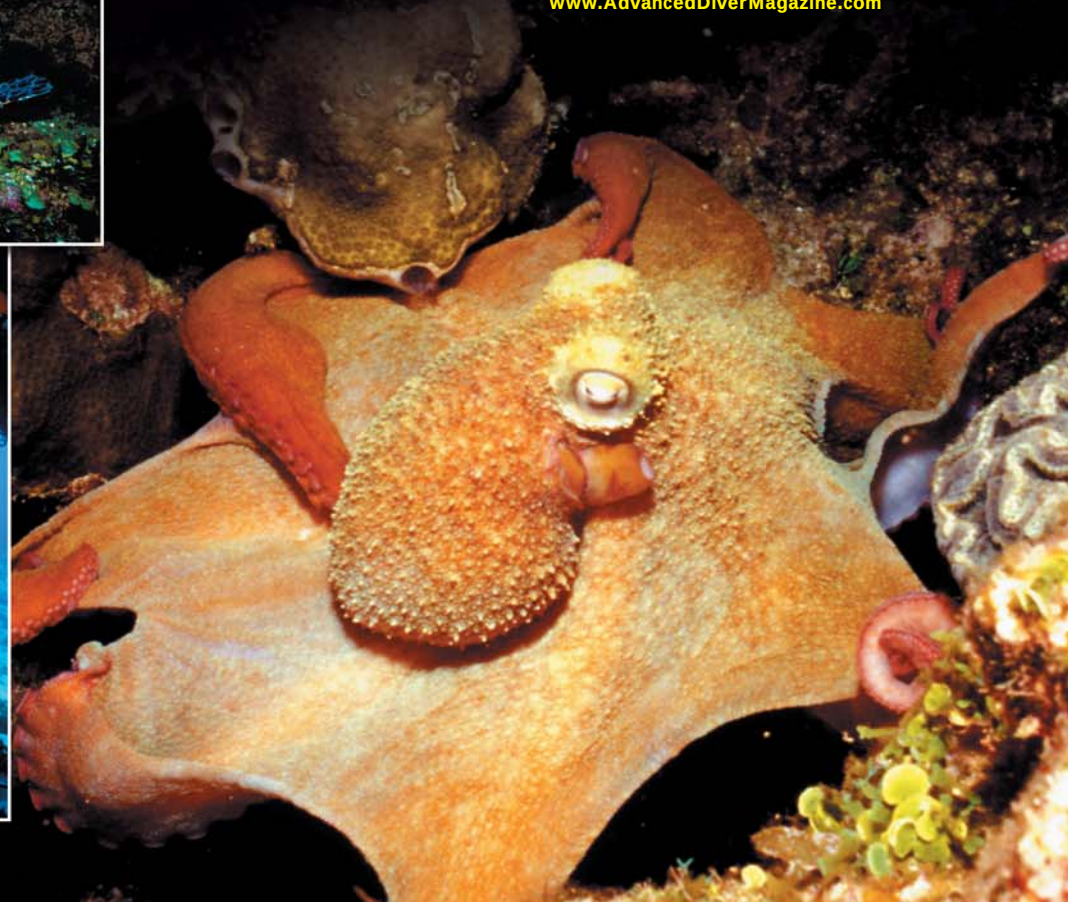


ST KITTS

DIVING OFF THE BEATEN PATH

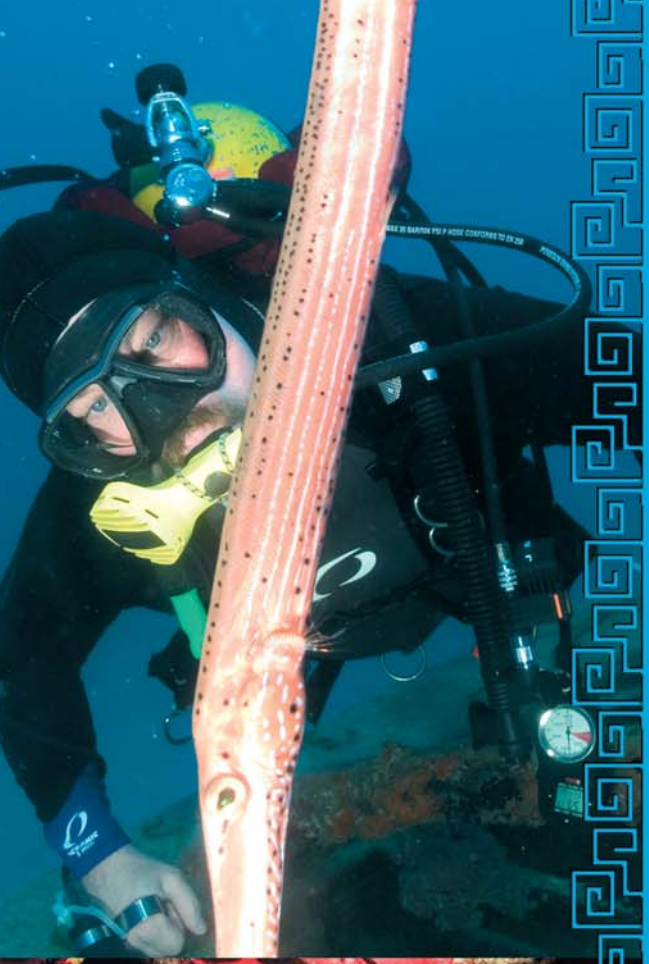
Text by Jeff Barris / Photography by Cass Lawson

The quaint little island of St Kitts lies neatly nestled amid the northeastern Caribbean chain of islands. This splendid location was discovered back in 1493 by the famed Spanish explorer Christopher Columbus, who originally called his new found port of call, Saint Christopher, after himself and his patron Saint. Following a few centuries and several insanely bloody battles, St Kitts is now a tropical retreat that soars humbly upwards from the Caribbean Sea towards the heavens in an assortment of curvaceous volcanic mountains. These now inactive contoured peaks, the highest reaching well over 3,000 feet in elevation, proudly model an astounding attire of flourishing green foliage that tightly embraces the landscape as far as the eye can see.

The island's mere 65 square miles boast island diversity with a capital "D." It's eco-touristy, subtropical climate, fluently sustains numerous species of amazing life including several types of edible fruit trees, brilliantly colored plants, and loads of odd looking animals that would likely make Darwin smile from ear to ear. Our initial unearthing of this astonishing atoll began as we slowly descended into the R.L.B. International Airport aboard our American Airlines flight from Washington D.C. A mere stone's throw below us was a brilliantly colored cobalt blue ocean that tightly cuddled the island's many surrounding elevations and brightly colored homes, captivating us in a state of grandness, while frame after frame of picture post card views deluged our senses.

Advanced Diver Magazine photographer Cass Lawson and I happily wound up in this part of the world after our publisher Curt Bowen received a telephone call from the kind people of the St Kitts Board of Tourism requesting that he send a couple of his divers down to report on the local diving. Curt called asking if we wanted to go dive some blue water and without a second thought, our bags were quickly packed.

Upon arrival into St Kitts, representatives of the St Kitts Board of Tourism greeted us with a small sign and huge smiles. Moments later we were whisked away to our lodging a few miles away, a charming hotel called



the Bird Rock Beach Hotel, which was stylishly perched upon the rocky edge of the Caribbean Sea. Here we set up shop for the next seven days.

In the evening, we met with St Kitts' marketing manager, Randolph Hamilton, who is one of the most passionate individuals about his country we have ever met. His love for St Kitts and its people is quite infectious. During our incredible meal, we eagerly exchanged thoughts, ideas, and ardently discussed ways to improve upon tourism, including the important future of diving in St Kitts. Little did Cass or I realize, the next morning we would be exploring one of the healthiest underwater eco systems we had ever seen.

Around the reefs

Our first dive was at a place called The Rocks, which is actually part of the largest reef system in the area called Coconut Reef. Surprisingly, we started gearing up at the dock because it was only a mile boat ride from shore to the dive site. Mike from Dive St Kitts said, "We have visibility between 60 to 100 feet and soothing water temperatures in the low 80s." He went on to say that "the over abundance of life here and the superb condition of the corals, sponges, and anemones are extraordinary." Mike was surely on the mark! After our hour-long exploration, we climbed back on board the boat and marveled non-stop about our dive. We just could not believe our eyes. I can only say that there's a good chance you too will skip a few breaths when you realize that every square inch of any inhabitable chunk of underwater real estate, including the mooring rope, has an endless unification of perfectly balanced marine organisms.

There are many other dive locations that are equally as impressive and a definite must see. Brimstone Shallows where divers can expect depths of 50 to 150 feet and exceptional visibility. Although the majority of the water column is filled with incredible fish life, the really good stuff is above 80 feet, making extended bottom times possible. Not a fin kick passes when you're not bowled over by the never-ending displays of slowly waving sea fans, schools of Creole wrasse, beautiful sponges, and large gatherings of silversides, jacks, and yellowtail.

Another fantastic dive location, which happens to be my favorite, is the reefs of Sandy Point. A half-hour boat ride, this site is overlooked by the 800-foot aerial British stronghold of Fort Brimstone. It is here where multi-layered reefs stack like aging cordwood and infinite layers of coral and mind-blowing seascapes burn an everlasting memory into your heart and soul. Many fantastic swim-throughs also join in acting as friendly gauntlets with pure white paths of sand helping to guide you effortlessly through a maze of endless optical amazement. During your visit here, you'll likely stumble onto a few ancient encrusted anchors that once moored some of the many cannon-laden frigates that came to fight in the early days of St Kitts. You can only guess the whereabouts of their nameless hulls.

Wrecollections

No great diving trip is complete without a few rusting hulls to satisfy one's fin-kicking fancy. One of three great wrecks in St Kitts is that of the M.V. River Taw, an actual real-life shipwreck that sank in 1985. This noteworthy freighter is found in 50 feet of water and is one of the island's favorite dives. Its 144-foot hull was once intact until hurricane Hugo scrambled her innards around doubling her aquatic personality. Many colorful fish species, big and small, make the "Taw" as it's commonly called by the locals, their permanent home. Large stingrays, slipper and spiny lobsters, jaw fish, sea turtles, and a gigantic puffer fish are some of the regulars. Make sure you bring a light because she's even more alluring at night.

There are two more wreck sites that are well worth a dive. The second is the Corinthian. A small tug that was intentionally sunk in 1995, she sits proud and perfectly upright in 72 feet of clear, blue water. She's also smack dab next to a shallow reef that levels off at 35 feet. You can explore her from top to bottom, inside and out without a problem. She is home to tons of silversides, snappers, groupers, and damsels by the score. There are a few showings of black coral displayed on her hull among the other colorful sponges and soft corals that caress this quiet workhorse's tired hull.

The third wreck is that of the M.V. Talata, which met her maker by way of a hurricane in 1983. Today she lies on her side, motionless and somewhat broken up, inside of the main harbor. Huge cruise ships including the QM 2 slowly come by heading to port while you visit the many morays, yellowtail, and multitudes of colorful tropical fish. Hoards of other amazing species of marine life also keep her company at a depth of around 50 feet.

In search of food

Man cannot live on diving alone, which means you got to eat. Rest your fins and sit back for a flavor experience to suit even the most finicky of gastric imbibers. After the diving is done, a tasty tour of the island is a must. A delicious maze of flavors, smells, and ambience awaits you at practically every turn. To start things off, head downtown to the hub of the island, to the amazing town of Basseterre. It's the heartbeat of St Kitts and the place for really good, inexpensive Caribbean fare, along with your standard people watching. For starters, indulge in a bottle of the delicious locally brewed Carib beer along with an order of some curried conch at the Ballahoo restaurant which overlooks the town square or the Circus Grill for some lip-smacking conch fritters. Taken locally, the freshness of the local food is beyond belief. Looking for some peace and quiet, then grab a taxi and head out of town to the Rawlin's Plantation. Here you will step back in time to the likes of an old sugar cane plantation, now smartly converted into a small hotel with warm breezes and landscapes to absolutely die for. A fantastic swimming pool draped in luscious flora, an unforgettable local staff, and an "Eden-like" fauna acts as the appetizer to the feast-de-resistance. Relax to the sounds of silence while spectacular displays of exquisite dishes such as stewed salt fish, coconut dumplings, spicy plantains, and other national island dishes are delicately displayed in an open-air buffet.

Dinner is an experience in itself. Most places are open air, accompanied by a live steel band and beautiful Kittitian servers. Want a barbeque? Go to Bobsy's for the broiled lobster, shrimp, and steak. How about a sumptuous, out of this world grouper dish at Stonewalls in Basseterre? Perhaps a romantic interlude at the Sugar Bay Club? I could go on and on. Overall, the entire St Kitts experience is one that brings on happiness, romance, and memorable experiences to all who make the journey. It's a place that's almost like a long lost friend wanting to embrace you over and over. I have made new friends here, and my heart tells me I will return once again too a place where time almost stands still and where beauty is etched in stone forever.

Special thanks to: The Honorable Minister of State, Mr. Ricky Skeritt and the hard working staff at the St Kitts Board of Tourism, American Airlines, The Bird Rock Beach Hotel, Dive St Kitts, Kenneth's Dive Center, Pro Divers, Turtle Beach Bar and Grill, Island Spice Restaurant, Frigate Bay Resort, Sugar Bay Club, Ottley's Plantation, Rawlin's Plantation, Ocean Terrace Inn, Ballahoo Restaurant, Circus Grill, Stonewall Restaurant, and the Oasis Café. And a special thanks to Randolph Hamilton and our good friend St Clair Maynard who always made us feel right at home.

KISS CLASSIC REBREATHER

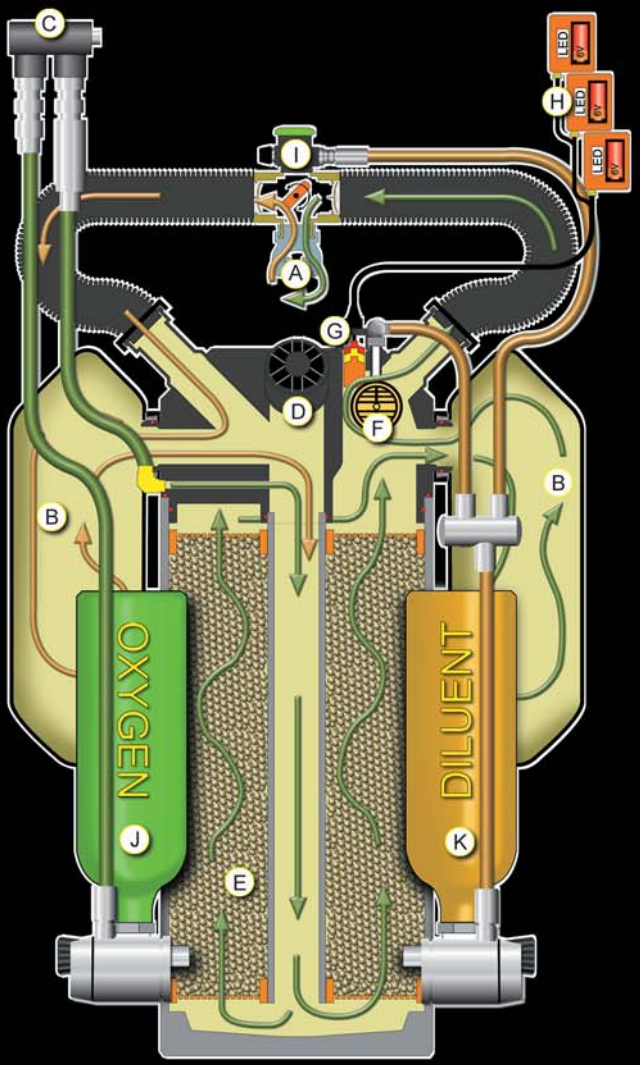
by Curt Bowen and Kim Smith

Gordon Smith, the founder of Jetsam Technologies Ltd., developed an interest in rebreathers around 1968 when he first read about Walter Stark and the Electrolung. But growing up in Denver, Colorado, he didn't have much of an opportunity to learn water sports. So years later, around 1979, having moved to Vancouver, on Canada's West Coast, he finally had the chance to take up diving. Never having lost his interest in rebreathers, he started building them for his own use around 1995. Aside from the interesting technology, Gordon was intrigued at the idea of longer bottom times, warm and moist air, silent diving, and three hours of gas at any depth!

Around that time in Vancouver, there was very little interest for recreational rebreather diving and the technology was not well known. But when Gordon showed up at the local dive sites with his new toys, his dive buddies became very interested. Interested enough to fork over some cash and demand that he build more units! It seemed like a good idea at the time and with over 8,000 square feet to work in and state of the art machinery at his fingertips, it made sense. This rebreather, dubbed the KISS rebreather due to its simple and straightforward design, was completed in 1998 and five were initially sold. Shortly after, the KISS was redesigned into what is now known as the Classic KISS Closed Circuit Rebreather.

Photo C.Bowen

A. DSV: Dive Surface Valve
B. Counterlungs
2 liter, 4 liter, or 6 liter
C. Oxygen Manual Add Valve with 15 micron filter
D. Apeks Exhaust Valve
E. Scrubber Canister
approx. 6 lbs, (2.7 kg)
F. ADV: Automatic Diluent Valve
G. Triple Sensor Well
R22D, teledyne sensors
H. PPO2 Displays
Three independent PPO2 displays. Each with its own housing, battery and sensor.
I. Bail-out Second Stage:
The bail-out second stage is incorporated into the DSV. To switch from closed circuit to open circuit bail-out, simply close the breathing loop. The bail-out second stage is plumbed to the diluent tank. NOTE: The bail-out second stage is for getting a sanity breath only. Divers should carry a redundant bail-out system for emergencies.
J. Oxygen Tank & First Stage:
13 cuft tanks are recommended.
K. Diluent Tank & First Stage:
The Classic KISS is compatible with either air or trimix as a diluent gas. 13 cuft tanks are recommended.



The Classics started getting recognized after a UK diver, Steve Millard, developed an interest. Steve was diving off Canada's fabulous west coast and had an opportunity to take a KISS for a dive. Having had a great experience, he soon ordered a unit. It was the first unit to be sold in the UK and the first sold outside of Canada. That was around the spring of 2000. Thanks to Steve's efforts, news of the KISS rebreather spread quickly. As it turns out, there were many divers, most with previous rebreather experience, who liked the simplicity and reliability of the KISS system.

The KISS philosophy, Keep It Simple Stupid, came from Gordon's background. As a tool and die maker by trade and a designer and builder of molds, he knows that some of the most reliable machines are those that are straightforward, easy to use, and easy to repair. Knowing that he was building a machine that was to be taken underwater and that was life support equipment, he felt strongly about the KISS concept. The more he thought about adding clutter and electronics to the unit, the less comfortable he was. He couldn't help thinking, why make it more complicated than it needs to be, after all, you can't reboot underwater!

It's this philosophy that lead to the development of the Classic KISS. The Classic is probably best known for its manual oxygen addition system. It is called "manual" as there are no electronic set point controllers to adjust and keep track of what the partial pressure of oxygen is in the loop. What it does have is a constant flow orifice. This orifice allows a small amount of oxygen, usually around 0.7 liters per minute, to be continually added to the breathing loop. Along with this constant flow, oxygen

can also be added to the loop by manually pushing the add valve button. What does all of this mean to the diver? Well, the orifice's job is to keep the diver from having to continuously add oxygen. When the diver reaches his desired diving depth, he'll need to manually adjust the partial pressure of oxygen to the desired level. Once there, as long as the diver isn't working hard or moving up and down in the water column, he'll probably not need to add oxygen again until he ascends.

Following the KISS philosophy, the Classic has been designed without alarms, lights or any other type of signaling devices which generally are used for alerting the diver to either a malfunctioning unit or a dangerous breathing mixture. When diving the Classic, the diver is solely responsible for keeping himself alive. If he doesn't remember to look at his displays, there aren't any reminders. Sound extreme? Maybe. But the likelihood of the diver forgetting, when he KNOWS that everything is dependent on himself, is slim. And if the diver has doubts on his ability to remember, well, not only shouldn't he be diving a rebreather, he shouldn't be diving at all!

Another feature that follows the KISS principle is the PPO2 displays. The Classic features a unique triple redundant display system, where each display has its own case, battery and reads only one sensor. If a problem arises with a display, there are two completely independent displays left to get the diver safely out of the water. For those divers who like the idea of a live deco computer, one of the displays can be removed and a dive computer, such as Delta P's VR3, can be added as a third display. The computer acts as the third PPO2 readout, just like the original display and also gives the diver "real-time" decompression information. When attaching a dive computer in this manner, the computer does not act as a set point controller or provide the diver with alarms. For those that really want these features, and understand the danger of complacency, there are a number of after market computers available, such as Kevin Juergensen's Hammerhead or Bruce Partridge's Shearwater.

Over the years, the Classic KISS remains unchanged. It still has the same robust scrubber head which has been machined from a solid block of Delrin, the scrubber canister is still made from PVC and the counterlung case is still built with marine grade aluminum which has been anodized and powder coated for durability. The Classic also still offers a variety of counterlung sizing to better match the divers own lung capacity. This greatly assists the diver in keeping proper buoyancy control. A few of the features have been refined, such as a smaller, lighter bailout mouthpiece, backlit displays, and a new molded manual add valve.

The Classic KISS is a compact, durable, closed circuit rebreather that has been designed for both recreational and technical diving and is rated to 250 feet (75 meters). When asked about the future of the Classic KISS now that the Sport KISS is in production, Gordon's comments are that as long as people want to buy them, he will build them. There are approximately 190 units worldwide.

www.jetsam.ca

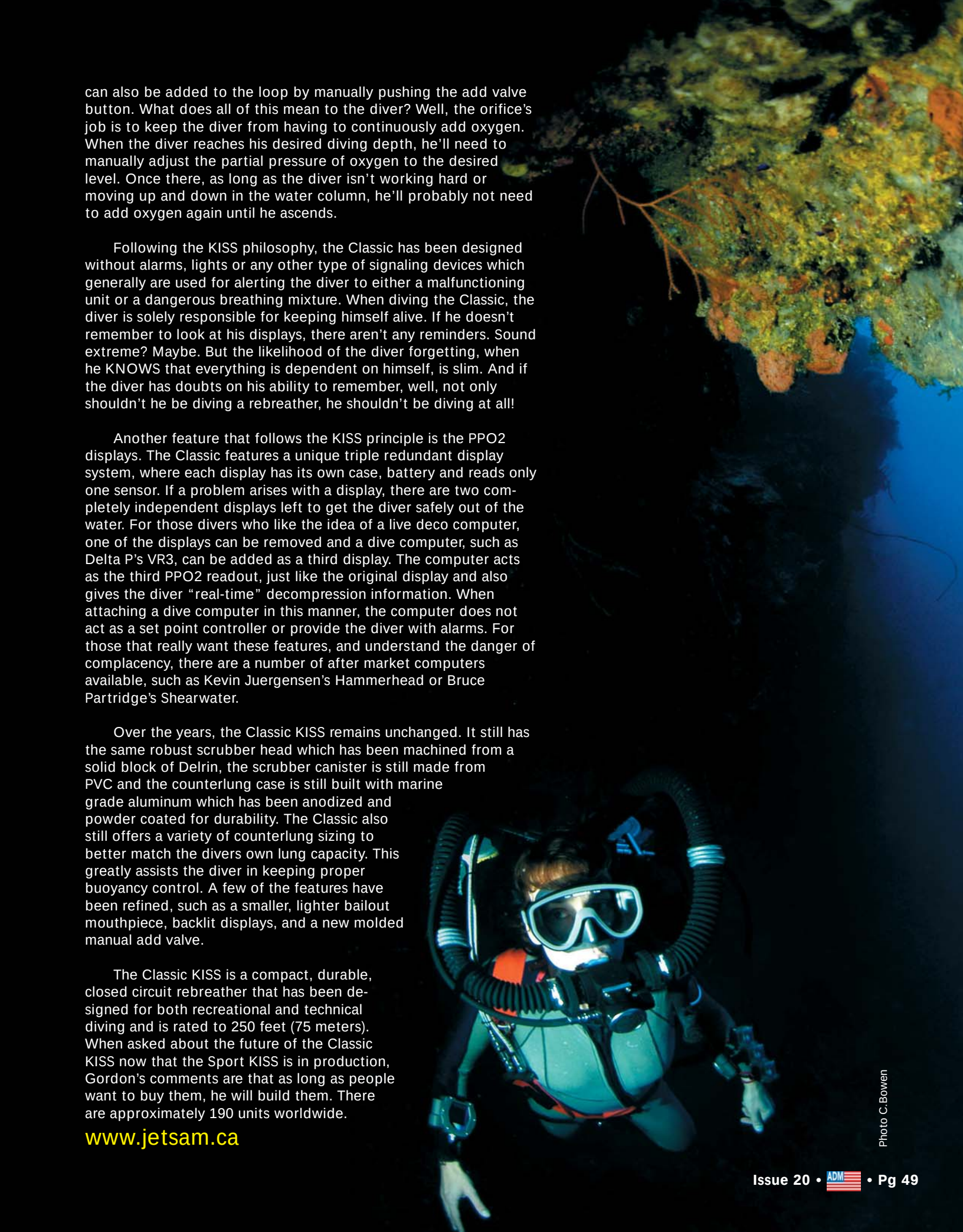


Photo C.Bowen

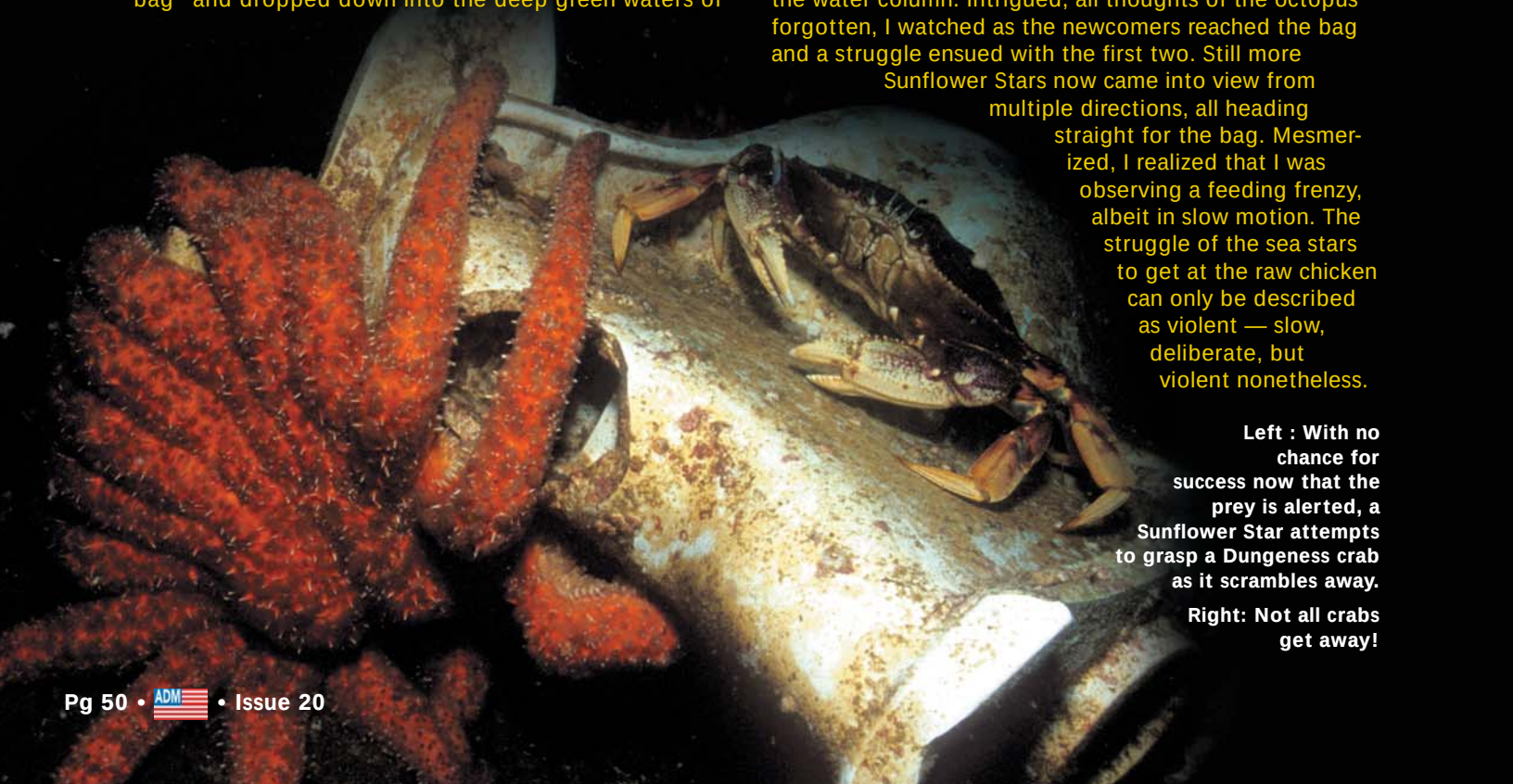
Sunflower Stars
Hyenas of the Sea

Text and Photography by John Rawlings

Several years ago, I headed out to one of my absolutely favorite isolated dive sites in north Puget Sound to do one of my absolutely favorite things — feed a Giant Pacific Octopus. I knew exactly where to look because I had found his den about a month prior and had been feeding him ever since. Usually, I simply grabbed a crab on my way down to the den, a large cave in the sand hollowed out under a colossal boulder, and dangled it in front of the opening. Soon, my huge friend would snake out a long twitching arm or two and take the tidbit out of my outstretched hand. This had been going on for weeks, and he almost seemed to recognize me when I arrived.

Today, I was trying something new, however, since the octopus had been doing a rather fine job of clearing out the local crab population. I had stopped on my way to the dive site and had bought some chunk chicken meat. I had plopped the chicken into my mesh "goodie-bag" and dropped down into the deep green waters of the Sound to see how my newfound friend liked KFC underwater style. At first, he seemed reluctant, but eventually a single arm worked its way out of the den and explored the chunk of chicken I held in my hand. Suddenly interest increased, another arm lancing outward and the colors of the big octopus slightly changing as he dragged the chunk of chicken down into the den. This continued for quite a while, each time one piece of chicken disappeared, I would reach back to my bag for another, until I reached back and the bag was no longer there...

Turning to see what had become of it, I was surprised to see two massive Sunflower Stars engulfing my mesh bag and dragging it away from me down the sandy slope. Out of the corner of my eye, I caught some movement and, turning, I saw four or five more of the huge Sea Stars gliding down the slop toward the bag, obviously having picked up the "scent" of the chicken in the water column. Intrigued, all thoughts of the octopus forgotten, I watched as the newcomers reached the bag and a struggle ensued with the first two. Still more Sunflower Stars now came into view from multiple directions, all heading straight for the bag. Mesmerized, I realized that I was observing a feeding frenzy, albeit in slow motion. The struggle of the sea stars to get at the raw chicken can only be described as violent — slow, deliberate, but violent nonetheless.



Left : With no chance for success now that the prey is alerted, a Sunflower Star attempts to grasp a Dungeness crab as it scrambles away.

Right: Not all crabs get away!

Eventually, my bottom-timer told me that I was approaching the end of my planned bottom time, and I reached out to stop the downward movement of my bag and reclaim it. This proved to be a task that was FAR easier said than done — each Sunflower Star gripping the mesh with hundreds of tiny tube-feet and some of them having everted their stomachs onto and through parts of the mesh in an effort to get at and devour the chicken. Lifting the bag up from the bottom, I suddenly realized how heavy several of these massive sea stars are, as well as how determined they can be when feeding. As I pulled each long arm from the bag, they would attempt to latch back on and would often come in contact with my arms or gloves, each time leaving bits and pieces of their tube feet clinging to my suit. Finally, shaking the last of them off was like suddenly dropping a sack of potatoes, and I briefly had to regain control of my buoyancy as I watched the last of the giant sea stars drift back down to the bottom, each of the others now heading off again on the hunt.

This was a side of these animals that I had previously not imagined. While hanging at my deco stops, I pondered what I had seen that morning and decided then and there that I needed to find out more about these voracious and fascinating creatures. I also considered the fact that I never want to be lying dead on the bottom of Puget Sound, because these critters would be amongst the first to arrive!

The Sunflower Star, *Pycnopodia helianthoides*, is the largest sea star in the world, capable of reaching nearly 39 inches across (1 meter), tip-to-tip, with arms reaching up to 15 inches (40 cm) in length. In addition to being the largest, this species is also the heaviest of all sea stars, often reaching 11 pounds (5 kg) or more, especially when there is an abundance of food readily available. Having more arms than any other sea star species in the world, it comes by its common name, Sunflower Star, because of the large number of arms that it sports. Its scientific name reflects this, *Pycnopodia* meaning "many-legged" while *helianthoides* means "sunflower." The number of arms on adult specimens ranges from a minimum of 15 to a maximum of 24, making this sea star resemble a huge sunflower when viewed from above. Seemingly able to sport every color of the rainbow, these giant sea stars can be almost any shade, from bright yellow or orange to a shiny blue or purple and almost anything in between. The color of the animal is dependent on how much of the skin is exposed when the gills extend beyond the calcareous outer plates. The texture of its skin feels almost "flabby," although spines protrude all over its upper body and down the arms.

Like all sea stars, on their underside, these animals have open "furrows" radiating down each arm that contain huge numbers of tiny tube feet as well as both gonads and digestive glands. The massive number of arms thus gives *P. helianthoides* a huge advantage when hunting, giving it enormous predatory capabilities in terms of both speed and dexterity when compared with other sea stars. When actively searching for prey, sunflower stars almost appear to glide over the bottom, every animal that can do so fleeing in all

directions. Sights such as this astonish divers that would never have imagined a "lowly starfish" could move that fast without benefit of time-lapse photography. This species has been recorded as reaching 360 feet per hour (110 meters) when hunting, and can reach this speed on either sand or rock. These voracious animals can be found in the sub-tidal zone down to extraordinary depths — one specimen has been found as deep as 1,427 FSW (435 meters). Sunflower Stars can be found throughout the coastal areas of western North America, from the Aleutian Islands in the north to southern California, with one source that I consulted stating that they can be found as far south as Isla Todos Santos, off Baja California in Mexico.

While most divers probably consider them carrion eaters since they are often seen feeding on and covering dead fish and animals lying on the bottom, the sunflower star is in fact an *extremely* active predator. Throughout its massive range, their prey-items are many and varied – sea urchins, abalone, sea cucumbers, and all manner of clams, shrimps, and crabs making the menu list. I have personally seen a sunflower star overpower and envelope a Dungeness crab that was buried in the sand and had timed its escape a moment too late. A common hunting tactic of the sunflower star is to locate a clam under a sand or rocky bottom and then excavate the area around it faster than the clam can tunnel away. Divers finding large "pits" in the bottom of their favorite dive site will usually discover that these were in fact created by sunflower stars in search of a clam dinner.

Definitely feared by other invertebrates, some prey species have developed escape responses necessary to survive when sharing an environment with *P. helianthoides*. Many ordinarily lethargic species will go to great efforts to escape the clutch of the voracious sunflower star. Abalone, for example, will whip their shells back-and-forth to break the grip when they sense a sunflower star has touched them. Urchins will direct their spines in the direction of the predator in an effort to fend it off and prevent it from getting a grip on their shell. Many species of clam will extend their foot and use it to "run" away by launching themselves off the bottom and rolling down slope, while some sea cucumbers, nudibranches and sea anemones will swim away in panic when they feel the slightest touch of *P. helianthoides*. Literally, when a large sunflower star sweeps through an area looking for food *everything* reacts — hiding, fleeing, or preparing to fight. Like most predatory sea stars, the sunflower star feeds by securing its prey with its arms and thousands of tube feet, and engulfing its victim with its everted stomach, whether struggling and alive or rotting carrion.

The comparison to the toothy critter that fits the same type of role on the African savannah would seem to be appropriate — *Pycnopodia helianthoides*, the sunflower star of North America's west coast, is truly the "Hyena of the Sea."

Above: A divers face shows the size that this species can reach.

Left: An actively hunting Sunflower Star – moving swiftly across the bottom. Anything that cannot get out of its way is fair game.

Diving the Dubnik Opal Mines

Text by David Cani **Photography by Petr Vaverka**

Excitement, enthusiasm, and euphoria are a just reward for all the pain that researchers and adventurers endure for the hours spent researching in libraries and long, uncomfortable travel to dive in caves and mines.

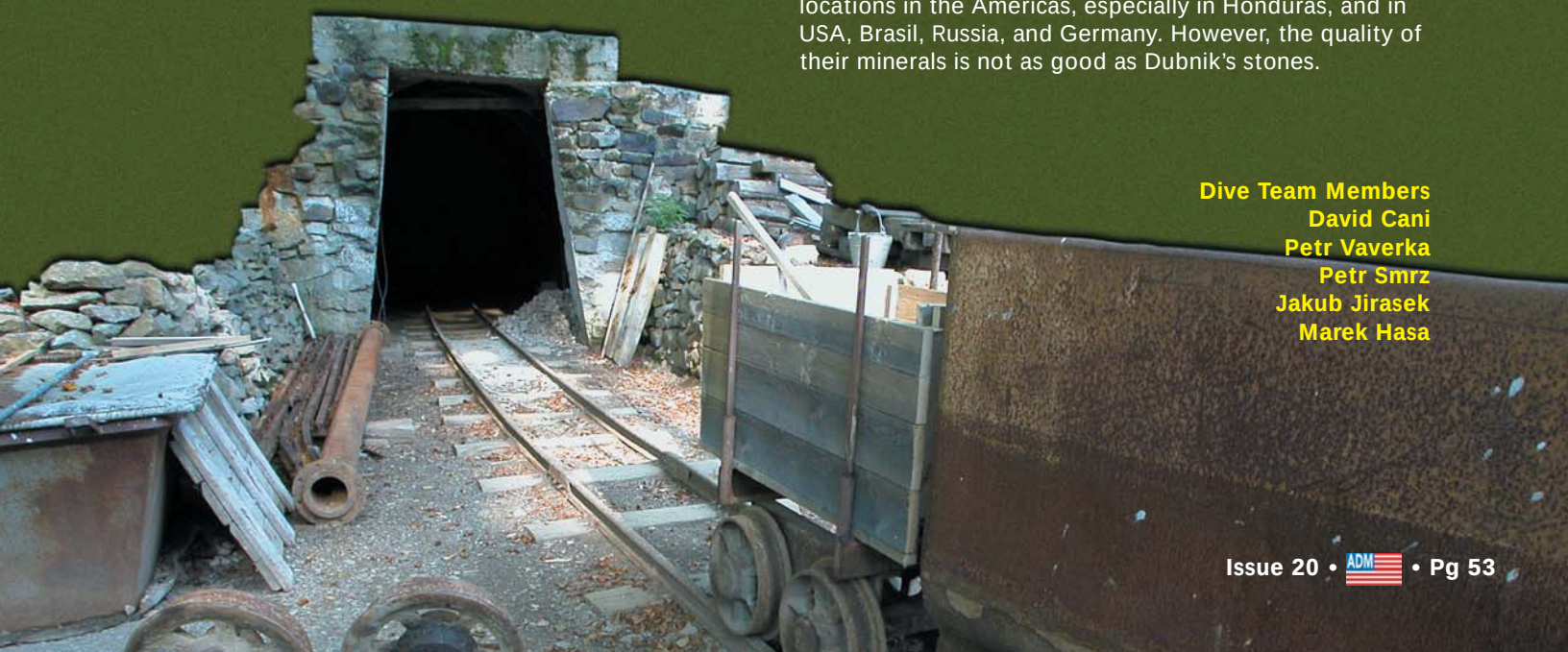
Trough the labyrinth of the opal mines

Only a few places in the world have a thousand year old history of human activity connected with diving. The opal mines in Dubnik, located close to Presov City on the eastern part of Slovakia, is one of them, which is why we chose them as our dive site.

Alive underground

The first mining of opals around Dubnik was in the 11th century. At that time, they were already extracting the costly opal making Dubnik the oldest and largest opal mine in the world. The opal mines are also some of the deepest in the world.

In the 18th century, there were about 800 workers who built over thirty galleries with a total length of over 22km (13.75 miles) by hand. To find something similar, you have to go to Australia to places like Lightning Ridge, Coober Pedy, or Mexico's Zimapan. There are other locations in the Americas, especially in Honduras, and in USA, Brasil, Russia, and Germany. However, the quality of their minerals is not as good as Dubnik's stones.



Dive Team Members
David Cani
Petr Vaverka
Petr Smrz
Jakub Jirasek
Marek Hasa

One of the Dubnik rarities is the "Vienna Imperial Opal" also known as a "Harlekyn," which is the biggest opal in the world, weighing 594 grams (20.95 oz) and is valued $500,000 USD The next most valuable stone is "Burning of Troy" (about $50,000 USD), which is now a part of France's coronation treasure collection.

In spite of the tremendous output from these mines, they were shut down in 1922. Shortly after the mine closed, opal thieves entered and destroyed what was left. Dubnik's underground spaces are not just great for precious stones, they are also perfect as a winter home for bats — it's the biggest European winter home of more then 14 different kinds of bats. During the winter, there are over 4,000 bats living in the caves.

In a clatter of bubbles

After traveling 670 km (420 miles) from Prague, we arrived on location and spoke with Vlado Konrad, the local boss. Vlado took us to see the dry parts of the main cave.

Dubnik's main cave is not all underwater — the underwater part is only a portion of Viliam's gallery with an intricate labyrinth that is close to Fedo's gallery. Corridors are on three levels with depths of 15, 30, and 50 meters (50, 100, and 166 feet). They are all connected by vertical passages, stairways, and the main Fedo gallery. The visibility in the slightly acidic water is unlimited. The maximum depth of 67 meters (223 feet) depends on the water level.

We've planed one dive for each day. Transporting our dive gear to the water wasn't easy because of the very intricate corridor system. We had to hike hunched over with all of our dive gear from the underground entrance through a slippery corridor using only light from our flashlights to see. Believe me, every slip or fall with a load of tanks hurts! Even so, we couldn't wait to get wet. We eventually got our last load of equipment through the long, intricate, dark, and already somewhat known corridors to our dive gear storage location.

Conducting a dive briefing and suiting up was very difficult and uncomfortable because of high humidity and the constant annual 1 C (33 F) air temperature. After finishing all of our preparations, we finally got into the incredible, crystal clear, cold water. Our dive plan was to go from the crossroad point on the right side through the 6 meters deep (20 feet) tunnel. Roughly after about 20 meters, we had to snake through partially collapsed walls of the tunnel. The bottom was not very muddy, so far.

We were amazed by "CICVARS"(that is the local name for formations growing from the ceiling) in the corridors. At the end of the corridor, there were steps

leading down to the next section — a horizontal tunnel at 30m of depth. When we arrived at the next tunnel, all that was left was a heavy wood frame from a ventilation door.

We were descending deeper and deeper through twisting steps. The corridor continued until we entered into a shaft named Fedo and then into a spacious hall. We were moving very slowly to keep from stirring up the heavy sediment lining the floor. Just one bad move could have very easily ruined extremely clear water and turned it into an impenetrable fog.

The main corridors were lined with many different reels and Ts, which are marked with arrows. For movement in cathedrals around Fedo and in lineless spaces we used our own reels and jump lines.

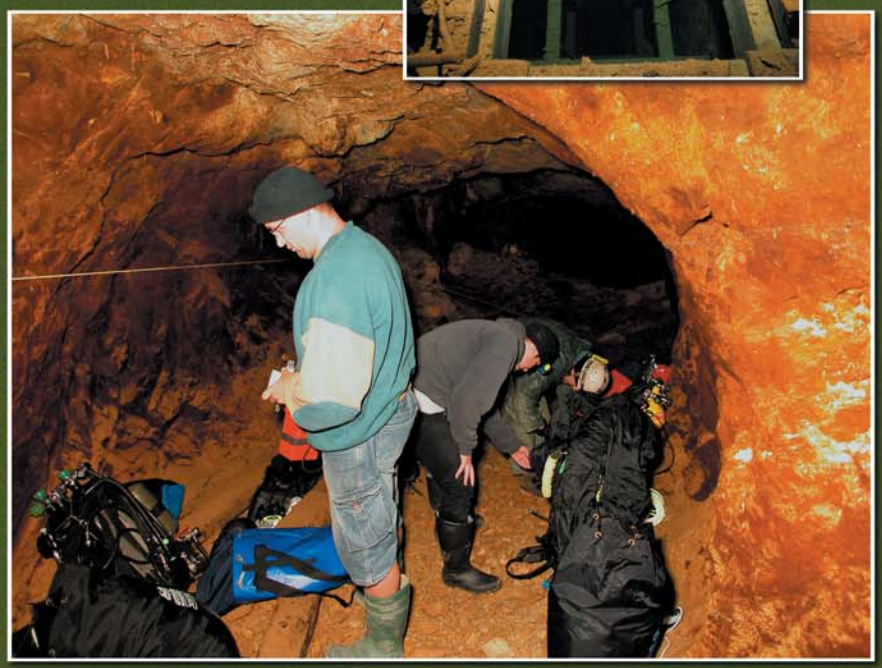
We left the shaft through a horizontal corridor (100 feet deep) in the direction of a vertical passage, which was at the end of one of the circles created by the flooded tunnels. Many wooden boards were on the ground in front of us. Between them, you can still see the footprints of horses. Less then eighty years ago, horses were working here and pulling heavy loads of earth through the dark intricate labyrinth.

We decided to ascend through the vertical tunnel where the visibility was about 20 cm (not even one foot). The ascent went well in a rattle of bubbles from the open circuit divers.

At the end of the dive, during decompression, we looked around on the left side of the main crossroad. The colorful scenes in the intricate corridor system were amazing. The long haul back to the entrance was uneventful due to our excitement from the dive.

Currently, Opalove Bane s.r.o. is taking care of the protected Dubnik mine, which is 6 ha (14.8 acres) of property including the underground spaces, corridors, shafts, tunnels, and technical monuments. Visitors and amateur opal hunters are allowed to visit the dry area of the mine during the summer season to look for opals after paying a local fee.

There are two circles for diving in Dubnik, which are about 600m (2,000 feet) long. But because of the high risk and



overhead environment, cave diving with the right configuration, special training, and experience (certification) are needed!

Head side first

For Sunday, we decided to go into a non-marked and lineless corridor at 40m (133 feet) of depth, which goes to a mezzanine all the way into Fedo, which was discovered two years ago by divers Hasa and Schovajsa.

After the descent to the main crossroad, Marek penetrated first, head side first, into a small slot. The rest of us followed him one by one. The last one to descend into the vertical tunnel was Petr. He descended in absolute zero visibility. To descend down a chimney with a mix of rolling bubbles, dirt, ooze, and mud is a courageous achievement. We descended deeper and deeper from the connecting corridor using our own reel, knowing that only a handful of other divers have ever been to this area. The ceiling of this tunnel is almost untouched with more than two feet long decoration of "limonitas" curtain.

Marek lead us through a corridor, which was known only by him. I followed about three meters (10 feet) behind with great admiration of his brilliant movement in a space like this. He did not stir up any sediment, so I had a great chance to take a lot of pictures in great visibility.

I could not believe my eyes when we came to a spot with rails, which lead us back to the Fedo shaft where it connected to a bizarre underground railway station. We were floating in crystal clear water, looking at 100 year old human activities that made this country famous.

The Fado shaft is very unstable with a lot of potential collapse above it. It's impossible to dive to the bottom of the shaft (50m, 166 feet) on open circuit. It may be possible for rebreather divers because of the lack of bubbles. Because of this, we only documented the shaft's exterior, rails, and adjacent corridors. The wooden supports here are in much better condition than in the tunnels at 30m (100 feet) — you still can see pulleys on beams. The wall's colors changed from red-brown to green-gray to almost blue. We were quietly astonished by the incredible and amazing scenery in the tunnels.

For our dives we chose to use EAN32 as back gas in double cylinders (18L and 12L) along with 80cuft stage cylinders. Jakub dove with his CCR CIS LUNAR rebreather. We used argon for drysuit inflation because the temperature of the water was 3 C (37 F). Our maximum depth for each dive was 34m (112 feet) with dive times of 70 minutes.

www.vaverka.net/

THE ERA OF SAIL

ARABY MAID

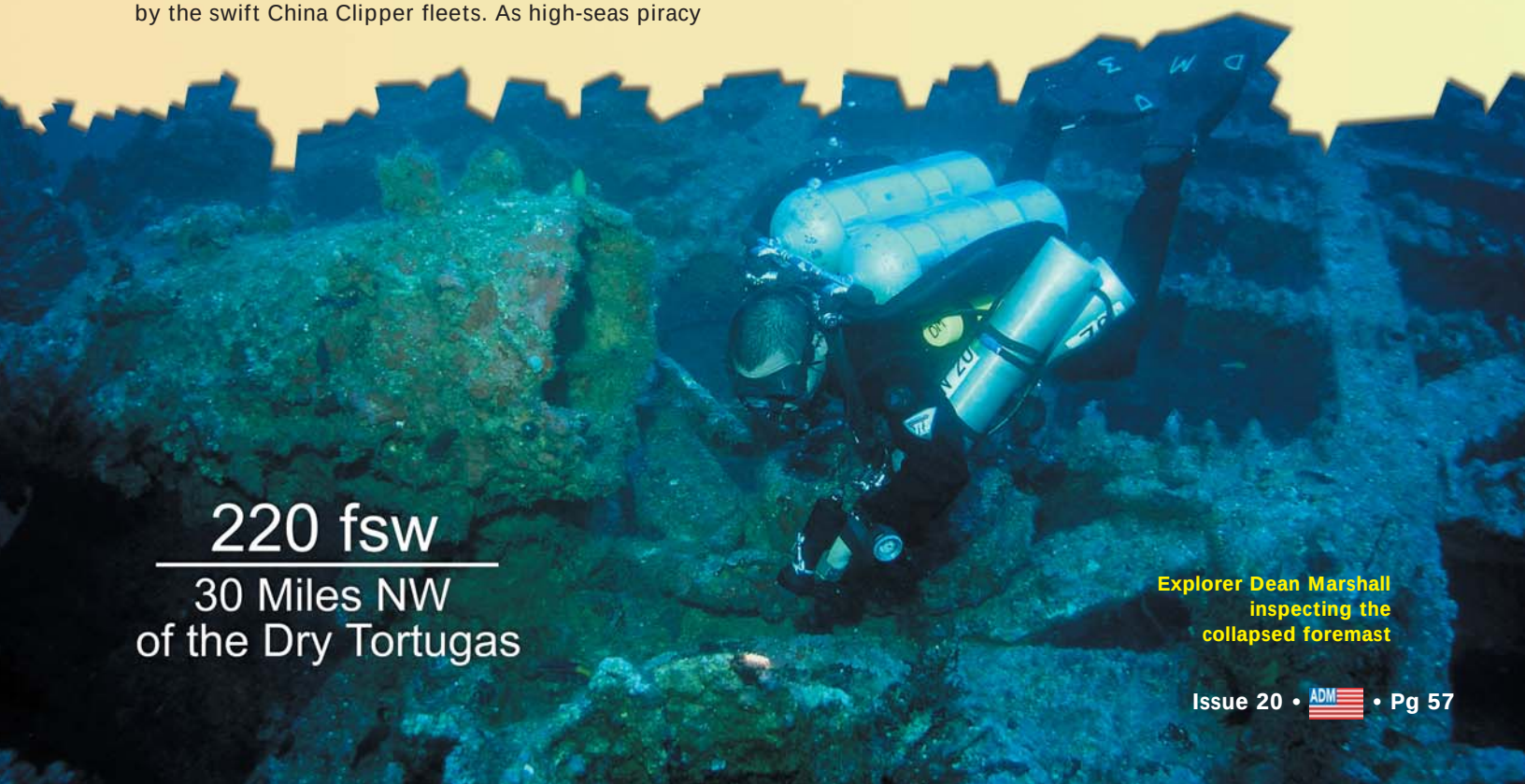
SUCCUMBS TO THE AGE OF STEAM

By Michael C. Barnette

The mid-nineteenth century marked an interesting conflict in maritime shipping. Dependence on sail was replaced by steam as the primary form of vessel propulsion. While steam provided numerous benefits, some companies, especially those with a long history in maritime commerce, still had a fondness for sail. The Scottish shipping interest of William Thompson and Company reflected this fondness for sail by its acquisitions of nine wooden barks or iron-hulled sailing vessels during the 1860s. The *Araby Maid*, official number 62272, was built in October 1868 by Robert Steele and Company of Greenock. An elegant bark, she was 194.6 feet in length, 32 feet in beam, and displaced 863 tons. The fully rigged vessel was built at a cost of £13,200 and was launched with Captain John Potter in command.

The *Araby Maid* was destined to carry cargo along the lucrative Far East routes that was largely dominated by the swift China Clipper fleets. As high-seas piracy was not uncommon in this region, the *Araby Maid* was equipped with two guns and 24 cannon balls, though there is no record of these ever being used. It is worthwhile to note that this particular vessel was built to replace the original *Araby Maid*, which was the first Thompson ship to visit Chinese and Japanese ports in 1859 during a two-year sojourn around the globe. The original *Araby Maid* later wrecked in the Straits of Belle Isle on June 24, 1862.

By the 1890s, William Thompson's two sons, James and William, took the helm of the company, which resulted in further development and expansion of the fleet; it was also around this time that William Thompson and Company was commonly referred to as the Ben Line. As the progressive-minded sons turned to the construction of numerous steamers, only the *Araby Maid* and the *Bencleuch* remained in the Thompson sailing



Explorer Dean Marshall inspecting the collapsed foremast

fleet. The last voyage of the *Maid* under Thompson management saw the vessel carrying coal from Ireland destined for Rosario, Argentina. There, she took on a load of wheat and unceremoniously sailed back to Ireland. The *Araby Maid* was eventually sold to *Aktieselskabet* of Laurvig, Norway in 1894.

The iron-hulled bark was lost following a collision with the 386-foot long Mallory Line steamship *Denver* on the night of November 21, 1903, approximately 30 miles northwest of the Dry Tortugas. The *Araby Maid*, commanded by Captain A. Larsen, was bound for Argentina from Mobile, Alabama, with a cargo of lumber. Quartermaster Rudolph Nath of the *Denver* stated that a heavy sea was running when the steamer struck the bark. Captain Larsen saw the *Denver* bearing down on his vessel, but realized it was too late to save his ship from the imminent collision. Following the impact, the *Denver* backed away, allowing the Gulf of Mexico to flood into the stricken *Araby Maid*. Five minutes after the fateful encounter, the once graceful bark slipped beneath the surface. Two men, one of which was the *Araby Maid's* First Mate, perished in the accident.

Billy Deans and Don DeMaria were the first divers to visit the wreck in 1989. They found the wreck resting on a sandy bottom in just under 220 feet of water. At the time, they did not know the identity of the vessel or its history, but simply referred to it as the "Schooner." The following year, Gary Gentile recovered the brass capstan cover from the wreck, which identified her as the *Araby Maid*.

Sitting upright, the once magnificent sailing vessel is amazingly intact. Due to the distance from shore, it is not uncommon to have over 100 feet of visibility on the wreck. As divers descend to the wreck, the breathtaking view of the *Araby Maid* first comes into view while over 100 feet off the bottom. The damage caused by the collision is easily identifiable on the port side near the bow, as a large v-shaped gash extends from the gunwale to the sand. The wood planking of the weather deck, as well as the cabin areas, has long since deteriorated, though the skeleton-like iron deck framing still remains fast. However, the wood planking of the lower deck is still sound, which is perhaps the most amazing feature of the

Photo Captions

1. **Winch on the ships upper deck**
2. **Araby Maid's capstan**
3. **Remains of the ships stern and steering station**
4. **Explorer, Joe Citelli on decompression after the exploration dive.**
5. **Diver, Heather Choat completes her required eighty minutes of decompression after an exploration dive.**
6. **A unique brick lined oven sets on the ships weather deck.**
7. **A view across the wreckage, revealing the lower deck.**
8. **A large anchor still sets, resting on the bowsprit.**

wreck considering she has been bathed by warm, oxygen-rich saltwater for over 100 years. Her foremast and mainmast lie off the starboard side of the wreck, broken at the bases just above the weather deck. While initially barkentine-rigged with three masts, at some point prior to the sinking she was apparently converted to a brig, as the mizzenmast (the aftermost mast) was razed just below the weather deck.

One of the large anchors rests on the bowsprit in the sand just off the starboard bow. The gracefully rounded stern of the *Araby Maid* is still intact, rising high off the bottom with her large rudder easily visible. A brick-lined oven resting amidships is one of the few features remaining on the weather deck. Other unidentified parts of wreckage can be spotted off the port side, most likely debris pulled loose as the *Denver* backed out from the pierced hull of the *Araby Maid*.

Due to its remote location and the depth of the water, few divers have visited the wreck. As such, artifacts abound throughout the site. Portholes can still be found along the hull, though most of the larger portholes from the cabin areas have been recovered. Divers have also recovered china, glass Fresnel lenses from navigational lanterns, deck prisms, a very ornate bronze binnacle stand, and miscellaneous personal effects.

The *Araby Maid* also hosts an abundance of large fish such as mutton snapper, black grouper, amberjack, Goliath grouper, and a multitude of small tropical species that now make the wreck their home. On one particularly memorable dive, I was completely surrounded by stratified layers of amberjacks, crevalle jacks, horse-eyed jacks, permit, pompano, and blue runners. The thick clouds of fish followed us almost to the surface, presenting an enjoyable diversion during our decompression. Frequently, blackfin tuna can be observed darting through the water column above the wreck.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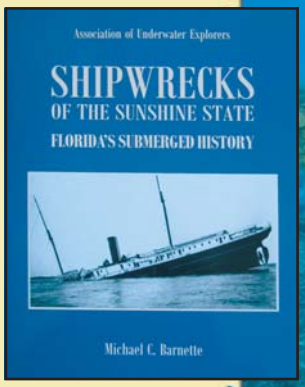
Michael C. Barnette is the founder and director of the Association of Underwater Explorers (http://uwex.us), a coalition of divers dedicated to the research, exploration, documentation, and preservation of submerged cultural resources. Employed as a marine ecologist with the National Oceanic and Atmospheric Administration, he recently published "Shipwrecks of the Sunshine State: Florida's Submerged History," which offers an extensive and comprehensive cross-section of Florida shipwreck narratives.



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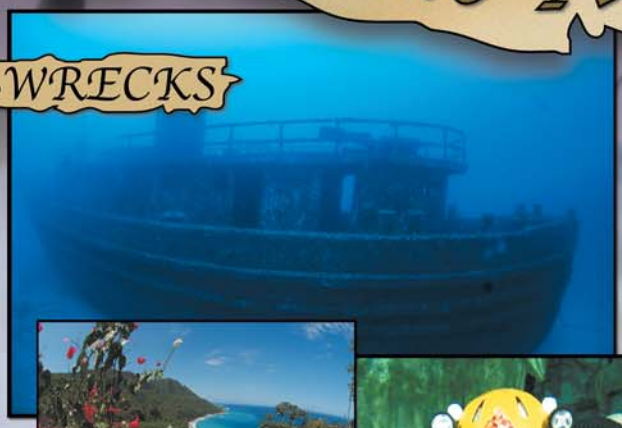
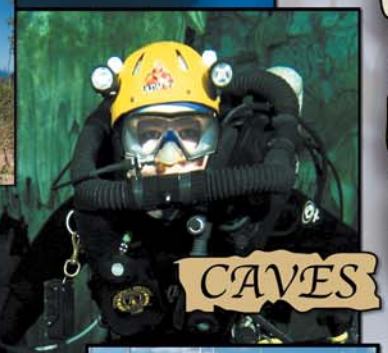
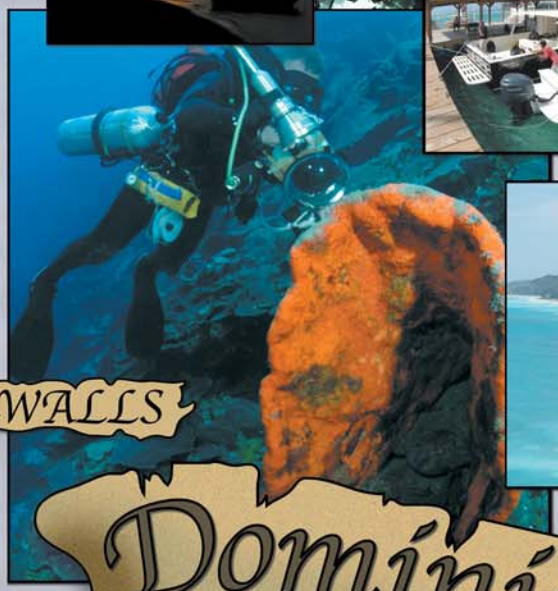
Where the Adventure Began

PIRATE'S COVE DIVE CENTER







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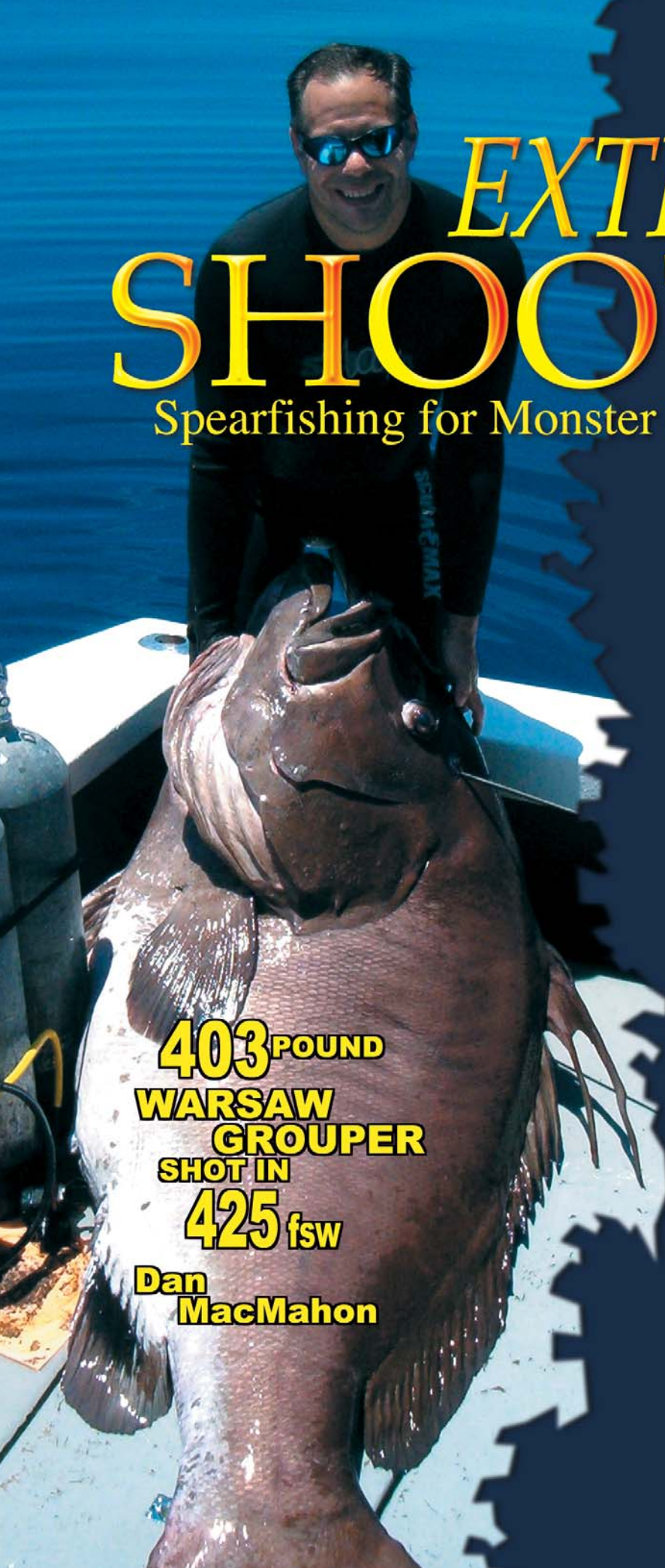
Dominican Republic

EXTREME SHOOTERS

Spearfishing for Monster Fish in Deep Water

by Dan MacMahon



On June 17, 2005 my brother-in-law, Ricky Hampton, and I dived on a freighter resting in 425 feet of water approximately 150 miles off the coast of Tampa Bay, Florida. While this is certainly a technical dive, it would probably not have registered a blip on the radar but for the fact that a 403-pound Warsaw grouper was harvested by spear, making it probably the largest fish ever successfully speared and raised at such a depth.

I posted a couple of photographs of the fish on www.spearboard.com (a website frequented by spearfishing enthusiasts), including only scant details of the technical aspects of the dive. Within three days, the photos had been viewed over 80,000 times. While I certainly understand the interest given the size of the fish and depth of the dive, I'm also somewhat blown away by all of the attention. This article aims to answer a few of the most common questions I've been asked since this recent dive.

Since moving to Florida from Georgia at the age of twelve, I've been interested in spearfishing. I developed a fascination with deep-water fish while watching my neighbor, a commercial fisherman, unload his quarry from the fish box. I recall well the occasional Warsaw grouper, which I think influenced my interest in one day seeing such a large trophy in his deep-water home. At that time, such deep water was outside my means, so I cut my teeth on plentiful reef fish one could find in the shallows off Pasco County, Florida. My friend and I would take Dad's sixteen-foot boat out to the fish camps, shooting fish with a $29 "Gaucho" gun. This same friend and I would later go in on the first scuba setup I would own, which would forever connect me to the sea and the thrill of underwater hunting.

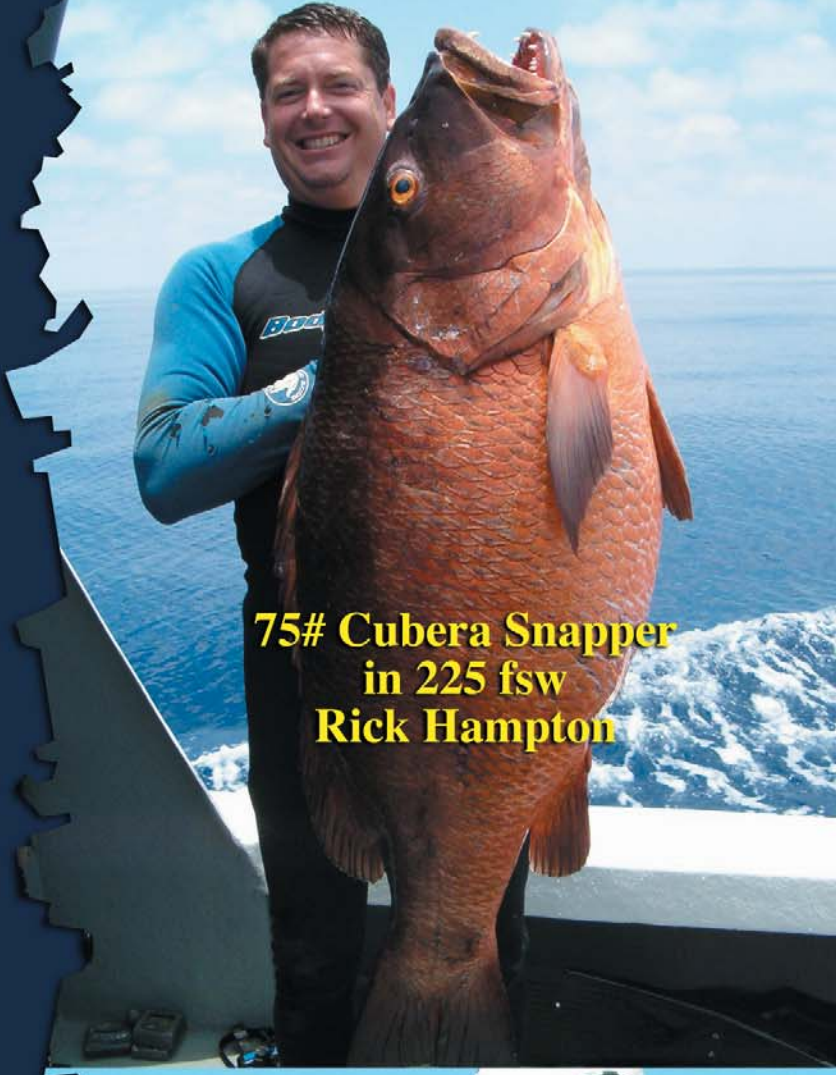
Thirty-five years have passed since that first set of scuba gear, but the passion to explore has not changed. About seven years ago, at age 40, I made the decision to become a full-time commercial spearfisherman. In fact, Ricky and I made the decision together, and we're still going strong.

Approximately two and a half years ago, we started discussing the possibility of harvesting a deep water Warsaw grouper. I became trimix certified through Joe Odem of TDI about five years ago, and I've used trimix regularly since then. I knew that a dive to 400 feet would require extensive planning, especially due to the task of harvesting a fish as large as a Warsaw grouper. For the next year, I designed and tested gear configurations, leading to our first 400-foot dive about 15 months ago. Our friend, Steve Simkins, accompanied us on that first 400-foot dive where the conditions were very poor. The bottom was dark with no visibility, forcing us to quickly end the dive and follow our three-minute plan. Still, the experience was worthwhile, enabling me to tweak our configurations, which lead to our recent engagement with a large grouper.

During the 15 months since our last 400-foot dive, we continued discussing all of the issues that come with combining a technical deep-water dive with spearing such a large fish. When the time finally arrived, we assembled a crew made up of Ritchie Zacker (a commercial diver off my vessel, HeadHunter), Kenny LaCasse, Rich Waters, and Jason Stanley; all super experienced and dependable divers. We loaded my 39-foot vessel, HeadHunter with all the needed equipment and supplies and began the 24-hour trip offshore. The weather was perfect and sunny and the seas were calm. We arrived at the wreck where a custom Spearfishing Specialties jug was deployed. The jug line nailed the wreck, ensuring that we would not loose our way during the descent.

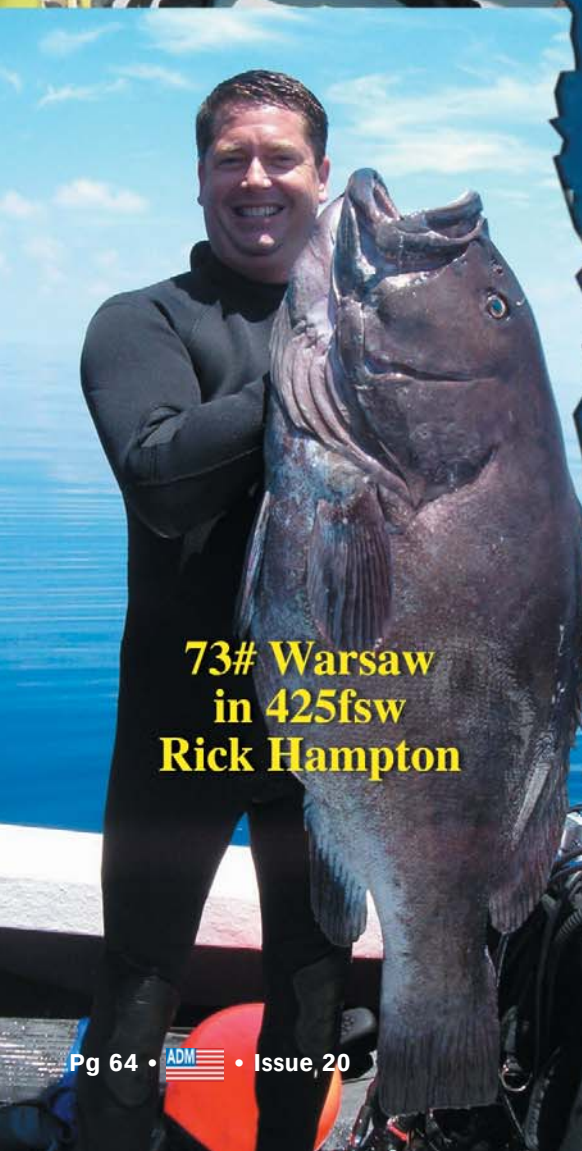
Kenny was designated the helmsman, with Jason as our support diver. Richie was our free diver and would start communicating with us at 100 feet. He also had the job of making sure the vessel stayed above us. Rich was poised with a camera at the surface to take photos.

We entered the water at 11:00 A.M. on June 17. The conditions could not have been better. The water was cobalt blue and crystal clear. It was the polar opposite of the poor conditions we encountered on our first deep dive. We had flat surface conditions, weak current, plenty of light at depth, and 150 feet of visibility. Our plan was to make a three-minute descent. At two minutes, fifty seconds into our descent, we hit the top of the freighter, which lies on its side, at about 375 feet.


75# Cubera Snapper
in 225 fsw
Rick Hampton


41# Warsaw
in 265 fsw
Ken Lacasse

93# Black Grouper
in 200 fsw
Dan MacMahon



73# Warsaw
in 425fsw
Rick Hampton

I noticed several Warsaws in the 50 to 100 pound class swimming in different directions. I also spotted a huge fish, well over 100 feet away. My immediate priority was to get properly trimmed, and as I was doing so, the fish charged toward me demonstrating aggressive behavior. As he approached, the giant fish bowed up, threw up its fighting spur, and blanched, generating an appearance one might expect from a "stoned" fish that suddenly turns discolored behind the shaft. Just as this happened, and with my buoyancy under control, I shined my HID light into the Warsaw's eyes. Whether it was the light, an act of dominance, or curiosity, the Warsaw quickly turned towards me, giving me a descent shot.

I pointed my commercial Rhino speargun and slammed the first free-shaft into the sweet spot, causing him to shudder. I quickly launched a second shot into his head. I grabbed the fish and crashed into the deck at 397 feet, quickly realizing just how big this fish was! I decided to power-head (shoot) him between the eyes to "make sure," since I didn't want to be attached to an angry 400-pound grouper at 400 feet. I then quickly attempted to pump as much air as possible into the fish, while swimming him up 20 feet until he turned positive and soared spiraling towards the surface. With that done, Ricky then went to work and stoned, with a single shot, a beautiful 73 pound Warsaw of his own.

The dive went flawlessly well. We were both wearing Zeagle twin bladder 80 lb wings and the new Zeagle FlatHead XP regulators. We had planned the dive for 8 minutes of bottom time and actually left the wreck at 7 minutes and 10 seconds. I was wearing twin LP 95s and Ricky was wearing twin 104s. Our bottom mix was TX11/62. Our deco tanks were 100 CF Fabers. Our first deco stop was at 170 feet, where we switched to TX25/10 and used that during the multiple stops until we reached 40 feet, where we switched to our final gas of EAN70. We had support divers starting at 170 feet and continuing to the surface. We also had an EAN70 hang-bottle at 30 feet with dual regulators. Our total deco was a little over 75 minutes. I don't worry about a few extra minutes of deco while being out 150 miles in the Gulf of Mexico. Our crew performed just as planned, with everyone doing their job and working as a team. Ricky and I could have never made this dive without a crew of experienced people like we had for this dive.

People now ask, "What's next? Will you do it again?" Maybe. I regularly dive in the 200 to 300 foot range to make a living, but this dive was just to fulfill a dream. If Ricky someday tells me that he wants to get a monster Warsaw, then I might consider doing it for him. Short of that, I have no burning desire to again go to 400 feet and shoot a fish that size. I don't know that such perfect conditions could ever be replicated.

DIVE VENEZUELA

By ADM staff writer Tom Isgar

Venezuela is an undiscovered dive destination with 1,740 miles of coast on the Atlantic and Caribbean and 14 named island groups. Margarita, Los Roques and Coach are inhabited. Los Roques and Margarita have accommodations and dive operations.

Diving ranges from clear calm water, high visibility, and large numbers of fish to waters which are influenced by outflows from the Orinoco and are cold and murky but home to strange and exotic fish. I have made 55 dives at six different areas, each with it's own character. All offer great diving. As a photographer I brought home images of dozens of new species.

If you want a picturesque remote island, then go to Los Roques. If you want more variety in your diving but also want night life and shopping go to Margarita Island. If you want adventure diving, charter a boat from Margarita to Los Testigos. If you want easy diving; short boat rides and great fish, night life and beaches Mochima Marine Park could be the place for you. If you have three weeks, do it all!

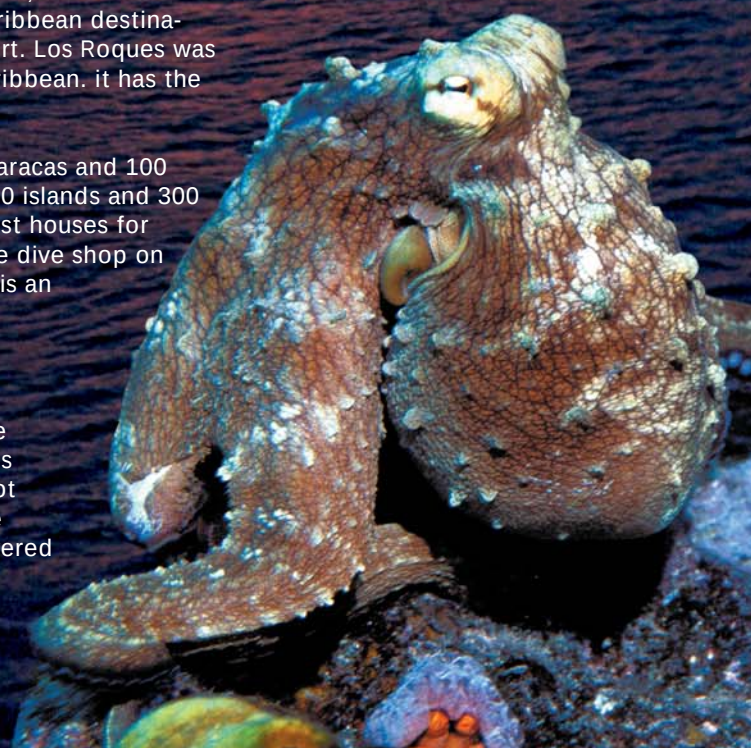
Los Roques

Los Roques is the best known of Venezuela's dive destinations, but is still undiscovered diving for most US divers. Compared to some Caribbean destinations, Los Roques is a more difficult to get to but worth the effort. Los Roques was established in 1972, making it the oldest marine park in the Caribbean. it has the third largest coral reef in the world.

The main Island, Gran Roque, is roughly 85 miles north of Caracas and 100 miles east of Bonaire. The entire archipelago consists of about 50 islands and 300 emerged sand banks. It is the only inhabited Island. The are guest houses for visitors, one gift shop and a hand full of cafes and bars. The one dive shop on Gran Roque offers two tank day trips. The Grand Roque airport is an asphalt strip with a guard house.

Diving in Los Roques

Diving Los Roques is Caribbean diving of years gone by. The reefs are healthy and fish are abundant. The majority of the dives are 50-80' on coral reefs, but there are 200 foot walls and 10 foot grass flats. There are also underwater caves with sharks, sponge forests, walls of soft corals and sea whips, and shallow reefs covered with staghorn and elkhorn corals.



With this wide variety of habitat expect a wide variety of marine life and you won't be disappointed. In six days of diving I saw more than 200 different species of fish. In addition to the standard reef fish there were lots of permit, black jack and African pompano. I also saw numerous rays and sharks.

Margarita Island

Margarita is a one hour direct flight from Los Roques or 45 minutes from Caracas. This large island (355 square miles) with a population of 320,000 is 25 miles from the mainland of Venezuela. Unlike other places in the Caribbean, where tourism is the main industry, Margarita is like visiting a small country. The tourist are mostly Europeans, mainland Venezuelans and other South Americans.

In Porlamar, the largest city, hotels, restaurants, casinos, duty-free shopping and world-famous beaches make an attractive destination for visitors. The commercial center of the island is a good place to walk, with nice stores, restaurants and street stands.

Dive operations on the island cater to visitors on multi-sport vacations. They may only run trips to one set of sites, so it is important to find out where they go before booking. The typical trip is a two tank day although you can negotiate for three-tank days. Trips usually include transportation to and from the boat and lunch. The boats range from modern dive boats to wooden fishing boats.

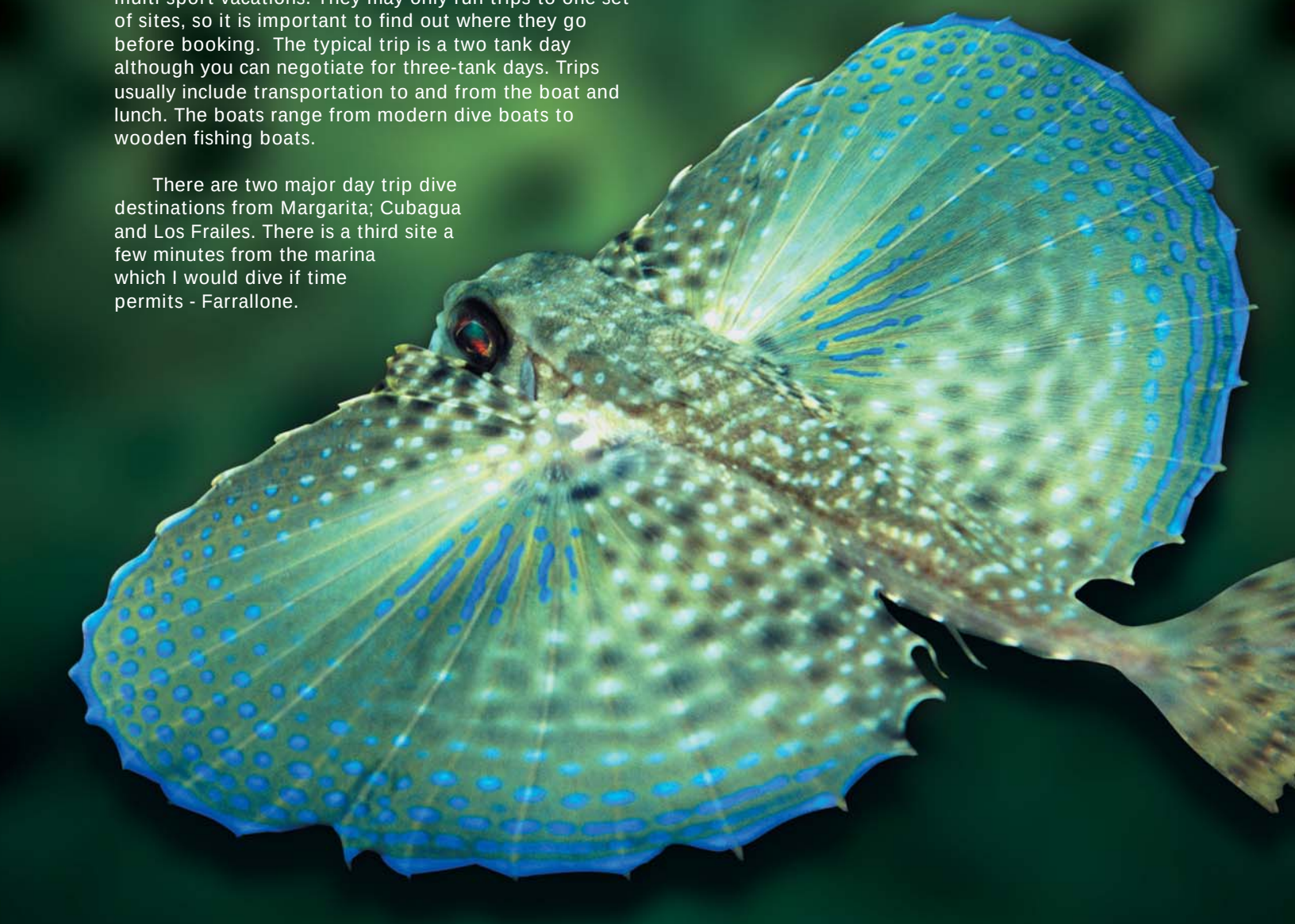
There are two major day trip dive destinations from Margarita; Cubagua and Los Frailes. There is a third site a few minutes from the marina which I would dive if time permits - Farrallone.

Cubagua

Cubagua is 28 miles south of Margarita. Cubagua was the earliest European settlement in Venezuela (1493), a fishing town which became a harvester of pearls but was wiped out by a tidal wave in 1541.

Your dive operator will pick you up at your hotel and drive you to a rough beach on Charagato Bay. From there it is a short ride to the dive sites. Charagato Bay is large but there are only two dive sites; the Santa Anna Ferry Wreck and The Deep Dive, a 70 foot dive on a sandy bottom with a few coral patches.

Large sections of the Santa Anna ferry are still intact even though there is deterioration to the structure above water. The bottom is at 45', with shallows running toward shore. The Deep Dive is a 70-foot dive close to the wreck. The anchor marks the center of the dive at about 60'. Divers work out from the anchor. The visibility is low; 20 feet on a good day. However, there are some species which make the dive worthwhile. I photographed my first Bandtail robinfish; one of those bottom dwellers that walks along the bottom and has venomous spines.



The water temperature at Cubagua is around 70 degrees with visibility of 15-25 feet.

Farrallone - Bird Rock

Farrallone is a rocky point rising out of the water. I had two really good dives here. The depth is 10-40'. While it was calm when I dove, big currents are possible. This site was one of the richest sites I have dived for invertebrates; numerous anemones, grape algae and zoanthids, as well as corals. I photographed a school of sea bream, gobies I had never seen before, a toadfish and flying gunnards. Forty dollars bought two tanks and lunch.

Los Frailes - The Friars

The other major destination from Margarita is Los Frailes.

Los Frailes is a group of eight cactus covered rock islands 10 miles northeast of Margarita. There are at least 16 dive sites, one on each side of the eight islands. In general the sites have rock walls covered in algae. There are huge boulders along the base of the walls as well as giant coral heads. These give way to a sandy bottom with patch coral and some oyster beds. Visibility has always been good and currents are variable.

Fish are plentiful and by diving the entire site; sandy bottom to shallows along the wall; a diver will see more than 70 species on most dives. Los Frailes provides lots of nice diving. Some operators offer a beach barbecue as part of the trip

Los Testigos - The Witnesses

Every adventure diver should investigate a trip to Los Testigos; 45 miles northeast of Margarita. There are no facilities on Los Testigos. You need to be self contained. We carried spare gear and a small compressor to fill tanks. There is a small Venezuelan Coast Guard station that requires boats to check in and has some administrative functions.

The trip was ten and one-half hours with rough seas on the Antares I. One of our party had dived Los Testigos several years earlier and was counting on finding the same fisherman with whom he had dived. No problem, except the only way to communicate with the fisherman is yelling from the beach once you arrive. So, assuming he was still alive and had a boat which ran, we set out.

We found the fisherman and used his wood fishing boat for a dive boat. We paid a small fee for the boat and his service, as well as leaving spare gas.

The Testigos are similar to other islands on the Venezuelan coast; rock upthrusts covered by desert vegetation, primarily cactus. Brown pelicans, terns and frigatebirds are the primary inhabitants, other than the semi-wild goats kept by the fishermen.

Except for shallow dives, Los Testigos is for experienced divers only. Many dives had serious current; mask pushed around your head, broken stinging hydroids in the water, chunks of coral and sponge rolling along the bottom. Of course, around the corner, if you were able to get around the corner, calm prevailed. Visibility was generally 70 feet and most dives were at depths of 40-60 feet.

Rabbit Island's Bajo (Ball) dive site is the most awesome dive I have ever had. This is a 40' dive with big surface current; backroll, swim straight down and hope to get to the bottom before being swept to blue water. The site is buffeted by at least two currents making it very rich in fish food.

Swimming down the bottom looked blurry. As I got deeper I saw the ocean floor covered with rivers, not schools but rivers, of fish (cottonwicks, gray snappers, yellow goatfish, sailor's choice, school masters, and others). I would swim across one and encounter another river of a different species. Sharks and huge barracudas patrolled higher in the water column and southern sting rays floated along the bottom. This site was so spectacular that nothing compares to it in my 20 years of diving the globe. I couldn't focus my camera on any subject without being distracted by something even more phenomenal. I finally gave in and just watched the show.

Los Testigos is adventure diving and worth the time and money. The owners of Antares I (www.Chartersailing.com) charged $900 a day for the boat which will sleep six divers.

Mochima National Park

Mochima ("abundant waters" in the native language) is the second oldest Marine Park in the Western Atlantic. It is one of the largest in the Caribbean with more than 360 square miles, encompassing 32 islands. The coast is mountainous with beaches, gulfs and inlets.

Mochima is located between the towns of Puerto La Cruz and Cumana, the first town on the American continent, founded in 1521. Although there is a rich history, this is a modern urban area. It is a large petrochemical port and as such has attracted lots of expatriates who encourage great restaurants and good hotels. The dive boat was less than ten minutes from my hotel door.

Mochima has diving for everyone. There are shallow clear water bays with sandy bottoms and some coral as well as mini-walls. There are some deeper wrecks covered in coral and there are caves that lead to air filled chambers and open water pinnacles packed with fish.

As with other locations, the normal trip begins with a pickup at your hotel and then two dives with lunch. I saw more than 70 species of fish on most of these dives. Nearly every sandy bottom has flying gunnards poking around in the sand.

Mochima, like Los Roques, could be a one week destination. The big difference is that night life replaces the quiet of Los Roques or Los Testigos.

Where ever you choose to go Venezuela offers great diving. It can be a laid back resort vacation or a true adventure trip to unexplored islands. The diving will be great, the people competent and friendly and the price; a bargain.

Los Roques
www.scdr.com Sesto Continente Diving
www.yachts@explorepartners.com Explorer Yachts
Margarita Island
enomisdivers@hotmail.com Enomis Divers
Magdalina Fort 011-58-285-269-2254 Cubagua
Mochima horisub@telcel.net.ve Horisub
Los Testigos www.chartersailing.com Capt. Marcos

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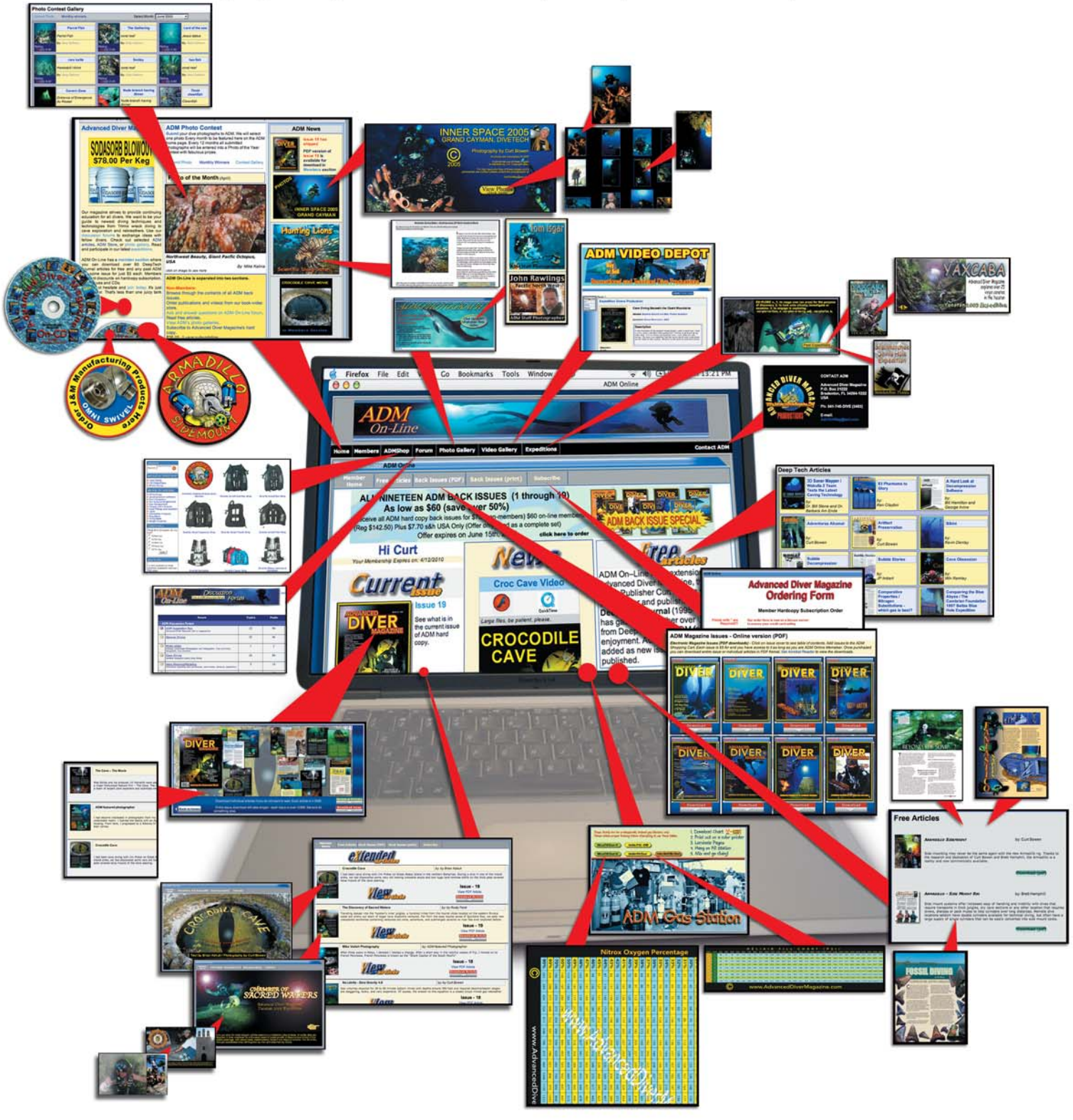

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www.diverite.com

Manta Industries 'Flexi Fun Star'

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www.mantaind.com

The First Scientific Dives at Pulley Ridge

Text by Eric Osking Photography by Rusty Farst

In late February, 2005 I received an email from Jim Culter, a scientist at Mote Marine Laboratory in Sarasota, Florida. Jim is a fellow member of a loosely knit group of trimix divers in southwest Florida known as E.U.G. (Explorers Under the Gulf), and a marine biologist by day. He was looking for volunteers to participate in sampling corals and other organisms at Pulley Ridge during a multi agency research project in June. This unique deep coral reef located far offshore in the Gulf of Mexico had been discovered only six years earlier by geological oceanographers from the University of South Florida (including my major professor during graduate school, Dr. Albert Hine). Scientists get excited by the possibility of new environments. They never know what studies will yield, perhaps a treatment for a previously incurable disease or a better understanding of geologic processes occurring elsewhere. As a diver, the chance to explore an area that is unknown doesn't happen every day. I replied to Jim as fast as my fingers could type "Count me in!"

Technical Divers Assist With Scientific Discoveries

On June 28th, one hundred twenty miles west of Key West, Florida, the 63 foot R.V. ***Tiburon*** pointed her bow into a 20 knot wind and building seas while six trimix divers (four with Scuba gear, two with rebreathers) prepared to be among the first scientific divers to investigate Pulley Ridge. We braced against the swells, fully rigged, in the lee of the stern while the captain maneuvered our vessel to the site we would be exploring. Nauseating exhaust fumes from the boat's twin diesel engines swirled around us as we waited. Baking in the tropical summer sun, our wet suit clad bodies drenched with sweat, I wondered "Why don't they make white wet suits?" Just when I thought I would pass out from heat exhaustion aggravated by dementia the order from the bridge was shouted: Dive! Dive! Dive!

In a few short moments our team of six stepped off the stern and made our way to the sea floor 230 feet below. We trailed a float and line to mark our position. Visibility this far offshore in the gulf is

Photo: Dr. Sylvia Earle explores the reef at 230 feet inside the safety of a submersible

Top left Illustration: Geological location of the Pulley Ridge reef system.

Top middle: Mote Marine's Chief scientist, Jim Culter.

Top right: USF science diver, Dr. James Garey gets hosed down.

Right middle: Dr. Eric Reintsema, physician and cave explorer prepares for a research dive down to the deep reef.

Right lower: Mote Marine diver Dave Wilson

Bottom: Veteran cave explorer and deep diver, Al Barefoot.

usually spectacular, in excess of 100 feet, and we were not disappointed. The bath-warm surface waters gave way to a slight thermocline at 150 feet, cooling us to 78oF. As we approached the sea floor, a current of one and a half knots sailed us over the coral formations we would sample. The bottom was a hazy endless plain of purple and brown plate corals averaging a foot in diameter, a few varieties of small sea fans, and clumps of green leafy algae. No relief of any kind, as flat as a Kansas prairie. Rusty Farst and Jeff Miller shot a video transect across 25 meters of the sea floor while Bret Blackburn and I collected coral and algae samples. Captain Tim Taylor and Doug Rice documented our efforts with digital still photography. After working for 15 minutes we began our ascent and lengthy decompression; drifting under the float as a group at decreasing depths. An hour and fifteen minutes after entering the water we were back on the turbulent surface climbing up the heaving dive platform of the R.V. ***Tiburon.***

Pulley Ridge is what is left of barrier islands that were drowned 130,000 years ago by rising sea level. It is a subtle bottom feature that trends N-S, is over 60 miles long and three miles wide, with depths ranging

from 200fsw to 240fsw. A precursor to the Gulf Stream, the Loop Current, bathes the area with warm nutrient rich water. Of particular interest to scientists is the abundance of flat plate corals growing on the southern portion of Pulley Ridge. These corals have grown laterally rather than vertically to take maximum advantage of the limited light that penetrates these depths. Utilizing only a small fraction of the surface light available to their cousins living in shallower reefs, these corals are much more robust and healthy than other populations of coral: an amazing fact considering that Pulley Ridge is the deepest known coral reef off the continental United States.

This expedition was supported by several scientific agencies including NOAA, the Florida Institute of Oceanography, Ocean Outreach, Mote Marine Lab, the Harte Research Institute, and the University of South Florida. In addition to the R/V ***Tiburon***, the R/V ***Suncoaster*** provided support during our dives. We even had the unique opportunity of diving with noted oceanographer Dr. Sylvia Earle as she surveyed the site in the research submarine ***Deep Worker.*** Based on the enthusiasm that our samples generated among the scientists topside, exploration at Pulley Ridge will yield many new and exciting discoveries.

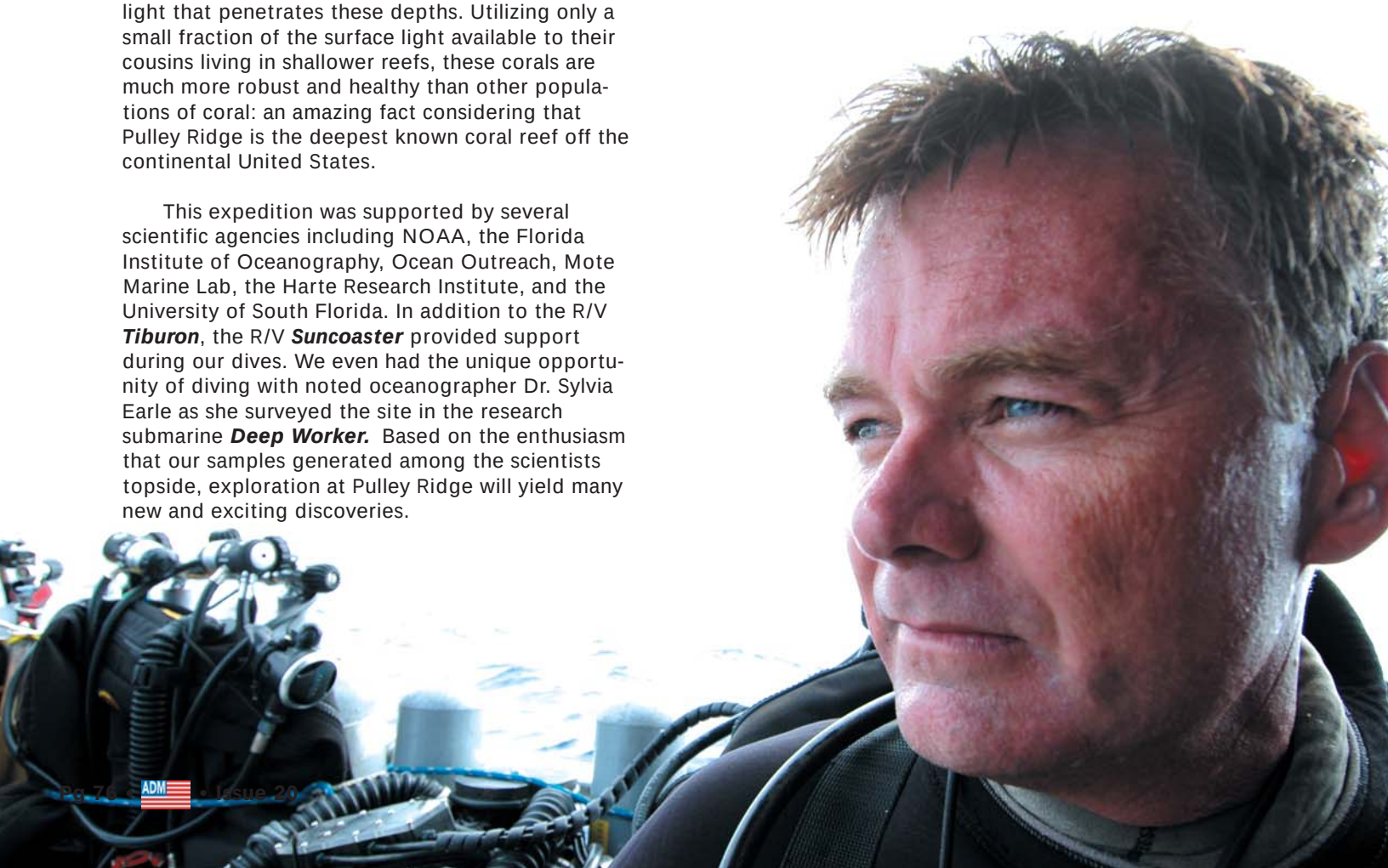
Top left: CCR diver, Doug Rice

Second from left: Staff scientist, Kim Ritchie Ph.D.

Third from left: Florida Keys Marine Santuary director, Bill Causey

Top right: R/V Tiburon and CCR diver, Tim Taylor

Bottom: Deep cave explorer and ADM staff writer, Eric Osking.



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RGBM NITTY GRITTY ISSUES

The RGBM grew from needs of technical divers to more efficiently stage ascents consistent with coarse grain dissolved gas and bubble dynamics, and not just dissolved gas (Haldane) constraints. And the depth, diversity, mix variation, and self consistency of RGBM diving applicability have satisfied that need. And safely.

The RGBM also grew from the needs of the recreational community for a consistent models to address reverse profiles (RPs), short surface intervals (SIs), multiday diving, and altitude excursions. These concerns traditionally fall outside of dissolved gas (only) models, ala Haldane, and require consideration of bubble dynamics.

The RGBM has gained tremendous popularity in the recreational and technical diving worlds in just the past 5 - 7 years, due to meter implementations, Internet software packages, specialized Table releases, technical word of mouth, NAUI training testing and adoption, Internet traffic, chamber tests, and, most of all, actual technical and recreational RGBM diving and validation. And the reasons are fairly clear. Recovering dissolved gas algorithms for short exposure times, phase models link to bubble mechanics and critical volume trigger points. The RGBM suppor ts the efficacy of recently suggested safe diving practices, by simple virtue of dual phase mechanics:

These practices include:

- Reduced nonstop time limits
- Safety stops (or shallow swimming ascents) in the 10-20 fsw zone
- Ascent rates not exceeding 30 fsw/min
- Restricted repetitive exposures, particularly beyond 100 fsw
- Restricted reverse profile and deep spike diving
- Restricted multiday activity
- smooth coalescence of bounce and saturation limit points
- consistent diving protocols for altitude
- deep stops for decompression, extended range, and mixed gas diving with overall shorter decompression times, particularly for the shallow zone
- use of helium rich mixtures for technical diving, with shallower isobaric switches to nitrox than suggested by Haldane strategies
- use of pure oxygen in the shallow zone to eliminate both dissolved and bubble inert gases.

Bubble models tend to be consistent with tec and rec measures developed ad hoc style, having useful signatures for diving applications across the full spectrum of activities. Or , said another way, bubble models appear more powerful, more correct, and more inclu

sive. In terms of RGBM implementations, the mechanistics of dissolved gas buildup and elimination, inert gas diffusion across bubble interfaces, bubble excitation and elimination persistence time scales of minutes to hours from tissue friction, lipid and aqueous surfactant material properties, and Boyle expansion and contraction under ambient pressure change, are sufficient to address all of the above considerations.

RGBM IMPLEMENTATIONS

So Suunto, Mares, Dacor, Zeagle, Hydrospace, Plexus, Steam Machines, Abysmal Diving (ABYSS), Gas Absorption Program (GAP), and others unnamed herein, developed and released (are releasing) products incorporating the validated and tested RGBM phase algorithm. With an iterative approach to ascents, the RGBM employs separated phase volumes as limit points, instead of the usual Haldane (maximum) critical tensions across tissue compartments. The model is tested and inclusive (altitude, repetitive, mixed gas, decompression, saturation, nonstop exposures), treating both dissolved and free gas phase buildup and elimination. NAUI Technical Diving employs the RGBM to schedule nonstop and decompression training protocols on trimix, helitrox, air, and nitrox, and released an exhaustive set of RGBM tables for those mixes (some 500 pages of tables). Included ar e constant ppO2 tables for rebreathers. ANDI uses GAP RGBM as their of ficial training algorithm. NAUI also released sets of RGBM no-group, no-calc, no-fuss recreational tables for air and nitrox, sea level to 10,000 feet elevation (9 plastic Tables).

- Suunto VYTEC/VYPER/COBRA/STINGER are RGBM meters for recreational diving (plus nitrox) .Suunto extended their recreational RGBM algorithm for deep stops in their new D9 tec/rec computer.
- The HydroSpace EXPLORER is a mixed gas decompression meter for technical and recreational diving, as are the ABYSS and GAP software vehicles. The EXPLORER is the first ever full RGBM computer for all diving. Hydrospace also provides an RGBM Simulator as a software package with the EXPLORER.
- The Dacor DARWIN is an integrated RGBM air and nitrox console for diving, and uses the very same basic recreational RGBM algorithm as Mares.
- The Mares M1 and NEMO computers are recreational RGBM air and nitrox computers with deep stops for light and near deco diving.
- Zeagle will be introducing a full RGBM computer (like the EXPLORER) for mixed gas technical and recreational diving.
- Steam Machines is developing an integrated RGBM computer module for their PRISM family of closed circuit (CCR) rebreathers.
- ABYSS, GAP, and Hydrospace Simulator are full up RGBM software packages with application to all diving, air to mixed gases, sea level to altitude, decompression to nonstop, and single to repetitive.

All are first-time-ever commercial products with realistic implementation of a diving phase algorithm across a wide spectrum of exposure extremes. And all accommodate user knobs for aggr essive to conservative diving. Expect RGBM algorithms to surface in other meters and software packages on the Internet. Count on it.

The C & C Team employs the RGBM (last 13 years). Military, commercial, and scientific sectors are using and further testing the RGBM. And scores of technical divers are reporting their RGBM profiles over

the Internet and in technical diving publications. There are presently other major RGBM implementation projects in the works for meters and software packages.

The USN is factoring information from RGBM into deep stop man trials at NEDU in Panama City, for air and/or nitrox exposures in the 150+ fsw range. Such testing is monumental for the USN to say the least.

The site RGBMdiving.com hosts information on all aspects of RGBM. plus offers premixed and custom tables for technical and recreational diving. Check it out. A number of monographs on the RGBM have been also released by Best Publishing Company for the more fastidious reader.

RGBM PROFILE DATA BANK

Divers using RGBM are reporting their profiles to a Data Bank, located at NAUI Technical Diving Operations (also LANL). The infor mation requested is simple:

- bottom mix, depth, and time (square wave equivalent)
- ascent and descent rates
- stage and decompression mixes, depths, and times
- surface intervals
- time to fly
- diver age, weight, and sex
- outcome (health problems).

This information aids in further validation and extension of model application space. Appr oximately 2,300 profiles now reside in the RGBM Data Bank. These pr ofiles come from the technical diving community mostly, essentially mixed gas, extended range, decompression, and extreme diving. Pr ofiles from the recreational community are not included, unless they are involve extreme exposures on air or nitrox (many repetitive dives, deeper than 150 fsw, altitude exposures, etc). Approximately 20 DCS profiles reside in the RGBM Data Bank, mainly within repetitive deco diving on nitrox, and reverse profiles.

NAUI Tec Instructors are a special class of users/testers, and have been over the past 5 - 7 years or so. They ar e largely responsible for the success and release of NAUI RGBM Tables. The T able below collates diving activities by NAUI Tec for respondents to an RGBM Survey. At pr ess time, some 10 - 15 % of NAUI Tec provided statistics. More information is gathering, and will contribute to final detailed statistical and risk analysis. Expect a longer r eport with names of contributors in the not too distant future.

NAUI Technical Diving RGBM Depth-Usage Tally

Depth Range	Total Dives
0 -100 fsw	8,166
100 - 200 fsw	6,128
200 - 300 fsw	1,136
300 - 400 fsw	441
400 - 500 fsw	31
500+ fsw	3

Tallies above include OC and RB dives, for both instructors and students.

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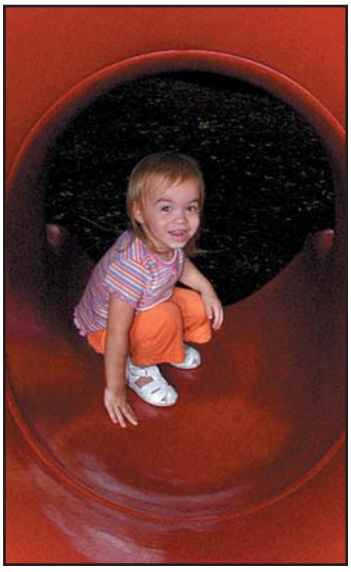

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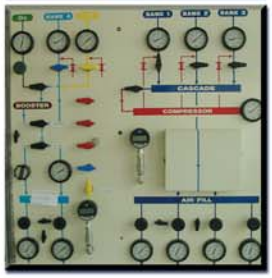

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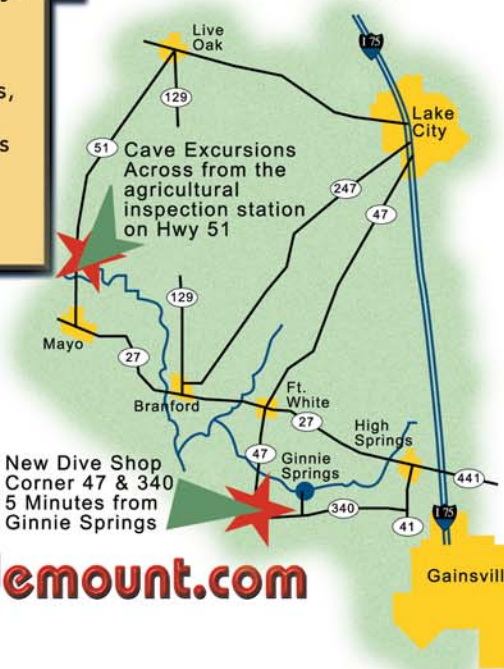

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