

ADVANCED DIVER MAGAZINE

A diver in full gear is visible in the upper right corner of the cover, swimming against a blue background.

ISSUE 27

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- Vodka on the Rocks - New Zealand
- Exploring Ojamo Mine - Finland
- Douglas Ebersole
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- Tech Week - Grand Cayman
- The Nakwakto Rapids - Canada
- Hammerhead CCR
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- Ice Diving 101
- BENT! - Patent Foramen Ovale
- Alaska's Wreck of the State of California
- San Andres Island - Columbia SA



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KISS Rebreather Scrubber Duration Study

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Jetsam Technologies has opted to release all its scrubber duration data, including testing methodology, via paid media. At Jetsam Technologies, we believe it is important for divers to have as much information as possible.

Testing was done at ANSTI Test Systems who are based in the United Kingdom. This independent testing agency, utilizing established, strict scientific standards tested both the Classic KISS and the Sport KISS rebreathers. **The criterion below utilizes a constant rate of CO₂ which is well beyond what any human could produce, for the duration of time listed below.** These tests were conducted in accordance with the EN14143 European CE Standard and utilized Sofnolime 797 grade.

Data for the Classic KISS				
Depth (meters)	Temperature (degrees C)	CO ₂ Generation (litres)	Breathing Rate (litres / min)	Duration (min) 5 mbar CO ₂ Point
40m	4 degrees C	1.6 litres	40 litre/min	157 min - 5 mbar CO ₂



Data for the Sport KISS (several sets of data were studied, with positive results)				
Depth (meters)	Temperature (degrees C)	CO ₂ Generation (litres)	Breathing Rate (litres / min)	Duration (min) 5 mbar CO ₂ Point
40m	4 degrees C	1.6 litres	40 litre/min	65 min - 5 mbar CO ₂
18m	4 degrees C	1.6 litres	40 litre/min	87 min - 5 mbar CO ₂
18m	12 degrees C	1.6 litres	40 litre/min	116 min - 5 mbar CO ₂

When comparing this data with information provided by other rebreather manufacturers, it is important to ensure you are comparing "apples to apples." It is vital that the durations are based on the same depth, temperature, CO₂ generation and breathing rate.

Why is Jetsam doing this? Because we believe all divers should have as much information as possible to ensure their safety. For more detailed information, we invite you to visit www.jetsam.ca.

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Written by Jim Rozzi and Patrick Wiget
Photography by Jim Rozzi, Patrick Wiget, and Jennifer Creel



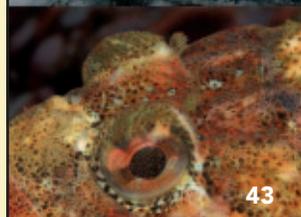
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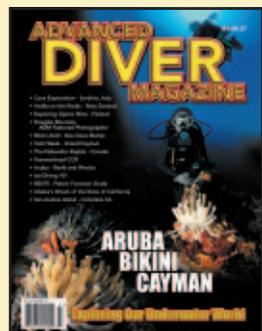
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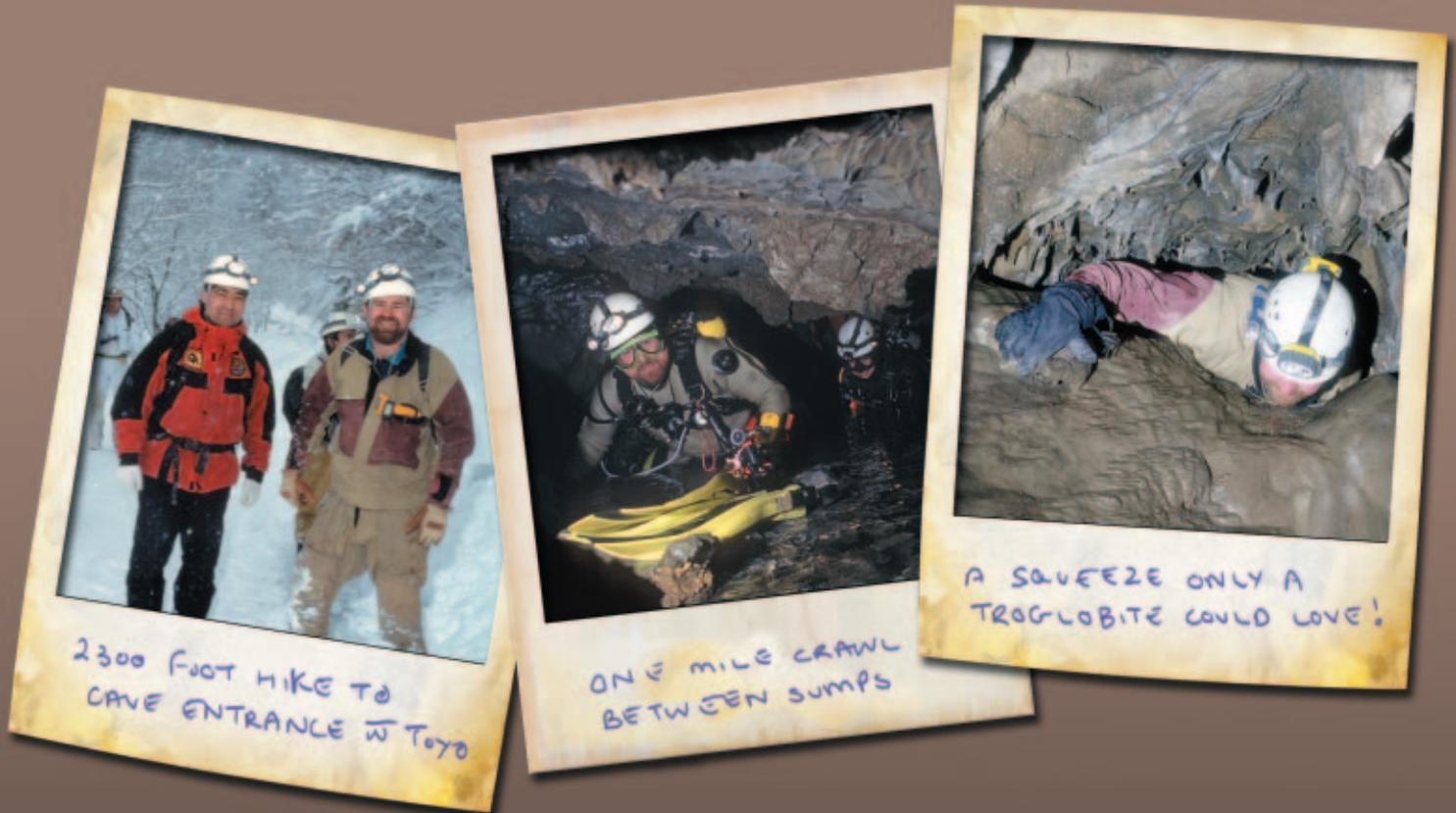


Cover Issue 27

CCR KISS instructor
Doug Ebersole hovers
above open water
instructor Brigitte
Achterberg, posing for a
shot with anemones.

Photo by Curt Bowen

Where does your dive equipment take you?



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Publisher's Notes

It's hard to believe that another year of diving has almost finished. It has been an exceptional year of discovery, new world connections, and advances in dive equipment technology.

In 2007, the ADM teams have explored many different locations, ranging from Mexico to Sardinia, Alaska, Russia, and Columbia...just to mention a few. The stories of these adventures, and more, are brought to life by the staff and guest writers / photojournalists of ADM. They share their own great enthusiasm for diving that is at the heart of ADM, while at the same time giving us helpful information, exciting tales, and maybe a new way to try a thing or two.

I find myself once again sitting in a foreign airport after several days of searching and photographing new underwater discoveries for upcoming editorials. Yes, I consider myself fortunate to have opportunities to dive and explore that many others do not have. It is always nice to get away to explore and enjoy the beauty of the planet, but it is also always nice to return home to family and friends.

2008 is just around the corner, bringing with it a multitude of upcoming ADM expeditions, including Mexico's Yucatan, the mountains of Guatemala, Dominican Republic deserts, and...maybe...Curacao's unexplored deep wrecks and walls?

ADM continues to strive to be in the forefront of exploration. It is our goal to bring you, our reader, outstanding editorials containing only the finest images, superior illustrations, and the latest in discoveries.

Be Safe and Dive Hard!

Curt Bowen
Publisher ADM

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Co-Publisher..... **Linda Bowen**

Copy Editor..... Victoria Leigh
Chief Staff Writer..... John Rawlings
Chief Photojournalist Jeff Toorish
Web Master..... Jakub Rehacek
School Master..... Savannah Bowen

ADM Staff Writers & Photographers

Mel Clark • Erik Foreman
Richard Harris • Jill Heinerth
Tom Isgar • Cass Lawson
Jim Rozzi • Tamara Thomsen

Contributing Writers / Photographers

Keith Ambrose Thaddius Bedford Leigh Bishop
Kevin Denlay Joseph Dovala Brett Hemphill
Dr. Thomas Illiffe Brian Kakuk Wes Skiles
Dr. Bruce Wienke

Editorial Contributors & Assistants

Ali Akers • Jim Akroyd • Jack & Karen Bowen
Rich & Doris Chupak • Jennifer Creel • John DeBoeck
Janine Dovala • Douglas Ebersole • Fredrik Ekroos
John Falcone • Veronique Gysin • Kevin Juergensen
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Curt McNamee • Pete Mesley • Dave Mitchell • Kim Smith
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Mike Stevens • Sten Stockmann • Joe Tezak
Patrick Tschanz • Charlie Tulip • Mikko Vormala
Thorsten Waelde • Anne Kazel-Wilcox
Jerry Whatley • Patrick Wiget

Contact Information:

Write..... Advanced Diver Magazine
327 Snapdragon Loop
Bradenton, FL 34212 USA
Phone..... 941-748-3483 (DIVE)
E-Mail..... AdvDvrMag@aol.com
C.Bowen..... Eanx@aol.com

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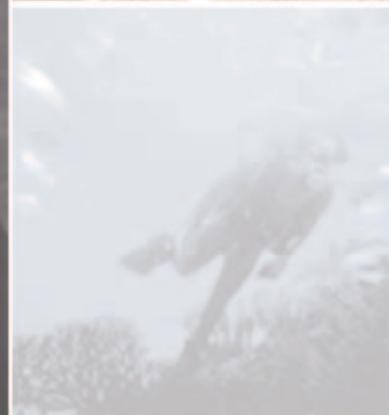
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A diver in a red jacket and black gear is operating a reel in a cave. The diver is wearing a black cap, a black mask, and a red jacket. The background is dark and rocky.

CAVE EXPLORATION SARDINIA, ITALY

Written by Jim Rozzi and Patrick Wiget
Photography by Jim Rozzi, Patrick Wiget, and Jennifer Creel
Scientific Exploration by Professor Thomas Iliffe, Ph.D

Many of you may have seen the article on Sardinia wreck diving in the last issue of Advanced Diver Magazine which featured WWII wrecks, *KT 12* and the *Nasello*. These war casualties lie in the Mediterranean waters adjacent to numerous caves near Cala Gonone, Sardinia. Our ADM team of Professor Tom Iliffe, Jennifer Creel, and Jim Rozzi were on reconnaissance assignment in Sardinia, Italy, to dive, photograph, and explore the many caves in the area. The dive team was hosted by Patrick Wiget and Thorsten Waelde of Protec Technical Dive Facility in Cala Gonone.

As I reviewed my notes and photographs for this second article in the series, my mind kept returning to the many wonderful scenes of this trip to Sardinia: Our welcoming committee, a herd of goats, complete with tinkling bells, was scattered along the winding mountainous road that descended to our destination of Cala Gonone. The fresh, salt sea air invigorated my memories. I remembered the shimmering crystal blue waters of the Mediterranean with the limestone cliffs rising from the sea to tower several hundred feet above the water's surface, and the numerous cave openings that pierced sheer walls of limestone. Wonderful aromas of the seaside barbecue prepared by our hosts returned to fill my nostrils, and my taste buds came alive with the memory of delicious pastas, roast pork, and fresh seafood.

Above: Patrick Wiget runs a primary reel as he enters Dragon Belly Cave.

But not to be forgotten were the caves....



Right: Scientific diver, Professor Tom Iliffe, studies Helectite formations that seem to grow in defiance of gravity.

Recalling the unbelievable beauty of Dragon Belly and how the cave revealed its secrets to us for the first time, I saw again the large stalactite centered and suspended above the sump entry, appearing as the menacing spear of a gladiator guarding the entrance to a room of treasures. Memories flooded my mind of hundreds of beautifully, fragile helectites growing out of the cave ceiling, seeming to defy gravity as they twisted, turned, and corkscrewed in all directions. The eyes and countenances of my fellow divers reflected their awe. What a beautiful secret cave! Dragon Belly, one among many that we dove, is truly the creation of some great master sculptor.

Perhaps you will join me as I revisit the memories of this mysterious and enchanting land.

But first, a little bit about Sardinia...

And maybe a taste of beer...Ichnusa, now a Heineken subsidiary, is the local beer. The name is said to derive from the general outline of Sardinia, which resembles a footprint in the sand. Ichnusa, from the language of the ancients, means footprint. The island, which lies just south of Corsica and west of Rome, is the second largest in the western Mediterranean. Sicily is larger in square miles but has less coastline. This island boasts numerous miles of beautiful sandy beaches. As it is very close to Italy, Corsica, Southern France, and North Africa, Sardinia has developed into a major tourist destination, especially during the hot summer

months of July and August. Mountainous areas great for biking, trekking, and rock climbing abound on the east and west coasts.

Sardinia's center was once submerged, and consists of limestone, marls, and sandstones. The island is a mountainous region with the highest point being Monti del Gennargentu at 5,960 ft. Populated since the sixth millennium BC, Sardinia was conquered by the Romans in 238 BC. It is an ancient land influenced by Phoenician, Carthaginian, and Roman cultures. Fertile soils were historically utilized to support agriculture and pasture. Mining of copper, silver, lead, cassiterite, and iron also occurred. Today the island is dotted with many vineyards and pastures. An occasional marble or granite quarry appears in the hillside. Since the 1950's, tourism has become the main economic engine. The magnificent beaches attract thousands of visitors per year. Dorgali, a municipality near Cala Gonone, draws an estimated 100,000 persons per year to enjoy the sights of the 29,000 ft cave, Ispinigole, and 52,000 ft cave, Bue Marino.

Once in Europe, Sardinia is easy to reach as three airports service the island with locations at Alghero, Olbia, and Cagliari. Of great interest and importance to our ADM team was the extensive concentration of karstic phenomenon in Sardinia. Many of the multitudinous dry caves are tourist attractions; however, we were lured by the promise of diving and exploring the beautiful caves along the coastline of Cala Gonone. We were not disappointed. Each of the caves had a distinct personality and appeal.



A twenty-five minute boat ride from Cala Gonone Marina will take the diver along miles of white sandy beach abutted by limestone cliffs filled with caves. On this course, the boat will approach a large irregularly shaped block of limestone that juts out of the sea and is surrounded on three sides by water. Near this landmark are several caves. While we prepared to dive, we observed rock climbers many feet above our boat who were clinging to the cracks and crevices of the sheer limestone face, making their way to the summit.

Dragon Belly

Located near the cliff, about twenty feet below the water's surface, is a small hole in the limestone about three feet in diameter. In 2005, Patrick Wiget, one of our hosts with Protec Sardinia, discovered this entrance that leads at a depth of twenty feet for a distance of approximately ninety feet to a small chimney opening to a dry cave. We ditched our dive gear, and left it tied off in the water below a large stalactite hanging over the water-filled opening. A four-foot climb brought us to the dry cave area where we began crawling through the cave passage. The floor of the cave was slippery with several inches of red mud that filled the cave floor. Soon we

were covered head to toe with the mud as we slithered our way to water-filled sections of the cave. Along the way, we stopped to admire the many formations of stalactites and helectites.

It was my first experience with helectites, which seem to defy gravity as they grow in a myriad of directions without regard to the downward gravitational pull of the earth. Twisting and turning in several directions, the tiny, fine, glass-like crystals decorated the cave ceiling in several locations. After gazing in awe at the cave decorations, we made our way to the last known water-filled section of the cave. The area quickly silted out to zero visibility. Our conclusion was to return with side-mount gear and smaller tanks to continue the exploration.

We returned to the exit, slid down to the water, and donned our gear. The mud washed off our wetsuits, bringing the water in the exit to zero visibility. Touch contact was required. Dragon Belly was well worth the effort to see the hidden beauty, an unforgettable experience.



Top Photo: All cave entrances were reached by dinghy, just a few minutes by boat from Cala Gonone Marina.

Left Photo: Protec divers entering Cala Luna cave from its sea entrance.



Top Photo: Bel Torrente is highly decorated with many interesting formations in the cavern zone.

Our ADM team continued to be enthralled by the Sardinian cave diving experience. The following are brief summaries of other caves in the immediate area off Cala Gonone.

Grotta del Fico

This cave, named after the fig tree that once grew over the entrance about forty-five feet above sea level, is dry, highly decorated, and has water-filled passages. It is accessible by cavern diving from the sea. There are unexplored passages in this cave. In the daylight area of the cavern, the diver will find small langoustine lobsters waiting to mature before venturing into the open sea. Both divers and non-divers may enjoy this cave.

Bel Torrente

Open from the sea, this karst system is filled with both fresh and saltwater, the amount of each regulated by rainfall, sea state, and tidal movement. The cavern zone generally has lowered visibility caused by decaying organic matter. The first section of the cave has stones polished by the water's movement that are scattered about the floor of the cave. Main passages may be dived by scooter and back-mount. Others require side-mount or no mount for further penetration. There appears to be

unexplored passage in this cave. The cave has a large air zone which leads from the sea entrance back to a highly decorated area. Guides routinely escort open water divers to this area to view the abundant formations.

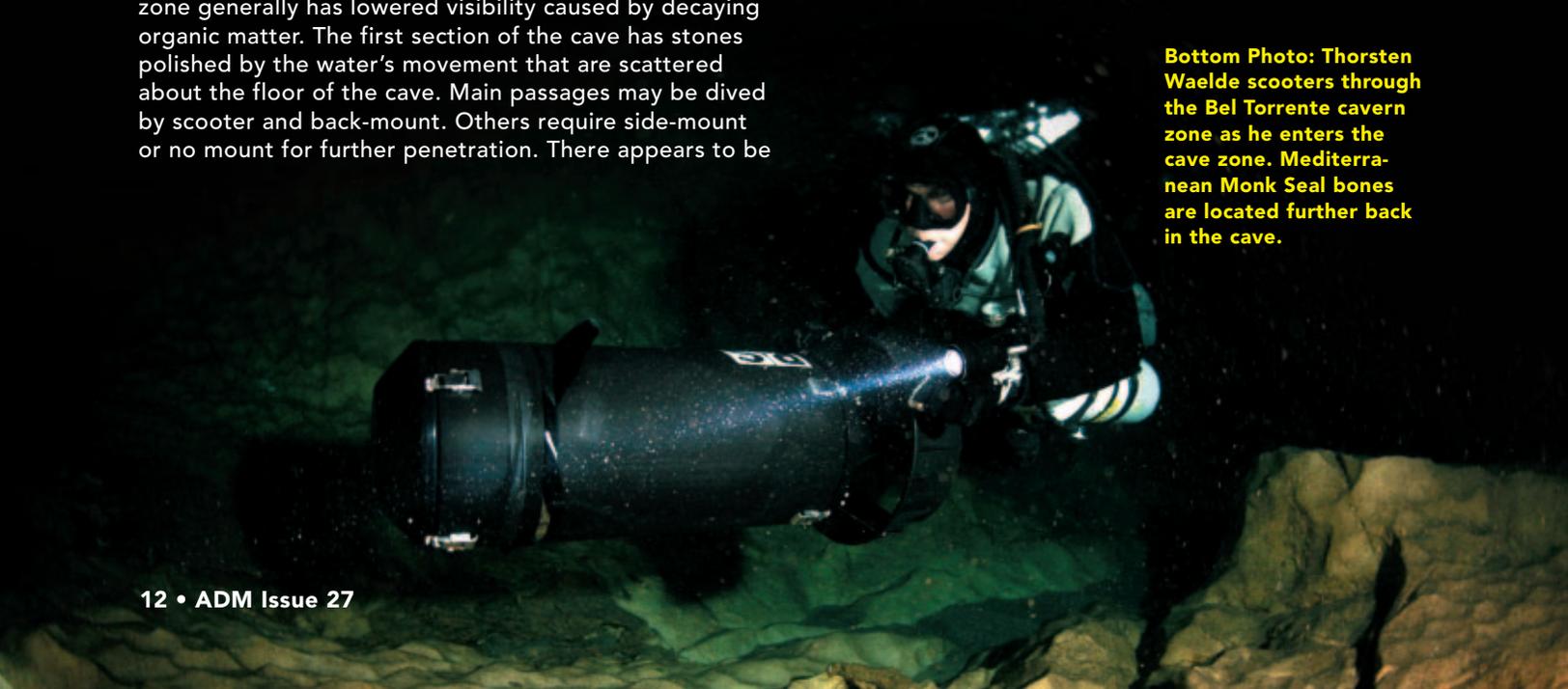
Cala Luna

This cave is entered from the sea, and has clusters of speleothems scattered about within the cave. The dive leads into a small passage through solid rock. Walls near the entrance are covered with mussels. The side passages are easily silted, and reduced visibility should be expected.

Smerelda

The entrance to this highly decorated cave is large enough to permit entry by boat. Boat tours from nearby Cala Gonone are run daily to this location. During our surface interval between cave dives, we took time to visit this scenic grotto, and to swim in the cavern waters.

Bottom Photo: Thorsten Waelde scooters through the Bel Torrente cavern zone as he enters the cave zone. Mediterranean Monk Seal bones are located further back in the cave.





Top Photo: ADM/Protec Sardinia dive team: Bruno Spagnuolo, Jennifer Creel, Patrick Wiget, Veronique (Vero) Gysin, Professor Tom Illiffe, Patrick Tschanz, Thorsten(Toddy) Waelde.

Bottom photo: Cave diver (Patrick Wiget) passing through the Bel Torrente restriction.

Just as departure date approached, we learned about Utopia with its possibility of deep exploration and penetration. This cave bottom is in excess of 300 feet, and appears to be unexplored in areas. Unfortunately, our time ran out and we were unable to explore further. We sadly bade farewell to our Protec hosts, but were heartened by our plans to return.

About the Authors

World explorer and photographer, Jim Rozzi, shares his view of our world through the camera lens. He resides in Naples, Florida, with his wife, Suzy, and may be contacted by e-mail to JimRozzi@AOL.com

Patrick Wiget, co-owner of Protec Sardinia, grew up in the dive industry, and has been diving since childhood. He is an IANTD Instructor Trainer and is a full cave and trimix diver. He is fluent in German, Spanish, Italian, and English. He may be reached at www.protecsardinia.com.



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Vodka on the Rocks

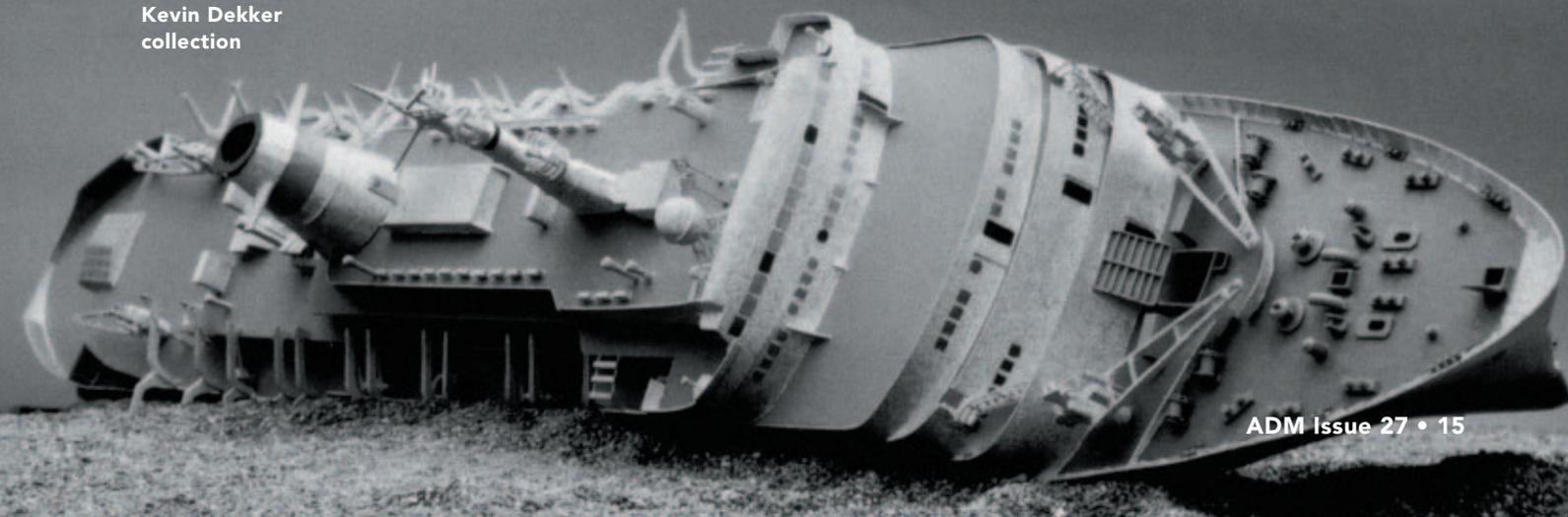
Text and Photography by Leigh Bishop

*In February of 1986 a harbour pilot made a fatal and unexplainable error that took the Russian passenger liner **Mikhail Lermontov** to the seabed. The events that unfolded became the makings of a classic modern day shipwreck story, a story of intrigue, espionage, conspiracy, and speculation. Leigh Bishop travelled to New Zealand to photograph the wreck, only to discover some hair-raising moments deep inside the wreck.*

Pete Mesley is a well-known technical diver in the southern hemisphere; he knows the Soviet wreck *Mikhail Lermontov* better than anyone. I'm hoping that's very much the case because right now I'm deep inside the wreck, my life is held in his hands, and I have no idea which way is out. I can just make out Pete's rebreather in front of me, and I'm desperate not to lose sight of him in the silt clouds that are rapidly destroying the visibility.

For this dive, we will make an internal traverse from the indoor swimming pool at the stern of the wreck through several complicated passageways that the crew once used. Past duty free, we make our way up through the wreck to the library, and exit aft of the cinema projection room. Pete calls this the "dolls run" as part of his tour includes a

Images courtesy
from the
Kevin Dekker
collection





storeroom full of children's dolls so buoyant they are pinned to a wall that has now become the ceiling. As Pete stops inside a rather less spacious passageway, he directs me up and through the now zero visibility roof above. As I feel my way up into the ceiling, I can feel switch boxes and cables hanging loose around me. Adjusting my buoyancy, I rise some 10ft (3m) and squeeze my way through an opening where the visibility clears. Above, my torch lights up dozens of eerie looking Russian dolls.

The local Kiwi divers who regularly dive the *Mikhail Lermontov* are against using penetration lines, the theory being that they could get tangled in them. Instead, they use their own navigation skills, having pieced together the wreck in their own minds.

This dive has to count as one of the most nerve-racking I have ever made. I'm deep inside a huge wreck with rapidly deteriorating visibility, hoping that my guide does actually know what he claims to know. The way out! The dolls have an evil look in their eyes; some have no arms or legs. As I feel the hair rise on my back, I begin to think this is not the place I want to hang around. Squeezing back through the hole below me, I drop down to where I am relieved Pete is still waiting. As we swim along the tight passageway, the visibility opens up and my heart slows a pace. Above us is a clock, frozen in time, with its Roman numerals clear. As the walls disappear, Pete indicates we are now in the open passage that leads deep down into the duty free area.

Duty free was located on the starboard side of the wreck, which is now the deepest point with hundreds of tons of Russian liner above it. As we swim into shallower depths, I am relieved that Pete has not chosen to take me deeper to go vodka shopping in duty free. Instead, we pass through the library and into the entrance to the cinema; where, for the first

time in the last 45 minutes, I can see natural light penetrating through the windows that are now above me. We spend another hour or so inspecting private cabins on the port side of the wreck as well as having a look into the cinema, Bolshoi Lounge, and the wheelhouse.

This was really my first experience of serious wreck penetration; but, as the week went on, I began to discover that the *Lermontov* is not just about hair-raising dives, but offers a variety of areas to investigate for all levels of qualified divers.

The *Mikhail Lermontov* was named after a famous Russian poet, and described when launched as 20,000 tons of gleaming white elegance. The *Lermontov* was one of the bigger vessels to visit the South Island of New Zealand as part of a cruise during February of 1986. She had left Sydney and arrived in Wellington before making her way along Tory Channel to Picton. From here, the Picton harbour pilot would take charge on the bridge and, in theory, see the Russian ship safely through the islands before heading out to sea.

On board, the 330 predominantly Russian crewmembers entertained over 400 passengers, mainly from Australia. At the time, the United States and the USSR were still engaged in the Cold War, so the presence of the Russians was quite something for the New Zealanders. 1986 was a year of disaster for both the Americans and the Russians, with news headlines such as the explosions of the Space Shuttle *Challenger* and the Chernobyl nuclear power station. This would also be the year when the Russians would lose one of their cruise ships to an error of events that was unheard of in the annals of maritime history.

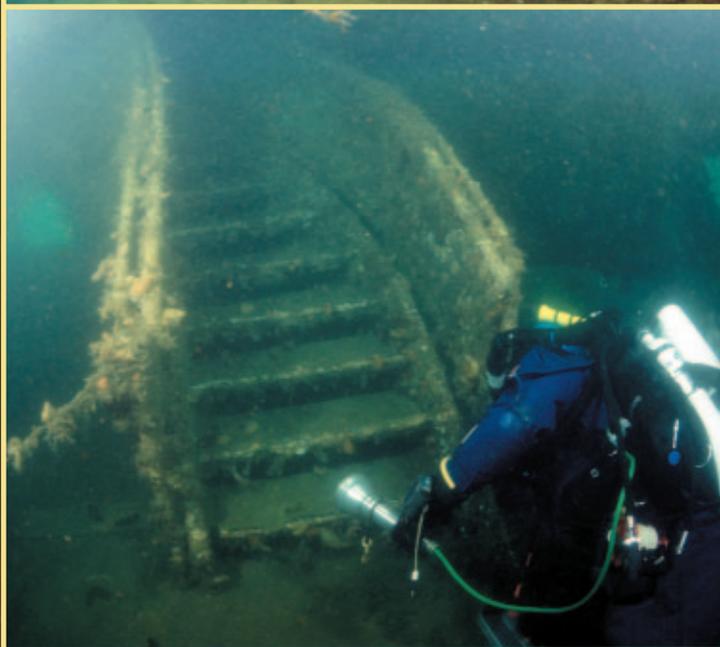
On the 16th of February, Captain Vladislav Vorobyev welcomed Picton harbour pilot Don Jamison aboard the *Lermontov*. Jamison was a man who knew the waters better than anyone, a trusted man and a man of experience. Jamison took the *Lermontov* along Queen Charlotte Sound, and was adamant that he was going to give the passengers value for money by showing them the sights, such as where Captain Cook first landed when he first discovered New Zealand in 1773. This all made Captain Vorobyev very nervous as on a number of occasions Jamison was told he had taken the vessel

Left Page: Haunting Russian dolls buoyantly pinned to the ceiling of a storeroom deep inside the wreck.

Top Right: The bar and stools inside the Bolshoi lounge on the forward section of the wreck.

Middle Right: A spiral staircase leading to the upper deck level of the Bolshoi lounge

Bottom Right: Inside the ships cinema where films like *Beverly Hills cop* screened as the ship was sinking.





far too close to land. Jamison declared that he knew the waters and everything was okay, although Vorobyev insisted that Jamison keep his ship further from shore. As the Soviet ship drew close to the Cape Jackson lighthouse, the watch crew had changed hands and none of the new helmsmen and navigators were aware of earlier near misses. At 5:21 p.m., Jamison made the first of three incremental course changes to port that would send the ship onto the rocks at Cape Jackson. At 5:34, the ship was rapidly approaching the lighthouse, and Jamison made a sudden spur of the moment decision and ordered a further turn to port, committing the ship to a course through the Cape Jackson passage rather than to starboard and clear of the dangerous reef. A decision that has never ever been explained to this day! The Soviet vessel struck the reef causing the ship to take on so much water that she sank a number of hours later.

The ship sank in a depth of only 109ft (33m) in nearby Port Gore, a remote bay surrounded by picturesque mountains; visiting divers will reach the top of the wreck at only 43ft (13m) below the surface. The wreck is permanently marked by three buoys identifying the stern, bow, and amidships sections.

Our team pulled into Port Gore and moored over the site for three days, the only other visitors we had were from a local university dive club who launched their own RIB each day. Our small live-aboard did the job, and the crew cooked fabulous blue cod, which they caught on a daily basis. Most *Lermontov* expeditions are conducted from live-aboard vessels due to the remoteness of the wreck's location, and begin from either Wellington or Picton.

The *Mikhail Lermontov* has to be in the top five wrecks I've ever dived. The wreck is fabulous and has much to offer. Lying on her starboard side and in such a shallow depth, two or three dives a day are the norm. With the rebreathers, we were conducting two-hour dives on the wreck with NO decompression.



Much of the port side of the wreck invites shallow penetrations that give access to areas such as the Bolshoi Lounge and other bar areas. Even today, the décor of 1980's Russian thinking can still be seen. Spiral staircases can be followed to deck levels above the discotheque, and bars remain with their stools still firmly in position. It makes a refreshing change to dive a wreck and identify almost everything you see. The bridge is an excellent dive in itself, and a doorway at the star-board side close to the seabed offers access all the way through the entire wheelhouse. It's in here that an array of all instrumentation can be seen as well as gaining access to the navigation room and officers' accommodation.

Left Page Top: New Zealand based Technical diver Peter Mesley who leads expeditions to the Lermontov.

Left Page Bottom: Pete Mesley swims through the covered promenade deck with private cabins exposed below him.

Left Backdrop: Cans of fosters beer fallen from a bar located aft of the ships swimming pool.

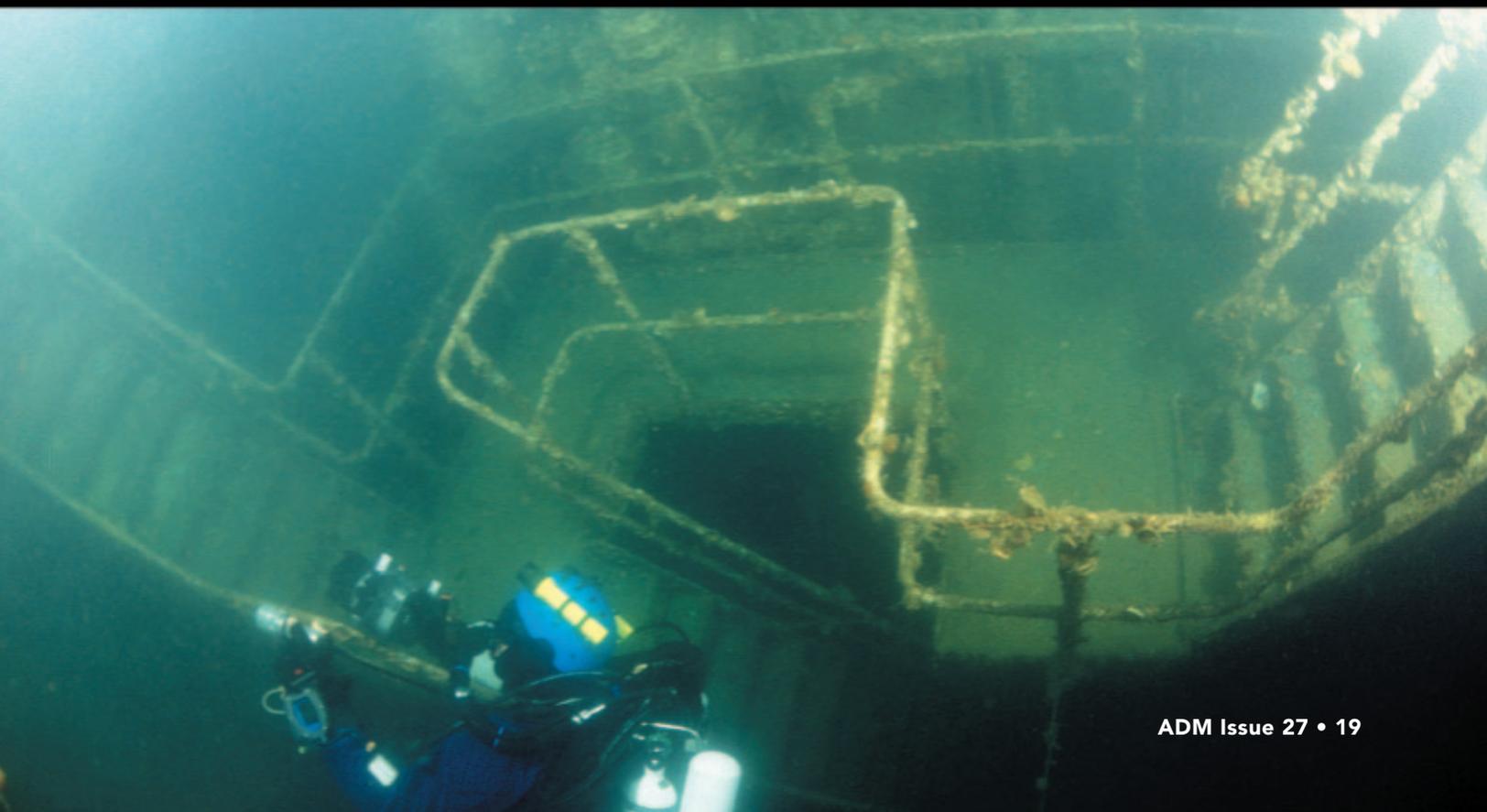
Below: Diver drops down past engineers gantry ways deep inside the Lemontov's vast engine room.

I swam through the cinema with its 80's style seats tightly packed next to one another. The last films that embraced the screen here in the week leading up to her sinking were "Beverly Hills Cop" and "Gremlins"! On the stern, I swam through the indoor swimming pool before dropping into the vast expanse of the engine room. This area is so vast that even the local divers dare not enter without a guideline!

We often came across bottles of vodka that had fallen from optic stands in areas like the Neptune Bar and Atlantic Deck; and, in stores behind the bars, stacks of cans of Fosters can be seen. Following the ship's plans, divers can tour around duty free, take a look into the barber's shop, swim the winter garden, and drop into the Nevsky Bar. For the die-hard diver, the real challenge is a penetration into the depths of the Leningrad Lounge. Some divers often return with a gold-leaf dish displaying the shipping line emblem. Maybe a cave diving course would be recommended before attempting this!

The *Lermontov* story has been the subject of several books. Though it is a story too deep to cover here, Jamison was never prosecuted in the aftermath, and, amazingly, his best friend was appointed to head the inquiry. Many questions were asked, complete with much Russian conspiracy surrounding the story. Today the files are still locked away in the national archives, and Jamison has never spoken a word about it since the inquiry!

More photos can be seen on the author's website www.deepimage.co.uk



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EXPLORING OJAMO MINE FINLAND

Text and photography by Sten Stockmann

My tanks scrape the ceiling, and my chest is pressed to the white limestone floor as I squeeze through the restriction with my scooter in front of me. Putting my heels to the ceiling, I push myself the last bit through the restriction and emerge just below the roof in an enormous hall. The water is crystal clear, and visibility is more than the 30m/100ft that my HID can illuminate. My buddy emerges from the restriction engulfed in a white cloud, and we hit the scooter trigger and start gliding over the apparently floorless room. But this is no natural cave – we are deep inside a complex man-made system of tunnels and halls called Ojamo Mine. With over 270m/810ft depth and with tens of kilometers of tunnels and passageways at various levels, this surely must be one of the premier diving spots in Northern Europe. At least, it has quickly become the Mecca of the small but rapidly growing Finnish technical diving community.

The history of the Ojamo Mine goes back to 1542 when King Gustav Wasa gave his gracious approval for the use of the iron ore found in the village of Ojamo. In those days, the method of mining consisted of burning wood to heat up the rock, then rapidly cooling it by applying water. The rock would crack, and could be removed more easily using pickaxes and crowbars. Explosives were not used before the end of the 16th century. The Ojamo Iron Mine was in use until 1850 when it was abandoned due to the lack of good enough ore.

Although the iron mine was abandoned, mining work in Ojamo did not stop. A large area of limestone was discovered, and a new quarry was opened in 1924. The mining work started with the building of a 7km/4mi railway needed to transport the stone to a nearby lime factory. The excellent quality limestone in Ojamo Mine was found to run in two separate veins in the ground.

Due to the immense size and extreme depths of over 270m / 800 feet deep, Ojamo Mine is full of small service tunnels and ventilation shafts. A team diver uses one of these smaller tunnels as a short cut between the much larger mining chambers.



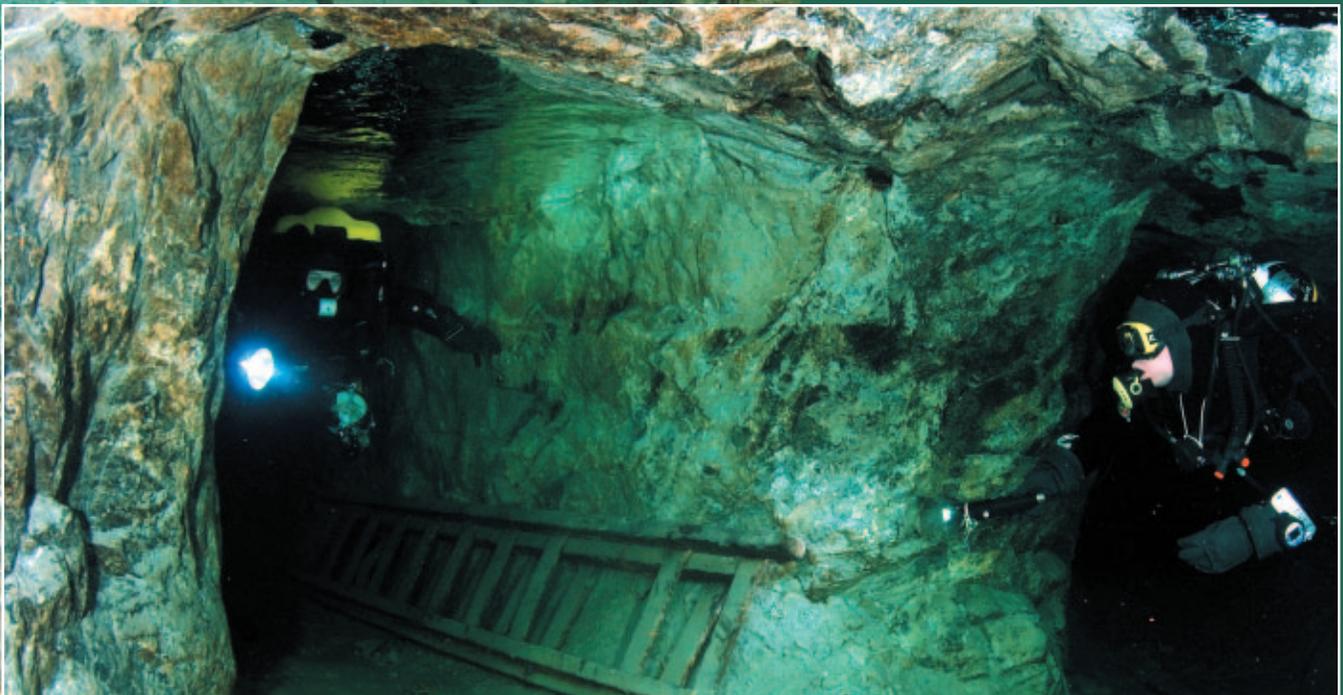
The white limestone walls and crystal clear waters of Ojamo Mine provide an excellent environment for both photography and videography. Diver Mikko Vormala sports a scooter-mounted video camera system as he effortlessly glides through the subterranean passages.



They were about two kilometres long, with most of the limestone lying under Lake Lohja. The mine began as an open quarry on the shore of the lake, but in 1931-1933 the work moved underground. In 1927, almost 250 men worked in Ojamo.

At the end of the hall lies an old stairway leading 20m/60ft down to another hall. Descending head first with electrical wires and light bulbs hanging from the ceiling is a bit tricky, but we manage to avoid entanglement and soon emerge in the next chamber. The water here appears, if possible, even clearer. We are now at the 58m/200ft level; and, as we scooter across, we admire the reflections of our lights in the bubbles trapped in the ceiling from previous dives. My eyes follow the vertical walls that seem to drop forever, and I try to make out the floor that should be at 88m/260ft depth, some 30m/100ft below us, but apparently my light is not strong enough. As we exit this room, we turn left, rounding an enormous pillar, and head for a brick wall with a small opening. On the way, we pass an old wooden dynamite box, with some sticks still left in it.

Below: Diving in a none-flow mine environment is deceptively easy, so proper cave diving protocols need to be strictly followed. Divers Thomas Stenius and Fredrik Ekroos are waiting at an intersection for the all-too-slow camera-dragging author.





The mining method used in the mine was called "stairs quarrying." This method made huge open spaces underground, and massive pillars were left between the open spaces to keep the roof up. In the first years, most of the limestone was lifted to the mining cars by hand, but later this was done by machines. Drills were operated with air pressure, and dynamite was the most commonly used explosive. Explosives were only used in the evenings when the mine was empty, as the explosion gasses were toxic. Mining ceased in the year 1965 because of economical reasons, as there was not much lime left. The machines were moved to the nearby Tytyri mine, and as the pumps ceased to work, the mine was quickly filled with water. The mining buildings were left to decay; and, because of security reasons, some open tunnels were closed.

As we pass through the small hole in the brick wall, the water starts to get greener, and the visibility deteriorates. Ascending a slope of rocks and stone, we soon find natural light above us. We are now in the open quarry part of the mine. As we continue towards our decompression bottles, we pass some old trees with leaves still in place. And if you look closely, you can find crayfish and small perches hiding under the rocks. Decompression is otherwise uneventful, and soon we are back in the sunlight.

Today the Ojamo quarry is used by a commercial diving school and an offshore safety training centre. Unauthorized diving is prohibited by law, but authorized diving activities are arranged several times a week all year round. Ojamo has quickly become one of the most popular diving spots in Finland.

Sten Stockmann e-mail: sten@elisanet.fi



Many interesting structures and objects have remained in the long abandoned mine. Fredrik Ekroos is scootering past an old stairway that leads down into much deeper chambers.

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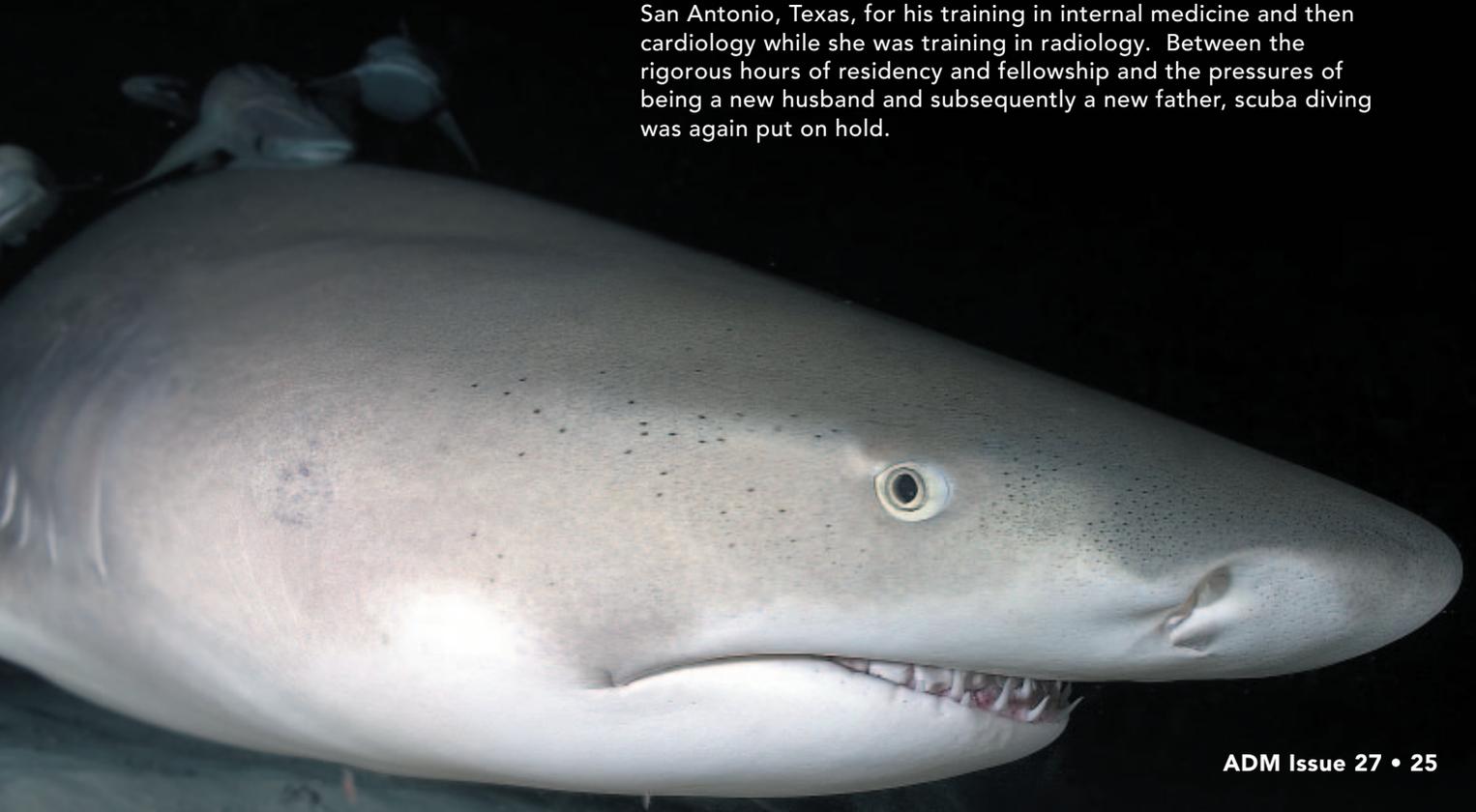
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ADM Featured Photographer **DOUGLAS EBERSOLE**

As a child growing up in Florida, Douglas Ebersole was fascinated by the ocean. Watching every episode of "The Undersea World of Jacques Cousteau" and Mike Nelson in "Sea Hunt," he longed to scuba dive and experience the ocean world. At the age of fourteen, Doug signed up for scuba diving lessons and bought his first set of gear – a Scubapro Mark V regulator, an At-Pac BCD, and two 72-cubic-foot steel tanks complete with J valves. His usual buddy at the time was an avid spear fisherman. While Doug loved topside photography and wanted to shoot pictures underwater, he soon discovered spear guns were cheaper than cameras and housings. So his early diving years were spent shooting fish instead of photographs. All through high school, he traveled all over the east and west coasts of Florida as well as the Florida Keys, diving every site he could find.

His college years were spent at Duke University in Durham, North Carolina. His diving was then limited to summer vacations in Florida and Mexico. After college, it was off to medical school in Miami, Florida, where he was much closer to great diving, but the time requirements of studying medicine limited his time in the water. After medical school, he and his new bride, Carol, moved to San Antonio, Texas, for his training in internal medicine and then cardiology while she was training in radiology. Between the rigorous hours of residency and fellowship and the pressures of being a new husband and subsequently a new father, scuba diving was again put on hold.

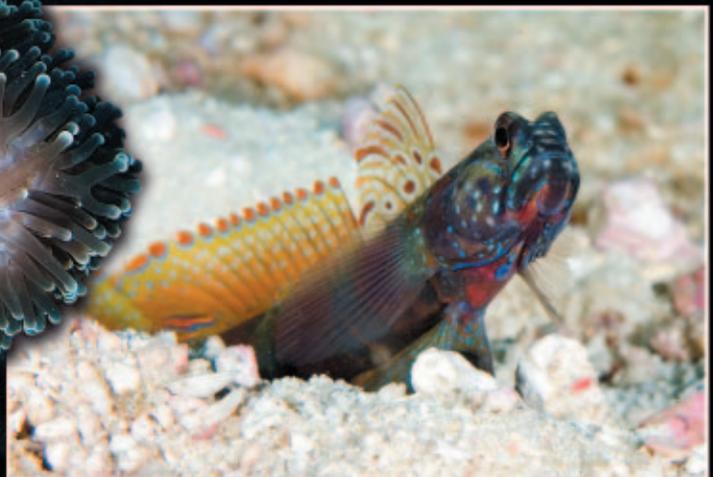




In 1996, Doug and his family returned to Florida to begin private practice. His passion for diving resurfaced, and he began diving again. This time, however, he could afford that camera! He began with a SeaLife ReefMaster, and then moved to an Olympus 4040, then up to a digital SLR. Currently, Doug shoots with a Canon 300D in a Sea & Sea housing with dual Sea & Sea YS-110 strobes. His favorite lenses are the Canon 10-22mm for wide-angle work and the Canon 100mm for macro.

Doug's wife, Carol, caught the scuba diving "bug" and got certified in 2000, followed shortly thereafter by their daughter Kimberly in 2001, at age 12, and their son Eric in 2003 at age ten. Suddenly, family vacations revolved around where they could find the best diving.

When his children reached the age where they too wanted to learn to scuba dive, Doug became an instructor – not to teach his children himself, but to oversee their training and make sure they were the best divers they could possibly be. His own diving progressed as well, moving through nitrox and trimix and then on to semi-closed and subsequently closed circuit rebreathers. Currently, when he is not taking photographs under water, he is teaching multiple levels of diving from basic open water certification through closed circuit rebreathers.



For his own diving, he prefers his KISS rebreather, and dives it almost exclusively whether above or below recreational depth limits. This applies to his international travel as well. As long as there is oxygen and sorb available, Doug is on his KISS.

When not underwater, Doug works as an interventional cardiologist at the Watson Clinic, and is the director of the Cardiac Catheterization Laboratories at Lakeland Regional Medical Center in Lakeland, Florida.

Perusing his dive log would show about 150 dives per year over the last ten years, from Florida and the Caribbean to Papua New Guinea and Indonesia. Although he has circled the globe to dive, Doug's favorite spots are "right in his own back yard" in West Palm Beach, Florida. And while he has captured beautiful images of many of God's wonderful creatures around the world, the images that give him the most joy are those of his wife, their children, and his father enjoying the wonders of the undersea world by his side.

More of Doug's work can be found on his website at

www.debersole.com



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Bikini Atoll

Size Does Matter – it matters a lot

Text and Photography by Joseph Dovala

Above: Looking out into this lagoon in 1946, you would have seen the fifth largest navy in the world assembled for the tests.

Right: A member of the sleek "greyhounds" of the sea, the destroyer USS *Anderson* lies on her port side. She saw many early battles in the Pacific, and managed to survive them all until "Able" — the first nuclear blast at Bikini.

The gargantuan flight deck of the *USS Saratoga* materialized out of the blue, and I found myself testing my regulator's maximum flow capacity at only 50 feet. I was privy to a mere fraction of the 880-foot long floating airfield stretched out before me, yet I could vividly imagine bringing in my Hellcat back from a successful sortie. Everywhere you looked was some kind of nautical artifact, navigation equipment, china, clocks; even a bugle adorned the vessel. Half a dozen reef sharks flew in formation over the massive deck as if circling to land, and all this in the first twenty minutes of our check out dive, day one.



This was supposed to be a nice leisurely swim above the flight deck of the world's only diveable aircraft carrier. You know, the dive masters watch you get suited up, evaluate your watermanship skills, and then talk among themselves how to schedule the week's dives and who to watch out for. The only problem was that this wasn't some run-of-the-mill ship sanitized and all cut open for diver safety.

The "Sara" was our country's first fleet aircraft carrier, and virtually all our pioneer naval aviators flew off her decks. She also took part in scores of WWII battles across the Pacific, earned eight battle stars, and could not be sunk by the Japanese, despite reported being destroyed numerous times. It took not one but two atomic bombs from our own Army/Navy to finally put her on the bottom, and she's bigger than the *Titanic*. I haven't felt this way on a dive since Cocos Island — and this was only the check out dive! We eventually made three more dives on the *Saratoga* as well as visiting six other ships, and this didn't even scratch the surface of this sub-sea fleet. It is not only the physical size of the nuked Bikini fleet that overwhelms you, but also the historical significance of these vessels that takes your breath away. It makes Truk seem like bathtub toys.

It was 1946, and despite the two atomic bombs recently dropped over the Japanese cities of Nagasaki and Hiroshima, much of the world (read Soviet Union) was unconvinced of the awesome destructive power of the new weapons in America's arsenal - or even that they in fact existed. So the powers-that-be decided that a "little" show was in order, and a virtually unknown atoll

Above: I could vividly imagine bringing my Hellcat back in from a successful sortie as we "flew" down toward the main elevator on the USS *Saratoga*.

Right Page: Joe Tezak explores the 5-inch main battery on the USS *Apogon*, a Balao-class submarine. Though easily circumnavigated on just one visit, she is very popular with divers. Her sister ship, *Bowfin*, is moored in Pearl Harbor as a museum, and definitely worth a visit on the trek out to Bikini.

in the Marshall Islands was the lucky winner for ground zero. Now, you have to remember that the world had just finished the most globally devastating war in history, and the United States was no longer the isolationist country that it had been before 1941. As anyone who has seen the movie *Patton* knows, sabers were rattling between the U.S. and Russia even before the first Nazis were signing their fraudulent Brazilian passports. So forty thousand military personnel and a fleet of some 240 ships descended on the lagoon and the lush island paradise of Bikini, for what was to be known as Operation Crossroads.

The peaceful natives were removed, the island was largely stripped of vegetation, and concrete bunkers were built. A force of seventy-three obsolete and captured warships was prepared with full battle readiness for the tests a few miles off the island. At the time, this fleet was the fifth largest in the world. On July 3, 1946, and again on July 25, two nuclear bombs known as Able and Baker, about the size of those dropped over Japan, were detonated in the lagoon. Able was an air blast dropped from a B-29, and Baker was an underwater eruption which produced the most famous nuclear explosion film/photograph of all time. No matter how many times I see it, I just sit slack-jawed in awe.

Two Frenchmen by the names of Heim and Reard are credited with designing a new two-piece bathing suit and naming it "The Bikini" just after the tests in 1946. It took a while but the style became very popular in the mid 50's, and it was proclaimed that this "swim" suit was going to have the same effect on the male libido as the bombs had on Bikini Atoll. I would tend to agree.... Let's see, where was I....

Oh yes...amazingly, only fourteen of the ships sank directly, but those that were still afloat were so contaminated that they had to be scuttled over the next few days or months. It was during this process that hundreds of American soldiers and sailors were exposed to exceedingly high radioactivity, and many paid the price in long-term health effects. Our ignorance of nuclear fission at the time of these tests was staggering. For a very sobering account of this see the film *Radio Bikini* (1987).



USS Apogon



USS Lamson



USS Saratoga



HIJMS Nagato



USS Arkansas



USS Anderson



The Japanese had not fortified Bikini Atoll, so it escaped almost unscathed from the horrors of the Pacific campaign. The roughly 160 endemic inhabitants lived a simple and healthy life far from the travails of modern society. Being a peaceful people and nomadic in origin, it didn't take a Johnny Cochran to convince them that they needed to go to another island "for a few weeks," while the United States showed the rest of the world what harnessing the atom was all about. They were told that they could return in less than a year. It didn't quite work out that way, and their principal residence island is now Kili and other Marshall Islands. As with most displacement of an indigenous people, their culture was irrevocably destroyed and must be added to the "casualty list" of Operation Crossroads. The fallout from this displacement is still taking its toll on the Bikinians, as well as other Marshallese (but that is a whole other story...).

Able and Baker were just two of many nuclear weapons detonated in the Marshall Islands. The first hydrogen bomb, Bravo (1954), was the most damaging and enduring detonation. This explosion was far bigger and deposited more radioactive fallout than any of the earlier tests and was highly underestimated. Several islets in the atoll were vaporized, and many people on distant islands, as well as a fishing boat, were smothered in ash. A number got sick and more than a few deaths were attributed to the blast.



Above: Janine Dovala checks out a navigation light from the bridge of the USS *Saratoga*.

Left: The bridge of the IJMS *Nagato*, where Admiral Yamamoto stood and gave the command to attack Pearl Harbor on December 7, 1941.

Right Page Top: A pair of 12-inch mains on the USS *Arkansas*. These guns shelled the beaches of Normandy and Iwo Jima.

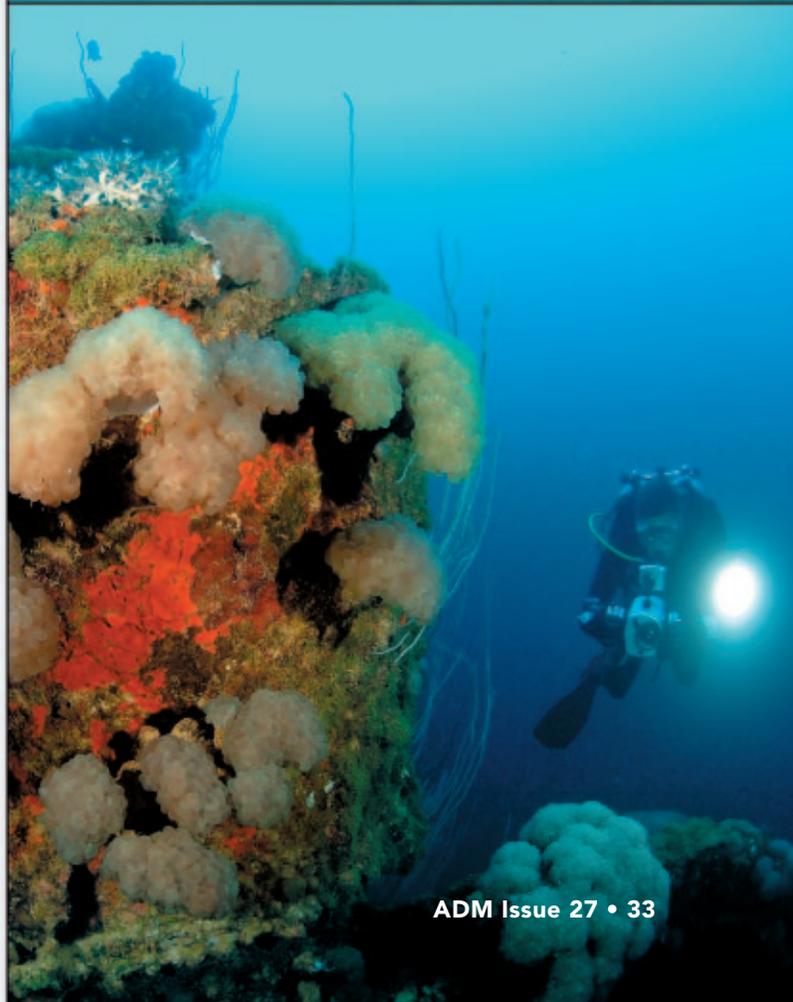
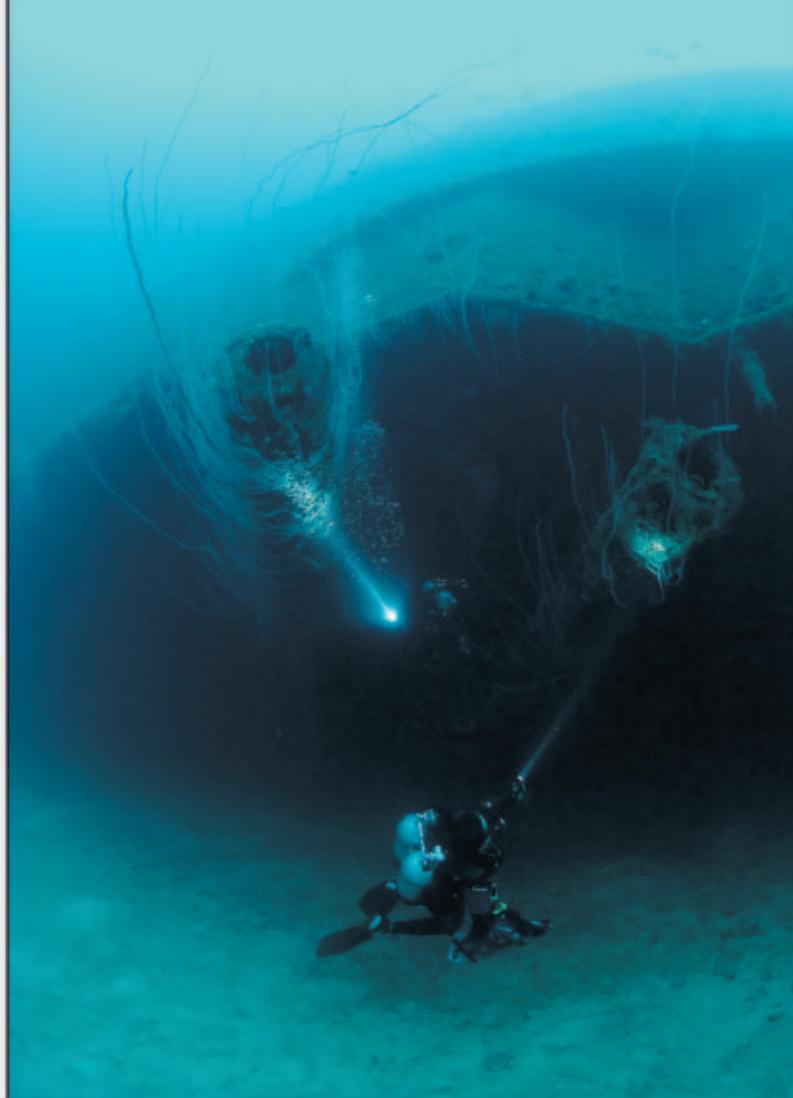
Right Page Bottom: The USS *Lamson*, another "greyhound" of the sea, sits upright and seems to support the most marine growth of the ships. Mike Stevens videos the picturesque aft section.

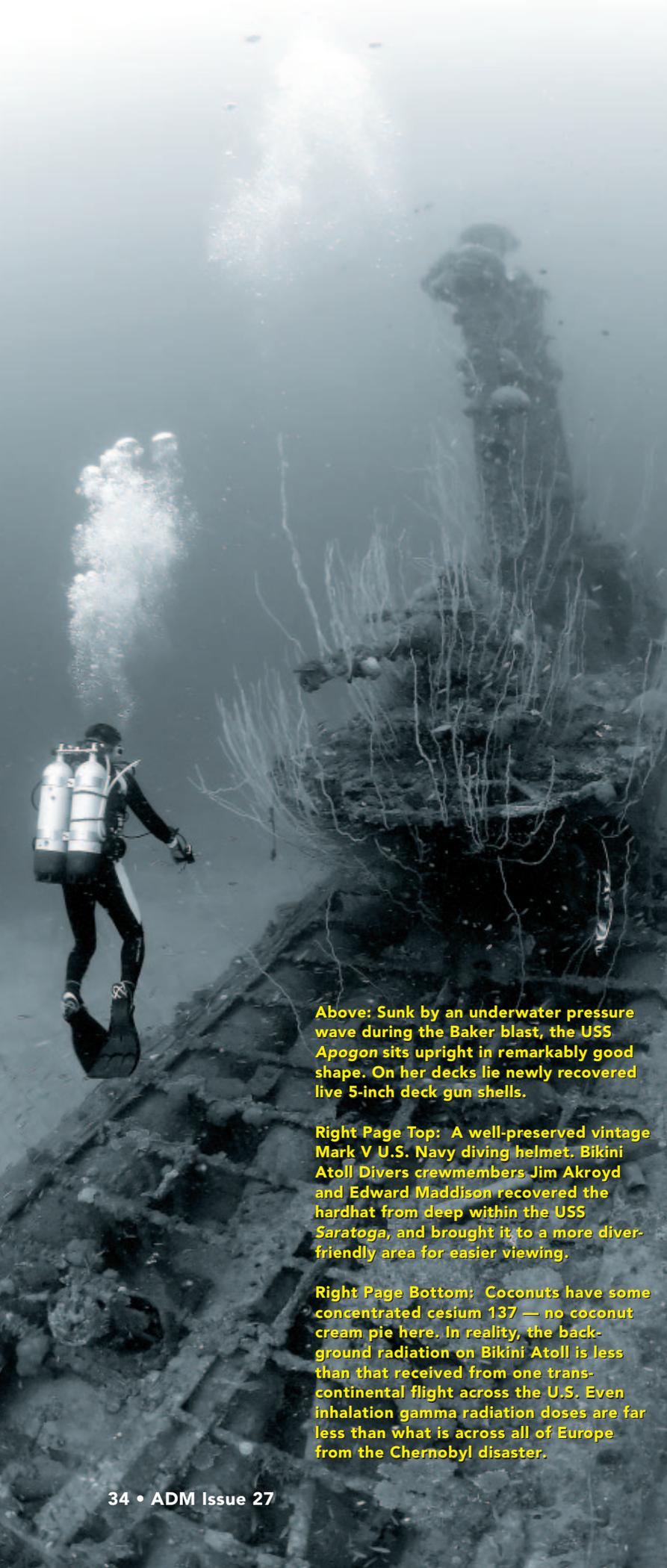
Looking at the island of Bikini now you would never suspect such a malevolent history. It is an absolutely gorgeous coconut palm studded landscape with miles and miles of deserted white sand beaches. The background radiation in the lagoon and on the sunken ships is less than what we received from our long plane flights from California. The lush coconut palms, however, have a problem. Cesium 137, from the Bravo test, has been found in the plant life and the coconuts have a slight glow at night. Well, not really, but the magnification effect makes them less than ideal for long-term consumption. Unfortunately, Cesium 137 is mistaken for potassium by plants and is concentrated within the plant's tissue. So, unless you grow hydroponically, food plants continue to take in cesium from the soil and pass it up the food chain – sound familiar? Attempts have been made at clean up but without success. The number of half-lives required to make this brand of cesium “safe” will take many more years. All food and produce has to be brought in by supply ship or air. The fresh water is produced from desalinization. Visiting here requires the usual satchel of waivers and disclaimers, plus a good read of the latest radiological report.

The sunken ships read like a who's who lineup from naval history. Battleships, cruisers, destroyers, and submarines lie on the bottom of the lagoon all within range of sport divers. One of the most provocative ships is the HIJMS *Nagato*. This Japanese battleship was the flagship of Admiral Isoroku Yamamoto, the architect of the attack on Pearl Harbor. You can swim by and touch the bridge where he stood and gave the order “Climb Mount Niitaka” which signaled the raid to begin on December 7, 1941.

As with most battleships, she lies upside down because these dreadnoughts are very top heavy from the massive armor topside, and almost always turn turtle when they sink. Even though the *Nagato* sits on her decks, it is a most impressive sight from the four giant props to the massive sixteen-inch guns pointing toward the sand. To quote historical country singer Johnny Horton “...with guns as big as steers and the shells as big as trees....” They're really, really BIG. While Johnny was singing about the German battleship *Bismarck*, any gun that can hurl a two thousand pound shell over twenty miles would qualify for these lyrics. The *Nagato* was the last surviving large capital ship of the Japanese Imperial Navy; and considering its role in starting the Pacific war, it is no surprise that she ended up in Crossroads - with considerable effort by a combined American/Japanese crew - as nuclear fodder.

The USS *Arkansas* is the American battleship in the Bikini lineup, and she is one of the oldest. Her career started before WWI in 1912. She was in the Atlantic during December 7, 1941, engaged in convoy duty. She participated in both theaters of WWII by providing support at the Normandy invasion and then saw action in the Pacific at Iwo Jima and Okinawa. Considerably smaller than the *Nagato*, she represents old world





Above: Sunk by an underwater pressure wave during the Baker blast, the USS Apogon sits upright in remarkably good shape. On her decks lie newly recovered live 5-inch deck gun shells.

Right Page Top: A well-preserved vintage Mark V U.S. Navy diving helmet. Bikini Atoll Divers crewmembers Jim Akroyd and Edward Maddison recovered the hardhat from deep within the USS Saratoga, and brought it to a more diver-friendly area for easier viewing.

Right Page Bottom: Coconuts have some concentrated cesium 137 — no coconut cream pie here. In reality, the background radiation on Bikini Atoll is less than that received from one trans-continental flight across the U.S. Even inhalation gamma radiation doses are far less than what is across all of Europe from the Chernobyl disaster.

dreadnaught technology; and although she, too, lies upside down, her very distinctive sickle-shaped hull is a dramatic sight.

The two American destroyers, *Anderson* and *Lamson*, are small enough to take in the whole ship on a single dive. Make no mistake though; these highly decorated veterans (fifteen battle stars combined) saw action throughout the war. *Anderson*, lying on her port side, and *Lamson*, settled upright, make fantastic dives with scores of interesting sights to eat up the twenty-five minute bottom times allowed on most dives. Looking at the relative size of these escort ships, you realize the special breed of sailor it must have taken to keep these “tin cans” in close proximity to the large, fast aircraft carriers moving in mountainous open ocean waves.

The American fleet submarine *Apogon* also sits upright and looks very much intact. If you visit the *USS Bowfin* in Pearl Harbor, you can get a real good take on what life was like below the waves during WWII. A hole has opened up in *Apogon*'s pressure hull; and, if you stick your head in, you can view inside the forward torpedo room. After seeing the long-ago flooded compartment, it is easy to imagine the dozens of U.S. subs that never returned, lying in their lonely undersea graveyards. Located next to the *Bowfin*, in Pearl Harbor, is a submarine memorial listing all the boats that didn't come back. Each of the many plaques gives a brief story on the sub and lists the names of the sailors lost. As you might expect, most of the vessels were lost with all hands somewhere in the Pacific. The closing epitaph on each one is “On Eternal Patrol.” As we are reminded now, the price of liberty is indeed high.

There are primarily nine ships and one submarine that make up the week's dive itinerary. Depending on the group, there is some leeway on how to dive them. Most dives are beyond recreational limits (average depth 150-165 ft with up to 60 min of deco), but the warm, clear water without appreciable currents makes for a nearly narcosis-free excursion.

These ships went down with arms and fuel oil. Live ammunition is everywhere, and leaking fuel can be encountered. There are cables, debris, silt, and more than a fair share of obstacles to watch out for. However, good buoyancy skills and the ability to follow a dive plan is 95% of a diver's requirement. They have a set way of doing things and it works.

Diving operations were set up and made public in 1996. Fabio Amaral, along with consultants Tom Mount and Kevin Delaney, designed a protocol that is largely still in effect today. Bottom gas is air in large capacity single or dual steel cylinders with a deco gas of 75% O₂ dispensed at 30, 20, and 10 foot stops by surface-supplied long hoses. This takes place on a nicely designed trapeze hanging from the dive boat.

Current head of diving operations is Jim Akroyd with his wife Gen, they and their crew run a very fine operation with some lively and informative briefings. If armed with some previous research on the vessels and the Pacific War before arriving, you can jump in with both feet during the discussions. Since there are only about fifteen people, plus up to eleven diving guests on the island at any given time, it feels very much like a non-moving live-aboard. But don't expect uniformed crew persons handing out hot towels and cookies after the dives. The food is plentiful but basic, as are the quarters. This destination is not easy to get to, nor is it for someone who wants "night life." But if stretching your eyes out on a beautiful uninhabited atoll, and blowing bubbles over and in some of the finest historical ships in the world sounds appealing, then Bikini is a must do. I'm heading back as soon as possible!



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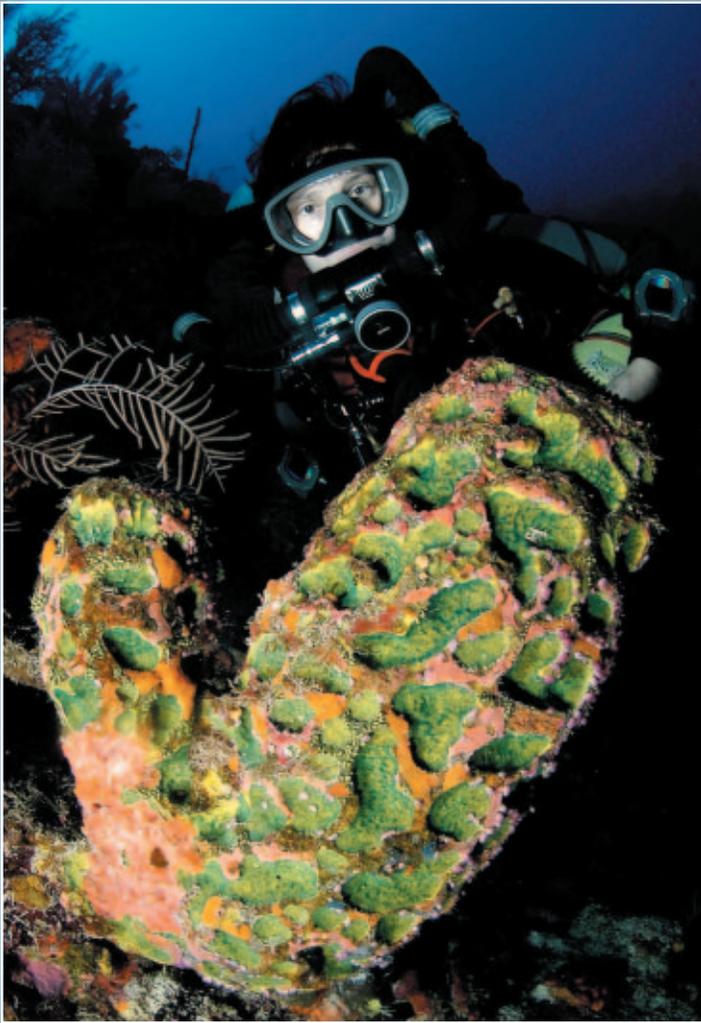


Tech Week • Grand Cayman

Text by Kim Smith
Photography by Doug Ebersole and Curt Bowen

The hot, humid air hit my skin as I stepped out of the plane and climbed down the wobbly staircase at the international airport in Grand Cayman. Say what you will about the sweltering heat of tropical summer, coming from Vancouver's cold and damp, it felt pretty good to me! But nothing about the weather – good or bad – could dampen my spirits on this trip: It had been many months since my last dive, and this was Divetech's Tek Week event!

Open circuit and closed circuit divers were invited to share the ocean and do whatever type of diving appealed, be it shallow recreational reefs or deep walls. Tek Week is a week of terrific diving and learning opportunities, and a chance to dive with some of the leading experts in the diving world today. To make things even more interesting, the various dive industry manufacturers are invited to show equipment and give demos. Attending this week were representatives from Amphibico, Closed Circuit Research, Silent Diving Systems, Fourth Element, Advanced Diver Magazine, Reef Photo & Video, Delta P Technologies, ExtendAir, Dive Rite, and, of course, I was there to represent the KISS rebreathers.



The Cobalt Coast Resort was the gathering place for the week, a luxurious owner-operated resort located on the tranquil northwest shore of Boatswains Bay, Grand Cayman. What better place could there be for Tek Week than the welcoming establishment of the Cobalt Coast, with the dive team headed by Nancy Easterbrook of Divetech, the on-site full-service dive center of the Resort?

I'd been to this resort before, but never really had a chance to appreciate how perfect it is. If you are in need of pampering, good food, dedicated resort and dive staff, clean & spacious rooms, this is the place for you. Accommodations at Cobalt Coast are probably the nicest that I have seen in a dive resort. Each room has a comfortable living room, with plenty of seating, a kitchen area with sink, refrigerator, and microwave, a large roomy bathroom, and a bedroom with either two double beds, or one king-size bed. I've bunked down in some interesting places over the years; this was one of my favorites. I felt like I had arrived home.

Upon arrival, I quickly hauled my bags to my room, dug out my rebreather bottles and dropped them off to be filled. Every flavor of gas was available for both open circuit and rebreather divers: air, nitrox, and trimix. They would be returned to me shortly; in the meantime, I would unpack and prep the rest of my gear. For those who don't want to pack their gear, at Divetech you have the option of renting quality equipment, including rebreathers and rebreather bottles. Instruction and gear purchases are also available, as the dive shop is fully equipped with anything you might want or need.

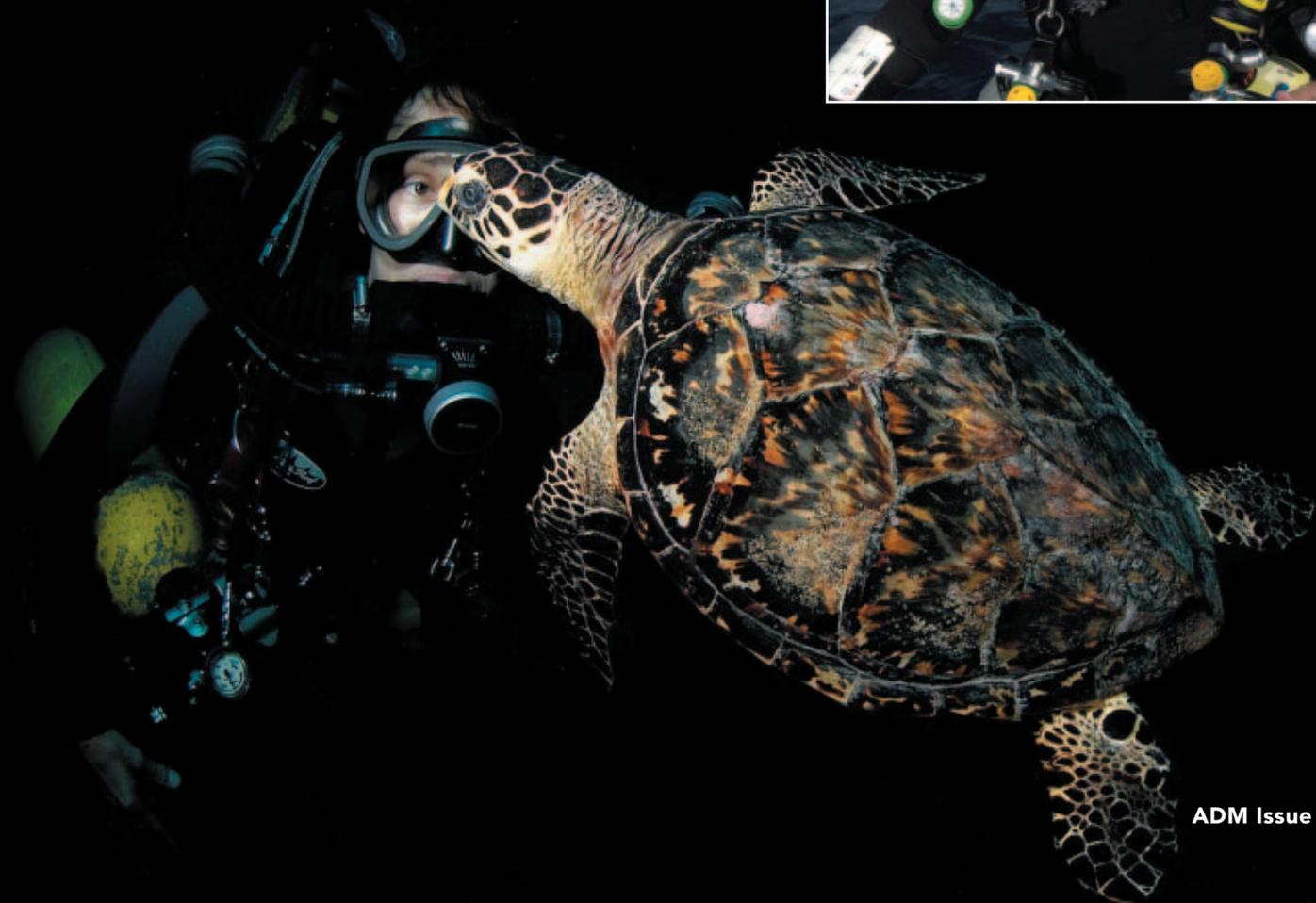
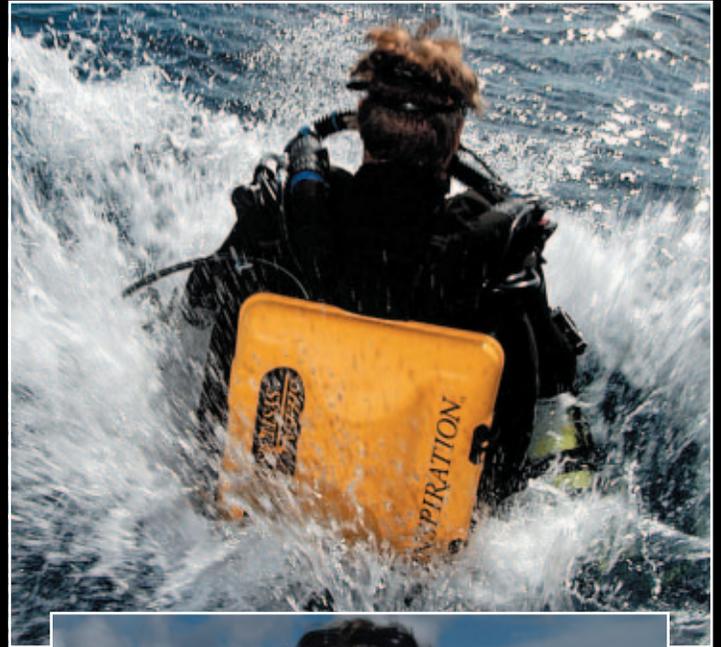


The next morning my dive buddies, Curt and Doug, and I donned our KISS rebreathers for our first dive. We opted to do a shore dive in order to check out our gear and ensure proper weighting. This was to be my first dive since my PFO closure surgery, and I was a bit nervous. My buddy Doug, a cardiologist, had seen my test results and reassured me that I was fixed and ready to go.

It felt amazing to fall back into the warm bath-like water. We quickly strapped on our bailout bottles, and started a slow, leisurely swim towards the wall. We passed over sandy bottoms and coral reefs, going slowly deeper. I could see beautiful butterfly fish darting in and out of the coral, a turtle in the distance slowly moving through the water, and schools of fish that looked stunningly beautiful in the blue, sun-drenched water. This is what tropical diving is all about! A little over two hours later, we surfaced at the dock and climbed out of the water. What a dive!

Over the course of the week, we did several dives, from both the boat and shore. Most dives were over two hours in length, giving us ample time to explore the deep walls and shallow reefs. With the boat always going to a new location, we were never bored. Boats were available in the mornings and afternoons.

Highlights of the diving for me include a tiny turtle swimming leisurely past me, so close I could touch him, getting nose to nose with a moray eel, and swimming through the tunnels of the sand shoots,





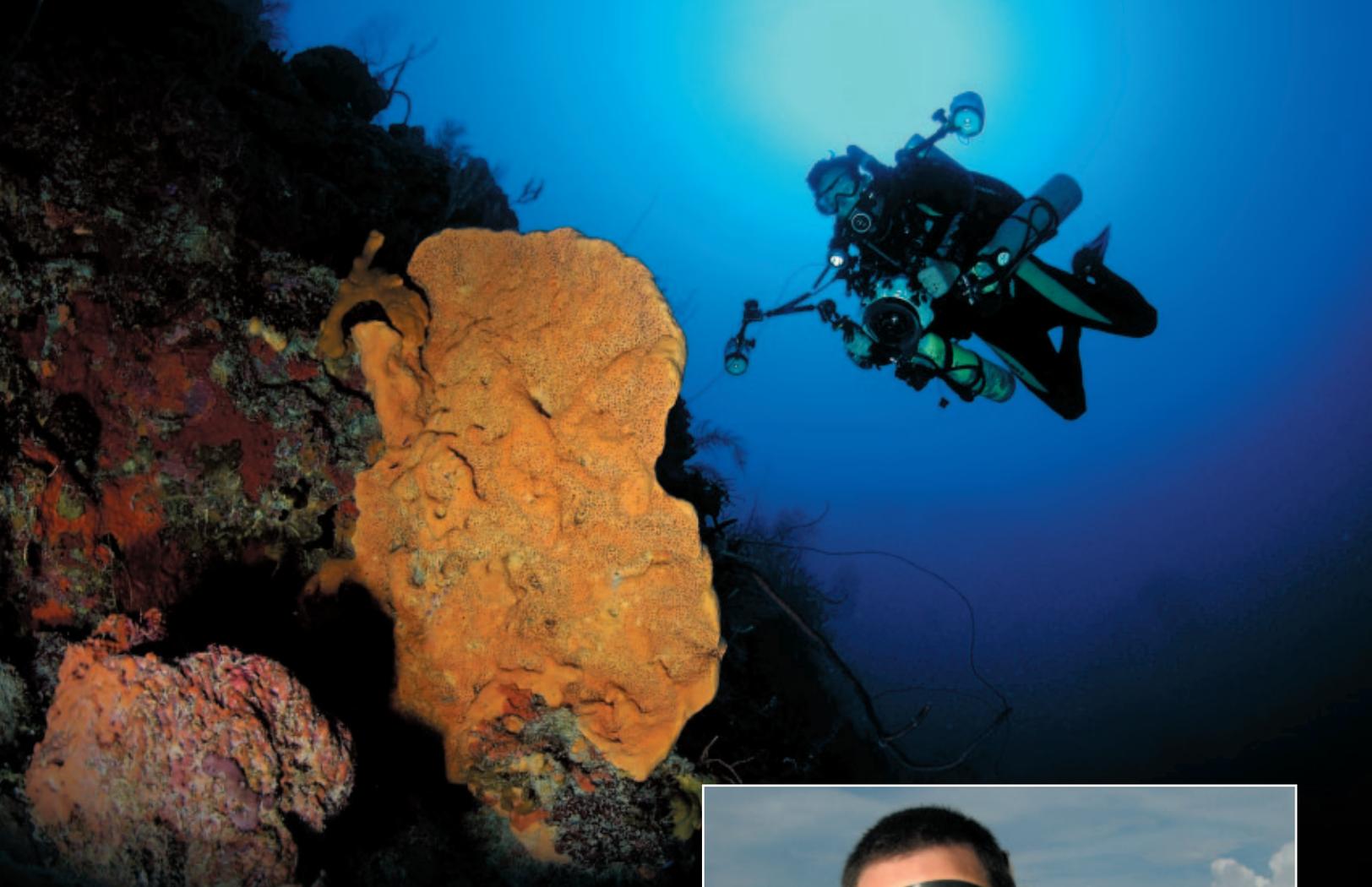
and marveling at the amazing color, texture, and formations. Some people were lucky enough to spot reef sharks; I wasn't one of them. We also saw a variety of rays on almost every dive.

After we surfaced from these spectacular dives, we had ample help from the staff to assist with hauling up our bailout tanks, cameras, and taking our mask and fins. All we had to do is walk up the ladder and sit down. It was nice to be spoiled!

One of the great things about this resort is that everything is included in a package price. Air fills, scrubber, tank rentals, food...there's no need to worry about carrying around money or credit cards. And if food is as important to you as it is to me, you will be pleased with the abundance, variety, and quality. Another terrific feature is that Cobalt Coast is equipped with wireless Internet, perfect for those of us who must stay in touch with the real world. Hanging out at Duppies Restaurant and Bar, or lounging in a deck chair, is my favorite way to work!

One afternoon was designated for pool demos. Everyone clustered around to try the KISS, Inspiration, Dive Rite, and Ouroboros rebreathers. Photography equipment was shown, computers explained, and Fourth Element dive underwear examined. There was a flurry of activity, and a good time had by all.





While this event was called Tek Week, it really was for divers at all levels of experience. I think this is what made it so enjoyable. It was a chance for everyone to see what else was out there and ask questions. Those diving single or double tanks were checking out the rebreathers, and everyone was checking out the latest photography equipment and environmental suits. It was exciting to see a young child take his first seal scuba class, while another person was taking a KISS rebreather class, and others were finishing off open circuit trimix classes.

After our dives were done and our gear prepped for the next days diving — a process that was ably assisted by the dive shop staff who kept everything running smoothly and calmly — we would sit back and relax with a cool drink by the swimming pool, and watch the amazing sunsets. It was sitting here after several days of diving that I was wondering about what a perfect dive resort should offer, and what this one could do to improve itself...I couldn't think of a single thing. Good going, guys!

Divetech / Cobalt Coast has a multitude of different events throughout the year for the whole family to enjoy. Including kids learning experiences, family specialty weeks, and extreme deep CCR / OC events. Visit their website for a complete yearly schedule.

www.divetech.com



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The Nakwakto Rapids

Cauldron of the North

Article by ADM Senior Photojournalist John Rawlings
Photography by John Rawlings and Valerie Lyttle

The Nakwakto Rapids – for years the very name has intrigued me. I have fantasized about diving in that cold, swirling cauldron and photographing the bizarre and colorful life to be found there. Staring down between my fins at the water thrashing and bubbling around the aluminum hull of our dive boat, I realize that I am on the verge of crossing yet another fantasy off my “gotta do this before I die” list. Slack water – or what passes for it here – has not yet arrived, and skipper John DeBoeck yet again reminds us to wait until he tells us to

leap. Known for tidal currents that regularly reach 16 to 20 knots, timing is absolutely critical here to avoid being swept helplessly down the tidal channel, and John has the engine running constantly just to stay in place in the lee of the small rocky island in front of us. Actually named “Turret Rock”, the island is commonly referred to as “Tremble Island”

because when the tidal currents are slamming through this narrow passage the island is said to literally tremble. Looking up at the trees on the island, I notice yet again the wooden signs that festoon the trees – each one a tribute to a boat that couldn’t quite maintain control in the swirling currents and slammed into the island. I try hard not to think about the fact that two of the signs up there on the trees represent John’s boats.....

Above: Their long necks illustrating how they received their common name, “goose-neck” barnacles, *Pollicipes polymerus*, thrive in the intense currents of the Nakwakto Rapids. An oversized and colorful variation of the species found only here, the brilliant red color is from the hemoglobin in the barnacle’s blood.



Vancouver Island

Below: ADM Team Member Valerie Lyttle edges closer to photograph a tiny portion of the blanket of invertebrate life that covers the bottom surrounding Turret Rock at Nakwakto.

Grinning from ear to ear, my dive buddy, Valerie Lyttle, looks in my direction, her eyes wide in anticipation. I wonder to myself if my eyes show a similar spark of excitement, and I'm certain that they must....we are on the verge of an amazing experience that few will ever share. The word "GO!" is shouted out behind us and the two of us stride off the side, dropping 4 feet to the green swirling water below. Within seconds John has handed me my camera system and I hurriedly deflate my wing to drop beneath the emerald surface. Plunging downward into an absolute maelstrom of bubbles, I feel myself being tugged fiercely this way and that by the current. From out of the corner of my eye I can see Valerie fighting hard to stay with me and not lose contact as we kick our way downward and further into the protective lee of the island. My large camera system seems to act like a sail – frustrated; I clutch it tightly to my chest to prevent the current from catching it and rolling me over. Bright colors and bizarre shapes seem to whirl by – photo opportunities lost. Just as I began wondering how I will ever be able to photograph in this environment I feel the current begin to dramatically slow and the swirling bubbles start to fade away. The change is absolutely dramatic.

The two of us stop, stare at each other for a few seconds, and then pause to glance around. An incredible and surreal vista greets us. My overwhelming first impression is of the color yellow – it seems as though the underwater seascape is completely bathed in it. Every square inch of bottom – both vertical and horizontal, is absolutely enshrouded with invertebrate life, which in places appears to be stacked up in layers. Large clusters of northern feather-duster worms, *Eudistylia vancouveri*, poke out into the water column, their deep purple and blue "feather-duster" heads dancing at the end of bright yellow sponge-encrusted tubes, instantly retreating back into their tubes if even slightly touched. Animals that thrive in current-rich environments simply abound here and the slopes are literally painted with anemones, sponges and soft corals of all types, shapes and colors – all proliferating in huge numbers. Fluorescent red and orange sea-stars of various species clamber over the seascape in a never-ending quest for food, their bright colors vividly contrasting with the sponges, corals and algae making for delightful photo opportunities. The beautiful "Orange-Peel" nudibranch, *Tochuina tetraquetra*, named for its shape and flaming bright orange coloration, is quite abundant, and I am able to photograph several individuals during the dive that appear to be as large as my foot, (and I'm a BIG boy!). I see few of the schooling fish that normally appear up in the water column, the strong currents here not being conducive to fish species not readily able to securely clutch the bottom. One of my favorite fish, however, is present in abundance – the Red Irish Lord. This species, *Hemilepidotus hemilepidotus*, a member of the Sculpin family known for its adaptable bright coloration and the beautiful red "starbursts" within their eyes, seems to be nestled in most of the cracks and crevices.

As Valerie and I slowly drift across the bottom both of us pause often to photograph a particularly colorful Red Irish Lord – the fish remaining completely motionless as if it couldn't even be bothered by our presence.

Kicking our way down slope into deeper water we find what I can only describe as rolling gentle hills sweeping off into the distance constructed of thousands upon thousands of barnacles and mussels. The most prolific of these was a species that I have never personally seen before – the Gooseneck Barnacle, *Pollicipes polymerus*. Once believed to only exist in the intertidal zone along rocky coastlines with both intense and constant surf conditions, the first dive teams at Nakwakto Rapids were astonished to find an absolutely massive population of this species at depths deeper than they had ever been documented previously. Named for their long goose-like necks, these barnacles are extraordinarily colorful. They are simply gorgeous creatures - their "heads" are covered with bluish-silver plates, and they have bright red "lips" outlining the tips. Upon examining the photos that I took of this species later I was struck by how "unreal" they appear – to me my photos look like a brightly garish painting made for a science-fiction movie set. Interspersed with these amazing creatures is an abundance of their cousins, the Giant Acorn Barnacle, *Balanus nubilus*, as well as bright blue-black mussels of absolutely huge proportions. Each of these species is a filter-feeder and the current swept environment of the Nakwakto Rapids is perfect for them. The barnacle species here are so incredibly prolific, with generations of animals stacked upon preceding generations that they appear to have literally re-shaped the contours of the bottom.

As we reach the opposite side of the island we began to feel the current again pressing against us – the force of it was clearly increasing and our time had become limited. Swimming closer to the rocks we begin our ascent, still pausing on occasion to photograph the many scenes and creatures whose unique colors constantly beckon to us. Nearing the surface after our final stop we find ourselves once again in the midst of swirling bubbles and we use protruding rocks to block the force of the increasing current. We emerge at the northwestern edge of the tiny island in a protected tiny notch in the rocks, just inches away from the shore. The other two-man team of divers await us with massive grins and glittering eyes and we exchange excited stories of what each of us had seen and photographed. John DeBoeck brought the boat in live to within 10 feet of the shore, the current swirling around the hull as he maneuvered in as close as he dared. One at a time, each diver would kick outward as quickly as possible toward the ladder and clamber aboard as the boat was quickly swept "downstream", then the boat would return again against the steadily increasing current to start the process again for the next diver. By the time the final diver was on board the waters of Nakwakto were swirling like the proverbial "Dervish" and it was clear

Below: A tiny universe of glittering stars in its eyes, a Red Irish Lord, *Hemilepidotus hemilepidotus*, nestles down amidst a puffy bed of tunicates. Known for its bright colors, many of the Red Irish Lords at Nakwakto had a distinct yellowish tinge to them based on their immediate surroundings.



to all of us that the site was no longer a "diveable option". It had been one of those days when I was hard-pressed to recall a more wondrous experience underwater, and I shall cherish the memory of this dive – the first time that I ever tasted the wonders of the Nakwakto Rapids.

The Nakwakto Rapids in the wilderness of British Columbia are an intense experience not to be missed - the excitement, colors and sheer abundance of species rivaling anything to be found anywhere else in the world. Divers wanting to experience this adventure can do no better than by contacting the following:

Browning Pass Hideaway – John DeBoeck
www.vancouverislanddive.com/

Tourism Vancouver Island
www.vancouverisland.travel/outdoor/divingsnorkeling/

British Columbia Ferry System
www.bcferrries.com/

Right: Found from the Aleutian Islands in Alaska to as far south as Baja California, a Pacific Blood Star, *Henricia leviuscula*, slowly glides down a wall covered with sponges, bryozoans and barnacles in search of its next meal.

Left: Located in the center of Nakwakto Rapids, Turret Rock is also known as "Tremble Island", as it is said to physically tremble when the tidal currents are slamming through the narrow passage, (Photo by Valerie Lyttle).

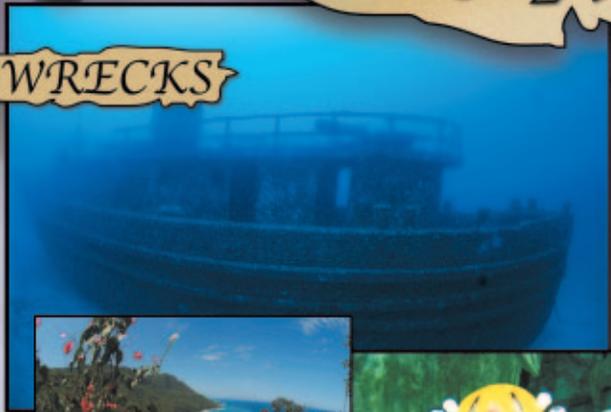
Below: A group of northern feather-duster worms, *Eudistylia vancouveri*, display their beautiful blue and maroon feathery crowns for my camera lens. At Nakwakto their rubbery tubes are commonly completely enshrouded with a bright yellow encrusting sponge that adds still more color to an already intensely beautiful scene.



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Where the Adventure Began

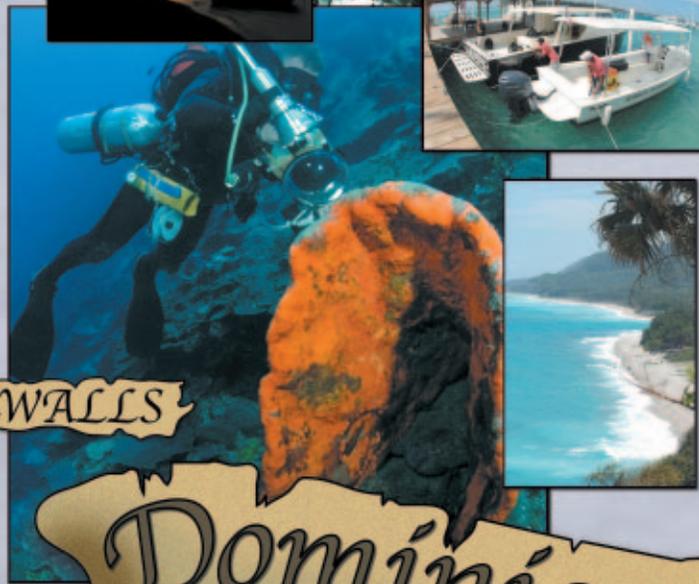
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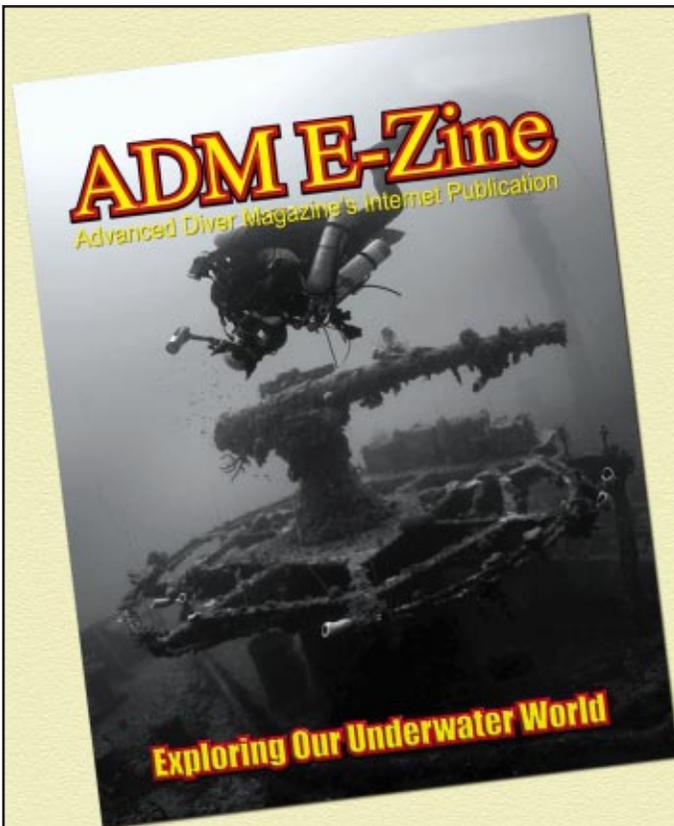
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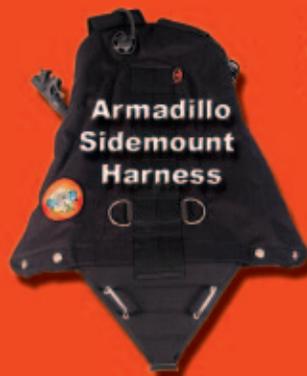
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Juergensen Marine Hammerhead CCR

By Kevin Juergensen and Jakub Rehacek, Ph.D.

It all began with an idea: How could we build a new Closed Circuit Rebreather that would incorporate some of the best ideas of the last twenty years, yet be simple and elegant?

Building such a machine was made easier by the knowledge base that spawned the new Juergensen Marine "Hammerhead" CCR. Long the leader in electronic control systems for practically every major rebreather in the world, Kevin Juergensen had just successfully collaborated with Lamar Hires of Dive Rite and Tom McKenna of Micropore to design and build the new Dive Rite Optima, which in less than eighteen months has sold over three hundred units worldwide.

Rebreathers, like the divers who use them, are a varied bunch, and there were still those who wanted what they considered an "expedition grade" machine – one that could be taken long and taken deep, with a loose-fill scrubber of high volume, rugged, yet simple to fill and maintain.

Designing a rebreather is no mean feat. For the Hammerhead CCR, Juergensen brought in Jakub Rehacek of Golem Gear as well as a relative newcomer to the rebreather field, Ing. Bretislav Vaisar, a Czech diver, designer, and machine shop wizard.

The new machine incorporates several innovations in a unit of its type, including a unique six-lug quick bayonet-style mount, which is backed by a spring-loaded mechanism. This ensures a secure attachment, while eliminating any sharp-edged fasteners for ease of removal, and minimizes entanglement hazards.

The internals of the Head hold true to the time-proven "Hammerhead" design of up to four oxygen sensors (three primary, and a fourth for third party monitoring).

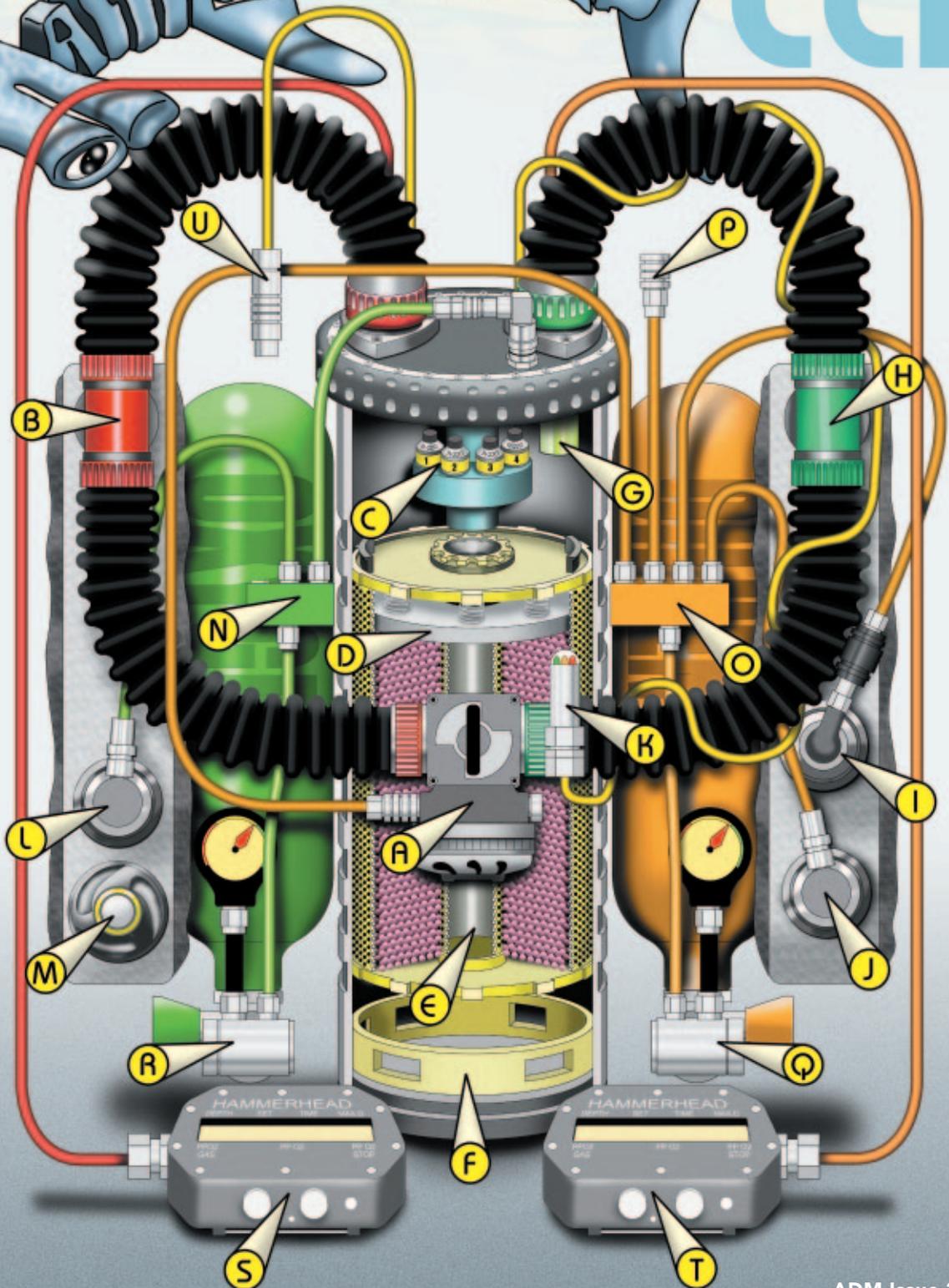


HAMMERHEAD CCR SCHEMATIC

- A.** Integrated BOV (Bail Out Valve): The Dive/Surface valve includes a fully adjustable high-performance Open Circuit Regulator that can be supplied with diluent, or an off-board gas source. The OC regulator can be removed for streamlined DSV configuration. Oversized crush-proof hoses are supplied enough for comfortable diving.
- B.** Exhalation counter lung T-piece has a water trap to ensure that even if there is water in the loop it gets captured in the counter lung. Rugged exhalation counter lung with puncture-proof inner bladder has a swiveling manual O₂ add valve (L) with quick connect fitting and over-pressure valve/water trap exhaust (M) at the bottom.
- C.** Threaded fittings on T-pieces and CCR head are specifically keyed for inhalation or exhalation side to ensure correct assembly. Unique six-lug spring-loaded quick bayonet mount ensures secure attachment of the head to the stack, with no entanglement hazards. On top of the head is a swiveling oxygen port with a 60-micron filter and quick connect for easy removal. Next to it are hard-wired ports for flood-proof cables of primary and secondary electronics, Fischer Connectors for DIVA, and a port for an optional fourth sensor monitor (VR3, HS Explorer, Pursuit) with Fischer Connectors at the monitor end. The time-proven "Hammerhead" design with up to four oxygen sensors (three primary, and a fourth for third party monitoring). Pre-scrubber injection of the oxygen ensures uniform mix through the scrubber before it reaches the sensors located on the inhalation side.
- D.** Revolutionary new radial scrubber with a built-in floating compression ring, the system constantly "packs" itself, preventing channeling. Large annular opening allows easy pouring of the adsorbent material. Capacity: 7.8 lbs of loose-fill sorb on standard scrubber, expedition and travel-size scrubbers are also available.
- E.** Generous water trap at the bottom of the stack, though the radial scrubber design and t-piece water traps will allow the Hammerhead CCR to operate even with a partially flooded stack.
- F.** Water trap spacer
- G.** Oxygen addition solenoid
- H.** Inhalation counter lung T-piece has a water trap to ensure that even if there is water in the loop it gets captured in the counter lung. Rugged counter lung, with puncture-proof inner bladder, has ADV (I) and a swiveling manual add valve (J)
- I.** Automatic Diluent Valve (ADV) is located in the inhalation counter lung. It gets triggered on counter lung collapse, or it can be activated manually. Flow stop for minimum loop volume operation is included as standard equipment.
- J.** Swiveling add valve for on/off-board diluent gas addition has a standard quick connect.
- K.** Display Integrated Vibrating Alarm (DIVA) – patented heads-up display in ratcheting adjustable holder. The DIVA can be set up in "user set point" mode so that a green LED flashes when user defined set point is maintained, and red flashes when PPO₂ deviates from it. The other option is "1.0 PPO₂ mode" where DIVA flashes orange when PPO₂ is at 1.0 PPO₂, and one green blink for each 0.1 PPO₂ above 1.0, and one red blink for each 0.1 PPO₂ below 1.0. The DIVA vibrates when loop PPO₂ is at life threatening level.
- L.** Swiveling manual O₂ add valve with quick connect fitting.
- M.** Over-pressure valve (OPV) also serves as water trap exhaust at the bottom of the exhalation counter lung.
- N.** Oxygen manifold/gas distribution block has 6 3/8"-12 ports (one equipped with 9/16 adapter).
- O.** Diluent manifold/gas distribution block has 7 3/8"-12 ports (one equipped with 9/16 adapter).
- P.** Wing inflation quick connect.
- Q.** Diluent 1st stage regulator.
- R.** Oxygen 1st stage regulator.
- S.** Secondary display provides the diver with a completely redundant, independently powered PPO₂ monitor.
- Full trimix decompression computer with GF (independent from the primary deco computer)
 - Integrated depth/timer
 - Integrated barometer
 - Temperature display
 - Integrated stack timer
 - Alarms for end of stack life
 - Two heads-up display modes
 - User definable set points for average display
 - LED "buddy" light on the handset
- T.** Hammerhead primary controller has a revolutionary Integrated Decompression Program, including gradient factors, selectable solenoid modes (including a proprietary algorithm for controlling the bolus of O₂ delivered to the system).
- User definable set points
 - User definable gradient factors
 - Ten user definable gas mixes
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 - User definable auto-shut down
 - Built-in barometer
 - Built-in temperature display
 - Built-in battery monitor
 - Full trimix decompression computer
 - LED "buddy" light on the handset
- U.** Fischer Connector for independent third party PPO₂ monitoring.

HAMMERHEAD

CCR



C. Bowen © 2007



The Banana Block O₂ sensor coupling system is still to be found on Juergensen's newest product, ensuring that the only electronic assembly exposed to the harsh environment of the breathing loop is easily replaceable.

With four available oxygen sensors, plus pre-scrubber injection of the oxygen (ensuring a uniform mix through the scrubber), the Hammerhead CCR takes its place as the most advanced unit on the market today.

Every Hammerhead CCR comes with the legendary Hammerhead Rev. C+ Control System - twin fully independent monitoring systems, the patented "DIVA" Heads Up Display (HUD), and Dual Trimix Decompression Computers - all in one sleek package.

Power consumption is so low on the Rev. C+ Electronic Systems that they only require a single AA alkaline cell for each computer to run for the full six-hour duration of the system.

Yet another first for the Hammerhead CCR, the unit can be configured with a Constant Mass Flow (CMF) Orifice, i.e. **Manual Orifice Oxygen Delivery** system - MOODs. The MOODs can replace the electronic solenoid oxygen injection, or it can be used in combination with the solenoid to provide a "belt and suspenders" solution, where the MOODs supplies basic O₂ metabolic needs to the diver, and the solenoid acts as a "parachute" delivering oxygen at the time of increased O₂ consumption - hard work, stress, rapid ascent when the diver is too preoccupied to manage his PPO₂.

The Hammerhead CCR offers unprecedented freedom of configuration. It can be set up as a fully electronic CCR (eCCR), or a manual CCR (mCCR) or a combination of both, manual CCR with electronic injection backup (meCCR). The mCCR version of the Hammerhead CCR comes with the legendary secondary Hammerhead display, including the DIVA and an integrated decompression computer option. An independent handset with a simple three-sensor readout is also included, making it the most sophisticated mCCR on the market.

Configuration with back-mounted counter lungs - **JZ System** - is another unique option available in the Hammerhead CCR. The JZ System back-mounted counter lungs are a "drop-in" option; no modification to the base system is necessary. The over-the-shoulder counter lungs and hoses are removed, and the JZ System is put in their place. The back-mounted counter lungs are "sandwiched" between the back plate and the wing, keeping them as close to the diver's centroid as possible, thus offering the best work-of-breathing available with back-mounted counter lungs. The JZ-System is equipped with water trap/dump, making it suitable for overhead environment and long/deep exploration dives.

The unique design of the JZ System opens up new configuration possibilities, including a dual rebreather setup option. Two independent scrubber stacks are worn on the diver's back; one is set up with the back mounted JZ System, while the other has standard over-the-shoulder counter lungs. A streamlined kit for those extreme expedition dives made possible by Hammerhead CCR.

At the heart of the Hammerhead CCR is a revolutionary new radial scrubber. The base model can hold up to 7.8 lbs (3.5 kg) of loose-fill 8-12 sorb. With a built-in floating compression ring, the system constantly "packs" itself, thus preventing channeling. A large annular opening allows easy pouring of the adsorbent material.

The team decided upon the use of Metalsub® quick connects for the tanks. In the USA, the unit comes pre-configured with Faber 3-liter steel tanks, but can be set up with any size bottles.

It is extremely easy to remove and replace the tanks with larger ones for extended range; and higher density batteries can be used in the Hammerhead controllers, giving up to fourteen hours of continuous use. Soon it will also be possible to install even larger scrubbers for expedition-level dives: Up to two extra pounds can be filled into the Expedition Scrubber that will be offered by the end of 2007.

A smaller, travel-friendly version (**The Hobo**) of the Hammerhead CCR is also available. The scrubber stack is shorter, and the smaller radial scrubber holds approx 3.5 lbs of loose-fill sorb, enough for a day of diving in recreational destinations. The Hobo still comes with all the bells and whistles of the "expedition grade" Hammerhead CCR.

Thoughtful ideas for protecting your gear during penetration dives come standard on the Hammerhead: O2 fittings that are right-angled to prevent damage in caves or overhead environments. Built-in filters keep salt

water and debris from entering your solenoid. A unique water trap design on all counter lung fittings ensures that even if you do get water in your system, it stays where it should. Super tough Cordura® wraps around a puncture / tear resistant internal bladder to protect the breathing loop from damage.

Simple, yet elegant - our ADV works in any position, flows like a champ under the most rigorous conditions, and is equipped with a shut-off valve as standard equipment.

One more standard feature that is not found on anything but a Hammerhead is an integrated BOV (Bail Out Valve). The diver can feed the fully adjustable high-performance Open Circuit Regulator with diluent, or an off-board source, gaining unprecedented convenience, safety, and the security of being prepared, no matter what the situation.

The Juergensen Marine Hammerhead CCR is, simply put, the finest commercially built rebreather in the world. Long the industry leader for Electronic Control and Decompression Computer systems, the bar has now been raised by one of the most trusted names in Technical Rebreather Diving.

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Technical divers Jamie Macleod & Stewart Oehl specifically designed the MV Trident for wreck diving expeditions into the Gulf, and with Jamie's book of "marks" have had great success. They find a new wreck on almost every trip, recently locating the USS Largarto, a WWII Balao class submarine missing for sixty years. Hundreds of years of maritime history are waiting to be discovered here. This is one of the few areas for wreck diving enthusiasts to have the rare opportunity to be the first to dive and possibly identify a major shipwreck.

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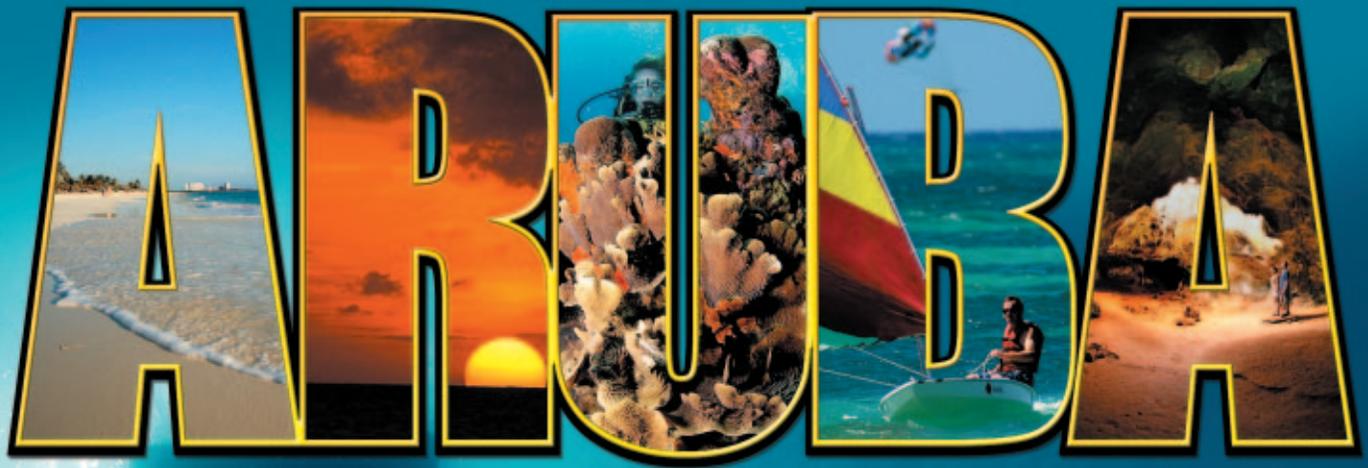
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ARUBA

REEFS & WRECKS

Text and photography by Curt Bowen

Today's modern Aruba is a vacationer's dream island, containing all the amenities for the worldwide traveler, special family vacations, and that never-to-be-forgotten week or two for honeymoon couples. Miles of white beaches and cobalt blue waters grace the poolside of mega hotels; bustling casinos are located at most large resorts, with a few open twenty-four hours a day; and five-star restaurants are available to nourish the senses and the taste buds. Aruba boasts an international cuisine, including the local Caribbean-style seafood restaurants. Local cuisine has its own distinction with the sharp taste of a local "yerbe hole" basil that brings out the best of the "catch of the day." Off the beaches, the island offers quaint historical village streets, colorful malls and bazaars, and rocking nightclubs.

Off the beaten path, further into the countryside, the true natural beauty of Aruba's desert interior is revealed, a landscape full of surprises containing beautiful desert landscapes, towering cacti, massive boulder piles, and old abandoned gold mines. Rocky cliffs line the opposite side of the island, enduring the relentless pounding of wind and waves. The ground shakes beneath your feet; thunder deafens your ears as enormous wind-driven waves smash onto the rocks causing soaring white explosions of water and salt spray.



But Aruba was not always this vacationer's wonderland. Caquetios Indians, of the Arawak tribe of Venezuela, inhabited this remote island for thousands of years until the Spanish explorer Alonso de Ojeda discovered the island in 1499. Like many good Spanish explorers, he and his crew quickly enslaved the local Indians, and transported many of them to Santa Domingo. By 1642, the 80-year war between Spain and Holland had ended, and the Dutch took possession of the island. In 1824, gold was discovered on the island, and a small gold rush took place. Along with the precious metal, Aruba also exported phosphate and aloe.

In 1928, another precious commodity was introduced to Aruba in the form of a massive oil refinery. Large deposits of oil were discovered under the shallow waters of neighboring Venezuela, and Aruba contained the closest protected natural deep-water port. Specialized smaller oil freighters were introduced, with wide flat bottoms that allowed the oil to be transported from the shallows of Venezuela to the refinery in Aruba. The oil was processed, then loaded into larger oil tankers and shipped around the globe.

May 10th, 1940, would change everything on this sleepy little island. Thousands of miles away, German paratroopers landed in Rotterdam and The Hague. German forces would cut through Holland and Belgium. On May 15, in Rijsoord, General Henri Winkelman of the Dutch General Staff signed the surrender of the Netherlands. The Dutch Army surrenders, and across the oceans the remote rock island of Aruba is flung into a world war.

On May 11th, 1940, unaware of the events in Europe, the 397-foot long, 2,164-ton German freighter Antilla was floating off shore of Aruba when she was surrounded by a flotilla of Dutch navy warships. When Captain Schmidt of the Antilla was ordered to surrender his ship, he placed explosives inside her hull. While disembarking with the forty-six members of his crew, several explosions rocked the ship and sent her to the bottom with all supplies onboard. The captain and his crew would ride out the remainder of the war as prisoners on the island of Bonaire.

The Wreck of the Antilla (60 feet)

The Antilla sits in the shallow waters a few hundred yards off the coast of Aruba, at 50 to 60 feet, with some of her wreckage almost sticking out of the surface. After 60 years under the water, she is covered with marine life including sponges, corals, and smaller fish. Close inspection of the wreckage reveals a large engine room, a single propeller, deck winches, and a multitude of pipes. The wreck is an excellent location for wide-angle and macro photography, as well as the perfect location for new wreck diver.

The Wreck of the Pedernales (30 feet)

Torpedoed in 1942 by German submarine U-156 under the command of Captain Werner Hartenstein, the oil tanker Pedernales originally sat in shallow waters. Most of the wreckage was salvaged after the war, leaving only a small section of the original wreck behind. Because it is located in only 30 feet, it is heavily encrusted by marine life and full of color for any macro photographer.

The Wreck of the Jane Sea (90 feet)

This 200-foot steel-hulled cement freighter was sunk in 1988 to form an artificial reef. It rests in about 90 feet of water, in a thick grove of various corals. Recent storms have turned over the stern revealing the single prop. The rest of the ship lies on her starboard side. Divers can explore her many cargo holds and unique bow section.

The Star Gerren Wreck (65 feet)

Built in 1962, this 225-foot German-built ship lies on its side in only 65 feet. The wreckage is an excellent location for schooling fish, barracudas, and angelfish.

The Tug Wreck (90 feet)

One of Aruba's most popular sites, a large tugboat sits in 90 feet, and is an excellent dive for the advanced

diver and macro photography enthusiast. Millions of small crustaceans, corals, and fish swarm this interesting wreck.

Aruba is surrounded by millions of years of coral growth. Almost every inch below the waves is covered with some type of colorful scenery. The island's main dive facilities have hundreds of shallow and deep reef sites just minutes from the shoreline.

Red Sail Aruba offers morning and afternoon two-tank dives to all the normal dive locations.
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Of course, one of my main goals in visiting the island of Aruba was to search for hidden deeper secrets -- wrecks and underwater caves that are never seen due to their extreme depths or remote locations. I quickly connected with a few locals who spoke about a couple of deeper oil freighters that were sunk by German U-Boats someplace just outside the refinery in the 200-300 foot range. A chance to discover something no other has seen since 1940...an excellent reason to return!

Dive Operations

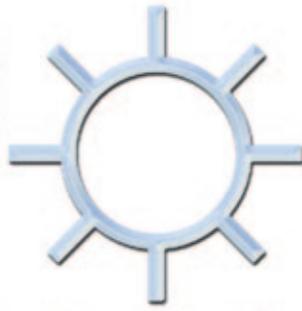
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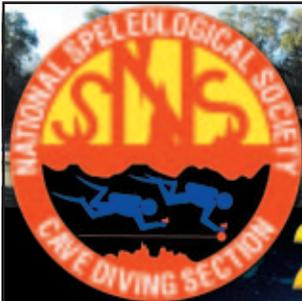
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Text and Photography by Tamara Thomsen

Ice Diving 101

With my roots firmly planted in the Upper Midwest, a midwinter trip to the tropics for a dive vacation only mildly satiated my appetite for the underwater world. For me, it wasn't reasonable to simply pack up my dive gear and wait for warmer weather in order to dive at home. The one thing that helps me through Wisconsin's five months of winter is ice diving. I guess that the divers up here are all some distant cousin to Paul Bunyan, typically having handy a hearty pair of long johns and a chainsaw. So, come late November or so, the motto of the northern diver changes to "Have chainsaw - will dive."

Ice diving welcomes you to a never-ending dive season, opening up opportunities to access favorite dive sites year-round. Sites that during the summer months are plagued with heavy boat traffic or poor visibility are now readily accessible. Objects lost through the ice such as ice shanties, snowmobiles, or vehicles can be recovered - a potential money maker for the savvy diver.

I've learned that as long as you play by the basic rules, diving under ice can be one of the safest of diving activities. If a problem occurs, after only a few swift tugs on the line tethering you to your access hole, your tender will send you flying, pulled for the light of the hole, and yank you out onto the ice sheet like a hooked fish. As only three or four divers dive at a time, standby divers are always available to tend to your needs.

Ice diving is nothing short of a small scale expedition. Preparation is key, and by far the most time consuming aspect. Nothing is worse than towing all your gear out onto the ice sheet only to find that a basic item was forgotten. It is a walk of shame having to leave your buddies to brave the chill on the ice while you walk back to the truck; or worse, have to drive back to the dive shop.

Besides the normal list of dive gear, my list of specialty items for ice diving looks like this:

Chainsaw • Gasoline/Oil • Axe • Ice Auger • Ice Chipper
Crampon • Sand • Block and Tackle • Ropes
Rope Minders • Carabiners • Ice Screws • Shovel
Chest Harness • Portable Ice Shanty • Propane Heater
(with full propane tank) • Extra Mittens/Hats
Extra Dry Clothes/Fleece • Hot Water in a Thermos
Extra Regulator • Extra Tanks
Full Face Mask (if it is really cold) • Dawn Dish Soap
Portable Chairs • Chemical Hand Warmers
Tarps • Dry Suit • Extra Thick Dry Suit Undergarment
Dry Gloves • Glove Liners • Small Snowblower (if there
is a lot of snow)

Before you pack up and head out on the ice, there are several advance preparations that must be attended to.



Not every piece of dive gear is suitable to handle the extreme temperatures of ice diving straight out of the box. Some regulator manufacturers suggest a simple adjustment of intermediate pressure to better tolerate the cold. Others suggest the addition of an environmental kit to the first stage. These kits, however, may use silicone to prevent freezing, and render your regulator incompatible for Nitrox use.

Make sure that the blades of your ice auger, axe, and chipper are sharpened. Check that there is propane in the heater tank. The chainsaw is one of the more important items and should also be carefully checked – the bar oil, spark plug – and make sure it starts and runs easily. A recon to check the ice thickness should be made ahead of time to make sure the chainsaw blade is long enough to cut all the way through the ice. Last winter the ice was 28 inches thick. With only an 18-inch blade on my chainsaw, I hired a friend, a tree trimmer by trade, to tackle the job of cutting the hole.

It is best to dive in locations you are familiar with to ensure adequate depth and suitable bottom composition. Dive sites with strong currents should be avoided, as this will make it difficult to impossible to return to the exit hole. When you arrive at the site, first drill a test hole with the ice auger to check the ice thickness and quality. Make sure you lower a weight on a measured reel through the test hole to check the depth of water. Some bodies of water are lowered during the winter to prevent ice damage to shorelines. This will ensure that the dive site is deep enough to avoid stirring up the bottom with fins while entering the water.

Ice six to eight inches thick will support the weight of people standing on it, while ice greater than twelve inches thick will support the weight of vehicles. Be aware that the cumulative weight of dive gear, vehicles, and people concentrated around the hole can cause the ice to sink or crack. Exhaled bubbles from open circuit divers under the ice will cause deterioration and further weaken the ice. Ice near shore or around breakwaters, piers, and pilings is generally weaker. Water currents caused by springs or rivers will thin the ice and cause thickness to vary. Changing temperatures also weaken ice and may cause cracks. It is best to watch the weather forecast, and choose a day following consistently cold temperatures. Late season ice that has experienced many freeze/thaw episodes may become rotten and honey-combed. This is the most dangerous ice as whole chunks will rot away or break off. Two years ago on a late March ice dive in unseasonably warm weather, we noticed the ice all around us seemed to instantly turn blue. Luck apparently was on our side because as the last equipment was removed from the ice, a booming crack developed leading out to open water, and within thirty minutes the ice that we had been standing on cleaved off! By the next day no ice was visible on the lake.

Once the site has been selected, it is time to cut the hole. The lucky diver selected to cut the hole should dress in a dry suit and safety harness. He should be tethered to warrant against accidentally falling in. Scribe the outline of the hole with an axe or chipper before you begin to cut. Some divers elect to tether the chainsaw as well, but problems may arise with entangling the tether. If the chainsaw blade does end up too short, then blocks will have to be cut and chipped away before the second and final cut can be made to access the water.

An ice diving hole is not circular. The best shape is actually an equilateral triangle with edges approximately eight to ten feet long. The triangular shape facilitates divers exiting the water. A diver can move into a narrow corner and, with hands on either edge, kick up onto the sheet. If the diver cannot get out by himself, he can back into the corner and a tender can pull him out by his tank valve/manifold while he pushes up with his hands. The hole needs to be large enough to accommodate three or four divers. Extra care should be taken in cutting the corners of the hole – over-cuts may result in the safety lines becoming stuck in the grooves.

The ice from the hole should be cut into small blocks and removed by prying out with the ice chipper or pulled out with a combination of ice screws and block and tackle. The ice blocks can then be used as part of a windbreak, and stored for later replacement into the hole. Although it is tempting to simply push the blocks under the ice, there are several reasons this is not a good idea: 1) Blocks under the surface may freeze to the ice, and it will not be possible to be replace them into the hole. 2) Divers can bang their heads on the blocks. 3) Ice blocks can work their way loose, and end up back in the hole during a dive. 4) Safety lines can become jammed amongst the blocks, making signals impossible to interpret.

A cool trick that I learned is to put a drop of Dawn dishwashing detergent into the water of the freshly cut hole. This will dissipate any oil from the chainsaw, keeping it away from dry suit seals and other petroleum-vulnerable gear. Once the hole is cut, the next step is to clear snow from the immediate area. A 20-foot radius around the hole should be shoveled clear to allow for better light penetration and to prevent wet dive gear from freezing to the snow. It may seem obvious, but don't set anything you want to keep dry in the snow or directly on the ice – it will melt underneath. Tarps are great for keeping items off of the ice. Sand should be scattered around the hole to increase traction, and crampons can be worn, if you have them. The ice tends to sink around the edges of the hole and water will get on its surface, making it very slippery. Along with shoveling in the immediate vicinity of the hole, a large circle 100 feet around the hole should be shoveled clear, with several radial spokes in toward the center, making a "wheel" pattern. This pattern will help a lost diver find the hole, if separated from the tether, and will provide greater light under the sheet. Depending on the thickness of the snow, another circle can be shoveled closer to the hole to allow for additional lighting.

I have seen some interesting and elaborate ice shanties created for diving. Some allow divers to actually sit inside, suit up, and access the hole from inside the warming shelter. Inexpensive pop-up ice shanties can be purchased from a local sporting goods store, and provide adequate shelter from the wind and cold while changing clothing. If propane heaters are run inside the shelter, be sure to consider exhaust ventilation. No shelter material, extra clothing, hats, or mittens should come in contact with the heat source.

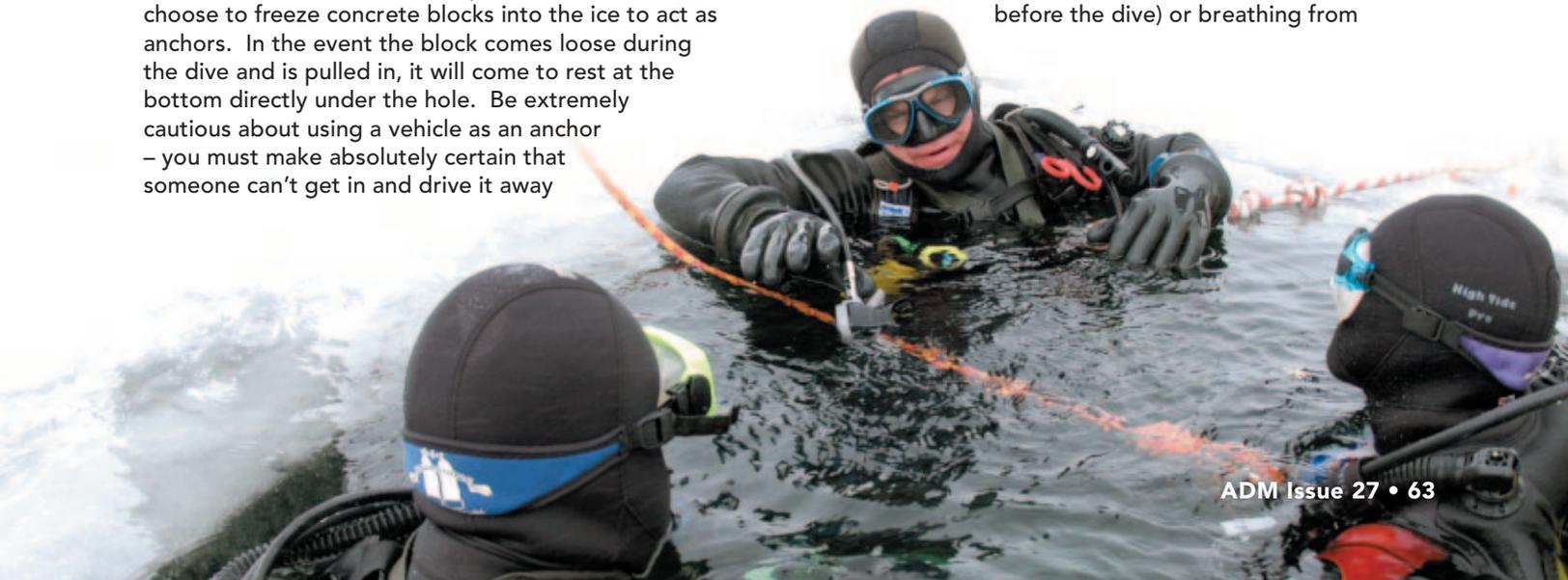
Primary tether lines should be 100 feet in length and a minimum of 1/4 inch in diameter. Thicker line is easier to manage while wearing heavy gloves. The safety/standby diver should be tethered on a 200-foot line. Brightly colored line is more visible through the ice sheet, and makes it easier to track the progress of the divers. Ideally, the line should be stored in a large-mouthed line bag, a milk crate, or on a garden-hose reel. The end of the line should be secured to the catchment, and the entire device should be anchored to the ice with ice screws, or tied to a fixed object on shore to avoid pulling it in. Some divers choose to freeze concrete blocks into the ice to act as anchors. In the event the block comes loose during the dive and is pulled in, it will come to rest at the bottom directly under the hole. Be extremely cautious about using a vehicle as an anchor – you must make absolutely certain that someone can't get in and drive it away

while divers are in the water. For whatever line storage device you choose, the tender must be able to easily see how much line is remaining, and must have a quick and tangle-free way to stow the line. One buddy team operates off of the same line. A knot with a locking carabiner is tied approximately 10 feet from the end for the lead/signal diver. Another station for the buddy should be tied with a locking carabiner onto the end of the line.

Decompression typically isn't the limiting factor for ice dives, but rather the ability to withstand the cold water temperatures. Dry suits are suggested for prolonged exposures, with the addition of dry gloves and extra warm undergarments. If chemical heaters are added, caution must be taken to avoid direct contact with the skin. Be aware that many chemical heaters are oxygen-fueled, and increased partial pressures of oxygen may cause hyperactivity of the heater. If you are inflating your dry suit with Nitrox from your primary tank (as opposed to a dry suit inflation system utilizing argon or air), burns may result, even through layered clothing. A safer option for suit heating is commercially available suit heaters, like those available from Patco, Inc., or Golem Gear which operate off battery packs wired into variable sized heating pads running through a bulkhead connector. If wetsuits are worn, warm water can be poured into the suit and gloves to help maintain body temperature during the dive. Warm water should be added immediately prior to entering the water, and care should be taken not to burn the diver. The warm water should be kept handy and can also provide a quick fix for frozen inflators and free-flowing regulators.

Commercially available chest harnesses can be used, or one can be fashioned out of a long piece of webbing tied into a loop, crossed in the back, figure-eighted through the arms and connected in the front with a locking carabiner knotted to the safety line. Many divers choose to add an additional weight belt buckle to their belt to avoid accidentally dropping weights during the dive. Redundant air sources such as pony bottles, H (or Y) valves, or double tanks are often used during ice dives.

Because outside temperatures can be colder than the temperature of the water itself, divers who are not submerged should avoid using a power inflator for wing inflation (oral inflation only should be used before the dive) or breathing from





regulators until fully submerged. If a free flow occurs, turn off the tank immediately and pour warm water over the first stage, into the second stage, and onto frozen inflators. Once these items are thawed and significantly warmed, then the tank can be turned back on. When the team enters the water, they should remain near the hole for a minute or two for a period of acclimation to ensure the proper function of regulators and to get used to being under the ice sheet. The dive team should follow the rule of thirds for gas management – use no more than two thirds of their total gas during the dive, allowing an adequate reserve for emergencies.

The divers enter the water as a team on one rope. When swimming, the divers should stay in the same position relative to one another. Divers on individual ropes may lead to entanglement, if lines are crossed underwater, when divers do not stay in the same relative position. The signal (or lead) diver is clipped into the line at the first station 10 feet from the end of the line, and the buddy is clipped to the carabiner at the end. If visibility is limited, the buddy may take up slack in the line between the divers and hold it coiled in his hand during the dive. The signal diver's responsibility is to relay messages to and from the tenders, and then to his buddy. Common signals that are used are: One tug = let line out. Two tugs = ok. Three (or more) tugs = take line up / recall divers back to hole. Any set of signals can be used as long as they are agreed upon prior to the dive. Single line tugs tend to be difficult to interpret and easily confused with line drag on the ice edge,

therefore signals should be strong and distinct. The receiver should always repeat signals that are given. It is important for the tender to keep the line relatively taut and maintain constant line awareness with the signal diver. Communication every few minutes will prevent line from becoming fouled on underwater obstructions. If there is no response to a signal given by the tender, it should be assumed that the dive team has separated from the line, and the safety diver/team (standing by) should be dispatched. Tenders should not pull all the line in if the divers become separated from the line, as it can be used by the safety divers to help locate the team.

If a diver (or dive team) becomes separated from the line, he should ascend to the ice sheet and look for the shoveled wheel pattern. While ascending, the diver should keep a hand above his head to prevent crashing into the ice. He should look only briefly for the wheel pattern and then wait under the ice sheet to conserve gas, looking for the safety diver or safety diver's line. Only if it is obvious should the lost diver progress toward the hole. The safety diver will follow the dive team's line out and sweep around at the extent of the snow pattern keeping just under the ice sheet at the surface. Only if necessary should the safety diver search the bottom. The search should continue until the safety diver has used two thirds of his gas, or the divers are found.

The tender's responsibility is not only to respond to signals from the dive team, but also to pay out and

repack line. At the beginning of the dive, the tender should ensure that the divers are securely tethered. Gentle tension should be maintained on the line at all times to avoid slack and to feel any communication, but the tension should not limit the divers' ability to move freely underwater. The line should be maintained free of ice, and prevented from freezing onto the ice surface by immediately repacking the line into the holding device. The hole will also need to be maintained by the tenders, and kept free of floating ice.

I find that the most interesting place to explore during an ice dive is directly beneath the ice sheet. Ice ridges, abandoned fishing holes, cracks and freeze-overs all provide interesting areas to look. By far the most fascinating time to ice dive is on freshly frozen "black ice." It is like diving under glass, and can provide fantastic photographic opportunities.

Many divers play ice diving games. Upside down underwater golf uses ping-pong balls instead of golf balls - divers flip upside down, stand on the ice sheet and putt into augured out holes. Upside down underwater water skiing has divers swim out the distance of the line, invert, stand on the ice sheet and tug the line three times. The tender and friends then take off running with the line towing the diver water ski-style back toward the hole at a rapid rate!

When the fun and games are done, it is time to close up the hole. Replace the ice blocks into the hole, and fill in the cracks with snow. Mark the hole with branches, poles, or a snow fence – anything to make others aware of the open water. If you are leaving poles or a snow fence on the ice, it is important to return within a few days to recover them. Review the list of items that you brought out on the ice so that nothing is forgotten or misplaced in the snow.

It is important to check with local authorities before ice diving. Some municipalities have laws regarding vehicles on the ice, and flotation required for passage over the ice. Additionally, there may be regulations regarding cutting and repairing the ice. Be aware of warnings issued, and consider the weight-bearing ability of the ice.

I hope that these few tricks that I have learned along the way will make ice diving safe and fun for everyone involved. Understand that there are as many different techniques for ice diving as there are ice diving instructors. This article was written to provide divers with new ideas and thoughts to improve your own ice dives, and is in no way intended to replace proper training.

Tamara Thomsen manages the North American Office for Delta P Technology, Ltd., makers of the VR2 and VR3 Dive Computers (www.vr3.co.uk). Owner of Diversions Scuba in Madison, Wisconsin (www.diversions-scuba.com), she teaches Ice Diving classes as well as technical diving courses through Technical Cave and Advanced Trimix.



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BENT!

Patent Foramen Ovale

By Bruce Konefe, Douglas Ebersole M.D and Kim Smith.

What exactly is a Patent Foramen Ovale (PFO)?

Between the upper chambers of the heart (the atria) there is a wall called the Atrial Septum. As the heart is developing in the womb, this wall between the two atria grows in two parts. One part grows up from the bottom, and the other grows down from the top. These two parts actually overlap, making a trap door. In a fetus, the pressure on the right side of the heart is greater than on the left, so blood flows across this trap door unimpeded. At birth, the lungs expand which drops the right-sided pressure lower than the left side, and the trap door slams shut. In most people, these two walls then fuse together over time.

How does this affect us as divers? When this valve does not seal properly, it allows the nitrogen bubbles to bypass the lungs. If the nitrogen bubbles are not off gassed through the lungs, the diver will have excess bubbles, and possibly get DCI.

What are the chances that you might have a PFO Valve? In roughly 20% – 30% of people the walls never fuse, and this trap door remains.

Are there any symptoms associated with a PFO? There are usually no symptoms. The best way to find out whether you have a PFO is to have tests performed at a hospital.



These are a few of the most common ways to get tested:

The **Transcranial Doppler (TCD)** test takes the least amount of time to perform, and causes the least discomfort. An ultrasound probe is placed on the temple near the ear. Then an intravenous solution of saline solution is given that contains very small micro bubbles. This procedure can indicate whether the micro bubbles are passing through the unsealed valve, or whether they are being filtered out in the lungs.

The **Transesophageal Echocardiogram (TEE)** An ultrasound probe is inserted down the throat in order to view the valve. A saline solution is injected to help view whether the foramen ovale has been sealed or not.

A **Transthoracic Echocardiogram (TTE)** is an ultrasound of the heart done from the surface of the chest wall. An ultrasound probe is placed in various locations on the chest usually along the left side of the sternum (breast bone), under the left nipple, and just below the sternum, and ultrasound images are taken. Again, a saline solution is injected to help view whether the foramen ovale has been sealed or not.

If I am a Diver should I get this test done?

Some people have a PFO, but have never experienced any DCI or had any problems. However, this does not preclude something happening. It is suggested that you speak to your personal physician about confirming whether you have a PFO or not.

If a test confirms a PFO, there are a couple of ways that it can be repaired:

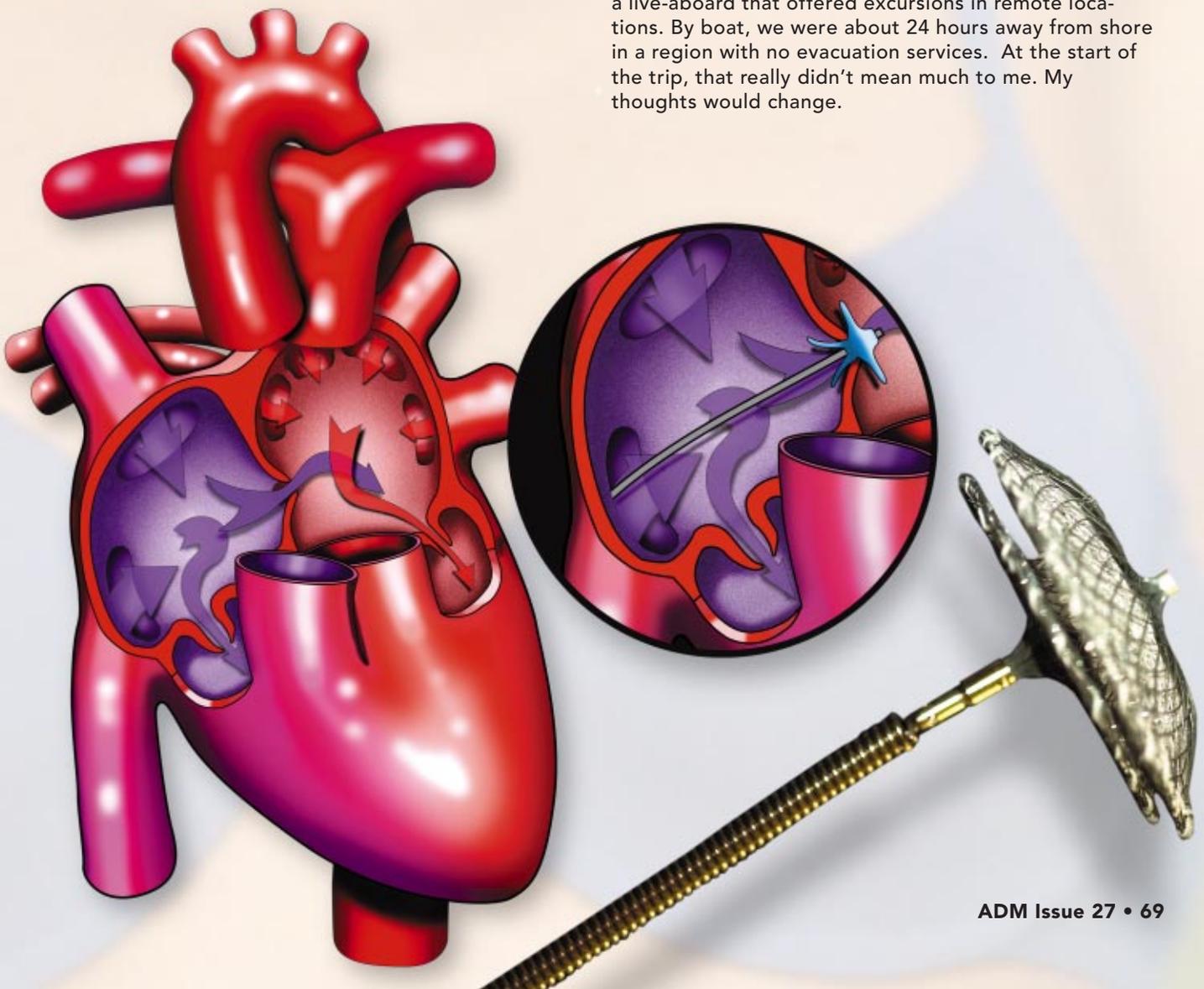
Surgical closure – A open heart surgical procedure to close the valve with a suture.

Percutaneously – A non-surgical approach through an IV catheter in the leg with placement of a “clamshell”-like device across the interatrial septum

Real Life Experience by Kim Smith

So, you want to know if you have a PFO? Basically, there are two ways to find out: get checked, or get bent. Having done the second, I would recommend the first.

It happened on a dive trip last fall. My dive buddies, Kevin, Drew, and I were booked for a week of diving on a live-aboard that offered excursions in remote locations. By boat, we were about 24 hours away from shore in a region with no evacuation services. At the start of the trip, that really didn't mean much to me. My thoughts would change.



This was an overseas trip for me, so upon arrival I was both tired and dehydrated. To make matters worse, my sinuses were feeling rather stuffed up. Most people would have done the smart thing and sat out a day or two of diving. But as it was a long journey, and there were limited days to dive, I fixed up a nice drug cocktail and chose to force my ears to equalize. I realize that I'm opening myself up for criticism, but that's ok. Most divers eventually find themselves in a situation where the decision they make isn't the best one. This certainly wasn't the first bad diving decision that I had made, and probably won't be the last. But I hope this one won't be repeated.

We completed three uneventful dives over the course of a few days. On those dives, I noticed that it took longer than usual to equalize. It was getting worse with each dive, which forced me to push my sinuses even more.

The morning of the dive in question, I still was not feeling up to par. The weather conditions were a bit rough, which brought on mild seasickness. Still feeling a little stuffed up, I took a Sudafed to help me clear. Ironically, my ears worked perfectly this dive, and I didn't have to force them at all. Perhaps I should have avoided the fancy drug cocktail and just taken the Sudafed in the first place?

The dive plan was to hit the water around 11:30 and do a 70-minute dive in the 200-foot range. After a perfect dive with beautiful crystal clear water, a multitude of sharks and tons of sea life, we surfaced. The conditions were still fairly choppy, making entry back onto the pitching vessel extremely difficult. It seemed as though it took hours just to hand up one of my bail out bottles. After all that effort, I decided to climb out of the water wearing my other bailout bottle and my rebreather. Up until that point, I had considered myself to be fairly fit. Well, my pants size may have stayed the same, but my fitness level had obviously diminished. I made it onto the first rung of the ladder, trying to move

up, but discovered that my strength just wasn't there. After struggling to get higher, the crew was able to take some of the weight. It was then that I noticed my body trembling. Heck of an adrenaline rush, I thought. But that's not what it turned out to be.

I dropped my gear on the bench and caught my breath, still feeling shaky. Thinking it would pass after rest and food, I ignored it. After lunch, I left the boys at the table and went to check my gear.

The vessel was over 100 feet long. Walking the length to the stern, I felt off balance, and deep down had a bad feeling. But with the boat still rocking, it was easy to tell myself that it was just seasickness. At this point, my body was still trembling. I've been seasick many times, and can easily recognize the symptoms, but it was hard to ignore how much worse the queasiness was. If I sat down and looked at the horizon, if this were normal, I should feel better...but the world kept spinning; in fact, it got worse.

You know how we wonder whether we are bent or if there is a problem? Well, let me tell you, there was no doubt! I knew that I was either bent or had a serious inner ear problem, and knew that I needed to tell someone, anyone, in a hurry. If this really were decompression illness, it could get much worse. As quickly as possible, I made my way back to the bow of the boat where the dining room was, hoping the boys were still there. Luckily, they were, because I was in no condition to go looking for them. I walked up, interrupted, and said, "I don't feel right." Boy, did that get their attention! There was no joking, no delay, no teasing, and no messing around. Kevin immediately started asking me questions, and did a neurological test.

At that point, we weren't certain that I was actually bent. With the punishment that my ears had gone through in the previous days, there was a distinct possibility that the problem was vertigo, and that seasickness was making it worse. Our dive profile was





conservative, and there were no unexpected problems on the dive. But in the back of our minds was the fact that I hadn't needed to push my ears on that last dive.

I recall that Kevin asked me if I felt nauseous. At first I didn't; but moments later, I knew I'd be sick. It was shocking how quickly it was progressing. Moving to my cabin, with Kevin right behind me, it was only moments before I started vomiting violently. I had never been that sick, ever. The world was upside down and spinning. The first hour (or so I have been told) was the worst, with projectile vomiting into a bucket every few minutes leaving me unable to stand, sit up, or take in any water.

After that first hour, my condition started to improve. I was still vomiting, but without the violence, and was able to keep water down. The boys forced me to get up and visit the toilet to ensure that I could urinate. That was important as it meant that my nervous system was functioning properly. Luckily, I could.

From the time that I announced that I wasn't feeling good until well after my recovery started, one of my buddies was with me at all times. If you are planning a trip to a remote diving location, where there is no emergency access by ambulance or helicopter, something to think about is the caliber of people you are traveling with. If there is a problem, are they going to stay with you and do their best to ensure that you will be ok? Do they know how to treat DSI? Do they know how to recognize the symptoms for what they are? Does someone have a first aid kit with an oxygen mask, and do they know how to use it? As I lay there feeling like crap, my brain was functioning enough to know that I was fortunate to be with two guys who knew what to do, and were there to do their best for me. Due to our location, emergency evacuation to a chamber was impossible. Our only option was a slow return to shore, which we commenced.

While Kevin stayed with me, doing the neurological tests every so often, Drew set up his first aid mask with an 80 cu ft tank of oxygen. Over the course of that day and the morning of the next, I drained that 80. Drew was in charge of anything that required leaving the sick room, and was the one responsible for logging information. They explained it afterwards: One person would be

the primary provider, on the front line with the sick person, and the other would be the assistant, delegated to run errands, keep the data log, and deal with other issues. This way the primary provider monitors the sick person from the start of the illness, and can better tell if he is getting worse or better.

The information that Drew logged was basically everything: when I started vomiting and how often, when I slept, when awake, when the oxygen was on or off, when I smiled, and when I seemed more stressed out.

The neurological tests that Kevin conducted consisted of three parts. The first determined whether I could do basic body movement, such as rotating my wrists, moving my arms and legs, and moving my head from side to side. This included strength tests that consisted of me squeezing Kevin's hands with both of mine, and pushing each of my legs against him.

The second test was checking hand/eye coordination such as stretching my arm out to the side and then touching my nose while my eyes were closed. Another was focusing my eyes on a pencil that was being moved side to side while holding my head still. Had I failed any of these tests, it would have suggested that a bubble had impaired my nervous system. Luckily, I did fine.

The third neurological test was to determine whether I had proper sensation to my skin. While my eyes were closed, Kevin used a sharp object (a paperclip) and a blunt object (Drew's dive pencil) to poke me. I was to tell him which object he touched me with, sharp or blunt. He started on the bottom of my foot and worked his way up my leg. Then he did the other one. It all went ok until he got to my right leg. I couldn't feel a thing! But that's normal for me as I have lots of scar tissue from an old injury. That gave me a laugh.

Re-hydration was also a key factor in my recovery. Due to the amount of fluid that I'd lost, it was very important to take in some electrolytes. Kevin made some horrible tasting cocktails that went a long way in dealing with this.

Fortunately, my health improved quickly. By that night I was able to eat a bit, and force myself to sit up even though I was still dizzy. Kevin described my symp-

toms and said that I probably had either a vestibular or inner ear bend, or I had damaged something in my inner ear while diving. For each symptom that suggested a vestibular bend, there was an equally clear reason that it could be something else. As our dive profile was conservative, we really didn't have any reason to expect a bend. He did mention that people who get a vestibular bend often have a PFO, and that it would be good to find out.

Initially, my balance came back very quickly, improving by the hour. The day after the accident, I made it up top and had dinner with the rest of the group, making the decision not to return to shore immediately. I spent the balance of the trip relaxing, reading, chatting, napping, and — oh yes — watching the boys gear up for diving. All in all, it probably took a week or so for me to feel somewhat normal. With all the traveling that I was doing, and the normal expected fatigue, it really was difficult to tell.

Upon my return home, I contacted a dive buddy of mine who, among other things, is a hyperbaric physician. He sent me for tests, and the bubble study performed at the local hospital confirmed that I did indeed have a PFO, with the technician commenting that it was the biggest shunt that she had seen. Go figure.

I was also scheduled to see an ear, nose, and throat (ENT) specialist to determine whether there was any permanent damage to my inner ear. That doctor confirmed that I have slight but permanent damage on my left side; it shouldn't affect my balance too much.

My accident was in October 2006. Following it, I saw the ENT specialist, was referred to a vertigo specialist, had a bubble study done, a Transesophageal Echocardiogram, met my cardiologist, and finally had my surgery June 2007.

The surgery itself was pretty straightforward. I checked into the hospital the morning of the procedure, and by early afternoon was walking out looking for a cab. The surgery took only fifteen minutes, and I was awake the entire time. I was a bit uncomfortable for about 24 hours; but within a week, I felt completely normal.

Waiting for the bubble study was probably the hardest part of this event. While ill, I just wanted to get through it and didn't dwell on why it happened. Afterwards, I wanted answers! Was I bent? If I was, did I do something wrong? It was pretty tough analyzing that day's events over and over again, and wondering whether I'd screwed up. When it was determined that I did have a PFO, I felt ecstatic. I'm pretty sure that I yelled out loud. It gave me closure.

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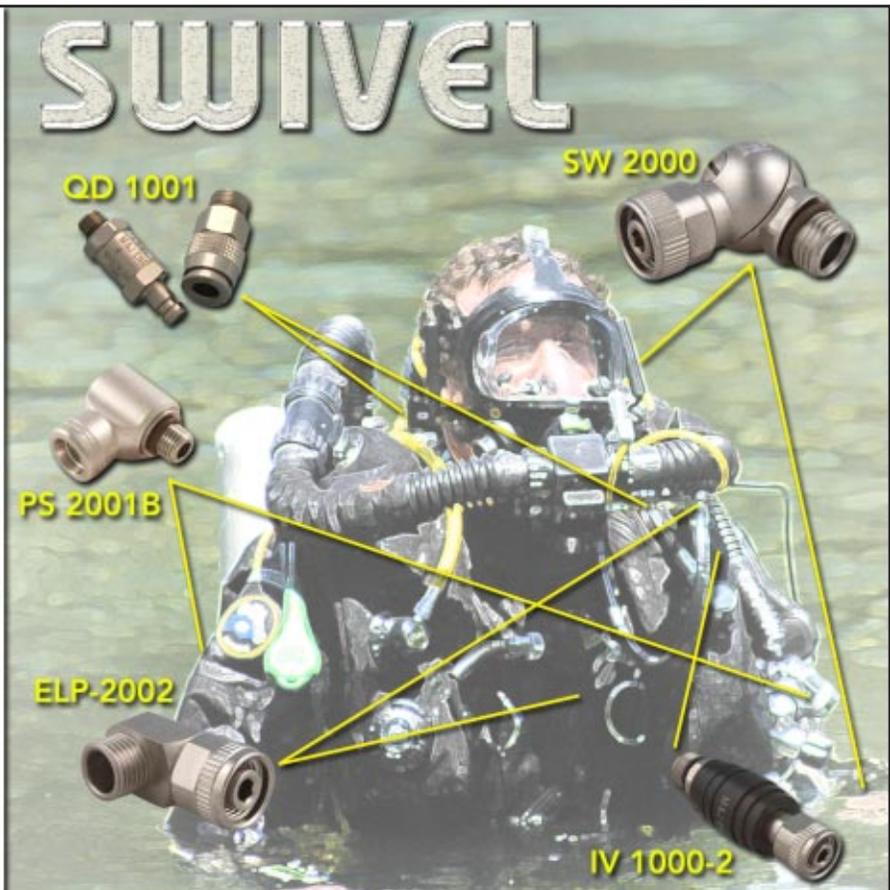
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Alaska's Wreck of the *State of California*

Article by ADM Photojournalist Mel Clark

Alaska is known world wide as a pristine last frontier. Many hardy souls have braved her rugged terrain and surrounding seas to seek their fortunes in gold, and it was here that the story of the *State of California* ended on August 17th, 1913.

The *State of California* was built in 1879 for the Pacific Coast Steamship Company. In 1913, she was on one of her customary runs from Seattle to Skagway, Alaska, with numerous ports of call in between. The day of the catastrophe, the ship's manifest indicated the *California* having seventy-two crew and seventy-four passengers.

One of the normal stops on this route was the Admiralty Trading Company Cannery, located at Gambier Bay. Here the *California* unloaded three tons of

cargo, and picked up four passengers. She departed the pier at 8:25 a.m. at dead low tide. Four minutes later, and less than a quarter mile from Point Gambier, the ship struck a shallow rock shoal called the Pinnacles.

Quickly taking on water, the life boats were lowered as Captain Cann attempted to run the ship onto a nearby rocky shoreline in a last ditch effort to save her passengers and crew. Unbeknownst to the good captain, a sheer rock wall loomed just beneath the waves long before the intended shore. Pile driving the ship full speed onto the rocks caused the air below deck to explode upwards, ripping the bridge and much of the top cabins away from the ship. Within seconds, the whole ship was swallowed beneath the boiling white seas.

There are conflicting reports about the total loss of life. Some say thirty-five souls were lost, while others say thirty-one. The official report from the Department of Commerce and Labor, file number 1197 of September 4th, 1913, stated thirty-one fatalities. This report also detailed that several may have lost their lives from exposure after being tossed into the cold water or struck by flying debris.

Deep inside the forward hold, Curt McNamee, KISS CCR Technical Diver, finds one of the ship's spare anchors covered with rusticles from being submerged for over 90 yrs.



Diving the wreck of the *State of California* was an exciting opportunity. I quickly assembled a team of many of my usual suspects for this technical expedition, including Curt McNamee, Jerry Whatley, Erik Foreman, and Dave Mitchell. Dave Mitchell, owner of "the Scuba Tank," Juneau's only dive facility, was our gracious host and local wreck expert.

Due to the wreck's remote location, this ccr-trimix expedition required quite a bit of pre-planning and supplies to accomplish successfully. Since most of the team was located in Seattle, Washington, the best way to get the required supplies to Juneau was to ship them by barge on pallets. The ending result was two pallets of equipment weighing over 1,000 pounds for four rebreather divers. This was over and above the equipment we could fly in with. Dave's response to this was, "Did ya pack the kitchen sink, too?" He, of course, was the unlucky guy who had to deal with our shipment when it ultimately arrived a week later in Juneau.

Once arriving in Alaska, Dave and his wife, Carleen, along with their two boys, Trace and Cody, allowed us to set up base camp in their home's garage, located just minutes from the majestic Mendenhall Glacier. Like a swarm of locusts, we soon overran the rest of his formerly quiet household.

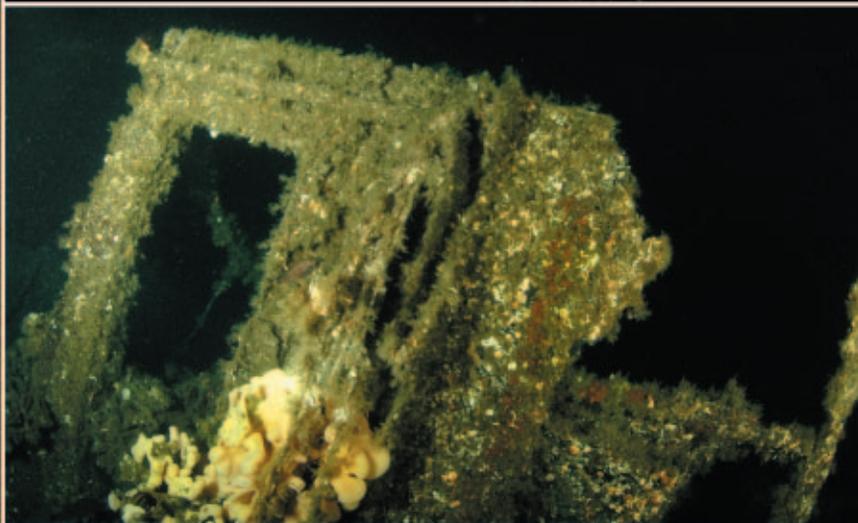
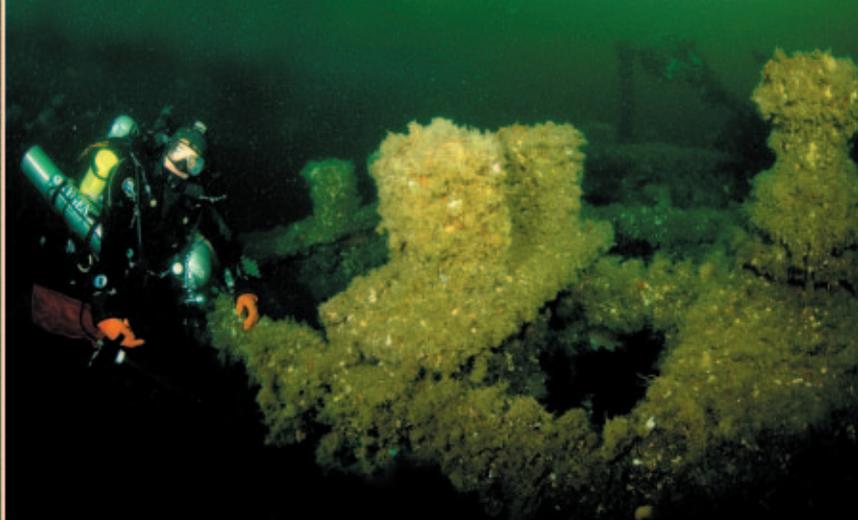
As on most expeditions, day one is designated as "shake-down day." A day used to assemble equipment, fill tanks, and conduct a simple pre-expedition dive. Loading our gear aboard Dave's Hewescraft, a 26-foot aluminum boat named *Decompression*, the team headed out to the wreck site of the *Princess Sophia*. Fortunately for Erik Foreman, we had this planned as a "test the gear" day as his drysuit zipper decided to fail. Fortunately, Dave's dive shop was able to fix him up. It was also during this dive that our team was able to experience the elusive prowfish - but that is another story.

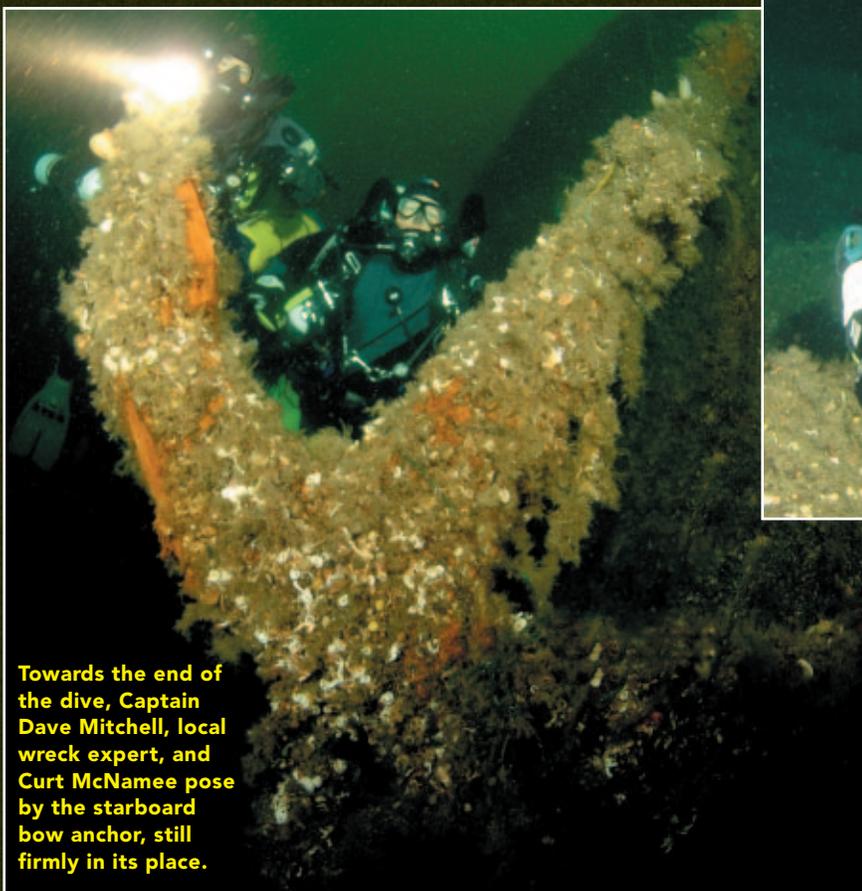
Top Right: Erik Foreman, KISS/Megalodon CCR Technical Diver, locates one of the ship's aft mooring stations at 210 feet.

2nd Down Right: Some of the remains of one of the forward cabins torn from the ship by the massive air explosion caused by the bow crashing into the underwater rock wall.

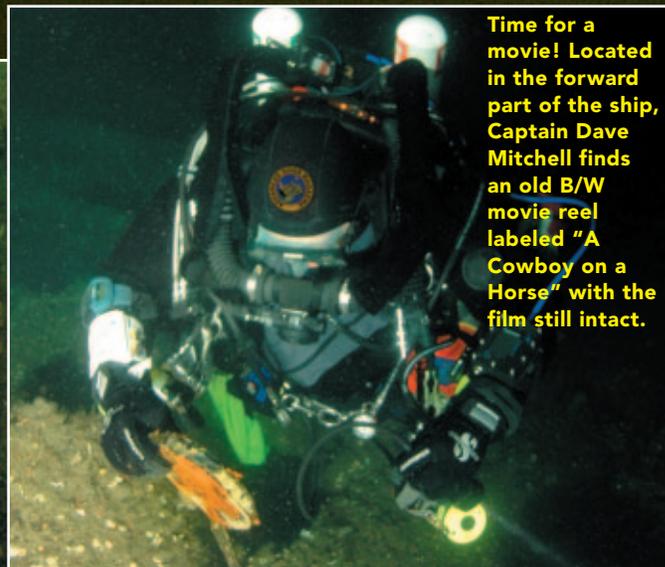
3rd Down Right: Starboard side wreckage becomes a perfect habitat for fish and other marine life.

Bottom Right: Flowing over the wreck for over 90 years, the nutrient-rich Alaskan water has produced this gigantic cloud sponge that is located mid-ships at 160 feet.





Towards the end of the dive, Captain Dave Mitchell, local wreck expert, and Curt McNamee pose by the starboard bow anchor, still firmly in its place.



Time for a movie! Located in the forward part of the ship, Captain Dave Mitchell finds an old B/W movie reel labeled "A Cowboy on a Horse" with the film still intact.

We arrived at the wreck after a three and a half hour journey. After considerable "mowing the lawn" (a phrase used by some to describe a search pattern by boat captains to find a wreck) with the depth sounder, and using some cryptic notes as to her general location, we finally saw her shape appear on the depth finder. But not before any number of thoughts went through our minds about having made it this far only to get skunked now!!! Captain Dave quickly hooked the ship on the starboard side.

Alaska is known as the "Land of the Midnight Sun" in the summer. Well, I can say this is far from the truth. Juneau, Alaska, at 4:00 a.m. is incredibly dark. I know this as fact because this was the ridiculous time we started off on our adventure to the *State of California*.

Nonetheless, the team was surprisingly enthusiastic and excited about starting the day. The wreckage of the *State of California* is located over seventy miles south of Juneau in "big water," as Captain Dave would say. He was also quoted as saying that things can turn mighty ugly, mighty fast out there. En route we passed through Taku Inlet, which is known for some of the most dangerous waters in Alaska. In this inlet, four water channels merge together resulting in standing waves even on a calm day. Fortunately for us, it was a calm day. The other issue with going to this wreck was the distance. The 26-foot boat was very heavily weighted with gear; coupled with the distance, this caused concern for our fuel supplies. In these remote areas there are no gas stations or 7/11's to get snacks or fuel. Packing three extra five-gallon gas cans, we watched the fuel gauge and GPS very nervously. We all knew that there was a chance that we could hit the "point of no return" on our fuel, and would have to abort our trip as well as our hopes of diving this seldom visited wreck. On this day, however, fortune shone upon us and we were given perfect conditions seldom seen in the Juneau area. It was sunny, warm, with no wind, and very little current.

Establishing two separate teams for the dive, Erik, Jerry, and I were the first to enter the water, followed by Curt and Dave. Divers rarely visit the *State of California*, and Alaskan law forbids the removal of artifacts from wrecks. These two points have resulted in a very well preserved and intact shipwreck. During the dives, Dave found a motion picture film reel titled, "A Cowboy on a Horse." Curt, Erik, and I entered the main cargo hold of the wreck to discover a spare propeller, anchor, and a multitude of other well-preserved artifacts. Due to the immense power of the disaster, the ship's bridge and all its contents were missing. Also, unfortunately, the force of the wreck sliding down the wall buried the screw and rudder in the silt below her, and the bow shows massive damage from hitting the rock wall.

The wreck of the *State of California* is just one of the many incredible and pristine wrecks in Alaska, most of which have not even been discovered yet.

For the serious wreck diver, a trip to Alaska, namely Juneau, is a must. The team wishes to thank Dave Mitchell, his family, and staff of the Scuba Tank for all their generous hospitality and long hours of hard work, making this phenomenal wreck expedition possible.

For more information on diving and wreck diving in Alaska, contact Dave Mitchell at the Scuba Tank, www.thescubatank.com, or at 907-789-5115.

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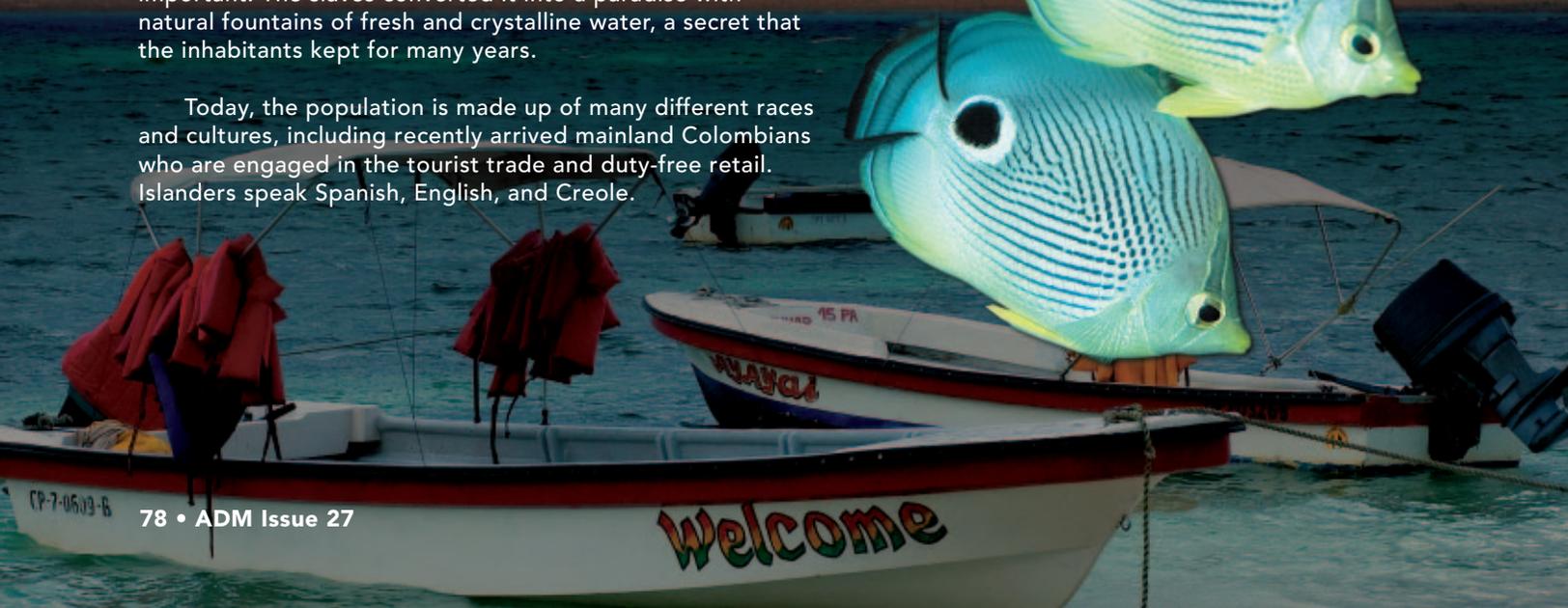
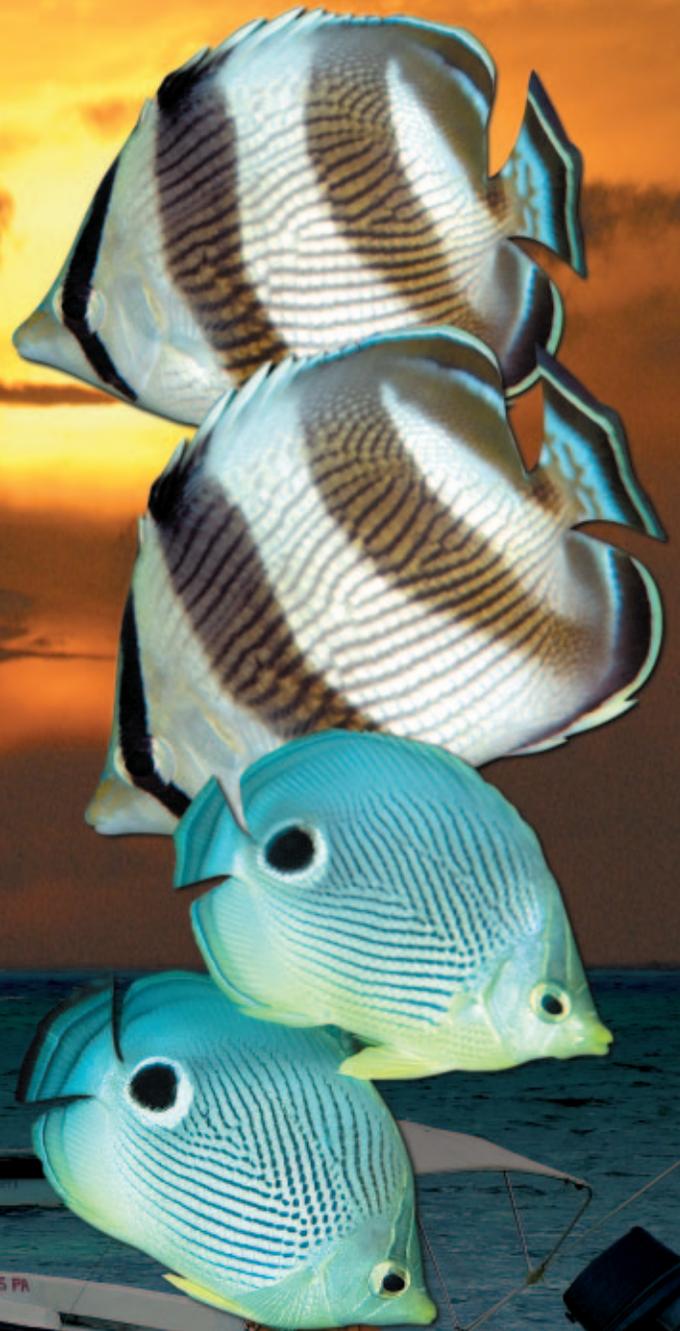
Text and Photography by Tom Isgar
(www.wildimagesphotography.com)

San Andres is largely undiscovered by American and European divers. It has fantastic dive sites, beaches, casinos, and great shopping. San Andres is very easy for American divers to get to: fly to Panama City then switch to a flight to San Andres. You can leave Miami early in the morning and get in for an afternoon dive in San Andres.

San Andres is one of two small islands in the Caribbean, roughly 160 miles east of Nicaragua and 480 miles north of Colombia. The islands and reefs are Columbian, but claimed by Nicaragua, and have in the past been a source of tension between Colombia and Nicaragua.

San Andres Island has a history of pirates, slaves, and missionaries. Some of the slaves stayed in San Andres because neither Spain nor England thought the island was important. The slaves converted it into a paradise with natural fountains of fresh and crystalline water, a secret that the inhabitants kept for many years.

Today, the population is made up of many different races and cultures, including recently arrived mainland Colombians who are engaged in the tourist trade and duty-free retail. Islanders speak Spanish, English, and Creole.



San Andres has a lush countryside full of trees, flowers, and fruits. Coconuts and some fruits and vegetables are raised. There are deposits of poor-quality guano, and rich oil and gas deposits are believed to exist offshore. Tourism is important.

The island is favored by great weather. From July to December there can be sporadic storms. The strongest winds are in June and July. The water temperature is between 81 and 86 degrees – t-shirt diving. The island is surrounded by a reef complex, formed with reefs and lagoons, including a variety of hard corals and sponges.

In May 2006 the exchange rate was roughly \$1 U.S.=2000 Colombian Pesos. The electrical current is 110 and uses standard American plugs.

Colombian citizens require the national ID card to visit the island. Foreign tourists require a valid passport and a Colombian visa. Holders of U.S. passports and some other countries do not require a Colombian visa. Check with your travel agent or the local Colombian consulate. All non-residents, including Colombian citizens, are required to purchase a tourist card, available from your airline or at the airport in San Andres. There is also a departure fee to pay at the airport when you leave (the rate varies depending on your final destination).

The town, located on the north end of the island near the airport, has most of the accommodations, restaurants, and shops. The largest public beach is in town. I stayed at a great bed and breakfast, Noblehouse, one block from the beach. Noblehouse has fifteen rooms and can accommodate 34 guests. It is moderately priced, but is very nice and convenient. The owners Jannethe and Arthur are totally guest focused. They can help solve problems as well as book all the activities you want, including small local restaurants. Wireless internet is available in the rooms.

The Diving

San Andres is a diver's paradise, with visibility of 75 to 100 feet and average water temperatures of 80F. The surrounding archipelago has been designated a UNESCO World Heritage Site. The archipelago contains fifty-seven known species of coral and more than two hundred and seventy known species of fish.

There are a limited number of dive operators on the island. I dove with Divers Team. The owner, Nelson Ramos, has been diving San Andres for 20 years. He knows all of the best dive sites. He also knows all of the underwater species – a rare find in dive guides. There are over thirty dive sites, twenty named.

Divers Team is a certified PADI International Resort, in business since 1986. They offer a full range of diving certification and specialty courses, mini courses, and equipment rental. Their dive boat leaves from the dock at the Aquarium Hotel. Their professional staff assembles your equipment, puts it on the boat, rinses it after the dive, and safely stores it - ready for your next dive. They also provide free pick-up at your hotel.





I dove a variety of sites with them – from under a boat in 20 feet of water with very strange anemones or jellyfish or something to a 132-foot dive on a spectacular wall. The diving is similar to other Caribbean diving, but the health of the corals and sponges and the variety of fish is better than most other locations.

Some of my favorite sites are:

- Grouper Wall – 132' – This is a spectacular wall, covered in coral and huge sponges. All the cracks were filled with fish. The top of the wall is also covered in fish.
- PADI Point – 73' – PADI Point is a very nice sloping patch reef. I photographed arrow blennies, masked hamlets, and a pair of juvenile spotted drums on one dive.
- Trilogy – 27' – This is an interesting site with large rock heads and undercut cave-like formations. Again, a site loaded with reef fish. The highlight was a school of permit.
- Morgan's Finger – 75' – A nice coral slope with sand along the edge. Several fish schools, sailor's choice and foureye butterflyfish. The butterflyfish are usually seen alone or in pairs. I also photographed shy hamlets and indigo hamlets, both fairly rare fish.



Things to do on the deco day:

This is a destination where non-divers will be delighted, and serious divers may need a few more days to explore. I spent most of a day driving a golf cart around the island, and discovered enough side trips for two more days. Great beaches, on the west side, places all around the island for stopping to fish, take pictures, or just hang out. It is easy to find something to do, on your own or by joining one of the many commercial trips: horseback riding on the beach or in the mountains, kite surfing, sailing, bike tours, and outings to nearby cays with lunch. There is a historical church and a small museum to visit. From the highest

place on the island (approximate 400 feet above sea level), you have spectacular views of the Caribbean. The contrast of blues and greens make a mixture of colors the locals call the "seven colored sea." They claim that San Andres is the only place in the Caribbean and Atlantic where this mix can be seen. And there are the topless beaches – all of the beaches – if getting a sunburn is on your agenda.



www.wildimagesphotography.com
www.sanandresnoblehouse.com
www.diversteam.net

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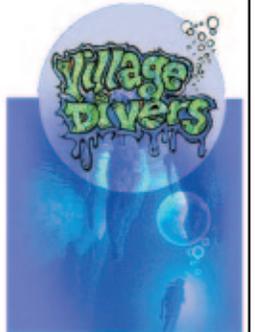
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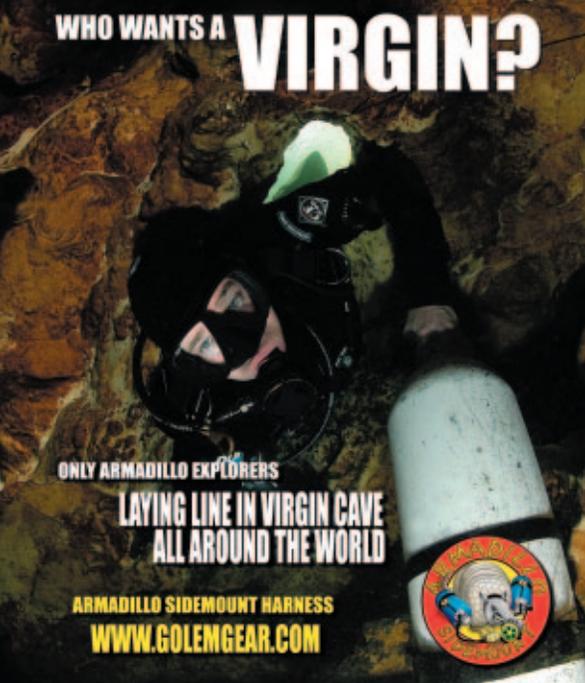
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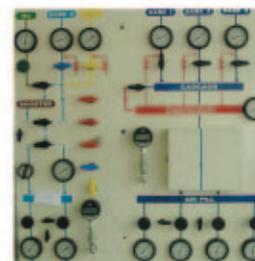
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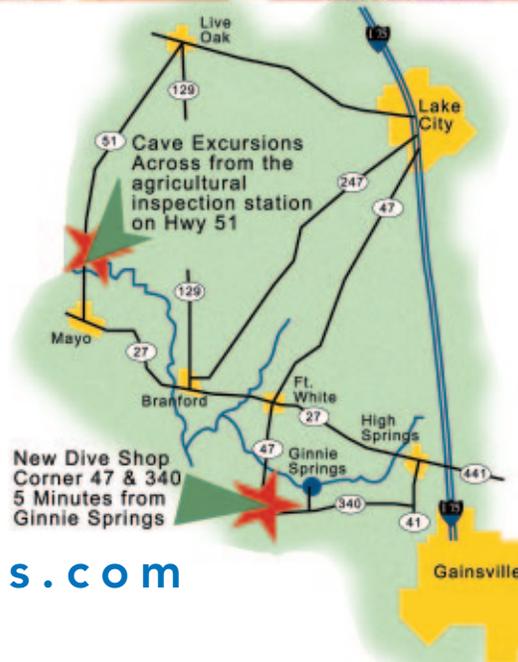
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A dramatic scene set in a cave. A diver in full gear is positioned in the center, looking towards the viewer. A large, red, textured hand is shown in the upper right, pulling on a white rope that is frayed and broken. The background is dark and rocky, with a bright light source creating a strong glow and long shadows. The overall color palette is dominated by reds, oranges, and yellows, suggesting a high-contrast, intense environment.

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