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Volume 43 Number 2

DIVER



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Sri Lanka

Sea life & Safaris

Inside:

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SEDUCTIVE SARDINIA
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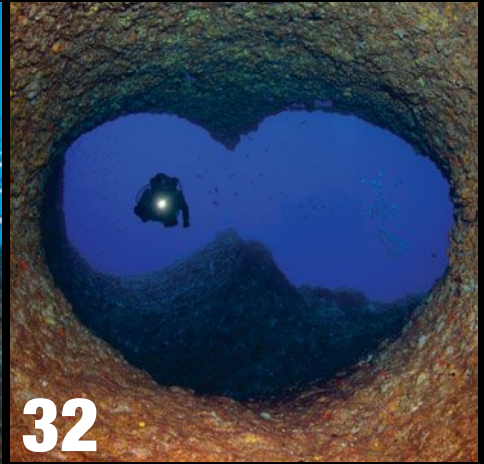
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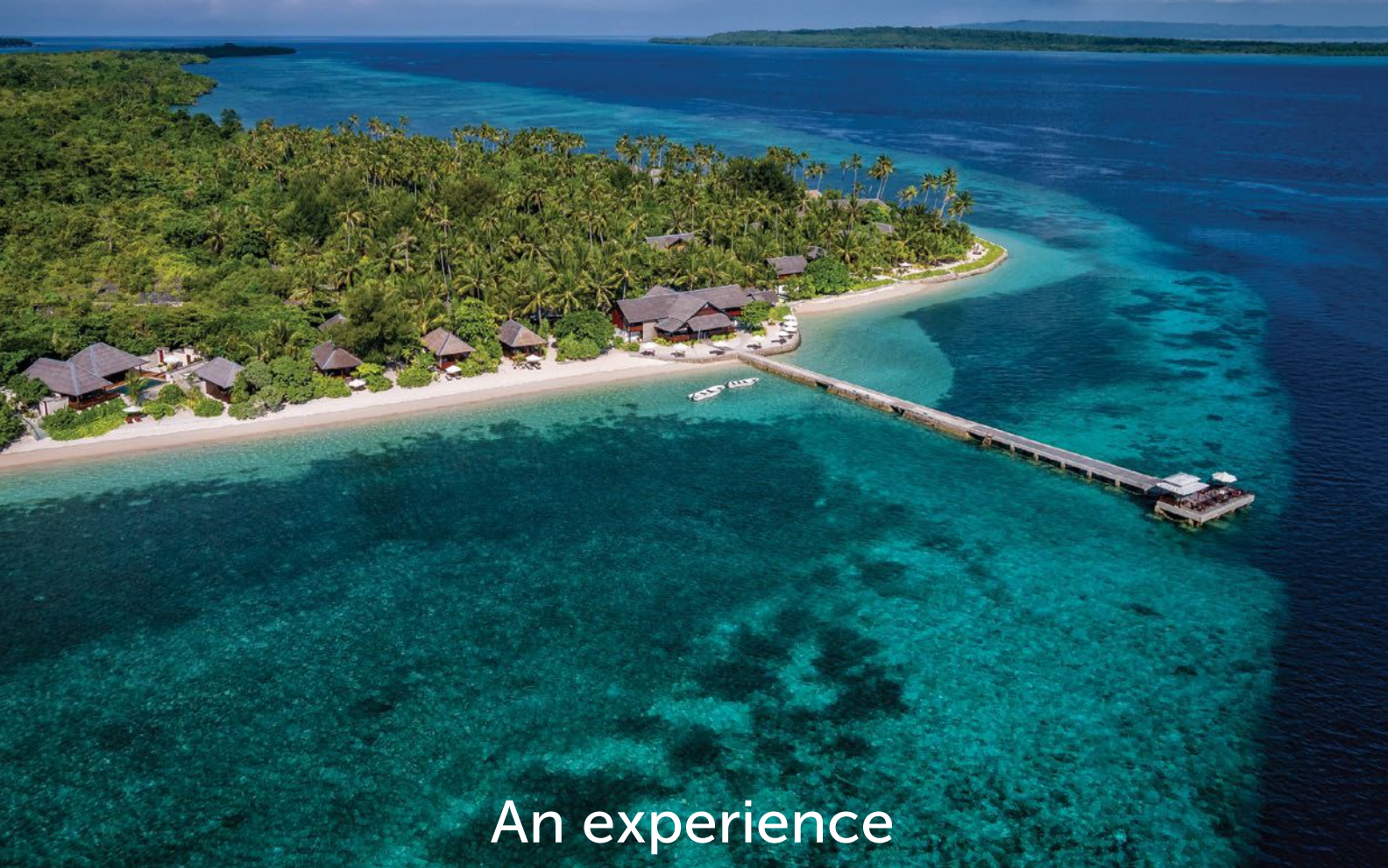
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Photo: © Carrie Vonderhaar, Ocean Futures Society

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Text and Photography by Jill Heinerth Originally published in Volume 40, Issue 7. Click here to subscribe. Pioneering Scuba diver Marjorie Bank...

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Soundings

There were a few sporting goods stores that sold some scuba gear but Vancouver Divers Supply was the first actual dive shop in Vancouver (c.1957)



Phil loafing in the VDS shop – those who know him will be thinking, “So...nothing has changed!”



Phil Nuytten

PUBLISHER AND SENIOR EDITOR

Another year bites the dust and what a strange and unprecedented year it's been. The weather seems to have developed some sort of a malignant brain tumour causing erratic behaviour to the nth degree (pun intended). Too hot and too cold is one thing, but rogue fires and deadly mud slides are something else again! A series of catastrophes and disasters that can only be summed up in a single word: *disastrophe!*

Such a *disastrophe* arrived in the form of a double-header of Cat 5 Hurricanes that hit the Caribbean in quick succession last fall. Imagine anticipating the arrival of a Cat 5 hurricane, carefully considering the options, and opting...to stay put! As we learn in this issue's *Hell Hath No Fury* (p.42), that's what one dive operation did on Grand Turk. Their preparations for and experiences during the storms make for some very interesting reading. And the way things are going on our Planet Ocean, we'll be seeing much more of this extreme weather in the future.

OK, so much for the ranting! This good news is that you are going to enjoy this issue of *DIVER* because there's something in these pages for virtually everyone. For starters, Brandon Cole's report on

Sri Lanka (p.18) describes a place that combines incredible water column and bottom life, hundreds of shipwrecks, and topside animals that are seldom seen elsewhere – and certainly worth seeing. And the best time to visit this stunning country is November through April. OK snowbirds, turning on the weather again for a few seconds... what's the worst time to be stuck in snowstorms, sub-zero temperatures, freezing rain, and the like? You sure don't have to be a rocket scientist to figure out that this would be a great place to be blowing bubbles whilst home base has turned into a giant icicle!

On to the *Big Picture* (p.10) by Eli Wolpin – Tuwanek is well-known to BC divers as a dive spot with infinite variety. It's equally spectacular in mid-winter...if you aren't someplace like Sri Lanka, where it's great diving *and* warm!

On a more serious note, Steve Lewis asks the question, “Do we teach them properly?” (p.58) and gives his view as a long-time instructor-trainer of divers.

From there we jump behind the curtain of the retail dive shop that conceals as many woes as it does ‘Hurrahs’. I can vouch for this, as I opened the first dive shop in Vancouver, BC, lo, those many years ago, called (originally) Vancouver Divers Supply.

It can be a tough way to make a buck, but you sure get to meet some interesting people! Jill Heinerth's look at *Dive Gear Express* (p.20) digs into this not-so-typical but very successful dive store. And Jill's regular column this issue explores the Paralenz, a new Go-Pro-plus underwater camera that has blown its testers out of the water (figuratively, of course). We live in a largely digital world now, so we'd best learn how to not only get the best of it, but the best *from* it. Paralenz is one of the ways. So, I might add, is Valstech's Lenzo underwater camera, which takes your iPhone 6, 7 or 8 (and soon X!) and turns it into an incredible image grabber. I have no doubt you'll be seeing a lot of each of the above in these pages.

Be sure to read the *Safety* piece by Divers Alert Network (DAN). It could save your bacon. If you don't already belong to DAN, you should check it out at www.dan.org

All the usual columns are in their usual places, and, as usual, excellent reading. Bless you, column writers, without you this fine magazine would not be possible. []

Regards

Phil

TOTALLY TUBULAR

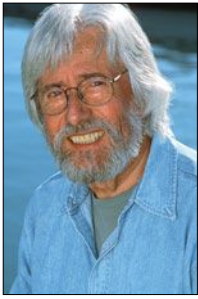
By Eli Wolpin

Tuwanek holds a special place in my heart: it is where I first learned to dive and where I often return, drawn by its beauty. A short ferry ride to the Sunshine Coast from Vancouver, British Columbia, lies a serene and oft-glassy bay, bookended by two islets and a backdrop of towering mountains. It is the textbook definition of an easy shore dive, with parking a few steps from the gravel beach entry. When visibility is poor in Vancouver, Tuwanek can be almost guaranteed to have clear water, revealing a beautiful underwater seascape of cliffs and boulder fields and dotted with octopus and wolf eel dens.

Through the seasons, the site changes from thick masses of kelp to barren brownish rocks. Every few years, a thick carpet of tunicates blankets the site. The Pacific transparent sea squirt is a whitish tube-shaped tunicate often found on prominent rocks or structures. Despite the ghost-like beauty of the aggregations, it may be an invasive species in British Columbia. Considered native to the Western Pacific, their exact impact on the local environment is unknown. Because they are aggregating benthic filter feeders, they may smother out competing organisms.

The giant ghost-like boulder lies in a mud-bottomed channel between shore and the right islet. I admit that despite my many dives at Tuwanek, I have not passed this location much. By chance, my dive partner and I passed by that day and discovered an amazing sight: the sides of the boulder absolutely covered in tunicates, while the sun beamed down on the kelp and plumose anemones atop. I will always return to Tuwanek, hoping for another magical day underwater. []





Hurricanes, Cyclones, the Oceans, and Us

BY JEAN-MICHEL COUSTEAU AND JACLYN MANDOSKE

The Atlantic hurricane season of 2017 was the most expensive year on record for natural disasters, bringing devastation to coastal communities and affecting both people on land and life in the sea.

The beginning of a new year is often a time for reflection. While many memorable events occurred over this past year, a series of some of the most powerful storms on record draws my attention to 2017. The storms barreled in – one right after the other. The strongest hurricane began as wind ripples on the other side of the Atlantic Ocean, swirling with growing power as it moved across the oceans warm water surface. Hurricanes, cyclones, typhoons – they are all similar phenomena, but named differently based on the ocean basin in which they rise – are the strongest storms on Earth. They have been part of our world for millennia, commanding life in the oceans to survive and adapt to the periodic turbulent conditions these storms create. Yet, ocean life rebounds, sometimes even stronger than before. As we've seen from this past year, these mighty forces of nature have the power to destroy. What can we learn from last year's unusually strong and powerful storms? And how can we protect ourselves in the future?

The 2017 hurricane season, which refers to the seventeen named storms that occurred in the Atlantic Ocean and Caribbean basin from April to November 2017, was considered "hyperactive" and extremely destructive. In terms of cost, 2017 was the most expensive on record for natural disasters – which include hurricanes, fires, floods, and tornados. Natural disasters cost the United States \$306 billion dollars in 2017, of which 85 percent – over \$290 billion – came primarily from three of the season's major hurricanes: Harvey, Irma, and Maria. Harvey



Photo: Holly S. Lohuis, Ocean Futures Society

dumped record rainfall in Texas. Irma produced the longest sustained wind speeds of 185 mph (300 km/h), and was the strongest hurricane to develop in the Atlantic basin. Maria went from a Category 1 storm to a Category 5 storm in less than 15 hours, the second fastest on record. Sadly, on top of the economic devastation, over 250 people lost their lives from the deadly storms that tore across the Caribbean and United States this past year.

These storms, with their rapid intensifications and catastrophic impacts, are to me, warning signs of our changing planet. While scientists may not, yet, be able to say one storm was the direct result

2017 hurricane season refers to the seventeen named storms that occurred in the Atlantic Ocean and Caribbean

of climate change, researchers can study the likelihood of these types of natural events occurring under different climate conditions. For example, scientists at Lawrence Berkeley National Laboratory found that Hurricane Harvey, which stalled over Texas and dumped more than 50 inches (1270mm) of rain in some places, was more likely to happen – up to 38 percent more likely, in fact – in our warm climate than if

Marine biologist Johnny Singh at the JMC Resort, Fiji, plants new mangroves to help restore these valuable ecosystems

we had not experienced current warming. Another straightforward example of the link between climate and hurricanes can be seen in water temperatures. Hurricanes thrive in warm water because it holds more energy – energy hurricanes use to grow stronger. The world’s oceans are warming as they take in excess heat caused by our release of greenhouse gas emissions into the atmosphere. And to make matters worse, the influence of climate change on rising sea levels only adds to the danger and threat of massive storm surge – the highest of which occurred during Hurricane Katrina in 2005 at nearly 30 feet (9m) above sea level. These complex consequences of our changing climate permeate across our interconnected and interdependent world.

From the tiny island of Barbuda, the first island to be hit by the monster Hurricane Irma, residents told stories of the “devil” storm that came through, some even saying they felt the ground shake as their entire island was engulfed in the eye of Irma. In Dominica, the first island hit by Hurricane Maria, a similar tale of devastation unfolds, and all along the pathways of these storms, you find similar stories – power and running water out, trees toppled, roofs ripped off, homes destroyed, and rivers of mud and water rushing through streets. While locals feel the impacts directly, their full implications can be global. Economics change, demographics shift. In Puerto Rico, over one hundred thousand residents left after Hurricane Maria from lack of electricity, water, services, and job opportunities after the storm. As people leave, local economies may struggle to recover. This also means losses for tourists and visitors – like divers – and even influences the global economy.

While the storm itself may last a few hours, the effects can last for years. In 2016, Cyclone Winston in the South Pacific became the strongest cyclone on record in the southern hemisphere, before making landfall along the coastlines of Fiji. In February, the massive cyclone made a direct hit on the Jean-Michel Cousteau Fiji Resort in Savusavu, Fiji, where many Ocean Futures team members, colleagues, and friends reside. Immediately after the event, we set up an emergency hurricane relief fund, raising over seventy-five thousand dollars that was sent directly to the villages



Photo: Jaclyn Mandoske, Ocean Futures Society

We set up an emergency hurricane relief fund, raising over seventy-five thousand dollars

most affected in Fiji. Yet, so much had already been lost. The hurricane destroyed buildings across the island, toppled boats, tore roofs, and flooded homes and businesses. The resort had to be closed for repairs until September, and when it was re-opened, it took time for people to return. Many places around the world struggle to recover from these types of events. It often takes time – and money – to bring communities back after the storm.

Shaping our world

In light of stronger storms, climate change, and our lives – how can we better protect ourselves into the future? Hurricanes, cyclones, and typhoons are all naturally occurring events, and our planet – and its beautiful, bountiful life – has figured out different ways to survive and recover from disturbance. Coral reefs may topple from hurricane surges, but they can rebuild. Mangrove trees may uproot, but they may get a chance to further disperse new seedlings. Storms can open, or close, new sandbars – giving life new opportunity, or taking it away. While we don’t always know how natural systems will recover, we do know that healthier ecosystems recover faster. And

Coastal habitats like mangroves protect coastlines and coastal communities during major storm events

these ecosystems – in turn – help us recover too. Healthy coral reefs, mangroves, seagrasses, oyster reefs, and other living shorelines break and slow storm waves that would otherwise rage into coastal communities. Coastal habitats take the brunt of impacts during major storm, shielding us from the worst of the storm surges, waves and wind. Coastal ecosystems protect us, and right now the world is losing coastal habitats at rates four times greater than tropical rainforests. Coastal habitats are among the most endangered ecosystems on earth. But we can collectively make these critical choices. We can ourselves by protecting life on our water planet.

When I reflect on the strong storms of 2017, I think about how connected we are to the conditions of our planet. We are shaping our world. Just as the consequences of climate change are great and vast, so too are the many solutions to adapt, prepare and mitigate its impacts. As storms may intensify and the oceans continue to rise, we need healthy coastal ecosystems to protect coastal communities. We need intact ecosystems to withstand the storms alongside us, and in term help us rebuild resiliency within our built and natural environments. There is a lot we can learn when we choose to partner with, and support the natural habitats around us. Together with nature, we ensure better futures for us both. []

DIVER Brief



BY JILL HEINERTH

Photo: Jill Heinerth

WORLD'S LONGEST UNDERWATER CAVE

Braving rights for the world's longest underwater cave just changed hands again. On January 10, 2018, a team led by German cave diver and Exploration Director of the Proyecto Gran Aquifero Maya (GAM), Robert Schmittner, discovered a tunnel that connects the Dos Ojos and Sac Actun cave systems; a connection he has been working on for 14 years. He was joined on that dive by Jim Josiak, Sev Reghr, and Marty O'Farrell. The discovery has revealed a newly combined cave roughly 215 miles (347km) in length. Mammoth Cave in Kentucky remains the world's longest cave of any kind, at over 400 miles (650 km) of explored passages.

Guillermo de Anda, archaeologist, National Geographic Explorer, and Director of GAM, said of the discovery, "This immense cave represents the most important submerged archaeological site in the world, as it has more than a hundred archaeological contexts. Within this system, we have

documented evidence of the first settlers of America, as well as extinct fauna and, of course, the Mayan culture."

The Sac Actun and Dos Ojos cave systems were both previously known and are near the Caribbean coastal town of Tulum. According to the rules of exploration, the most extensive cave claims naming rights over the smaller system. They will now be known collectively as Sistema Sac Actun. The team is within close reach of connecting three other nearby systems including one they refer to as "The Mother of all Cenotes." Many cave divers consider the porous limestone landscape of the tourism region called the Mayan Riviera to be "one cave." Local data provided by the Quintana Roo Speleological Survey indicates that there are at least 358 submerged cave systems, which represent about 870 miles (1,400km) of flooded passages north of the town of Tulum alone. Although divers have not made physical connections between all the

215 miles (347km) of underwater cave, full of archaeological treasures and sometimes a huge support network, including the odd scuba donkey

cenotes and cave passages, experts agree that the spongelike landscape could be adversely affected by pollution or overuse that would affect all systems.

Tulum has become the central hub of cave diving on the planet, with underwater explorers devoting much of their lives to surveying the highly decorated caves. Among them Canadian diver Bil Phillips, a pioneer of the exploration of the Mayan aquifer, who, together with James Coke, founded the Quintana Roo Speleological Survey, a database with detailed maps of these complex systems. A team member of GAM, Phillips explored the region until the last days of his life. The GAM team dedicates their meaningful achievement to Phillips, who was the underwater cartographer of the project and who passed away in November 2017. On January 21, 2018, the team laid Phillip's ashes at the location of the cave connection, in a memorial dive to remember their exploration partner and friend. []

Introducing... PADI Travel

PADI has introduced its latest endeavour - PADI Travel - an online platform and full-service team that provides travel services in the hope of inspiring divers to explore more of the underwater world and take care of our oceans, and we presume, make some money in the process.

PADI Travel caters to groups and individual travelers, and aims to support dive stores' current travel programs. It combines the best of online booking with "concierge-level travel consultancy", offering: 24 hour-a-day customer service, one of the largest online selections of liveaboards and dive destinations, dedicated dive travel experts with in-depth dive knowledge and experience, and eco-friendly trip options to help people dive with a purpose. With more features still to be added.

The new travel platform is made possible by an integration of technology and a team of dive travel experts from Diviac, a startup dive travel company that has been successfully operating since 2015.

"The new PADI Travel is the natural evolution as we expand the program globally and optimize it to provide a best-in-class digital experience for dive travel," says Drew Richardson, PADI's CEO.



█ Oceanic has launched the newly designed and updated Alpha 10 regulator. Divers can choose from a piston or diaphragm first stage, and an optional swivel adapter. Both have a pre-dive switch (an update from the Alpha 9). www.oceanicworldwide.com



█ And the nominations are... up to you! Much-loved dive conference TEK Dive USA, happening April 27-29, has opened nominations for its Technical Diving Awards. Six awards are up for grabs. Have your say, then buy some tickets! www.tekdiveusa.com

THRILLED FOR THE FRILL

A new species of Giant Octopus has been discovered. The GPO - the largest species of octo in the world - is actually two: the Giant Pacific Octopus and the newly named Frilled Giant Octopus.

Scientist and divers have suspected for years that GPO name may actually cover one or more sub species. Inhabiting waters from Alaska to California, and even Japan, the GPO lives between 3 and 5 years and can have a 15 foot (4.5m) arm span.

Nathan Hollenbeck from Alaska Pacific University confirmed the discovery by identifying a distinctive frill along the length of the body. These frilled octos also had raised skin-like eyelashes, and two white spots on the front of the head. GPO's only have one.

DNA analysis has been completed and results published last November. So there you have it, DIVER would like to officially welcome the Frilled Giant Octopus to our waters!



█ With an 8% increase in visitors over the last year, it seems the Cayman Islands are becoming the destination of choice for many scuba divers, with a total of 418,403 stay-over visitors during 2017. The US saw a 13% increase, with 6% increase for Canada.

DEJA BLUE 9

█ Performance Freediving International's annual coaching camp and competition is now open for registration. Taking place in April / May, Deja Blue 9 offers two weeks of training followed by an 8 day comp. The event is known for the high standard of safety throughout. Followers can keep updated on Facebook as the comp unfolds.



BAN THE BAGS

█ Montreal is the latest city to pass a bylaw banning single use plastic bags thinner than .05mm. The UK grocery store Iceland is aiming to remove plastic packaging from all its own brand products - a first - whilst British Columbia's capital of Victoria plans to ban plastic bags by July 1st. Turtles everywhere rejoice!

HAWAII UNDER PRESSURE

█ The University of Hawaii's Hyperbaric Treatment Center is now accepting patients on a case-by-case basis. This is reassuring news for the islands, which have been without a public chamber since October. The chamber has just had a "soft opening", operating with a skeleton crew and is expected to be fully operational by March 1st. Anyone requiring access is advised to phone first. The centre was forced

to close after an adequate number of physicians were no longer available for emergency services at the center.

PRESIDENT OF THE USFA

█ The United States Freediving Association has voted in a new President, John Hullverson. San Francisco-based Hullverson is a 2 x US national record holder for dynamic no fins, and has represented USA Freediving at AIDA World Championships. www.usafreediving.com

Photo: Jeff Lindsay



CAVE INSTRUCTOR / CO-OWNER OF UNDER THE JUNGLE

NATALIE LYNN GIBB

How long have you been diving?

I was about to write “not that long” but then I realized I have been diving since 2003, so 15 years! I have been cave diving for just about 11 years.

What made you want to become a diver?

I never considered scuba diving as something I would be very interested in, but I spontaneously enrolled in a scuba course on vacation and the moment I first breathed underwater, everything changed. The sensation of freedom, the ability to “fly”, the fact I could explore an entirely new part of the planet — I was hooked.

Most memorable marine life encounter?

There is a cave in Cozumel called Aerolito, and it’s filled with marine creatures that have adapted to the cave. One time I saw creature that I can only describe as a neon pink, transparent, tiger tail sea cucumber. It was hanging off the cave line, stretching out and waving its tiny mouth tentacles around. Fascinating.

How did cave diving change your life?

I was always a little lost until I discovered cave diving. The moment I first dived in a cenote, I knew that I wanted to be a cave explorer. It’s a way for me to combine my curiosity, love of science, and fascination with nature in a single activity. It quite literally gave my life a purpose.

Favourite dive site?

That’s impossible. All caves are

beautiful. People diving with me have heard me exclaim, “I love this place. Maybe it’s my favourite!” after nearly every cave dive.

Who is your go-to dive buddy?

Vincent Rouquette-Cathala. Vince is my business partner and exploration partner. We have pushed each other to become better divers and to learn as much as possible. I wouldn’t be a third of the diver I am without him. We dive so much together that we have a type of telepathy. I swear I can understand what he is thinking just by his smallest movements and breathing rate.

Where would you like to dive but haven’t?

Antarctica, Molnar Janos in Budapest, ice caves, French caves, Australian caves, the caves in the Bahamas, I think there are some caves in the Philippines, you get the idea.

“Diving is a means of discovery. We know so little about the underwater world — most of our knowledge is confined to areas near the surface, in the open water.

With cave diving and technical diving we have a means to voyage further into the planet. Technical and cave diving are still relatively young sports. I am sure there is a lot left to discover about our planet.”

Craziest thing you’ve seen underwater?

At a cave we are currently exploring there are weird microbial growths. Some of them hang down from the ceiling in metres-long formations that we are calling snottites. They sway and move with the tiny motion of the water, like big long eels. It’s nuts.

Favourite dive snack?

Almonds. I have often eaten enough to make myself feel ill. I can’t stop.

You can take any 5 people on a dive...

I don’t need five! Just two: my parents! Neither of them is allowed to dive, and I wish I could share what I do with them.

Favourite diving movie?

I love the *Fishing Under the Ice* video by Juusdo on YouTube. For me he uses the strange physics of the underwater world in a beautiful and whimsical way that is just perfect.

Proudest diving moment or achievement?

It’s sort of general, but I love watching my former students excel. They make me proud, even if they don’t know it!

Favourite piece of equipment?

Shearwater Perdix. Having an illuminated screen is amazing, and makes my diving safer because its easier to read and I am not as distracted by having to light my wrist.

What’s next?

Keep exploring and teaching. Improve my videography because I love it so much, and continue to assist some scientists I have good relationships with. There is so much to learn! []

“Stay humble and stay curious. There is never just one way to do something, and there is so much left to be learned! Listen, watch, see what everyone else is doing, and adapt the procedures and techniques that work best for you. Most of all, whatever your underwater passion is, pursue it relentlessly!”

DIVING FACTS



The Diving Almanac showcases over 2,000 diving records, diving personalities, and historical events: www.divingalmanac.com

RECORD

LONGEST SOLO CAVE PENETRATION DIVE: 10,444 feet (3183m) – Sheck Exley (USA), 1989. Chip’s Hole Cave System, Florida. No DPV (Diver Propulsion Vehicle) was used.

LARGEST ARTIFICIAL REEF:

The USS *Oriskany* 888 feet (271m), a retired U.S. aircraft carrier scuttled on May 17, 2006 off the coast of Pensacola, Florida. It took the *Oriskany* 37 minutes to disappear below the surface. *Oriskany* (CVA- 34), an attack aircraft carrier, was launched on October 13, 1945, and was decommissioned on September 30, 1975. During the Vietnam conflict, a fire raged through five decks, claiming the lives of 44 men.

HISTORY

2017: *Blue Planet II* debuts. The series took more than 4 years to film, 125 expeditions, 39 countries, and 4000+ dives.

PERSONALITY

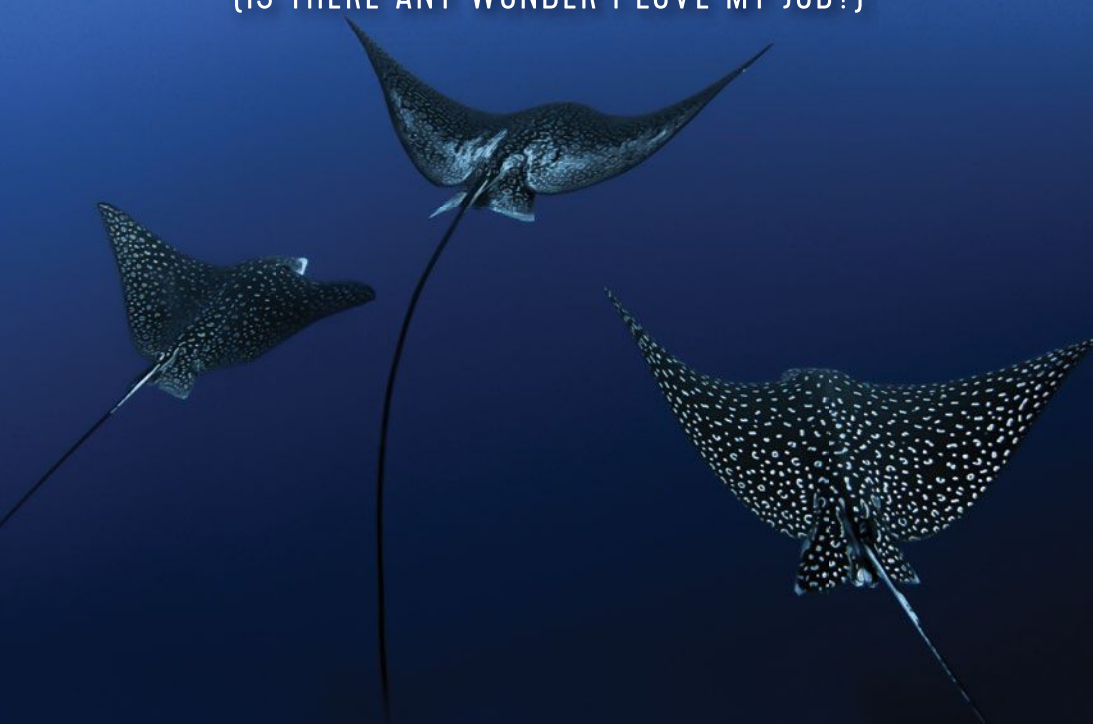
EXLEY, Sheck (1949-1994): Pioneer cave and deep diver; deep diving record holder, first to reach 1000 cave dives; did over 4000 cave dives in 29 years; died while attempting to dive below 1000 ft (305m) in Zacaton Cave, Mexico. The Sheck Exley Safe Cave Diving Award is presented by the National Speleological Society Cave Diving Section to divers who have completed 1000 safe cave dives.



Site Name: Princess Penny's Pinnacle
 Island: Grand Cayman
 Photo: Amanda Nicholls

"OUR OFFICE VIEW"

(IS THERE ANY WONDER I LOVE MY JOB?)



Cayman Dive Log

28°C/82°F weather
 100+ft visibility
 sea conditions

boat
 deep
 wreck
 shore
 wall
 training
 reef
 night
 photo



Amanda Nicholls
 Underwater Photographer,
 Caribbean Producer Services

What excites you the most about being a photographer?

I have been living and working on Grand Cayman for over 11 years as a photographer and each day I enter the sea, I have no idea what she will present to me. She is wondrous, beautiful, alive and unpredictable. I love the unknown!

What makes diving in Cayman special?

It's all about the clarity! With no river run off and a deep wall surrounding our whole island, Grand Cayman has exceptionally awesome visibility. That, along with the sun shining every day, helps accentuate the most unique shades of Caribbean blues! Makes you want to dive right in and explore.

Favourite dive site to photograph?

Good question, not sure I can answer because I love so many sites for so many different reasons. I like to show the topography of our towering walls and how small a diver really is against it, my favourite wall dive would have to be Princess Penny's Pinnacle, or White Stroke Canyon, or Northwest Point, yup, can't decide, sorry! They are all amazing.

Photography tips for Canadians?

The first thing you will notice coming from Canada is the amount of light we have underwater in Cayman. Make sure you bring your strobes, the colours of the corals show so much better with a strobe. Your wide angle lens will be a real winner with our walls and swim throughs but don't forget we also host some great Macro subjects too. Pack everything!

Our 365 spectacular dive sites have earned the Cayman Islands their status as a diver's nirvana. Tell us your story on our Cayman Dive Log at www.divecayman.ky

FIND YOUR CAYMANKIND



Start diving today at www.divecayman.ky



Normally we're all about diving, but when so much of a dive trip is spent above water, think about heading to **Sri Lanka** - a country that offers incredible encounters above and below the waves

SEALIFE

TEXT AND PHOTOS BY



SAFARIS

BRANDON COLE



and over hand, we pull ourselves down the line, against the current. It seems an interminably long descent. Pale and amorphous jellyfish drift by in the haze.

It would not take much right now to make me believe them wandering ghosts from the beyond, for my insides are clenched tight and my thoughts swirl wildly. I am amped up, overloaded with that peculiar mix of excitement and apprehension that comes from long anticipation of an important and challenging dive. There is quite a story underneath us, with tension and mystery pressing in from all sides.

We continue, every foot downward seemingly taking a year. Which is not far off the mark, for when we finally level off at 110 feet (33m) we have indeed been transported back a century to the 445-foot (135m) long SS *Perseus* in all her shadowy glory. I

cannot see an end to her immensity, left or right. I query our guide, making a spinning motion with my hand, and he calmly points left. With no time to waste, we being to swim. And swim, and swim, over an endless expanse of dark metal and alongside shoals of bright fish until the hull angles deeper and we see our goal waiting below.

Touching down on the rippled sand at 132 feet (40m), we stare up at the huge blades of the propeller, which stopped turning on February 21, 1917 when this steamship hit a floating mine laid by the notorious German raider *Wolf* and went under forever.

We kick past the rudder to hover over a field of debris and admire the hulking backside of the *Perseus*. We swim through the spokes of the massive steering quadrant, and then into the breached stern. We are moving below decks now, surrounded by invertebrate encrusted metal. With the ship's severe list to starboard, it feels like a tilted stroll through a vaulted, colonnaded hall.

Many vessels have yet to be properly surveyed and even identified – exciting for wreck aficionados

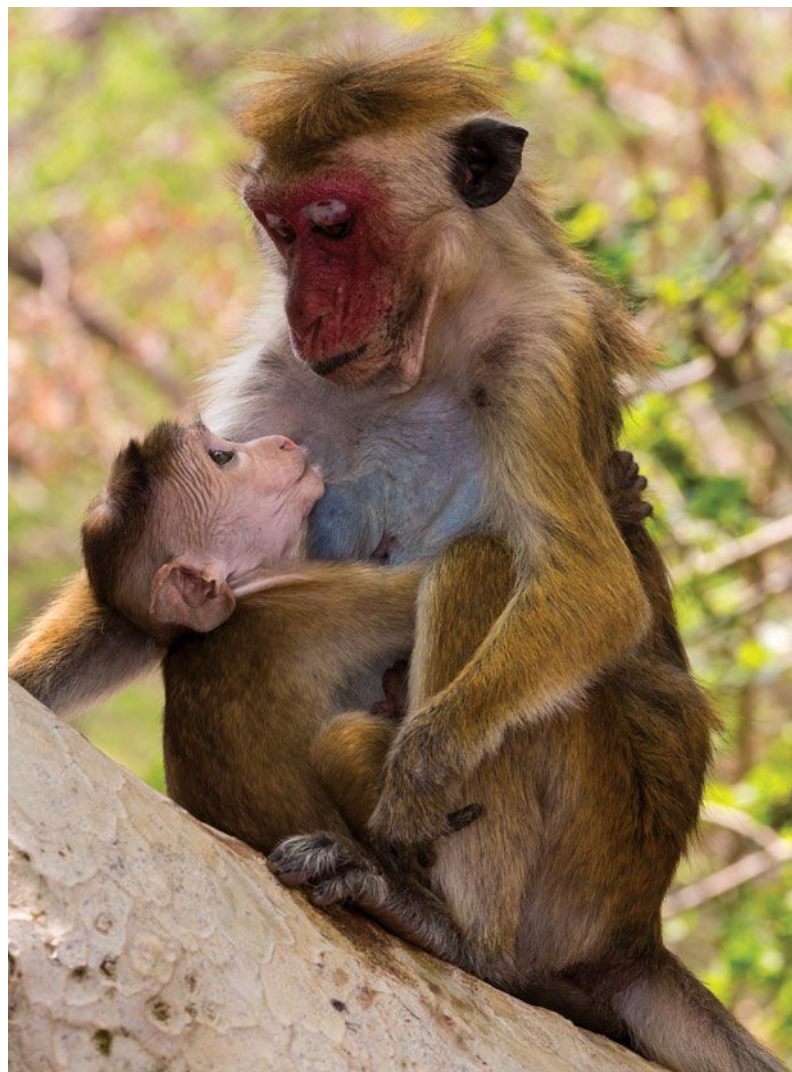
Left: The *Pecheur Breton*, commonly known as “Cargo Wreck” and most popular wreck site in Sri Lanka.

Middle: The Battery Barge, as of 2017 fewer than a dozen people have explored this small wreck

We pass bushes of black coral while tangerine-hued anthias fish flit around us. Light streaming through holes in the deck – courtesy of the ravages of time – helps reorient us, and we emerge from this stunning swim-through facing amidships.

I gaze back down into the muted monochrome world of the sloping hull, following it to the keel, where I can still see the prop frozen in time, and I am tempted to make the same circuit again. But our time for exploration (on this tank, at least) is up, and up we must go.

Climbing back onboard our dive boat, we are all smiles. Only one hundred odd divers have ever seen the *Perseus* in her silent, submerged slumber. “That was amazing!” my



dive buddy Melissa enthuses. “With the stern’s girders and beams covered in red cup corals, it felt as if we were encircled by the ribs of an ancient, gigantic whale. We were literally diving into, and through, living World War I history!”

History and mystery

An estimated two hundred shipwrecks lie in Sri Lankan waters. Some, like the *Perseus*, *Worcestershire*, and the *Hermes* aircraft carrier, were casualties of the World Wars. But the majority have been victims of mishap and neglect. Some ships hail back to the age of steam, while others are of modern design and succumbed to the Indian Ocean much more recently. Many vessels have yet to be properly surveyed and even identified. These are exciting, fertile fields of wreck aficionados. Nishan Perera, our guide on this voyage of discovery, says that we are the first North American dive photojournalists that he has

...deer, mongoose, water buffalo, crocodiles, monitor lizards, monkeys, and a dizzying variety of birds...

Toque Macaque monkeys, usually found in troops of 8-40, as they age their faces become more pink, as seen in the mother here

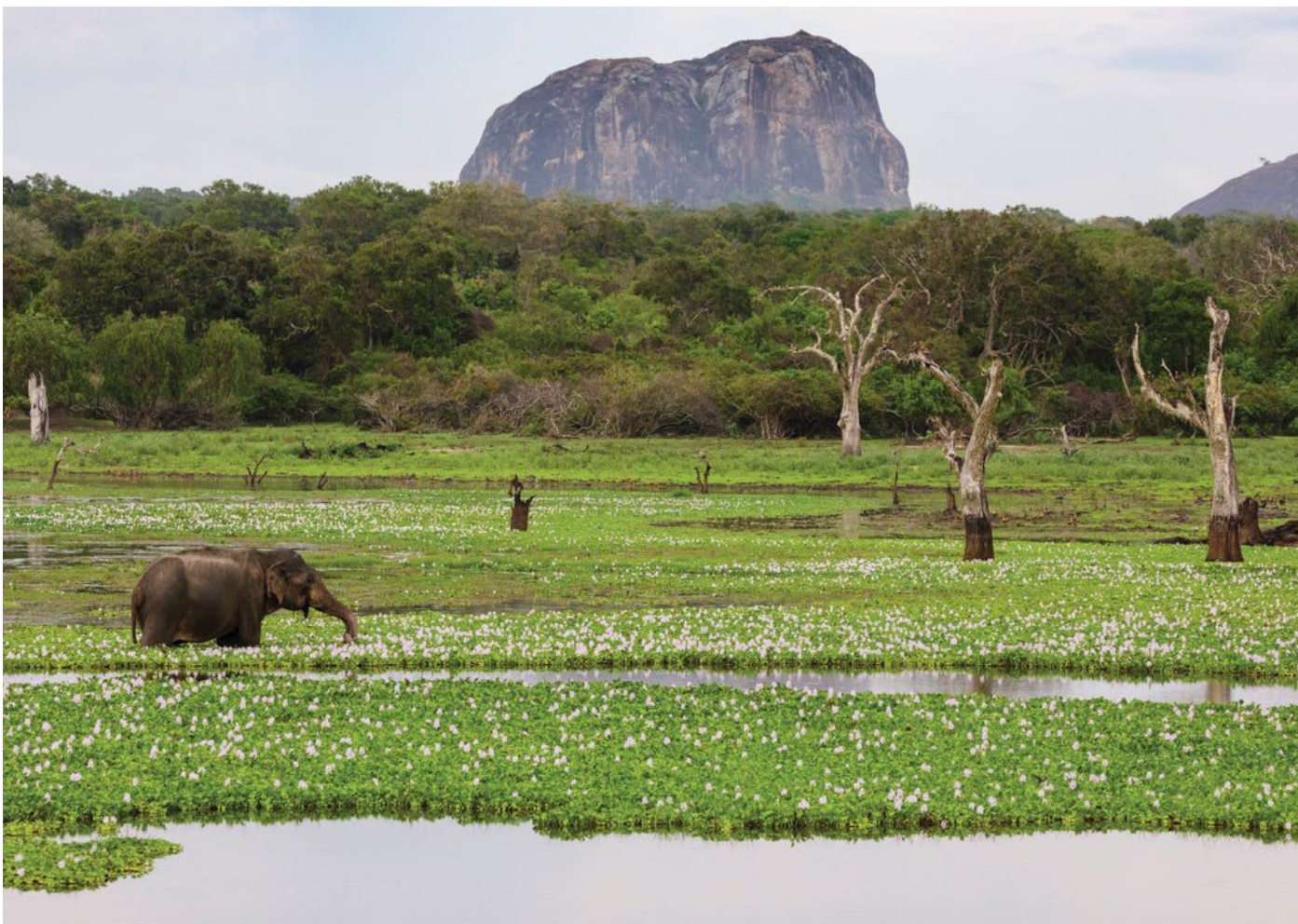
shown around. A marine biologist and explorer, Nishan is a wealth of knowledge. He and a friend were the first to dive many of Sri Lanka’s wrecks, including *Perseus*.

Our week with local scuba operator Island Scuba focuses on sites off Colombo, Sri Lanka’s capital city and an important international port past and present. Situated two-thirds of the way down the western shore of this teardrop-shaped island southeast of India, Colombo is the portal through which recreational and technical divers alike can access dozens of shipwrecks resting on the sandy bottom 90 feet (27m) and deeper.

On the *Nilgiri* we find a psychedelic shag rug of pink cotton candy soft

corals, two strikingly patterned honeycomb moray eels, and at least eight bold lionfish. Nicknamed the Trug, this 181 foot (55m) tug sank in 1997 south-southwest of Colombo while aiding a distressed vessel. It is flipped completely upside down on the 100 feet (30m) sand bottom, creating a cave of sorts underneath which is easily accessed. Another smallish wreck only recently surveyed is the Lotus Barge, so named until its real name is unearthed. During the 35 minute ride offshore, our captain Ravinder smiles widely at us, repeating, “Very good, many fishes,” in heavily accented English. The ex-fisherman is right, of course. The piscine biomass and gorgonian density create a fishy forest here. We especially like the coppery sweepers congregating around the boiler in the heart of the compact vessel.

With a swell building and winds forecast to kick up for a bit, we decide to offgas for a few days and



see some of the sights above the waves. Armed with a only a vague plan, courtesy of the well-worn Lonely Planet book from our hotel, we flag down a colorful tuk-tuk – one of the millions of three-wheeled, mini taxis scooting around – and ask our driver to take us to the Pettah market district. We point at pictures in the book just to be sure everyone is on the same page. Colombo is a city for the adventurous. We are not entirely sure what we are doing, but we survive (and thoroughly enjoy) the colourful chaos in the jam-packed streets and food stalls. I have never experienced the sensory overload India's cities famously deliver, but my wife attests that the crush of people, motion, energy, noise, colour, and smell here in Pettah is a worthy introduction to traveling in India, which looms just 32 kilometers (19 miles) to the north across Palk Strait.

Next up for us, and reason alone to book a trip to Sri Lanka, is a wildlife safari by jeep. Naturalist guide extraordinaire Pradeep Kumara takes us to Wilpatu National Park north of Colombo for wildlife viewing rivaling

Africa. Thanks to his sharp eyes and uncanny intuition, we spot our first leopards in the wild. In addition to the majestic cats, we sight deer, mongoose, water buffalo, crocodiles, monitor lizards, monkeys, and a dizzying variety of birds from bee eaters to storks, peacocks to crested eagles. From our open-topped Land Rover in Minneriya National Park we watch, completely enrapt, as herds of Asian elephants roam the grasslands, play in the lake and mudflats, and press tightly together for multigenerational family bonding.

We emerge from the bush and move back in time, climbing to the top of Sigiriya, the ancient rock fortress with its monolithic carved lion feet that brochures hail as the Eighth Wonder of the World. At the Golden Temple of Dambulla, we go underground to admire the bright murals and painted Buddha statues on display in the monastery's caves. Later we tour Anuradhapura, Sri Lanka's First Kingdom, established in 380 BC. This World Heritage Site is sacred to the Buddhism faith and home to a temple built around the

The Sri Lankan Elephant in Yala National Park, the largest of the Asian elephants, growing to nearly 12 feet (3.6m) tall and up to 12,000 lbs (5500kg)

world's oldest living tree.

We are normally all about scuba time when we travel, but Sri Lanka impressed on so many levels – from the mouthwatering cuisine to the ancient architecture, the exotic wildlife to the friendly, gentle people, always gracious, always smiling – that now we cannot imagine not adding extra time for immersion in Sri Lanka's wonders above the waterline.

Re-engaging the fleet

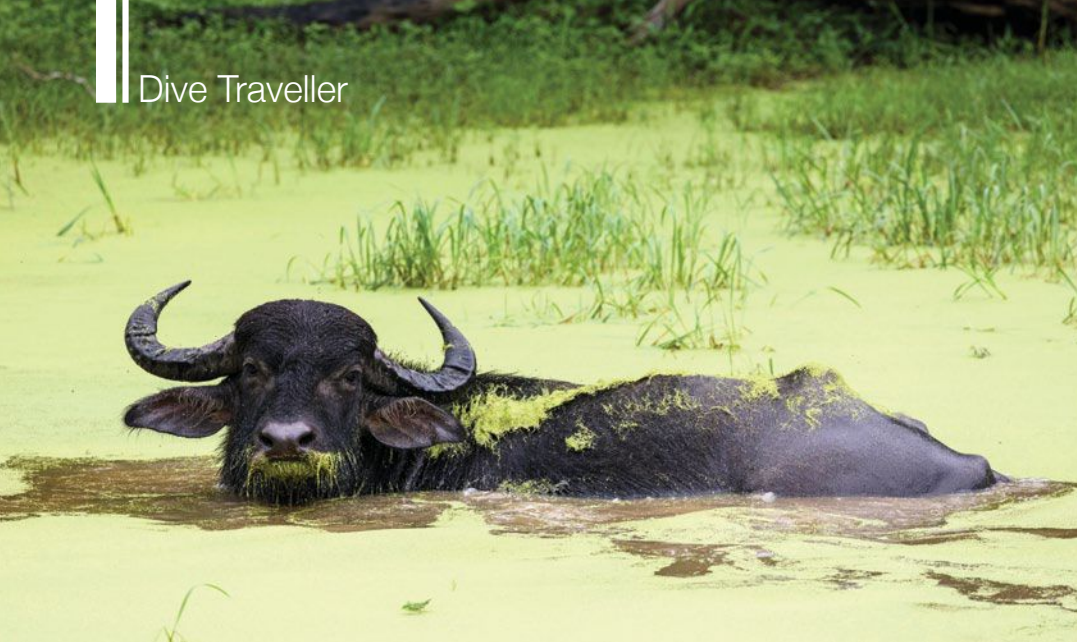
The next few days look perfect for nitrogen (re)loading. We meet up early with the Island Scuba team, launch the boat off the beach through mellow shin-high surf, and make a beeline into the fog. Nishan double checks our gear and studies his GPS. Ravinder mans the tiller, smiles, and points offshore – to somewhere very good, no doubt.

Will it be the Clarke Wreck? Named after Arthur C. Clarke, the famous science fiction author and avid scuba diver made his last dive on this small ship in March 1992 to celebrate his 74th birthday by exploring innerspace. Or how about

Right, the SS Perseus decorated with orange cup corals. This 445-foot (135m) long steamship sank in 1917 during World War I



“An estimated two hundred shipwrecks lie in Sri Lankan waters, some casualties of war but the majority victim of mishap and neglect”



returning to the Wallet Wreck? One of our favourites from last week, this unusually shaped vessel of unknown pedigree lies in 132 feet (40m) and is a haven for mobs of fish. Narcosis may have had something to do with the naming of this wreck, which to some resembles a giant purse or wallet. Another site we definitely want to repeat is the Taprobane East Wreck (sinking history and vessel name also unknown) with its photogenic “Heaven’s Gate” structure richly decorated in resplendent corals. And yet another is the 254-foot (77m) long cargo ship *Medhufaru*, which sits upright and showcases a cool frontend loader for those enamoured of heavy machinery. *Medhufaru* offers a nice multi-level profile. We started at 92 feet (28m) on the sand at the towering bow, ascended to 70 feet (21m) to play with the Tonka truck on the deck, and then worked up to the bridge at 50 feet (15m).

Nishan chimes in, “With this calm sea, we can go anywhere, dive whichever wrecks you choose. We

are the only ones out here. It is your ocean. Pick away. We will be sure to squeeze in the Battery too. I know it has been on your list since day one.” Melissa and I greedily compile our wish list for the next couple days. Sink it and they will come

The Car Wreck (officially *Chief Dragon*) joins many other Ceylon signature shipwrecks as proof that lifeless metal, in the right place, can be transformed into a thriving artificial reef. We excitedly descend to the deck in 73 feet (22m). Wave after wave of metallic-flanked fusiliers wrap around the wreckage, parting around protruding beams, ducking under giant iron plates, and arcing over overgrown winches and almost unrecognizable car chassis. Bannerfish parade about. Jacks feint and attack, harrying their smaller scaled and finned kin. Cruising on the current, we happily drift though it all, then kick back upstream for another fishy ride bow to stern. In its previous, boring life, *Chief Dragon* carried automobiles from port to port. We much prefer its new gig as a

Over the years I have seen just about everything here: electric rays, massive shoals of fish, pelagic wanderers...

Top left: A water buffalo cooling off in a pool covered in algae. Above left: The ruins atop Sigiriya, an ancient rock fortress, now a UNESCO World Heritage Site. Middle: An unidentified wreck know to locals as Wallet Wreck, complete with wire corals and black coral bushes

marine life magnet and meetup.

On a surface interval we ask about the ship’s background and receive a sobering story. After a fire led to its sinking in 1983, fishermen helped point the way to the Car Wreck’s location. A brief period of cursory exploration by local divers ensued, but then ended abruptly with the onset of the Sri Lankan civil war. This site, along with pretty much every other wreck in the area, became off limits for almost three decades because of naval port security regulations during the terrible conflict, which plunged the country into chaos. The nation’s economy suffered, the land itself suffered, and more than 100,000 Sri Lankan people lost their lives. In 2009 the devastating war ended. And people started to visit the



wrecks again.

“*Chief Dragon*, *Medhufaru* and the nearby *Thermopylae Sierra* are now all fun, peaceful, popular sites,” says Nishan. He continues, “My personal favorite is probably *Pecheur Breton*, which we call the Cargo Wreck. I know the structure like the back of my hand. Over the years I have seen just about everything here: electric rays, massive shoals of fish, pelagic wanderers, even whale sharks!”

Eager to dive Sri Lanka’s most popular wreck, we backroll and submerge, fanning out to explore the *Pecheur Breton*. Though Melissa and I do not bump into any bus-sized spotted elasmobranchs, we do find the huge resident grouper lurking under the stern, well camouflaged scorpionfish, and a juvenile emperor angel. Plus a most excellent torpedo ray wobbling about, which almost tempts me to test its high voltage personality. Most of our 45 minute bottom time is enjoyably spent in the 66-82 feet (20-25m) range near the stout mast – a hive of fish activity at the center

of a spiderweb of derelict fishing net – and then clambering around the ship’s bridge. The superstructure’s railings are absolutely smothered in brilliant cup corals. Orange opulence lights up the late afternoon’s darkening teal waters like garlands of marigolds abloom at a Sri Lankan festival. Festive and fantastic.

Uncharted

In more than 30 years of submersion, I cannot (yet) claim to have discovered my own shipwreck. But it almost feels like that now. I am far offshore and far below. Entranced at a heady depth of 148 feet (45m), I gaze up to the stern of a small wooden ship. Grasping feather stars, bubblegum pink cup corals, and a garden of sea fans proliferate in this oasis surrounded by barren sand. A curtain of black corals sprout from the wooden gunwales behind which lionfish and cardinalfish lurk in silent shadow. A school of golden bigeye snapper orbits the enigma.

It is nicknamed the Battery Barge,

Top: Snowflake Moray Eels, often seen on sandy open bottoms and among coral rubble. Above: The Sri Lankan Leopard, the top predator on the island, but also an endangered species with less than 1000 estimated in the wild

ABOVE & BELOW:

TIMING:

■ Sri Lanka has two monsoon seasons. To dive the shipwrecks out of Colombo the preferred time to visit is November through April. January through March usually delivers the best weather and sea conditions.

DIVE CONDITIONS:

■ Visibility ranges between 33 and 100 feet (10 and 30m), depending on location and season. Water temperatures vary from 79 to 84°F (26 to 29°C). A 1 or 3mm full suit is recommended for abrasion protection while shipwreck diving. Currents on the wrecks range from non-existent to strong, and surge is possible. Because of potentially challenging conditions and the depths of the wrecks, even a recreational diving itinerary should be considered advanced.

DIVE OPERATOR:

■ Island Scuba
www.islandscuba.net

SAFARI GUIDE:

■ Pradeep Kumara,
Safari in Sri Lanka
www.safariinsrilanka.com

MISCELLANEOUS TIPS:

- Before traveling, secure your E-Visa at www.eta.gov.lk/slvisa/ Fly to Colombo (CMB).
- Arrive a day early to combat jetlag from the long haul, which can take 20 to 30 hours from North America depending on routing.
- Hire a metered tuk-tuk (a Flintstones-like, cozy 3-wheeled taxi) to tour Colombo on the cheap, visiting the Fort, Pettah market, and temples.
- If in country during a full moon, attend a Poya festival celebration.

but its true identity and history are to no surprise, unknown. That is just fine by me, as I have come to love mystery in the deep. According to Nishan’s friend Dharshana, the very accomplished technical diver who first laid eyes on this prize after receiving a tip from a fisherman, Melissa and I are two of only a dozen people to have ever explored here on scuba. Other people may be content touring the most popular sites, but I prefer right here, off the map and immersed in obscurity. I will savour this moment. And I will search for my own shipwreck. There has to be another one lying around here somewhere in this remarkable swath of the Indian Ocean, unseen, unknown. []

Mark Derrick

AND THE STORY BEHIND DIVING'S ONLINE RETAIL BEHEMOTH



Divers all across North America know the brand Dive Gear Express, but did you know they're just another local dive store?

TEXT BY JILL HEINERTH

When Paul Heinerth and I owned a dive shop on the West coast of Florida, we noticed that Internet sales were beginning to encroach on profits in our brick and mortar store. It was easy to be reactionary and fear the change in the retail scuba business, but in my heart I knew that the industry would need a paradigm shift to usher it into the 21st century. It would need more than simple adaptation and high speed internet. Technological

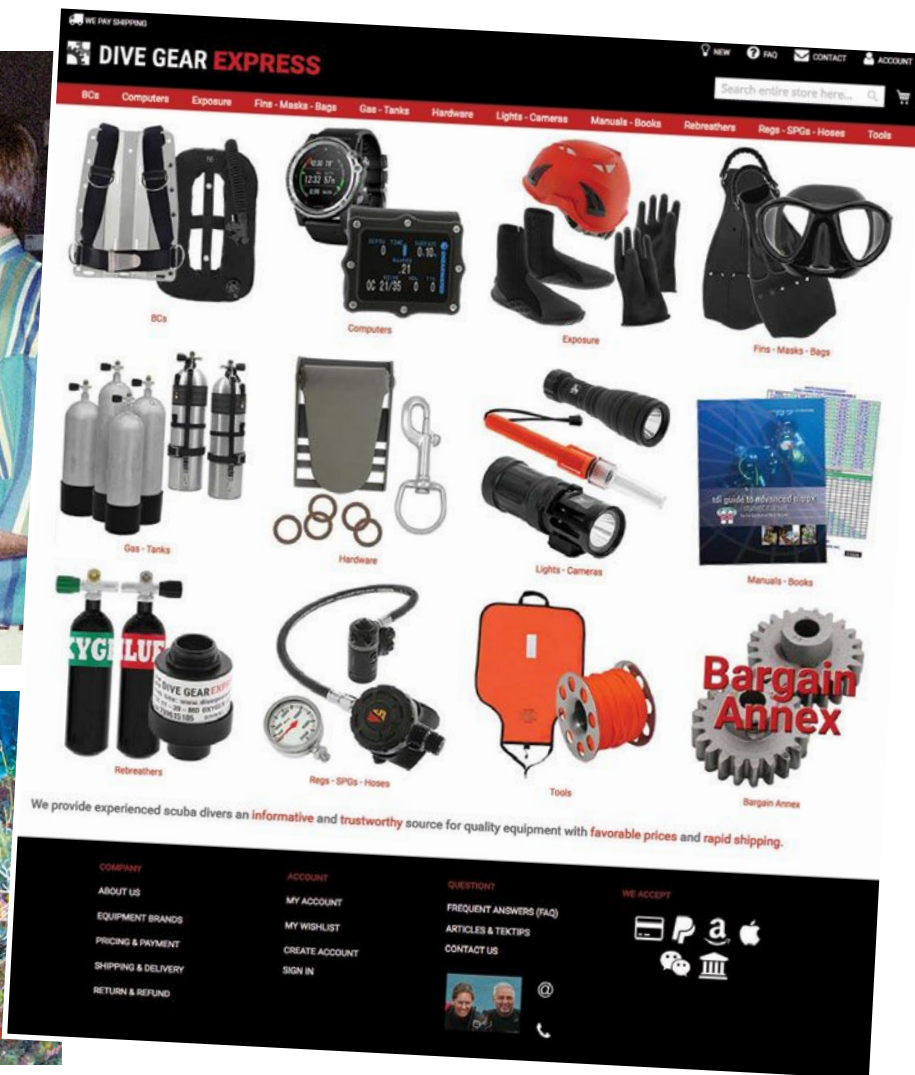
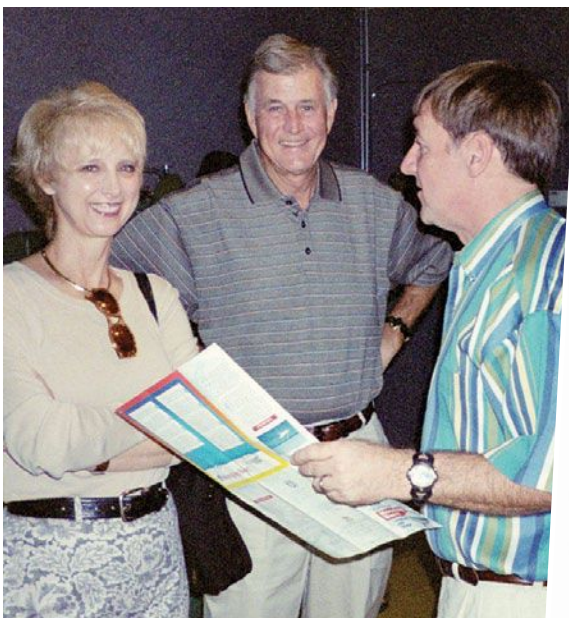
innovation would be at the center of a rejuvenated marketplace with online sales and convenience the key to consumer acceptance.

It is no surprise that a man with retail experience and technical skills is at the center of one of the dive industry's fastest growing and dependable brands. Mark Derrick isn't interested in inflating his own ego. He would rather talk about the industry and the team that helps him make Dive Gear Express a success. However, his personal story and that of the brand are a great lesson for the dive marketplace as a whole.

Mark Derrick and his team have worked hard to bring DGX from its humble beginnings to one of diving's most recognized retail brands

Filling a void

For Derrick, the concept of Dive Gear Express didn't arrive in a flash of brilliance. It evolved over a lifetime of connected experiences. As a young man, he gained his retail and management experience while working for his father in a small chain of furniture stores. Although he learned a lot, he was not terribly interested in furniture and craved further challenges. In the early 90's, he founded an internet service provider (ISP) and grew the business over the following decade, getting out just in time to beat the dot-com bust



of the early 2000s. His timely exit offered an opportunity to kick back and enjoy his true passion of diving for a couple of years before some basic needs inspired his next move.

An early technical diver, Derrick earned his Trimix Diver cert from the respected instructor Billy Deans in 1993. He moved to rebreathers in 1996 and never looked back. An avid aquarist, his diving interest was more about the marine life than wrecks or caves, and in South Florida he found a vibrant and healthy ecosystem in the depths of the Gulf Stream current. As much as his passion for technical diving and instruction grew, he noted a void in information and accessibility of equipment and fills. "It was a nightmare getting technical gas fills, and so in summer 2002 I opened a small dive shop that focused on gas fills... thus the name, Fill Express. The idea was that I would not compete with the other shops, and it could pay for itself with gas fills. The rule was, if Divers Direct sold it then Fill Express did not... I carried only one

Top: Mark and his dad - the inspiration for the Bargain Annex.

Above: Mark, fascinated by marine ecosystems. Right: The DGX website as it is today

brand of equipment, Dive Rite. I was a long time IANTD instructor, but I didn't teach any sport classes other than Nitrox."

Creating a global brand

The game-changing business transition occurred when Derrick coaxed permission to sell Dive Rite equipment online. "Lamar Hires [the CEO of Dive Rite] required convincing because he was concerned about publishing prices of dive equipment on the internet," Derrick said. "Today that seems almost ridiculous, but in 2002 it was very forward thinking and quite a risk on his part... virtually the entire recreational diving industry was strongly against the sale of diving equipment online." On March 1st, 2003, Derrick made his first online sale and delivered the product the

next day. By 2009, the product lines had expanded to the point that the name of the online website was no longer representative of the business and he re-branded the website as DiveGearExpress.com. A short year later, he sold off the Fill Express business and chose to focus on constructing a digital transformation of his company, creating a global brand with worldwide shipping and outreach.

Digital outreach was just as important as online sales, with Derrick posting a knowledge base of materials aimed at a burgeoning population of new technical divers. "When I started out with the website, there was very little information available about the equipment or the techniques needed to configure and dive it. So, out of necessity, the website had to include much of that information and the rationale behind configuration to sell the equipment." Derrick reports. He wrote 'Tek Tips' and articles on topics ranging from helium penalties, lift bags, decompression models,

An avid aquarist, his diving interest was more about the marine life than wrecks or caves



and oxygen sensors to brand-related education and training information to fill a critical industry knowledge gap. In doing so, he raised the profile of the site to an educational hub. Additionally, he brought on informed staff to fill any gaps with a dedication to service and personal knowledge. The staff dive locally and around the world. Six members are technical divers with Trimix and/or Full Cave qualifications, and four hold rebreather certifications. Several are active instructors and all can attest that they use the equipment they sell. Derrick's sister and frequent diving partner Lisa is the site photographer and knows how to highlight product features that answer the needs of their customers.

Customer loyalty has been earned with hard work and uncommon service. Countless on-line reviews describe the personal efforts of the staff to take care of the customer above the ultimate profitability of a single sale.

So what can the industry take away from this unique and successful business model? Derrick sees growth

in some regions of the globe but a general decline in the domestic US market. "My overall impression is that it has been stagnant for some time. Over the years, I think the US diving retailers developed an addiction to high margin equipment sales, along with the detriment of services like training and fills. Our customers frequently describe a wide variety of poor experiences with the dive industry that illustrate a general lack of focus on the end-consumer, and this is evident at both the manufacturer and the retailer levels." In short, retailers have used discounted training to sell equipment rather than focusing on great training as a stand-alone product. Other sports have a much different approach to professional training activities that focus on the customer's specific needs and not on an economic model that requires selling gear. Equipment service, training and consumables such as tank fills will need to thrive on their own in a changing digital world where products in all business sectors are sold online. The brick and

I think we will see rapid growth in the dive industry as we bring on a new generation of confident divers

Mark teaching students. The DGS staff dive locally and around the world, and are a mix of rebreather, cave, and trimix certified divers

mortar store of the future will need to exist in a specialty service sector with solid partnerships with online retailers that support their model. Derrick adds, "My optimistic view is that revitalized local dive shops [will] focus on high-quality services with training and diving activities as their primary profit center. Once that occurs, I think we will see rapid growth in the dive industry as we bring on a new generation of confident divers who pursue the activity as a lifelong hobby."

To that end, Derrick still maintains a storefront, but not in the traditional sense. He sees himself as a 'destination retailer'. He doesn't need a high profile location on the beach, but understands that his online clients need the option of dropping by to fill immediate needs for diving in the South Florida region. The same people that support the



web business are also available at the 6,900 square-foot (640m²) facility to help customers try on gear or support a purchase with personal knowledge. They can also refer you to a good local boat or the best restaurant near the dock.

Last year Dive Gear Express shipped to 120 countries with revenues scattered all over the world. Although roughly half of sales are domestic, Derrick does not feel that any one country is key to success. Relative country rankings fluctuate from month to month as new clients are turned on to the website. Recently they have seen a lot of growth in orders from Singapore, Hong Kong, and South Korea; and have exhibited at dive shows being held in those countries.

Template for the future

Today, Derrick is a long way from his father's brick and mortar furniture business in a warehouse surrounded by cotton fields. Like his Dad's company, his business has grown exponentially and to a purpose-built location. Like his Dad, he put in the time and effort of heavy lifting, in his case not just physically moving gear but also coding and writing software. He still thinks a lot about his humble Southern roots and has honoured his Dad with a unique tab on his website. His father

Last year Dive Gear Express shipped to 120 countries with revenues scattered all over the world

Top left: Kennis pulls an order for delivery. Right: Mark on his rebreather. Left: The ever popular DGX booth at ADEX. Right: Keith and Joyce at the kiosk

dedicated a portion of his shop to merchandise priced to move. His 'Bargain Annex' contained overstock and end-of-line products at deep discounts. "When I built our website, the webpage where we list our discontinued and clearance inventory was also named Bargain Annex. It is a way of paying homage to my father, Ed Derrick. Before he passed he told me he really liked that."

With Dive Gear Express, Mark Derrick is disrupting the established paradigm. In the process, he may have created the retail diving community's most promising template for the future. Don't forget your roots, but clearly look to emerging technologies to bring unique education, personal service, and products to a global audience. []

Vertigo in Diving

TEXT BY PAYAL S. RAZDAN, MPH AND NEAL W. POLLOCK, PhD



Photo: Eiko Jones

Changing ambient pressure is the most essential factor divers must learn to manage. It has major effects on buoyancy, work of breathing, inert gas uptake and elimination, and on gas spaces within or affecting the body. Divers understand that proper equalization of the middle ear space is paramount to minimize discomfort and possible damage. Still, ear-associated barotrauma is the most common diving injury. While many divers are reasonably well informed about squeezes and reverse blocks, there is less appreciation for another condition involving the ear, alternobaric vertigo. Preparation can help divers recognize symptoms and optimize their response to minimize the associated hazards.

Alternobaric vertigo

The term alternobaric vertigo (AV) was coined by Claes Lundgren in the early 1960s to describe cases of sensory disruption caused by an unequal rate of equalization between the two ears. Vertigo is the perception that the body or its surroundings are spinning or moving. Nystagmus (involuntary rhythmic movement of the eyes) can occur in concert, possibly including nausea and vomiting. While more commonly associated with diving, pilots have also reported events.

AV may be accompanied by the feeling of fullness, tinnitus (ringing in the ears), and muffled hearing in one or both ears. Some divers notice a hissing or squeaking sound prior to its onset. Symptoms can range from mild to severe, but most importantly, they are transient, generally

A lot of divers have experienced vertigo at some point, but with proper understanding and good buoyancy control complications can be greatly minimized

subsiding within seconds as the pressure difference wanes.

Normally, on the surface ambient (surrounding) pressure changes are small and equalization occurs naturally. The auditory tube (Eustachian tube) is a flexible duct that connects the back of the throat (nasopharynx) to the middle ear. It is generally collapsed, but will open naturally with normal activities, including yawning, swallowing, sneezing, and head tilting. Diving produces pressure changes that are far greater than those in air, with the greatest impact in the shallowest depths where the rate of relative pressure change is highest. During descent, increasing pressure compresses the volume of gas spaces, including those in the lungs, sinuses, mask, drysuit, and middle ear.

The tympanic membrane (eardrum)

separates the outer and middle ear. Sound (pressure waves) causes the tympanic membrane to move dynamically, and this movement is transferred to three small bones in the middle ear (malleus, incus, and stapes). The stapes delivers the stimulus into the fluid-filled spaces of the inner ear through the oval window, the indirect line of communication to the sensory organ for hearing (cochlea). Pressure changes also stimulate the fluid-filled semicircular canals (vestibular system) responsible for sensing head motion, orientation, and balance.

During descent, increasing ambient pressure causes the tympanic membrane to bow inwards in a more static manner, putting it at risk if the movement is too extreme. Middle ear equalization techniques allow for volume adjustment to restore the normal position of the eardrum. Techniques like the Valsalva maneuver employ active effort to increase pressure in the nasopharynx to direct gas through the auditory tube into the middle ear. During ascent, gas expanding in the middle ear normally passes through the auditory tube without action.

The right and left semicircular canals process stimuli independently to monitor balance. If the rate of equalization is substantially different between the two ears, the brain can erroneously translate the difference as movement. This mismatch can occur if the pressure required to open the auditory tube differs between sides. It is this pressure-induced, mismatched stimulation of the vestibular system that is responsible for AV.

Likelihood of an event

AV events commonly occur during ascent, but can also occur during descent. AV is rarely reported, often because the event passed without ill effects, but possibly also if symptoms lead to a panic response and a secondary fatal injury. Panic creates high risk situations, such as when a diver bolts to the surface. A retrospective study reported in 2006 found 27 percent of subjects reported a history of AV associated with diving. A prospective study, generally a much stronger research design, had previously found symptoms of AV in 14 percent of subjects completing monitored dives. Women have been reported in at least two studies to have a greater susceptibility than men.

Difficulty equalizing increases

the risk for AV. Physiological factors such as a history of otitis media (inflammation of the middle ear) and auditory tube dysfunction (inflammation of the auditory tube along with fluid and mucus build up) are potential risk factors. Excessively small auditory tubes may increase the risk for dysfunction.

Symptoms lasting more than a few minutes may indicate a more serious condition and warrant medical evaluation. Poor equalization can cause the eardrum to rupture. In such cases sharp pain may be followed by severe vertigo driven by the rush of relatively cold water into the middle ear (caloric vertigo). Fortunately, caloric vertigo will also subside as the temperature difference wanes.

Inner ear barotrauma caused by tearing or perforation of the delicate membranes leading to the inner ear (perilymph fistula) is a much more serious condition. Inner ear decompression sickness (IEDCS) can present with symptoms similar to inner ear barotrauma.

If the rate of equalization is different between the two ears, the brain can erroneously translate it as movement

Other conditions considered mild or rare may go undiagnosed until reoccurring bouts of AV are investigated. Superior canal dehiscence syndrome (SCDS) is caused by fracture or thinning of the bone above the superior-most semicircular canal. With SCDC, pressure stimulation of the middle ear can also produce vertigo and nystagmus. SCDS may be misdiagnosed as AV, IEDCS, or inner ear barotrauma.

Reducing risk of AV

Performing gentle, active equalization early and often during descent will help to reduce stress on ear structures. Equalizing in a head up position is frequently easier. Divers who encounter repeated AV should reevaluate their equalizing techniques. If success cannot be easily achieved medical evaluation is warranted.

Ear and sinus inflammation and congestion can make equalization more difficult. Some divers choose to rely on nasal decongestants to control congestion. While they may relieve symptoms temporarily, they can mask pre-existing medical

issues. Continued use, usually considered four days or more, can also lead to inflammation of the nasal passages known as rebound congestion, which can make equalizing challenging.

Congestion can also lead to reverse block, a condition in which gas becomes trapped in the middle ear during ascent. This can interfere with surfacing attempts. If a slow ascent does not resolve the condition, injury can occur. Conservative dive profiles and proper gas management will give the diver additional time to deal with any equalization issues that develop during ascent.

The acute sense of disorientation and movement can be disturbing, but recognizing symptoms, staying calm, and maintaining a stationary position will allow the symptoms of AV to resolve naturally. The disturbing sensory perception must essentially be ignored until the condition resolves. Holding a depth assisted with a fixed visual reference or maintaining physical connection to an unmoving feature like a rock or fixed anchor line can help in the typically brief acute state.

Disorientation and panic in the face of AV can lead to inappropriate movement and additional injuries. It is important to understand that AV symptoms will wane rapidly as the unequal pressure difference resolves. A diver should not attempt to force equalization while experiencing AV since this could make symptoms worse, and possibly damage delicate ear structures.

Situations producing AV symptoms can be complicated and an unexpected case can compound the challenges. If equalizing difficulties arise early in a dive, with or without AV, it probably should be ended. If symptoms are experienced later in the dive, the focus should be on how to end the dive safely. Divers who understand AV, have excellent buoyancy control, and who can remain calm in the case of surprise events will be in a good position to manage to avoid complications. []

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Sardinia



The marine protected area of Tavolara, formed in 1997 but a fantastic example of MPA's at work



A secret worth sharing

TEXT AND PHOTOS BY ANTONIO BUSIELLO

Italy is internationally renowned for many fine things, including the food, the wine, the arts, the Renaissance, the Pope, the fashion, and the lifestyle. However, few people outside of the country know that the diving in Italy is as exceptional as the rest of its attractions.

Last summer I returned to Italy and spent few weeks in Sardinia, one of my favourite diving destinations in Europe. With over 1100 miles (1770km) of beautiful coasts, Sardinia is the second-largest island in the Mediterranean Sea.

This beautiful island is a popular tourist destination for Europeans and is known for its night life, for the luxury lifestyle of “Costa Smeralda”, and for the breathtaking landscape. Amazing white sandy beaches alternate with huge granitic rock formations that fall straight into the sea – a sea where the colour goes from emerald green to all kinds of shades of light blue and turquoise, making you feel like you’re in the Caribbean, but with Italian cuisine – what a great deal!

Sardinia is one of the most geologically ancient pieces of land in Europe, with one of the most important underwater caves system of the entire continent. Located on the west side of Italy and right below the French island of Corsica, this island has been populated

since prehistory. There is evidence of human habitation on the islands as far back as the Bronze Age. Particularly interesting to the modern-day visitor is the Nuragic civilization that lived on the island for many centuries starting around 1500 BC, leaving statuary, artefacts, villages, and temples that can be visited by the many archaeological sites around the island.

There are three international airports on the island: two in the north (in Alghero on the east side and in Olbia on the west side) and a third in Cagliari, the main city in the south. The greater part of the island is still very wild and fascinating, offering many opportunities for outdoor activities. I love the hiking and following the many trails that lead to wonderful hidden beaches.

Diving in Sardinia is an unforgettable experience. There are many different diving opportunities at all experience levels, from beginners to advanced divers. With hundreds of dive sites all along the coast, including cave diving, underwater archaeological and fossil discoveries, wrecks, deep technical dives, big animal encounters, and great macro, Sardinia is considered one of the best diving destinations in Europe. Two spots in particular have been rated amongst the best 10 dive sites in the Mediterranean Sea: the famous Papa Banks and Lavezzi, the Groupers City.

Here’s a run down for some of my favourite dive sites in Sardinia:



MPA of Tavolara

Tavolara and Punta Coda Cavallo Marine Protected Area (MPA) is a great example of conservation. It is located on the north east of the island, right south of world-famous Costa Smeralda. It was declared as protected area only in 1997, but since then an amazing amount of work has been done and its water is now populated by a great variety of marine life. It is not uncommon to see snappers, jacks, octopus, big schools of Mediterranean chromis, and colourful, ornate wrasse – even just snorkelling. Tavolara and Punta Coda Cavallo MAP can easily be reached by a scenic half an hour drive south from the Olbia airport. Tavolara attracts divers from all over for its beautiful Papa Banks, one of the best diving experiences in the Mediterranean. It is also known for technical diving and deep wrecks, like the beautiful and mysterious *Languste*, a German battleship that

sank more than 70 years ago and now lies at 280 feet (85m).

Only authorized diving centres may dive in Tavolara and Punta Coda MPA.

Papa Banks

Papa Bank 1 and Papa Bank 2 are separate dive sites divided by a sand channel on the east side of the small island of Tavolara. These are dives you definitely want to repeat more than once. The first bank is composed of six steps that start at 53 feet (16m) and go deep to 118 feet (36m). The second bank starts at 92 feet (28m) and ends on the sand bottom at 147 feet (45m). They are each full of marine life. The first thing you notice on the steps at Papa Bank 1 is a huge school of Mediterranean chromis and ornate wrasse in and around the big gorgonian fans that are found all over both banks. This site is famous for the *paramuricea clavata*; this

More than a hundred caves spread along a few miles of this impressive coastline,

Sardinia is home to the largest marine caves in the Mediterranean

gorgonian can be found here in different colours, especially the beautiful yellow and red bicolor variety. They are enormous and it's common to see big groupers, snappers, and jacks swimming around them looking for food. It is also possible to see big yellowtail, morulus and Mediterranean moray eel coming up, following walls covered by healthy populations of yellow cluster anemone. Amazing scenery, indeed.

Molara Wreck

Sardinia is a paradise for wreck diving. Due to its geographical position in the middle of the Mediterranean, it was on the most important European routes



for centuries. All kinds of wrecks can be found in these waters: ancient Roman ships, World War II battle ships, airplanes, and cargo ships. Some of them are very deep, accessible only with technical diving.

The Molara Wreck, for instance, is one of two ships sunk by submarines during WWII just off the coast of Tavolara. Only recently the wreck was recognized as the *l'Oued Yquem*, built in 1920 and operated by a French company. It was sunk by the Netherlands Navy submarine O21 on October 3rd, 1941, while sailing back from Syria.

The wreck lies on the sand between 105 and 121 feet (32 and 37m). What is left of the big ship comes out of the blue as divers start their descent. Inside the 230 foot (70m) wreck are groupers, big European conger, and sometimes lobsters; around it there are always schools of saddled seabream, red mullet, and snappers.

Il Grottone

This easy dive with a max depth of 46 feet (14m) is the perfect afternoon dive, a great ending to a wonderful diving day in Tavolara. From the water, the big and easy cave, right underneath the huge Tavolara cliff, offers a spectacular view. The ample dimensions of the cave allow sunlight to get in and once your eyes adjust to the low light, you can't but admire the different kinds of colourful algae and sponges that completely cover the walls. Il Grottone is the perfect place for open waters divers to get a taste of the surreal atmosphere that a huge cave entrance like this can offer. Outside the cave it's a non-stop encounter with big groupers,

With over 1100 miles (1770km) of coastline, Sardinia is the second-largest island in the Mediterranean Sea and full of life

moray eel, octopus, lobster, and big schools of small reef fishes, like Mediterranean chromis, saddled seabream, Mediterranean rainbow wrasse, and beautiful ornate wrasse, probably the most colourful fish in the Mediterranean Sea.

Capo Caccia Caves

On the west coast of Sardinia, facing the sea from behind ancient brick walls, lies the beautiful fishing village of Alghero. Alghero should be a mandatory stop for visitors to this side of the island, as it doesn't get much better than enjoying a nice aperitivo while watching the sun setting into the sea right in front of the majestic Capo Caccia cliffs. The cliffs tower above the famous Capo Caccia underwater caves. Just few miles north of Alghero, this is the most important underwater cave system found in Italy, with some of the biggest underwater caves in Europe. More than a hundred caves spread along a few miles/kilometres

There are many different diving opportunities at all experience levels, from beginners to advanced divers



of this impressive coastline, where huge limestone cliffs fall straight into the sea. This huge karst system goes deep inside the island and these caves have been here for millions of years. In some of them, archaeologists have found evidence of human use that dates back to prehistoric times.

In some cases, underwater caves are the only way to access terrestrial caves, where fossils and impressive stalactites and stalagmites are located. This is also one of the few places in Italy where divers can see the beautiful red coral in less than 30 feet (10m).

Nereo's Cave

This cave, named in honour of Nereus, a mythological figure also known as the Old Man of the Sea, is considered the biggest marine cave in the Mediterranean Sea. It's a huge connected system of arches, tunnels, air chambers, and caves that extend deep into the mountain for hundreds

Locals say this is an extension of heaven on earth and I can't say they're wrong

yards/metres. Nero's cave has many entrances, making this dive interesting and different every time.

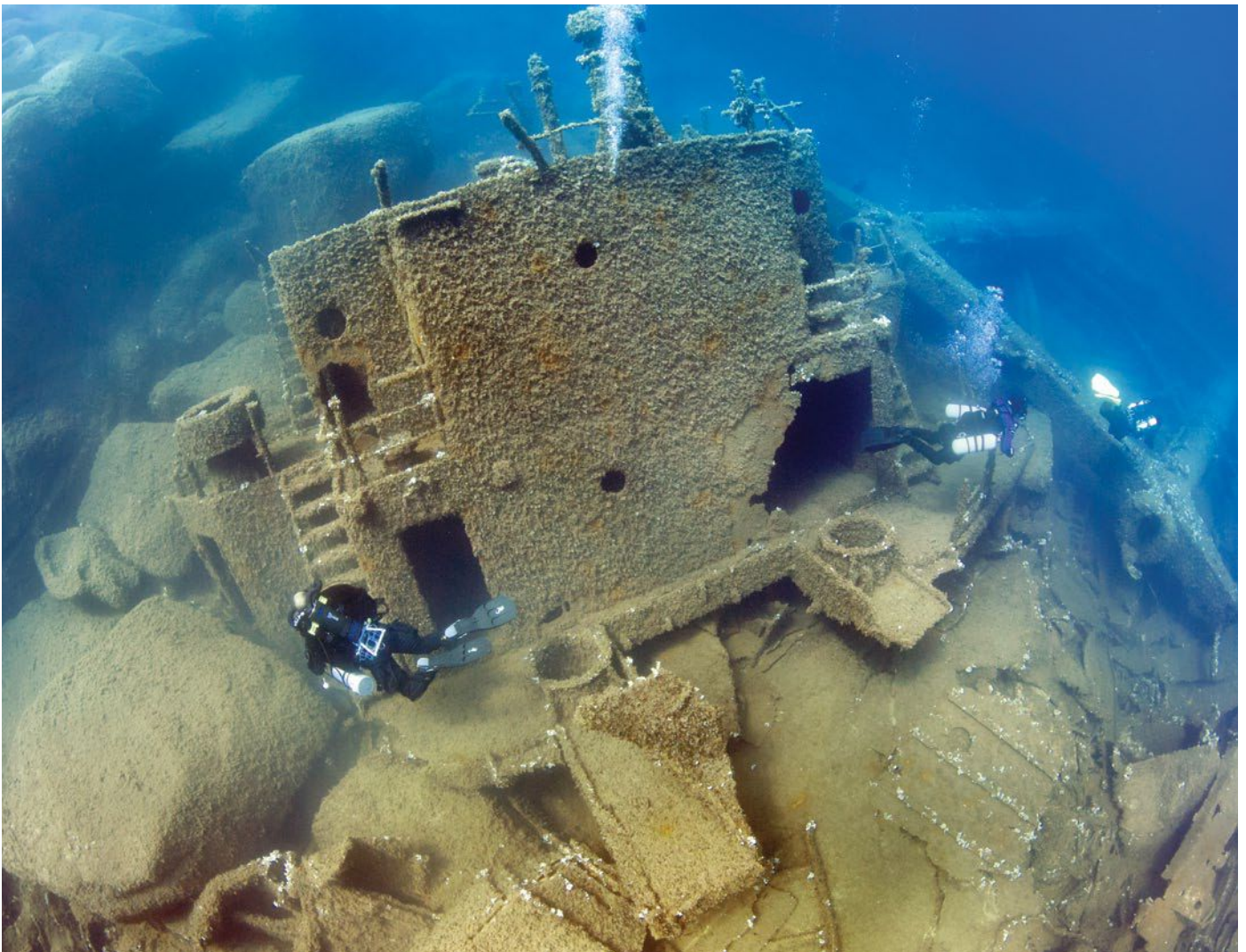
The deepest and probably the best entrance is at 105 feet (32m), where a long tunnel leads to a huge room illuminated by external light, creating spectacular light effects. Other entrances/exits can be found around 52 and 59 feet (16 and 18m), among them The Heart at 60 feet (18m) is shaped like – you guessed it – a big heart (noticeable especially from the inside). An extraordinary view awaits when exiting this amazing cave. Some of the tunnels are quite large and create a circuit with open water, allowing sea currents to bring life and nutrients into the cave. Walls are covered with red coral and

yellow leptosammia, and lobster, congers, slipper lobsters, pagurus, and golden coral shrimps are pretty much everywhere.

Falco's Cave

What's not to love about these caves?! Above: Grouper City is as fun as it sounds with these gentle giants. Right top: Nudi's offer something for the macro diver, whilst the occasional sea horse can be spotted around Capo Galera

This relatively shallow cave (maximum depth of 50 feet/15m) was named in honour of Ennio Falco, the great free-diver of the 1960's. It is considered one of the most important caves in the area due to its uniqueness. The cave walls and arches are fully covered a variety of sea life, including sponges and red coral. Snappers and grouper cruise by the entrance, offering a pre-show before the main attraction. From Falco's cave it is possible to access a terrestrial cave, where divers can leave their equipment and walk around in the mysterious atmosphere created by the cave walls, arches, stalactites and stalagmites, made all the more dramatic under the illumination of a diver's flashlight.



Archipelago di La Maddalena

This National Park was established in 1994 and also includes the sea around the many small islands that compose the archipelago between Sardinia and Corsica. Locals say this is an extension of heaven on earth, and after visiting the archipelago I can't say they're wrong. The water is so clear that is hard to describe it. Red and yellow rocks emerge from light blue water that splashes down on ultra-white and soft pink sand beaches; it is just a stunning show to see. The marine park includes over 30 diving spots, accessible only by authorised diving centres. Life is abundant even in shallow waters, which offer great diving experiences for all levels of divers, from beginners to the most advanced. Even hard-to-please divers will find their bliss. With big animals encounters, deep wrecks, stunning walls, and amazing clear water it is a truly beautiful place that will also appeal to technical divers.

Grouper City

For decades Lavezzi has been known in the Mediterranean as the Grouper City. Here huge friendly groupers get close and will follow divers for pretty much an entire dive. This diving spot is located few miles north of the Archipelago in the Bocche di Bonifacio National Park and attracts divers from all over Europe. The depth ranges from 80 to 100 feet (25 to 30m). The bottom is full of large rocks covered with gorgonians and yellow cluster anemones. Sea life abounds here: in addition to the groupers, divers commonly see big snappers, sea bass, jacks, and schools of barracuda.

Clan Ogilvie Wreck

What an amazing experience is to dive a wreck that has been on the bottom of the ocean for 120 years. The *Clan Ogilvie* was built by the English company Stephen & Sons in 1882 and sunk in 1888.

The *Angelika* wreck, not much life but a great photo op and fun to explore.
Marmorata, Sardinia

This is not an easy dive, since the wreck lies on the bottom at 170 feet (52m) and the current can often be strong. The wreck is completely covered by sponges and gorgonians, some of the biggest ones in the archipelago. All around is an amazing show of big fish including groupers, snappers, yellow tail, big lobsters, and moray eel. []

Who to dive with

Tavolara and Punta Coda Cavallo MPA:
Blue Infinito Diving Center (offers accommodation)
www.bluin.finito.it

Capo Caccia caves:
Capo Galera Diving Center (offers accommodation)
www.diving.capogalera.com

Archipelago di La Maddalena MPA:
Bluedivecenter
www.bludivecenter.com

British Columbia has one of the most successful artificial reefing programs in the world, DIVER was present for an anniversary dive of the former HMCS *Chaudiere* to learn more

25 years of The Chaud

Just a short boat trip from Egmont on the beautiful Sunshine Coast of British Columbia, lies a lush artificial reef called the Chaudière. Well known and well loved by the BC diving community, “the Chaud” as it is affectionately known, was a gamble that paid off. The 366 foot (111m) decommissioned Canadian destroyer escort was sunk by the Artificial Reef Society of British Columbia (ARSBC) on Dec. 5, 1992 at Kunechin Point in Sechelt Inlet. At the time it was the largest man-made reef of its kind in Canada.

In 1987, the ARSBC was simply a group of divers with no commercial connection to diving but who had

a vision: recreational divers would enjoy exploring a sunken ship that had been properly prepared for divers, by divers. There was no idea where all this might lead, but there was some speculation on the broader implications for eco-adventure scuba dive tourism in BC.

At that time, the Provincial Government’s tourism department undertook a study of the possible impact of an artificial reef program on dive tourism, and, in its 1989 report, the conclusions were optimistic. Encouraged by the report, the ARSBC organized to sink the *G.B. Church*, a 178 foot (54m) coastal freighter as its pilot project in 1991 at Portland Island BC.

Not long after the sinking of the

These ships were considered the most high tech and highly advanced anti-submarine hunters in the world

G.B. Church, Tex Enemark, one of the original founding members of the ARSBC, started extensive lobbying in Ottawa of officials from the Royal Canadian Navy. The Navy was in the process of systematically decommissioning their Mackenzie and Restigouche Class destroyers, most of which were built in the late 1950’s to early 1960’s. At that time, these ships were considered to be the most high tech and highly advanced anti-submarine hunters in the world.

Photo: Chris Straub



Photos: Trisha Stovel, Neil McDaniel

Following the vessels' decommissioning, these ships were often used as a source for spare parts for the other surviving members of her class. The first of these ships was the *Chaudière* and, rather than be scrapped for razor blades or bicycle frames, Tex was successful in convincing the Minister of Defense at the time, Paul Dick, to donate the ship to the ARSBC to become an artificial reef. In a press conference held in Victoria, the ARSBC was awarded the ship and a bill of sale for \$1.00 plus 13 cents tax. Fortunately, the minister forgave the tax, and the rest of the team chipped in 25 cents each to seal the deal. Talk about a bargain!

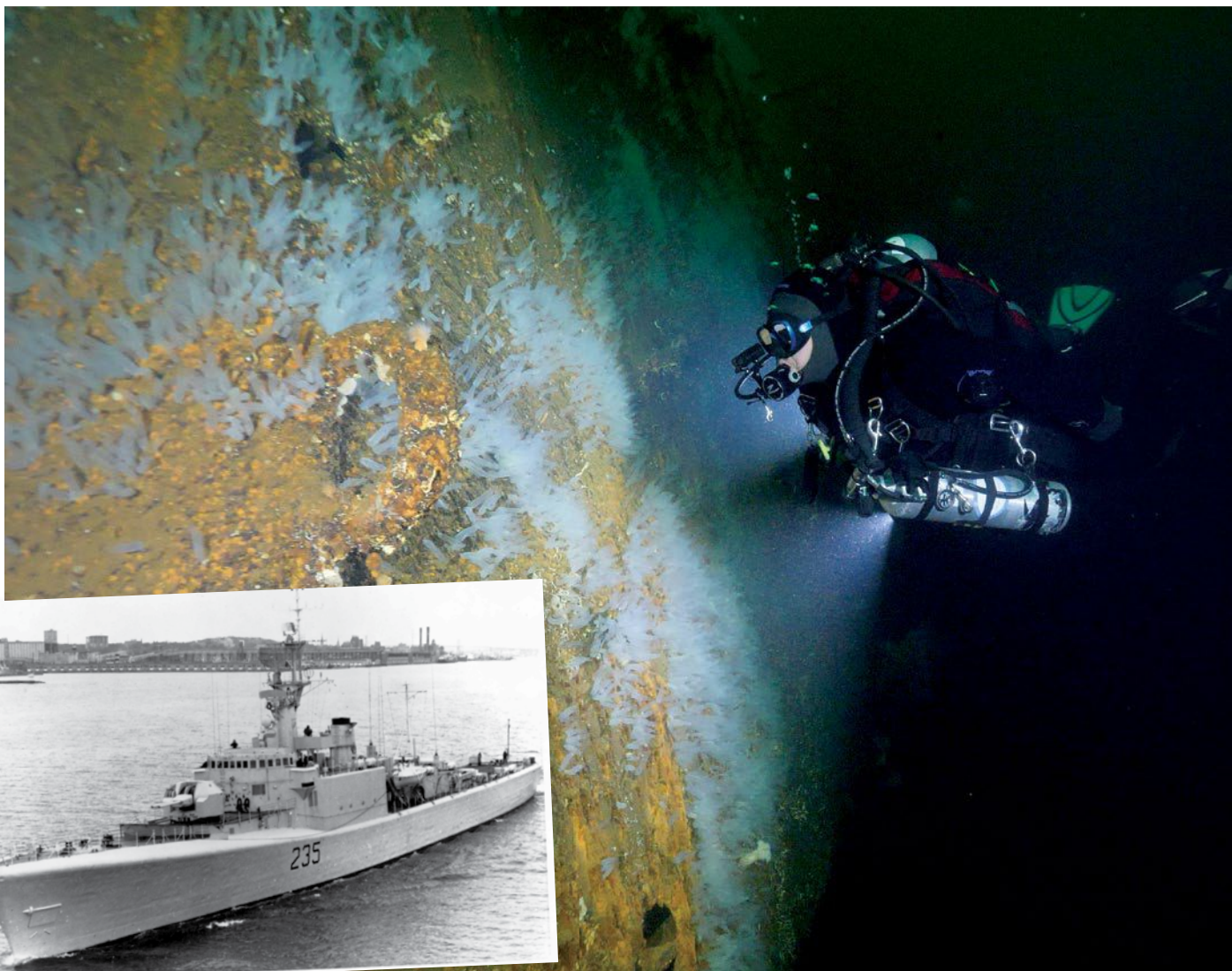
Having the vision

The spot originally selected for the sinking of the *Chaudière* was near Nanaimo; however, despite a great deal of support from the local diver community, there was little interest from Nanaimo tourism. At some point, the ARSBC was approached by a small group in Sechelt, BC, a community of about 15,000 people, who asked if the ARSBC could sink the ship in their region. The project was in need of capital to the tune of about \$30,000 as a prerequisite to obtaining the ship. In those days, there was one dive operator in Sechelt, Kal Helyar of Porpoise Bay Charters, and his was a small operation that had only been in business for 18 months. Kal could

Top: Sinking on her port side the reef has taken on an eerie feel with becoming shafts, and the bridge (above left) now a vertical bank of windows.
Right: Sechelt, BC, stunning above and below the water

see the value of the *Chaudière* to his business and was extraordinarily generous with his support in every way. He helped raise the funds in remarkable time and made this a community project. It took over 11 months and 110 volunteers, who combined dedication, ingenuity, scrounging, and a lot of hard work to ready the ship before it was towed from Vancouver through the Skookumchuck Narrows to Kunechin Point. The *Chaudière* was the largest vessel ever to traverse the narrows and some parts for the hull actually scraped with submerged rock formations at the narrowest points.

Shortly after the sinking, about six full time charter operators went into



Photos: Neil McDaniel, Trisha Stovel

business, none of whom had helped to finance, prepare, or volunteer to work on the ship. Initially, Kal suffered a loss of business rather than a gain because of this burst of competition. Over the subsequent two years, however, most of the other operators dropped out because they seemed to think the business would come to them. Kal kept marketing and today Porpoise Bay Charters is the main operator servicing the *Chaudière* from his operations base in Egmont.

Lessons learned

This was the first time a project such as this had been attempted, and preparing the *Chaudière* was a steep learning curve for the ARSBC because of her size and complexity. At that time it was unclear how much the ship could be remediated for diver exploration so only 20% of the ship was made ready for diver penetration. The controlled sinking

of such a ship also had never been attempted and instead of sinking upright, the *Chaudière* sank on her port side. The ARSBC learned a lot from the *Chaudière* project about ship preparation, ballast, and balance and free-water effect. The lessons learned here allowed the ARSBC to adjust future ship preparations to ensure that they sank upright on their keel. The society improved diver access preparation processes as well, and now it is common to have nearly 100 percent accessibility for exploration and marine life habitat recruitment.

Subsequent to the *Chaudière*, the ARSBC went on to acquire more destroyers, albeit at a vastly higher cost and obtained through Crown Assets Distribution. The vessels that followed included the former HMCS *Mackenzie* in 1995, *Columbia* in 1996,

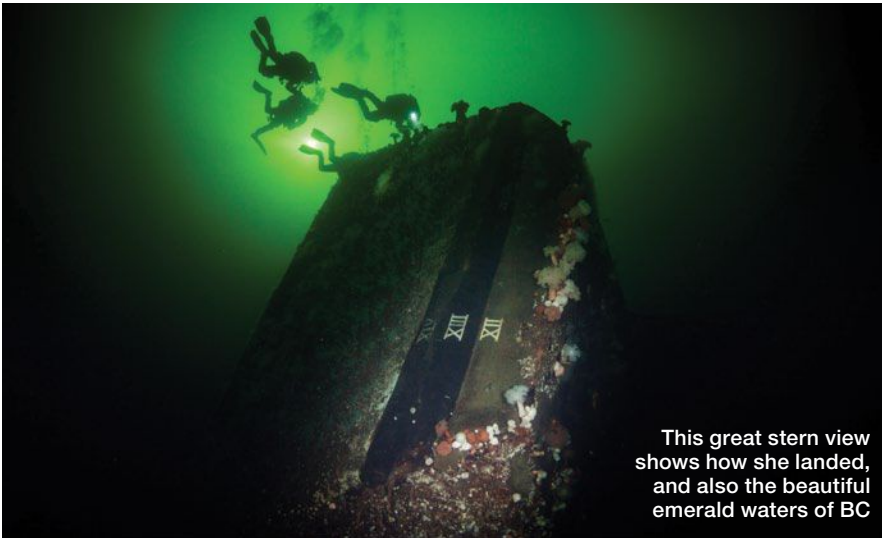
The ship remains a long term, stable marine habitat for a variety of foraging, breeding, and sheltering..

The *Chaudière* has a blunt (tunicate covered) bow, as her original nose was cut off and put onto another vessel. Below: Every birthday deserves a nice cake!

Saskatchewan in 1997, Cape Breton in 2001, and the *Annapolis* in 2015. Each one subsequently added to an impressive fleet of artificial reefs in BC coastal regions. The society also sank a Boeing 737 passenger jet complete with wings and tail, adding a range for diver interest.

Serving underwater for over 25 years, the *Chaudière* is considered a mature artificial reef that mimics a natural reef environment. The ship remains a long term, stable marine habitat for a variety of foraging, breeding, and sheltering fish and fauna. The *Chaudière's* scale and complexity will continue to serve for decades while divers and marine life





This great stern view shows how she landed, and also the beautiful emerald waters of BC



ARSCB volunteer Gary Friesen installs new mooring lines

Photos: Chris Straub, Trisha Stovel

continue to enjoy the site.

On December 12, 2017 a group of divers consisting of members of the ARSBC, along with DIVER magazine, friends and associates, paid tribute to the wreck of the *Chaudière* on its 25 anniversary.

While on site, a few divers were also tasked with the job of installing two replacement floats and lines to attach to the wreck at mid-ship and one closer to the forward gun. This was routine maintenance, and Kal was ready for everyone with the gear all prepared for installation.

The task didn't take long and then it was off to continue exploring the ship. Large lingcod and rockfish linger in the dark recessed areas of her hull. Down deep, closer to the bow are massive structures of cloud sponges. Along the rails and outcroppings are colourful plumose anemones and great concentrations of crystal tunicates. Juvenile and mature rockfish abound and it seemed like a new generation of sea cucumbers has begun to emerge.

The ship remains a fantastic dive, and, although her age is beginning to show after 25 years submerged, the *Chaudière* lies in a stately manner, welcoming divers to explore the structure.

Currently, the ARSBC is working on a new project, consulting with Catalyst Paper in Powell River to sink up to four large, American-built concrete ships. These ships were also known as "The Hulks of Powell River" are still in use as an effective breakwater for the paper mill; however, the ships are deteriorating and are well past their lifespan. Ranging from 366 to 440 feet (111 to 134m) long, they will be sunk one at a time in Powell River, British Columbia, within recreational scuba diving depths and placed in a cluster formation allowing divers to swim from one to the other. []

The ARSBC is a non-profit group of volunteers who, over many years, have become experts in artificial reefing.

For more info visit:

www.artificialreefsociety.bc.ca

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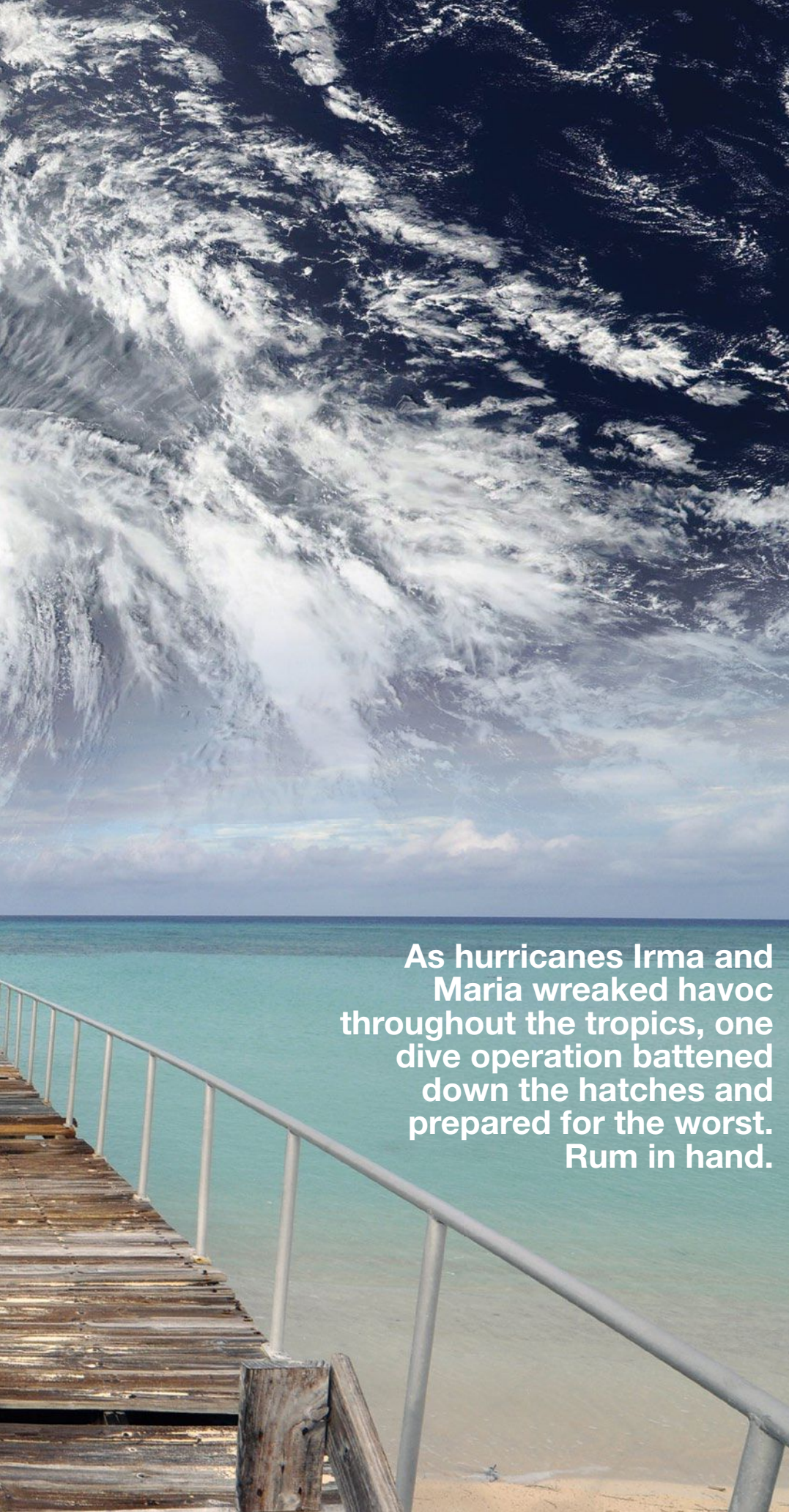
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HELL HATH NO FURY

TEXT AND PHOTOS BY
DAVID JONES



As hurricanes Irma and Maria wreaked havoc throughout the tropics, one dive operation battened down the hatches and prepared for the worst. Rum in hand.

In September 2017 two massive hurricanes, the strongest storms ever recorded in the Atlantic Ocean, named Irma and Maria, tore through several island nations in the Caribbean leaving a path of destruction in their wake. These Cat 5 monsters landed almost direct hits on the small Island of Grand Turk in the Turks and Caicos, the island upon which our equally small diving and humpback whale watching business is situated. My partner and I stayed with our business, experiencing the full impact of both hurricanes and have been on the recovering island since the passage of these very destructive weather systems.

Our personal experiences, and the many challenges such monumental environmental disasters present to a small dive shop, may in some part entertain, in some part enlighten, and perhaps leave you in a better position to prepare yourself to survive such a storm and cope with basic living afterwards. Mark my word, preparation is key.

The one thing you must not do in the face of a hurricane is adopt a nonchalant attitude, deciding that you don't really need to prepare, assuming that it won't be that bad, or thinking it might even miss. If we'd thought like that, these storms would have torn our relatively comfortable existence apart and left us sitting, just like Tom Hanks in *Castaway*, trying to suck the slime out of a raw crab and wondering how it got so, so bad.

In the end, even after all of our careful preparations, we were still at the mercy of Mother Nature. There was no escape, except by jumping on a plane, but that would have meant leaving our home and our business unattended for weeks, possibly even months. Sure, we could have flown out in a heartbeat but we knew we wouldn't be able to fly back in such a hurry. And sure enough, international flights were suspended after the storms and services did not return to the islands for several weeks.

Luckily (or unluckily) we had experienced the total devastation of a Category 5 hurricane just three years earlier in a different location. That particular event, a dead center direct hit, resulted in the loss of

our first diving business. Our boat was simply snapped in two. So, the very second we became aware that we were in the projected path of Category 5 Irma, approximately a week before we would feel the initial effects, we went into immediate, total, and absolute lock down.

The nervous excitement we had felt before our first major hurricane had dissipated completely upon witnessing the aftermath. A lush tropical island had been transformed into a barren moonscape in a matter of hours. We fully appreciated that we were in very great danger and must take immediate action to ensure our personal survival and the survival of our business.

Advanced prep

The first matter was provisioning: water, food, and fuel (priority one, two and three respectively). Small islands have limited supplies and panic buying increased exponentially as Irma crept closer and closer. If we had left our shopping to the last moment we would have been unable to buy many of the things that eventually helped us to cope with the aftermath. As we had no plans to start catching crabs, we started our survival shopping the day after we found out she was coming.

We made advanced preparation with a 350 gallon (1560ℓ) rain water tank and had allowed this to fill completely prior to Irma. We also filled a hundred empty wine bottles (no, we're not raging alcoholics, we collected them from friends – well, most of them!) and several five gallon (23ℓ) office-style water bottles. Additionally we filled our fifty five gallon (250ℓ) dive gear rinse bin and our similarly sized, wheelie-style garbage can (cleaned and sanitised), with non-potable, town supplied water. The rinse bin and garbage bin were intended for dish washing, bathing, and flushing. All-in-all we had approximately four hundred and fifty gallons (2000ℓ) of drinking water and one hundred and ten gallons (500ℓ) of utility water.

And we needed every single drop. As I write, it has been two months since the second hurricane passed and town water is still only intermittent in supply. Immediately after the storms there was simply no city water supply; the Island's main storage tanks had been compromised and contaminated and all privately-owned drinking water supply stations were out of operation due to salt contamination and the



absence of electricity. These normal water sources remained out of service for several weeks.

The only source of potable water in the aftermath was via foreign aid distribution each day and this only started a few weeks after the storms. If we had needed this aid water, we would have had to face the grim prospect of queuing for hours in the baking sun, while already dehydrated, getting eaten alive by mosquitoes and under the supervision of British Army soldiers, all for one or two gallons (4.5 or 9ℓ) per person. We were really happy we had stored all the water we did.

Maria hit two weeks after Irma and, thankfully, despite the roof damage and constant house flooding, there was plenty of rain in the interim so our tank had filled to the brim again. Our rinse bins lasted the distance,

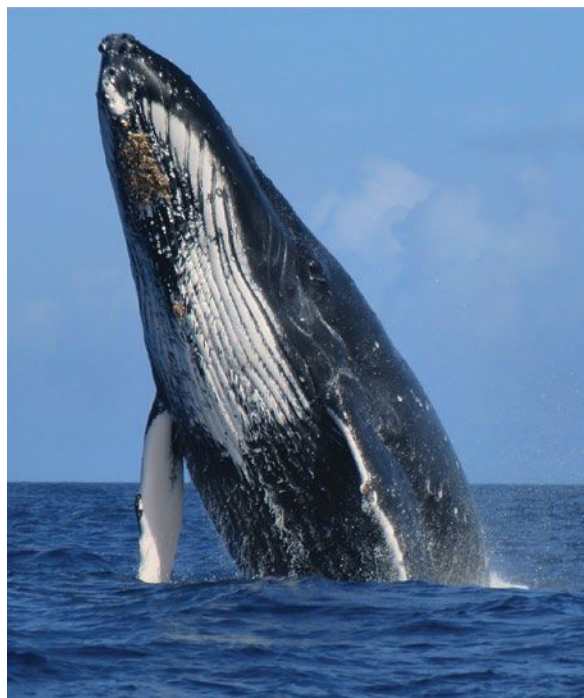
We would have had to face the grim prospect of queuing for hours in the baking sun, while already dehydrated

Hurricanes Irma and Maria have been estimated to have caused over US\$160 billion of damage, their impact on the tourism and dive industry can't be underestimated

too. Having enough water stored to be independent for several weeks was essential. We weren't thirsty once and had an ample supply for cooking, drinking and washing until city water was restored. Not having to waste hours queuing each day gave us more time to focus on the extensive clean up and repair efforts.

Spam, spam, spam

Food was the easy part, apart from the fact that we had no electricity and subsequently no refrigeration. It was canned, preserved and dry goods only. For protein we bought



all the stuff that you normally wouldn't even touch, like tinned meats, spam, spam with bacon, hickory smoked spam, tinned sardines, etc. We should have bought small tins, because without a fridge everything we opened had to be eaten or it would spoil in the heat, and there is only so much corned beef one man can eat in a day!

We knew no stores would be open for weeks so we stocked up with powdered potatoes, rice, pasta, prepared sauces, canned veg, and powdered seasonings. A plethora of pick me ups like warm sodas, chocolate in various stages of melting and potato chips really helped make things feel more normal. Powdered water flavours and syrups broke the monotony of plain warm water; tea, coffee and hot chocolate became invaluable.

The obligatory bottle of rum for the times a stiff drink was the only remedy... lasted about a day

And the obligatory bottle of rum for the times a stiff drink was the only remedy. I think the rum lasted about a day. Anyway, we had enough and with a bit of variety we quickly forgot the refrigerator ever existed.

Irma snapped almost every single power pole on the island and Maria snapped just about anything left. We were left without electricity for two months and nineteen days, which meant no electric stove. Anticipating this, we had bought a Coleman click-and-cook gas stove and forty tins of butane fuel. This item is now in our top ten best buys; it provided

Turks and Caicos, a great location for humpback whales and beautiful reefs - which went remarkably untouched throughout the assault

hot meals every day at the touch of a button. Fuel was as scarce for several weeks after the storms so we were glad we bought so much of it.

No power also meant no lights. We had prepared for this with MPOW solar lights. They charge all day in the sun and at dusk they come on with sensor and offer a blinding, beautiful, white LED light that really does last all night. It made everything so much easier and was great for security. There is nothing a thief loves more than the cloak of darkness. We had been looted after the hurricane in our last location so we conducted night watches for several weeks after the storm.

Our solar lighting was complimented with several Scubapro Nova LED dive torches, bright and totally waterproof, perfect for the damp conditions. We had emergency candles as a last backup. We bought more batteries than we thought we would need and still didn't have enough - lesson learned.

Plans A, B, and C

We live on the upper floor of a two story building and have the dive shop below at ground level. Our main concern was that our roof would be torn off, so we prepared an evacuation plan. If the roof flew away or was seriously compromised we would evacuate downstairs. This was what happened, as projectiles, torn from other roofs, were whipped up and transformed into missiles. One such missile struck our roof with such force that it cracked three of the main 2 x 6 roof trusses. The impact damaged our zinc roofing, which then sheared off piece by piece and went flying away.

Thankfully the plywood sheathing under our zinc roof held. Nevertheless, the frightening crack of that initial impact was enough to send us, the hounds, and our emergency grab bags scurrying for Evacuation Point B, the dive base downstairs. We donned our Bell crash helmets, opened the door and crawled out, down the stairs to the dive base, through the full force of Irma. Once my wife and the dogs were safely inside the dive base I returned upstairs to collect the half of our provisions that were still there. We had split our survival items between upstairs and downstairs in case upstairs blew away or down stairs flooded. The helmet saved me twice, once when a UFO struck it so hard that I was knocked over, and again on my return when the

door swung open violently enough to jam my head between it and the wall. Plan C was our Jim Bouy Life raft, which was fully prepared for launch should the storm surge hit our location, but thankfully it did not come to this.

So, with all provisions now secure we stayed in our 6x6ft (1.8x1.8m) concrete, windowless dive base changing room, the entrance of which had been sand bagged to a height of 4ft (1.2m), for all eight roaring hours of Irma and an even more tedious sixteen hours of Maria, with the food, water, stove, lights, first aid, two dogs, one table, two chairs and travel scrabble. I am not sure how it is possible, but it was too loud to play scrabble. Although it wasn't totally comfortable, we accomplished the first tier of survival in this little room: the preservation of self. Astoundingly, unlike many other island nations and considering the force of both hurricanes, not a single life was lost in the Turks and Caicos as a direct result of the storms.

Securing the base

The biggest challenge while preparing was the securing and protecting the business assets. Every single thing that makes the business run, from paperclips to a thirty two foot long boat, had to be protected from being blown away, destroyed by impact, soaked, submerged, or crushed. If it could be moved we moved it, and where possible we moved it to our ground level room or the basement. We ziplocked it, we bagged it, then we bagged it again, we containerized it, we taped it shut, and, finally, we raised it off the floor. Two months later there are things that we still cannot find because they were so well packed away.

The boat and engine were the biggest concern, as they are the most expensive and most exposed. Hurricanes create monumental seas that are capable of breaking boats in half with ease. We removed our boat from the water and placed it on the trailer. We would have put it on the ground if we didn't have a trailer, because left it in the sea it was as good as lost anyway. So, our boat was secured to its trailer at every available point, filled with a large quantity of sand bags, and then ratcheted down to the trailer using commercial shipping ratchet straps (they make good weight belt fabric, too, by the way). Finally the tongue



of the trailer and the main cleat on the bow were chained to 2000lbs (900kg) of old steel machinery we'd bought for \$40.

Our boat was still there after both storms but there was evidence that it had tried to move and it had suffered minor impact damage. Practically every single boat that had been left in the water in the sheltered local harbour had capsized, been beached, or just plain wrecked. We had marine hull insurance and we read the terms closely: the boat was not permitted to be on its mooring during the passage of a named windstorm. Although we didn't need to claim, it was very reassuring to be covered.

We raised our truck and dive compressor to a height of four feet (1.2m) on breeze blocks to prevent water damage from the forecast 30ft (9m) storm surge and coastal flooding. We removed the truck battery to protect the electrical system in the event of submersion and covered the compressor in heavy duty tarp before chaining it to a wall. We had filled our vehicle gas tank and stored plenty

Practically every single boat that had been left in the water in the sheltered local harbour had capsized

A 30 foot (9m) storm surge makes an easy meal of any dive boat in its path, just make sure you read the small print on your insurance!

of spare gas. Petrol stations didn't open for weeks after the hurricanes and a working vehicle was essential during the recovery effort. We also had a small inverter that charged our devices from the truck battery, and it proved invaluable.

Mod cons

Hurricanes make smartphones totally stupid. We had zero communications: no landline, no cell phone coverage, no internet, no email, no Whatsapp, no Twitter, and, best of all, no Facebook, so we talked to our neighbours and we made some new friends! We had a traditional analogue radio and the first thing that came back on for us after about a week or so was the local radio station, broadcasting the news that Maria was fast approaching. If it were not



TOP TEN BUYS

- MPOW Solar Lights, Push-to-activate wall mounted LED lights and Scubapro LED dive lights
- Coleman click n' cook gas stove
- Large square mosquito net
- WEN compressor generator
- Honda household generator
- Bell cycling helmet
- Analogue radio
- Seatech trailer
- 12V to 110V inverter
- Solar fan

GRAB BAG CONTENTS

- Cash
- Passport
- Flashlight
- Small first aid kit
- Chocolate bars
- A lighter and waterproof matches
- Handheld VHF radio
- Leatherman multitool
- A bottle of water
- Rum!

for radio, we would have had very little idea of the need to brace for the second hit. We had just unpacked! The only outgoing communication option available was Satellite phone and we didn't have one. It was over a month before we could make contact with our families.

We had no serious medical emergencies from injury, so the biggest health risks we faced during the recovery period were sickness from contaminated water, spoiling food, mosquito borne disease, and nasty prickly heat. It gets unbearably hot and humid after a hurricane, and our AC was now a relic of the past. However, we had a solar fan that proved amazing, another top ten buy. As our home was compromised with damaged roof and broken windows, we were also fighting with the swarms of mosquitos, flies and their associated diseases. The best defense was our large, square mosquito net. Mosquitoes can turn a nightmare into a living hell.

The one thing we should have had in the middle of the whole mess

Months later, much as been accomplished on the island ... but there are still signs of hurricane damage

was, undoubtedly, a generator. We now have one that is capable of running the dive compressor so we can actually charge dive tanks without grid electricity. However, the high power requirement of this machine means it is not ideally suited to running the house. It is just too expensive in terms of gasoline. The ideal set up would be to have a high power generator exclusively for compressor use and a smaller unit to run lights and a fridge. Our dive compressor generator is now drained and stored, ready and waiting for next year's hurricane season.

Months later, much as been accomplished on the island and tourism has resumed, but there are still signs of hurricane damage. I don't think it is possible to totally erase the scars of a double header

Top: A common post-storm sight, effecting the whole dive and tourism community in the Caribbean. Above: Hurricane Irma had wind speeds of up to 185mph (298km/h)

of Cat 5 hurricanes. However, the coral reefs suffered extremely little damage. They look the same as they did the day before the storm, the only evidence of damage we have seen was some broken Gorgonian sea fans and the plates of the shell from an unfortunate Hawksbill Turtle that washed up on the beach. It is truly remarkable how well the reef withstood the storms. We were open again for diving on the 14th October but tourists really didn't start to appear until November. Essentially it took two months for business to resume properly, still quite an impressive feat considering the severity of the storms.

With some thoughtful planning and some elbow grease, we came out essentially unscathed from some of the fiercest weather systems ever recorded. We sincerely hope we never have to do it again, but working in the scuba industry can put us in locations that are prone to such events. If we do face it again we will be ready. The question is, would you be? []

TITANIUM³

The latest evolution
of an elite element



LIGHTER. Weighs even less than our legendary T2

LONGER. Now go up to 3 years before servicing

LIVELIER. Fresh styling and ultimate performance



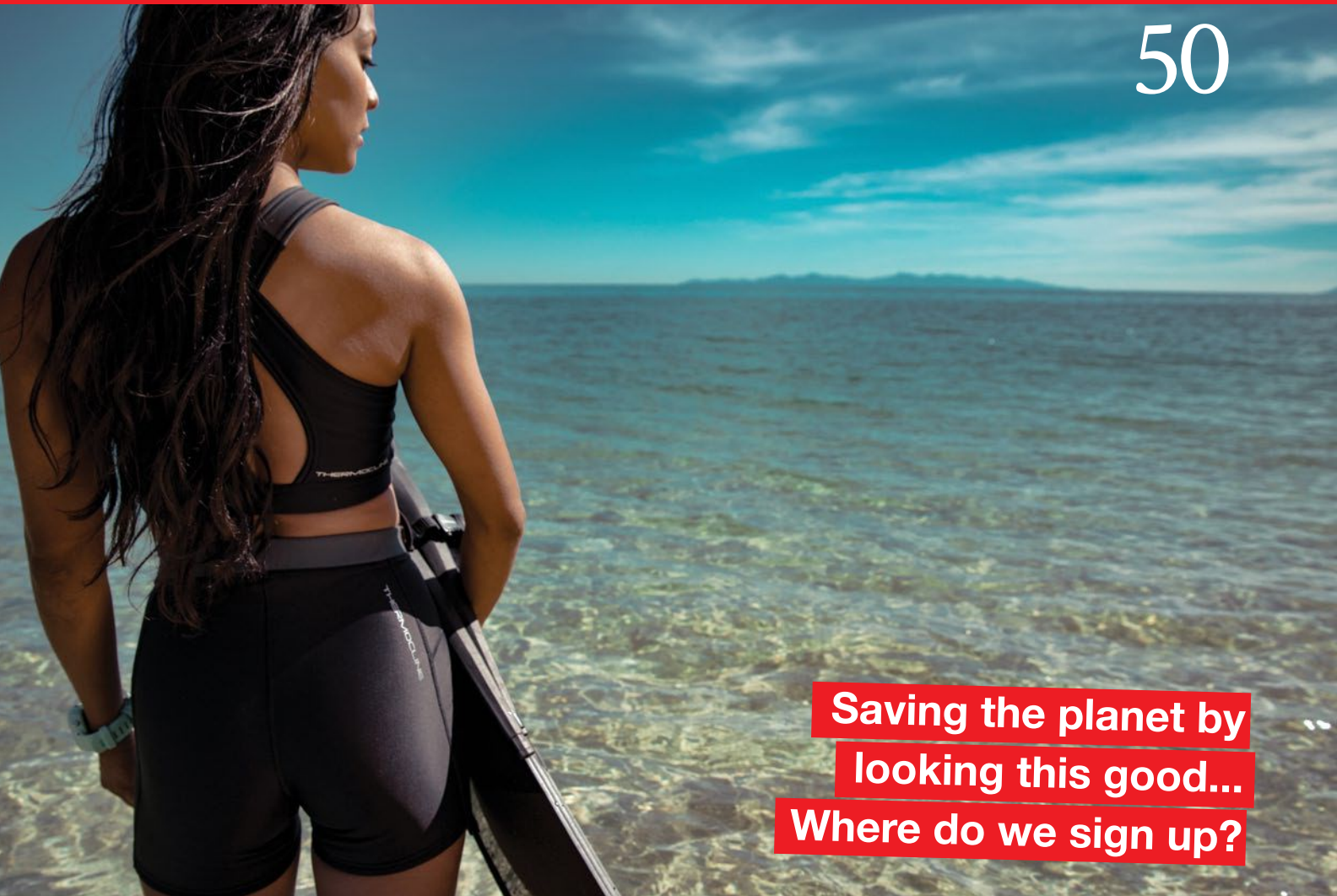
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atomicaquatics.com

DIVER *down*

Things you need to know about dive gear, medicine, photography and more...

50



Saving the planet by looking this good... Where do we sign up?

Being Digital

Advanced planning will keep your slide shows engaging

page 52



Safety

Strategies for open ocean survival

page 56



Medicine

Pulmonary barotrauma in abnormal lungs

page 60



Final Cut

Will Paralenz send Go-Pro the way of the dodo?

page 54



Tech diving

Returning to fundamentals is a step forward

page 58



Eau Canada

Special guest turns mediocre dive memorable

page 66



Gear Stop



Fourth Element

Thermocline

The “next generation of oceanwear” they claim - well, we think they’re right. The new Thermocline range offers the world’s first neoprene-free wetsuit. The neutrally buoyant wetsuit is partly made from ghost fishing nets. The nets are reclaimed, cleaned, and recycled into nylon yarn that is then used to create Thermocline fabric - a process and business model Fourth Element has spent years pioneering and perfecting. The new Thermocline range is lightweight (a full suit weighs just 2lbs/1kg), machine washable, breathable, and hypo-allergenic. The inner fleece layer draws moisture away from the skin and wicks through the breathable membrane where it evaporates off the nylon surface. Thermocline compares to a 2mm neoprene wetsuit, with a range that consists of: full one piece wetsuits (seen here), short and long sleeve tops, vests, hooded vests, leggings, shorty spring suit, long and short sleeved swimsuit, crop top, hoods, and socks. Fourth Element continues to be innovative, showing the world that adventure brands can produce a range of lifestyle and exposure protection products using recycled materials without loss of style, or quality. By 2020 they have pledged to be free of all plastic packing. Fourth Element is leading the way, and for a change, we hope everyone copies them.

www.fourthelement.com



AQUATICA

Lanyard

From \$45

Simple ideas are always the best, and anyone with a large camera system will understand the need for a good lanyard. This comes in two nifty parts - the lanyard itself, available as 10 or 20 inches (25 or 30 cm), and the optional mounting brackets. Multiple brackets can be stacked at a time, allowing for the lanyard to be clipped on, but also for additional ball mounts. A neat solution at a great price.

www.aquatica.ca



Custom Divers

50mm webbing accessory retainer

\$12.55

UK firm Custom Divers has made an innovative and cheap little product that will appeal to many. This stainless retainer easily fits onto webbing without the need to re-thread or undo a harness. Once fitted, the bungee cord can stretch over an accessory, such as a light, and be fixed into the locking slots to secure. Another simple and practical idea well executed. We've already purchased a few!

www.customdivers.com

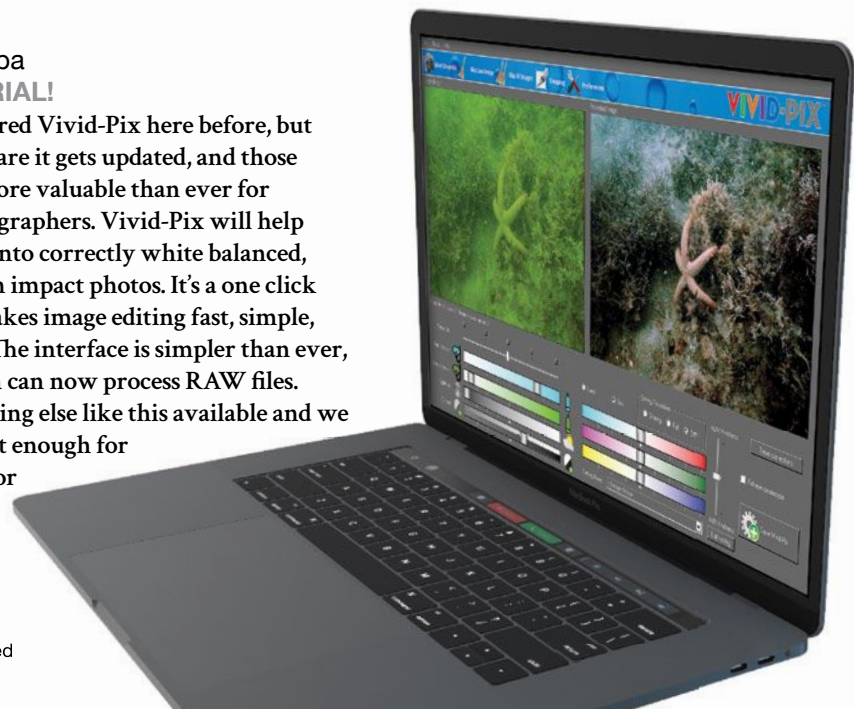
VIVID-PIX

Land & Sea Scuba

\$49.99 FREE TRIAL!

Yes, we have featured Vivid-Pix here before, but like all good software it gets updated, and those updates make it more valuable than ever for underwater photographers. Vivid-Pix will help turn your images into correctly white balanced, colourful, and high impact photos. It's a one click Photoshop that makes image editing fast, simple, and actually fun. The interface is simpler than ever, and the PC version can now process RAW files. There's really nothing else like this available and we can't recommend it enough for shooters looking for a quick fix!

www.vivid-pix.com

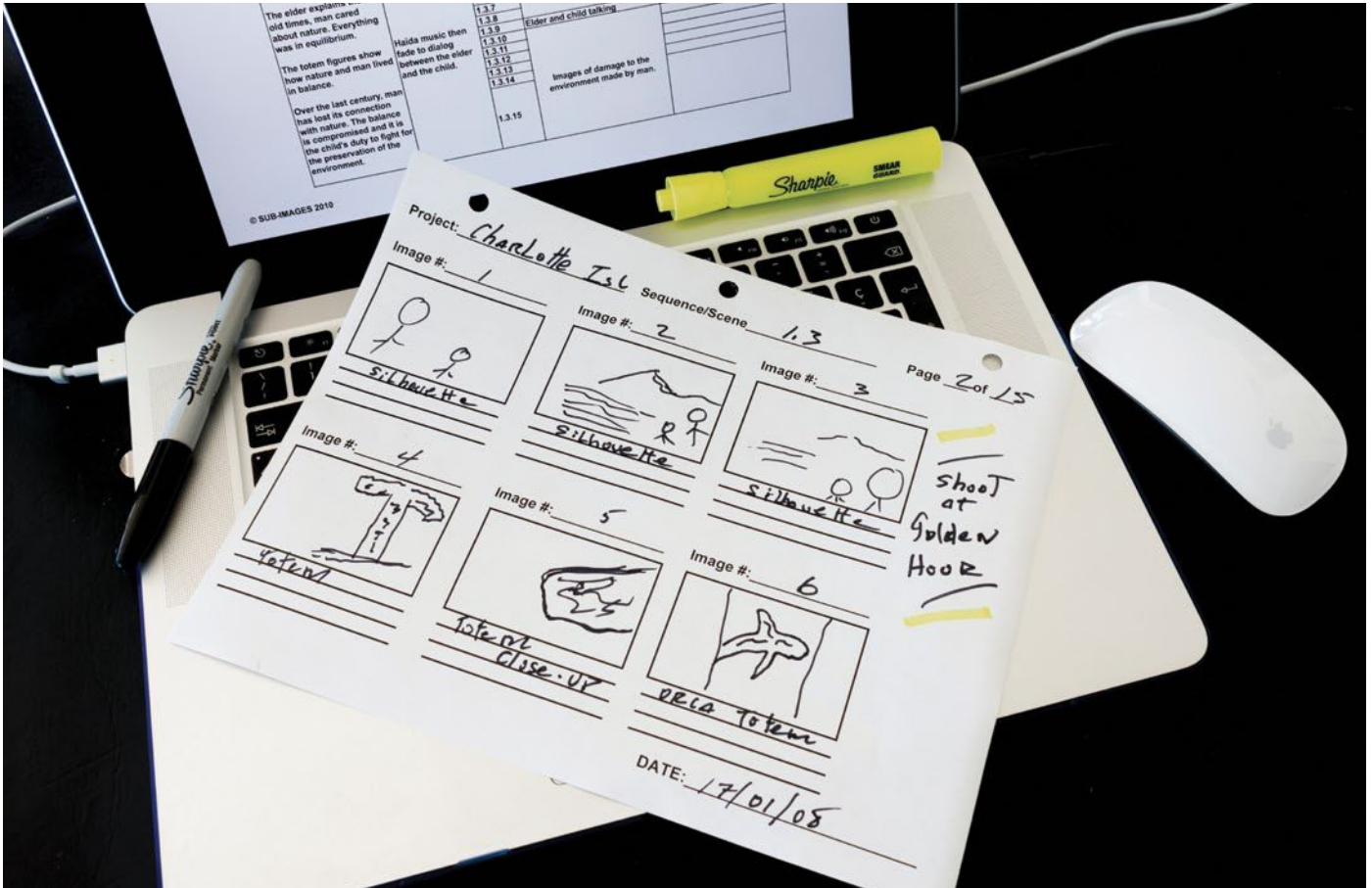


*Prices in USD unless noted



Presenting your images Part I

By MICHEL GILBERT & DANIELLE ALARY



Photos: Alary-Gilbert/SUB-IMAGES

In this Facebook and Instagram era, most pictures end up on social media. You should consider moving beyond that.

Although these days we seldom view the physical slides of years past, we still call an image viewing session using a projector or a large TV screen a “slide show”. The latter can induce excitement, or sleepiness. The difference may depend on the subject, but most often it is the absence of storyline, the lack of a considered sequence of images, that turns such an event into a boring experience.

With some planning and a bit of work, your presentations can become unique events.

Before making any presentations you must answer a few questions:

- Who makes up the audience? Dive club, family, class, general public?
- What is the purpose of the presentation? Entertainment, education, training?
- What does the audience know about the subject?
- What are the key messages?
- Where will it be presented and which media will be used to present it?

The program may consist of commented slides or images and music put together in a multimedia presentation.

Of course, preparing a viewing session for a family gathering is different than working on a training class or a symposium. Answering

You can expand the scenario into a storyboard.

This serves as a reference once on location. It helps save time. As for u/w images, you may memorize the storyboard before your dive and use a slate with point forms to make sure you don't forget key subjects

these questions will help you focus on key aspects of the presentation.

Tell a story

The cornerstone of any presentation remains the story. Take some time to think about a specific angle, a topic that will resonate with your audience. Instead of titling it 'My Trip to the Charlotte Islands', look for the story inside the story: 'Unknown Secrets of the Charlotte Islands', or the ubiquitous '10 Reasons to Visit the Charlotte Islands'. Creativity pays off.

Before your trip, jot a short synopsis on a piece of paper or, better yet, on your favourite word processor app. As in any story there must be an introduction, some key topics/subjects and a conclusion.

SYNOPSIS

Introduction

Rising sun background with traditional Haïda elder explains to a young child the importance of preservation, especially the oceans.

Core

Opening with traditional Haïda sculptures, evolving toward ocean-related subjects. For entry by a diver we explore the Emerald Sea

Conclusion

On a sunset background, the elder explains what will happen if we do not take care of t

Section	Content	Soundtrack	Image #	Subject	Notes
1.0	Introduction				
1.1	Opening/Titles Solemn opening		1.1.1	Black slide	
			1.1.2	MG & DA present	Black background - white letters
			1.1.3	In cooperation with....	Black background - white letters
			1.1.4	Our Fathers' Will	Black background - white letters
			1.1.5	Fade to black	
1.2	Prelude Vast panoramas of mountains and the coast.		1.2.1	Totem	Silhouettes
			1.2.2	Large trees	Silhouettes
			1.2.3	Mountains	Silhouettes
			1.2.4	Rising sun over the mountains	
			1.2.5	Seacoast as sunrise	
			1.2.6	Waves	
			1.2.7	Vast horizon	
			1.2.8	Aerial of the coast	
			1.2.9	Forest	
1.3	Dialog The child asks the elder about the state of nature The elder explains that in old times, man cared about nature. Everything was in equilibrium. The totem figures show how nature and man lived in balance. Over the last century, man has lost its connection with nature. The balance is compromised and it is the child's duty to fight for		1.3.1	Elder and child	Silhouettes
			1.3.2	Elder and child near the sea	Silhouettes
			1.3.3	Elder and child	Silhouettes
			1.3.4		
			1.3.5	Totem figures illustrating the land and sea creatures.	
			1.3.6		
			1.3.7		
			1.3.8		
			1.3.9	Elder and child talking	
			1.3.10		
			1.3.11		
			1.3.12		
			1.3.13		
			1.3.14	Images of damage to the environment made by man.	
			1.3.15		

Expand your synopsis into a more detailed scenario. It doesn't need to be a 500-page document; a simple list of ideas is sufficient.

Translate the scenario into a shooting list. For some images you may even think about a storyboard just like the ones they draw in Hollywood. Use matchsticks drawings to illustrate your ideas and eventually explain them to a divemaster or a model-dive buddy. Visualise your dives in advance, imagine different shooting situations and build pictures in your mind. This exercise will help you work faster once on location.

Sometimes you have to produce using available material. In such a case, take the time to think about your storyline as the basis of your presentation. Otherwise the presentation will consist of a series of images rather than being a cohesive experience.

On location

During the trip, bring up the shooting list or the storyboard and work toward achieving the goals that you have set. You may end up shooting only 50% of the images you have in mind. Don't panic, you will stumble upon unforeseen photo ops that could make up for the difference.

Shoot the same subjects at different angles, with varying types of lighting. Shoot from a distance and then move in as you continue to make images. These combinations will provide more variety

Left: Writing a short synopsis helps you build your story and makes production more efficient. Expanding that synopsis (right) in a scenario and eventually a shooting list ensures that you remain focused while in the field

It is worth spending some time adjusting your projector and/or your computer to optimize image quality

during the editing process.

Also, think like a video producer. Shoot sequences, complete little stories within the broader story. Keep your key topics in mind and, although you should follow your shooting list, do not hesitate to improvise as opportunities materialize in the course of a dive.

Don't forget to shoot topside images. They will complement the underwater work and make for a more complete story. Digital is cheap: make plenty of images.

Back home

Editing comes next in your project. Armed with the shooting list, the scenario and a computer, select the best images that tell the story.

Note we did not write: select the best images. We wrote: select the best images that TELL THE STORY.

It means that some high quality photographs may not make it, while others that are not the best of the best actually end up in the final selection.

Editing is a merciless process. You should cut until it hurts. Remember, the ratio of used vs shot images at National Geographic average 1/1,000 and even less than that depending on the project.

Soundtrack

If your program includes music, select tracks that help you carry the message. For

presentations aimed at family and friends in a home environment there is nothing wrong in using copyrighted music. However, anything meant for the public needs copyright clearance or, alternatively, a selection of music that is royalty-free. You can find this easily on the internet.

Instrumental music is the best choice as the lyrics in a song may distract the viewer.

Just like images, music must help convey the right mood or the message of your presentation.

If you include narration, keep it to minimum and make sure it is properly recorded.

Again, the soundtrack's purpose is to build a foundation for the images and the story. Do not throw on any piece of music and then sync images in a random fashion. Research, edit, and properly assemble your presentation.

Soundtrack accounts for 50% of the impact of your program. It is worth investing some time and taking care in the editing process to properly build the music and/or narration layers.

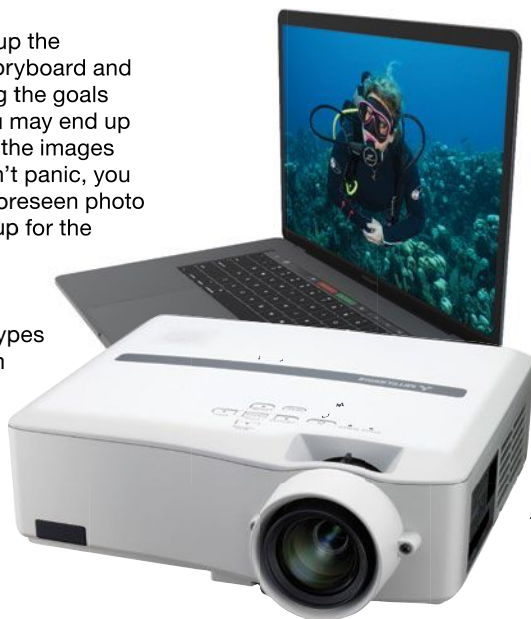
Sometimes we even select our music before we go out on a shoot. In such case we bring the tracks with us and listen to them during the trip. This puts us "in the mood".

More to come

So far we have seen how to build your story and select music and images. In our next column we will learn how to put everything together in the proper software.

In the meantime, go out and shoot some images!

Happy bubbles! []





Camera with a Cause

BY JILL HEINERTH



Photos: Jill Heinerth

When a swarm of Eagle Rays strafes a group of vacationing divers, everyone remembers it. These days, it's likely that more than a of the few divers caught the dynamic display on camera. Action cameras are the norm rather than the exception on most dive boats today, and GoPros have become ubiquitous while most other brands struggled for attention. But recently at the Dive Equipment and Marketing Association (DEMA) trade show, a competing camera called Paralenz caught my attention - you may have also seen it in the last issue's Gear Stop page. It addressed many of the nagging problems I had experienced with over a long string of GoPro purchases. I have owned no less than six GoPros over the years and all of them had shortcomings that

the new camera has eliminated. But beyond great features, Paralenz has also embarked on several exciting collaborations that, according to Marketing Director Jacob Dalhoff Steensen, emphasize their "responsibility towards leaving cash instead of trash" in places where divers use their products.

The first program to come online will donate 5% of profits from cameras sold to a small NGO or conservation organization in the local area of the dive shop/resort/live-aboard where the camera was sold. Dalhoff Steensen notes, "Once it is up and running, it will create a stream of funds to small research and conservation communities. It is a business model that we wish to encourage other companies to follow as well." Two other philanthropic ocean conservation and research initiatives will be announced by the company soon.

The camera offers several features never before seen in an underwater

Paralenz is specially designed as an underwater cam, built by divers, for divers

Above and opposite page: These three images have been given no post-shooting white balance, the colours you see have not been altered for print and are directly off camera

action camera. This is because it's specially designed as an underwater cam, built by divers, for divers. The small camera logs your dive and inserts markers in the file to indicate the depth and time for a photo or video sequence. When the dive is over, you can transfer the logged data and footage to your phone or computer. Their proprietary app generates a dive profile and places all your photos and recordings at the time and depth you took them. As you scroll through the dive, the pictures and videos are displayed. Dive logs and recordings are easily shared with your community of friends and dive buddies. The app also lets you control all settings of the camera and makes sure that the



firmware is up to date.

With a built-in pressure sensor, the same data stream can be used to auto-correct colour as the depth changes. Depth and temperature info can be optionally overlaid on images and video or logged merely as data on the dive timeline. There is no need to purchase or carry a series of colour filters since everything is handled by the software.

The rugged unit looks like a small flashlight. Its cylindrical barrel is equipped with a spinning collar that switches between various shooting modes. A beefy trigger switch is easily operated with bare hands or thick gloves, and haptic feedback helps you “feel” when you have started or stopped a recording. Various tactile buzzes indicate different menu choices, but you can also look at a tiny screen on the back of the unit to see its menu system.

During my course of camera testing, a firmware update was offered online, improving the unique buzz signatures making it even easier to determine if you successfully triggered your camera without needing to remove it from your helmet or mask. An auto-



record option is available for divers who prefer to set the camera to activate upon descent and turn off at the surface. (I know I am not the only person who has taken a GoPro on an entire dive and forgot to trigger it because it was on my head!) Other accessories include a third-person viewer to convert it into a selfie camera.

The streamlined shape means that many mounting options are available. A series of rails on the device guide it into an included GoPro-style adapter for a helmet or hand mount, but you will also find it easy to tuck into your wetsuit sleeve or hold it like a flashlight with the

The unique Paralenz with its rotating bevel and easy-to-use record switch



SPECS:

- Weight: 5.5 ounces (155 g)
- Battery life: LiPo – 1600 mAh. 3+ hours recording (1080p – 30 fps) or 2+ hours recording (4K – 30 fps)
- Full charge in 1 to 2 hours
- Memory: Micro-SD card up to 64GB
- Paralenz Dive app: Viewing/Sharing/Settings (iOS and Android)
- Video Resolution: 4k-30 fps/1080p-100 fps/720p-200 fps
- Still Resolution: 8 MP
- White Balance: Normal or DCC (Depth Colour Correction) (can be turned on/off)
- Video Format: MOV – H.264
- USB-C port
- Wi-Fi, Bluetooth and USB connectivity
- Pressure/temperature sensors
- Up to 656 feet (200 metres); military-grade aluminum
- Microphone

For more information visit: www.paralenz.com

included lanyard. You might even decide to attach it to the side of your mask strap using a slice of a bicycle tire inner tube. The options are endless.

The only negative feedback that I have involves issues of aim. With no viewfinder or image display, it will take a couple of dives to get accustomed to the field of view. However, if you want to set it, forget it and just enjoy the dive, this won't slow you down at all. Besides, word on the street says an integrated viewer is coming soon.

If you are looking for a reliable new action camera, give this one a hard look. You won't need to worry about flooding, fogging or colour filters. The product is built, tested, and improved upon by divers who desire to establish a community around the camera. The bonus is that your purchase will also support small, local conservation initiatives that desperately need help! []

THE SCUBA DIVER'S GUIDE TO UNDERWATER VIDEO

Jill Heinerth's book can be purchased through Amazon for \$29.99



Open Ocean Survival

BY DIVERS ALERT NETWORK

You've surfaced from a dive on your favourite offshore site and realized your boat is nowhere to be found. Maybe there were issues with current or navigation on your part or the captain's, the vessel is off chasing another diver who needs assistance, or maybe the crew had to abandon a sinking vessel, but you're stuck on the surface with your buddy. Regardless of what caused you to be lost at sea, the situation can be terrifying and incident reports indicate that it happens several times a year to divers across the globe. Last year, in North America alone, several incidents involving lost divers needing rescue by helicopter made the news. You take every precaution possible to avoid this situation, but it's important to prepare for survival at sea, should the unthinkable happen. Keep calm and read on, we'll walk you through the basics of open-ocean survival techniques.

Keep calm

The single most important thing you can do in an emergency situation of any kind is to stay calm, and assess your situation with a level head. It is a common occurrence in some areas and conditions to be out of site of a dive vessel at times. Whether your view of the boat is blocked by heavy seas, lack of lighting on the vessel at night, or distance alone, it may be the case that the crew has a careful eye on you. Their higher vantage point gives them a much longer field of vision than you have on the surface, and they may have to track a large group of divers spreading in a current. At night, running a vessel without unnecessary lights makes it easier for a captain to maintain night vision to keep an eye on you, and you may have to look for the red and green of the vessel's side markers (or respective colours and light combinations depending on location and vessel type). Take note of these before you get in the water if you're in a new location. If it is the case that you have been lost by your vessel, panic can quickly make your situation dangerous. Take a deep breath, locate and grab hold of your buddy, make yourself positively buoyant and as comfortable as possible, and assess your situation.

Assess your situation

When evaluating your situation, you want to take into consideration all information available to you. Were you live boating



Photo Courtesy: DAN

and a vessel may be coming to pick you up, or did you drift away from an anchored vessel? If you are lost without the knowledge that a vessel is actively looking for you, it may be wise to consider whether there is a safe shore entry nearby – particularly in the case of inshore charters. Extended exposure to the elements will mean you will have to contend with the heat of the sun, loss of body heat from the water, lack of food and water, and the effect of long exposures to sea water on your skin. You'll want to look at what you have for signaling devices and exposure protection first – your first priority should be signaling a vessel, and keeping yourself from becoming too sunburnt or cold in the process. Should your attempts to signal a vessel fail, you'll want to ensure that you're as warm and uninjured as possible while you wait for a search party to locate you.

Prepare for the worst case scenario

If it is apparent that help will not arrive almost immediately, it is wise to begin planning for the worst case scenario, and hoping for the best. Ditch your weights, inflate your BCD and lie back on it to keep yourself out of the water as much as possible. Tie your BCD to your buddy's with a piece of line from a reel or a clip – becoming separated while exhausted from extended exposure significantly increases risk for both of you. Stay close together for warmth, and to help each other deal with issues that arise. You can survive for approximately 3 days without water, and

3 weeks without food. Depending on the location you're in, hypothermia will likely be your most immediate concern. Keep your exposure protection on, minimize unnecessary movement, and pull your legs up towards your torso and hug them to minimize heat loss. If sun exposure is a concern, you can find some protection by holding a fin, piece of wetsuit, or other equipment over your head. It's unlikely that you'll be able to source water or food while floating, so focus on staying warm and close to your buddy

Make yourself visible

After you've grouped up with your buddy or buddies and assessed your situation, your next priority is making it easy to be found. Focus on low-effort signaling devices; you'll need to save your energy. Surface marker buoys, dye markers, strobes, and flashlights are great signaling devices. Any flat shiny object, like the surface of a dive computer or a mask, can be used to reflect light at a passing vessel, and a brightly coloured fin waved in the air can get the attention of someone more effectively than your gloved hand waving. At night, a flashlight shined up into a surface marker will illuminate it and make a more effective signaling device, and noise makers like whistles can attract the attention of searching rescuers. []

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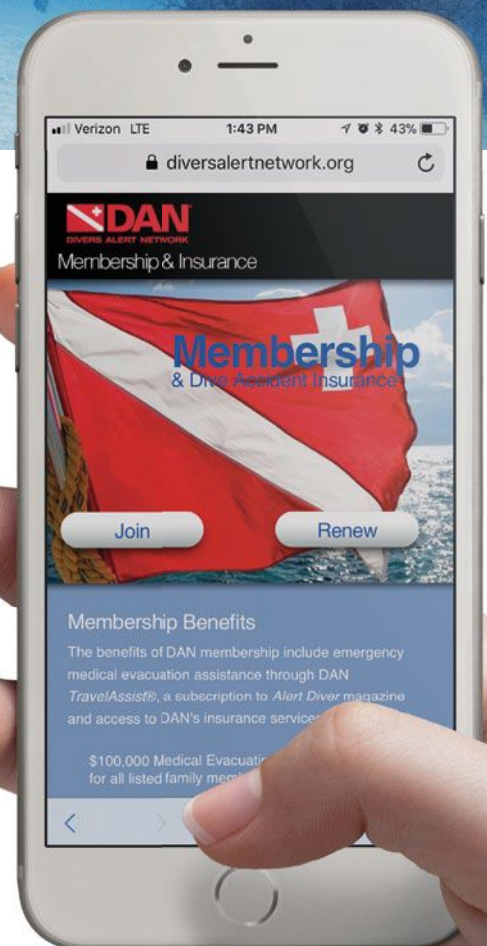
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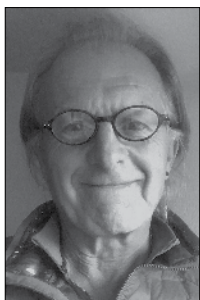
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Do We Teach Them Properly?

BY STEVE LEWIS

The final life lesson in 2017 — apart from the one saying “Do not leave your passport, credit cards, iPhone, MacBook, and all your ID in your briefcase in a locked car in a grocery store car park in Mexico under any circumstances, even for ten minutes” — is that amongst the complete scuba training menu of courses (up to and including trimix in a cave on a rebreather), an open-water scuba program is perhaps the most difficult to teach.

It had been a while. The calculations were a little sketchy, but a best estimate was that the last open-water cert with my name on it was issued sometime late in the 20th century. I’d trained and certified open-water instructors more recently, but the last time I took a punter off the street and helped them breathe-in, breathe-out, kick their feet about, and generally survive underwater was about 1999.

This recent class was obviously a learning experience for us both.

My hope was and is that the newly certified RAID open-water 20 student who put her faith in me as her instructor, learned enough to keep improving her skills safely, with a smile on her face, and a new appreciation of this beautiful planet. She certainly seems to be turned on by the whole concept of recreational diving, and I hope she enjoys it for many years to come learning more about herself, and the underwater world with every dive.

I learned many things; perhaps more than my student.

Number one was to be more gentle, more forgiving, and more empathetic with my student. I’d grown used to clients arriving for a class (think cave or trimix or DPV or wreck penetration) with at least several dozen logged dives; and in most cases more than 100. When your student’s underwater experience consists mostly of



Photos: Steve Lewis, Sue Regan Kenney

watching movies like *Big Blue*, *Sanctum*, and the 1951 classic *Frogmen*, your viewpoint and expectations as an instructor need to be modified.

Spending time with a scuba “newbie” also showed me that it’s a good idea for technical instructors to go back to basics on a regular basis. Things like equipment assembly and disassembly, buddy checks, mask fit, and clearing are a good test of an instructor’s knowledge and teaching skills.

Another important outcome was the realization that an open-water scuba program needs much more time, patience, and understanding of the physiology of learning than allotted by the major training agencies, and certainly more than

Tech instructors can learn a thing or two from teaching an Open Water course. OW student Susie gives our seasoned contributor some things to think about

the average time (four to five dives spanning around two hours in-water) spent by the handful of shops polled in researching for this article.

On that score, let’s consider some parameters.

It’s probably obvious to anyone in our industry — professional or consumer — that scuba training could be better than it is. As an industry, we lose a huge percentage of potential customers because they have a cruddy experience their first time out. The classic marketing joke about scuba diving is that while a dead diver is bad for business, a diver whose first underwater experience scared the crap out of them does more damage.

Of course, scuba diving it not for everyone. Some people simply don’t



feel comfortable in the water and our industry would do well to recognize that. But even strong “water people” deserve scuba training that is more detailed, more focused on realistic limits, more tailored to individual needs and learning style.

It could be argued with some strength that doing so would reduce the figures for both fatalities and frightened customers.

On the other hand, there has to be a reasonable baseline to build a business case for scuba training; a curriculum that can be delivered in a reasonable time for a reasonable investment of time, effort and money, to the broadest market possible. But what does that mean, and how does that translate into an actual training program?

Finesse skills

A shop owner who often sits and chats over a coffee with me suggested that we are not training “cave divers”, so “finesse skills” such as tight buoyancy control, horizontal trim, and knowing more than one way to move through the water are not required. I disagree.

Being able to hold one’s position in the water column and being able to do so while clearing a mask or digging into a pocket for Wetnotes or a light is surely not a finesse skill: it’s basic, isn’t it?

Similarly, moving through the water in an efficient and streamlined fashion — translate that into horizontal for most circumstances — can’t really be considered finesse can it? It must be basic because it’s

way less work to swim horizontally than near vertically. And less work translates into less stressful. And surely we all agree that avoiding stress while diving is the best possible plan?

Also, knowing how to swim across a landscape without stirring up a cloud of silt, breaking coral or ploughing furrows in sand and mud might be finesse, but it’s required if we are going to dive with any respect for the environment, and respect for the enjoyment of other divers.

So, if we agree these basics are necessary for divers to really enjoy their time underwater, shouldn’t we strive to teach them as instructors, expect them as customers, and work to perfect them as divers?

Not surprisingly, but sadly, demonstrating, teaching, coaching and encouraging these basics from the very beginning takes more time and dedication than is usually available to people learning to dive.

I just spent more than a week — nine days — in the water with my first open-water student in 18 years. That’s time in the pool, time in shallow water, time doing actual dives, one-on-one.

She is not a candidate for a technical diving program by any means. But that was not part of the expectations we discussed at the beginning of her class. However, she has the basics and is beginning to look like she is at home in the water.

Perhaps like many active divers who struggle mastering what I call scuba basics, she’ll need more

Steve and student running through the fundamentals, whilst above right, the basics of diving - not forgetting anything!

coaching and gentle reminders the next time she goes diving. And that’s OK. Every one of us would do well to bush-up skills from time-to-time — even someone with more than 20 years teaching technical diving.

More important is that she has learned her responsibility extends not just to the environment and other divers, but to her own personal safety and awareness, too.

It should be obvious to anyone running a business, which I do, that a nine-day open-water diver program would be a prohibitively expensive item. My daily fees for teaching a technical program would probably not carry over well into the recreational market so let’s not use them as a benchmark. But even so, this last open-water program would have cost a couple of thousand dollars in instructor fees alone.

Of course that’s untenable, but it has me thinking.

Well, it has me wondering what the answer might be, and it’s not obvious. Several of the smaller agencies are promoting more thorough recreational diver training: more time, more practice, more coaching, more focus on “finesse”. I hope this starts a trend. I hope the consumer learns that the value of this type of program over the cookie-cutter, cheap and cheerful alternative far exceeds the higher price tag.

For my part, the coming year’s focus will be on teaching every program with a little more empathy and a little less dogma. I might even teach a few more basic open-waters. I’d like to be better at it! []

Steve Lewis is an author, adventure travel consultant, and a technical diving instructor-trainer/evaluator. He lives in a small converted 19th-century schoolhouse in the wilds of Muskoka and has what he terms “the good fortune” to travel around the world to lecture and teach



Pulmonary Barotrauma

Abnormal Lungs

BY DR. DAVID SAWATZKY



Always ascend slowly, and if you've suffered from pneumonia, wait at least six weeks after all symptoms resolve and the routine X-ray gives you the all clear

Photo: Trisha Stovel

A 65 year old female instructor with many years diving experience did a dive on a wreck in 72 feet (22m) of water. The dive was uneventful. Upon surfacing she immediately developed difficulties breathing and even though there were two physicians on the boat who assisted with CPR, she was pronounced dead when she arrived at the local hospital. Autopsy showed that she had died from arterial gas embolism. The only relevant point in her history was that she had been very sick with a 'cold' (pneumonia) but had fully recovered a few weeks before the dive.

In the last column I discussed pulmonary barotrauma in normal lungs. The causes are usually very rapid ascent, panic, buddy breathing (holding breath ascending while buddy has the reg) and layngospasm (ascending while coughing). In this column I will focus on the equally common problem of pulmonary barotrauma in abnormal lungs.

In the last column I mentioned that the lungs are covered in a very tough

membrane called the visceral pleura. As a result, when an area of lung ruptures, the gas is almost always contained inside the lung and forced into the circulation or back towards the mediastinum. On rare occasions, however, the gas escapes from the lung and enters the potential space between the lung and the chest wall. This is called a pneumothorax (air in the chest).

Pneumothorax is relatively common in medicine. Frequent causes are trauma

(knife wound to the chest, broken rib that tears the lung, etc.), ventilation of seriously damaged lungs, and various medical procedures (subclavian venous catheters, esophagoscopy, etc.) Occasionally it happens without any obvious cause.

This 'spontaneous' pneumothorax occurs in individuals who are born with or develop blebs (blisters) on the surface of the lungs. These air sacks represent areas where the visceral pleura is very weak, and they are like a giant alveolus on the surface of the lung. They communicate with the bronchi, but usually through a very small connection. The blebs are almost always near the top of the lungs; the effects of gravity stress them and sometimes they rupture, causing the pneumothorax. Tall, thin males are at increased risk.

Diving while breathing compressed air increases the risk of rupture. As the diver descends, the air in the blister will compress; when the diver returns to the surface the air will expand and refill the blister. No problem. However, during the dive the blister can slowly refill. When the diver ascends to the surface in this situation, the gas in the blister will expand to greater than the original volume and the blister can rupture. Because the connection from the blister to the airways of the lungs is usually small, the gas in the blister will not have time to escape into the lungs, even if the diver does a normal or slower than normal ascent.

Anyone who has a spontaneous pneumothorax is at greatly increased risk of having a second or third spontaneous pneumothorax (people with one bleb usually have many). Therefore, most diving medical experts consider a history of spontaneous pneumothorax a lifetime contraindication to scuba diving. Most divers also have a chest x-ray before they start diving. If the x-ray is done when the person has exhaled as much air as possible from their lungs, large blebs will be visible. If one is seen, the person should not dive, ever. Smaller blebs are not visible.

Excessive exhalation

To help prevent pulmonary barotrauma, divers are taught to breathe out while they are ascending. Sometimes a diver develops pulmonary barotrauma even though they exhaled all the way to the surface.

One proposed explanation is that the normal lung is like a soft sponge built around a mesh of elastic tissue. The alveoli and smallest airways have walls that are only one cell thick and therefore they have no internal support. As the lungs expand, the elastic tissue is stretched and it helps pull the alveoli and smallest airways open. When the lung is collapsed this elastic support is removed. Therefore, if the diver vigorously exhales to minimum lung volumes some of these small airways might completely collapse, trapping air in the alveoli they supply. As the diver ascends these alveoli could over inflate and rupture causing pulmonary barotrauma.

I am not convinced this really happens. As the air in the alveoli expands it should force its way out through the small airways without causing lung damage. I think a more likely explanation is that the diver had abnormal lungs. Never-the-less, divers should breathe normally during ascent and not exhale to minimum lung volumes.

Abnormal lungs

We have already discussed one form of abnormal lungs above (blebs causing

pneumothorax). There are a very large number of other lung problems that can cause pulmonary barotrauma including but not limited to cysts, asthma, bronchospasm, infection of any type, inflammation, mucous plugs, sarcoidosis, tumors, reduced pulmonary compliance (stiff lungs), pleural adhesions, fibrosis, and scars from any cause.

These multiple causes all share a common mechanism of injury. They partially obstruct a bronchus, leaving only a very small opening through which air can move into and out of the portion of lung supplied by that bronchus. Either the airway is partially filled with debris (mucous, inflammation, infection, etc.), the bronchus is partially collapsed from pressure on the outside of the bronchus (sarcoidosis, tumors, scar, etc.), or both.

So what happens when this person goes diving? This is the same problem as the bleb that causes pneumothorax as explained above, except that this time the gas escapes into the lung and the diver will suffer from mediastinal/subcutaneous emphysema (20%) and/or arterial gas embolism (AGE) (80%) rather than pneumothorax.

Sometimes a diver develops pulmonary barotrauma even though they exhaled all the way to the surface

It should be obvious that the critical factors are the size of the opening in the bronchus, the volume of lung supplied by that bronchus, and the length of the dive. If the opening is large enough relative to the volume of lung supplied, the diver will be OK with a normal ascent and will only get into trouble with a rapid ascent. If the opening is smaller, the lung will rupture even with a slow ascent.

In cases of fatal AGE in divers with normal lungs, the area of damage is usually only the size of the tip of your finger and it is very difficult to find at autopsy. Therefore, a single small abnormality in the lung can be fatal.

Obviously, then, a person with any detectable abnormality of the lungs should not scuba dive.

Return to diving

Pulmonary barotrauma is not always fatal. If the person survives, can they return to diving and, if so, when? If the person has been left with any residual problems, sources agree that they should not return to diving. If the person appears to have made a complete recovery the situation is more controversial.

There are two ways to look at this question. The diving medical literature contains a couple of dozen cases of divers who have suffered pulmonary barotrauma, apparently made a complete recovery, returned to diving, and then suffered a second pulmonary barotrauma. In most cases the second incident had no apparent cause (the diver had done a normal ascent) and the results were very bad (the diver died or had serious neurological damage).

It seems most likely that the diver had suffered some lung damage with the first incident and that damage caused the second incident. Therefore, many diving medical experts believe that that anyone who suffers pulmonary barotrauma should be banned from scuba diving for life. I have been involved in two cases of Canadian military divers who suffered pulmonary barotrauma and were returned to diving (against my recommendations). The first died a year or two later in a diving accident where it is unknown if pulmonary barotrauma was a factor or not. The second voluntarily gave up diving.

As technology has evolved, there is now a better way to determine if these divers can return to diving than using an exhalation chest x-ray. If you wait until the diver has completely recovered from the first incident (at least 6 weeks) and then do an exhalation high resolution spiral CT scan of the lungs, you should be able to detect any abnormality down to a few millimeters in size. If any abnormality or gas trapping is discovered, the person should not return to diving. However, if the CT scan is completely normal, diving might be an option. Their risk is most likely still increased by some unquantifiable – but most likely small – amount. Note that a standard CT is done at inhalation only to look for scars and structural changes. Exhalation views are required to assess a diver (gas trapping).

So what happened to the 65 year old instructor who died? She had suffered a serious lung infection a few weeks before. We know that in cases of pneumonia (the infection involves the small airways and alveoli) the person still has visible abnormalities on a routine chest x-ray for up to six weeks after all their signs and symptoms resolve. Therefore it is most likely that she still had abnormal lungs and at least one partially obstructed bronchus when she did her dive. Even though she did a normal slow ascent, it was too fast for the air to escape from the partially isolated section of the lung, it ruptured, she suffered arterial gas embolism and died. After pneumonia you need to wait for at least six weeks and until your chest x-ray is completely normal before you return to diving. []

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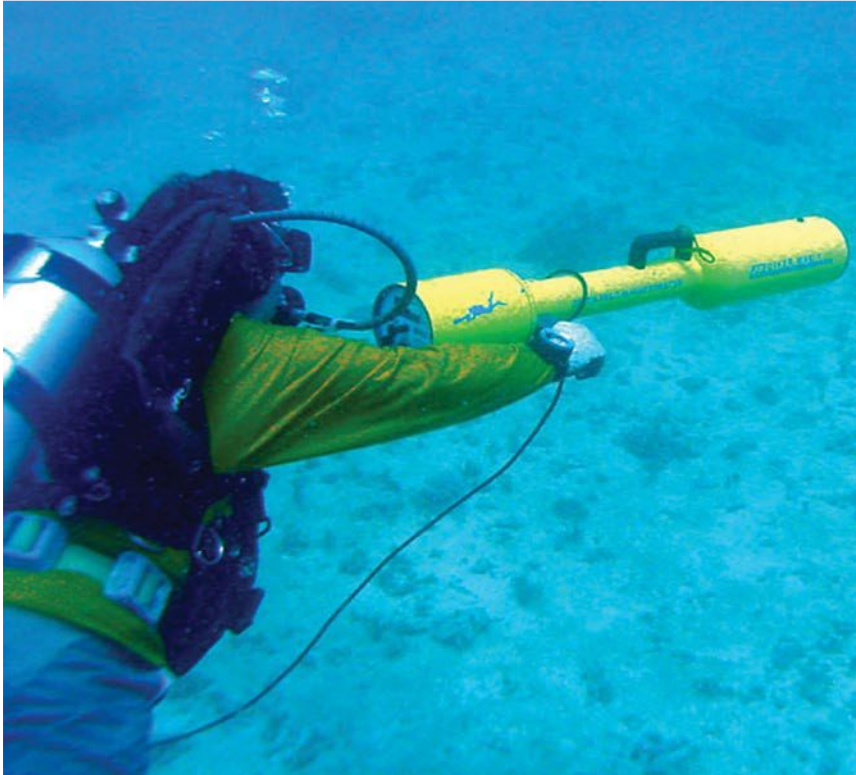
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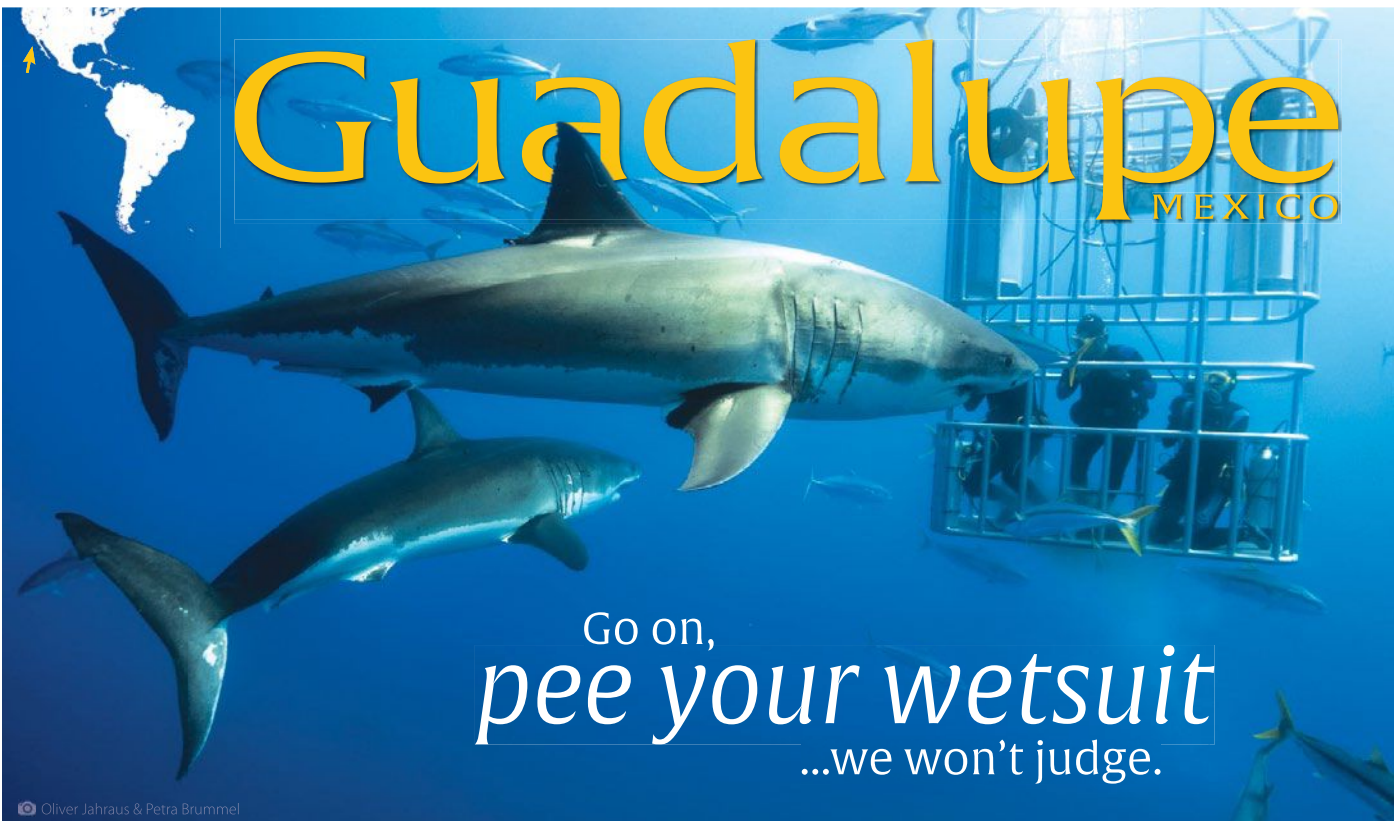
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HERO IN A HALF SHELL

BY DAVID GILCHRIST

It was one of those days that every diver experiences – you simply have to get underwater. My buddy had picked me up in the morning and we set off for the Welland Scuba Park, on the Old Canal in Welland, Ontario. Visibility had been poor in the last two weeks, but we were hopeful that it might have improved. At the park, we planned to scooter to the site of the Train Bridge, where visibility tends to be better, but upon arrival we were dismayed to find the visibility was still poor. I wasn't feeling too optimistic about photo opportunities and was starting to look for possible macro subjects when I spotted an unusual shape on the bottom. Moving closer, I realized it was a small turtle. Wow! After all my years of freshwater diving, maybe, just maybe, I could get some freshwater turtle shots. As I slowly approached, the turtle watched me but thankfully remained stationary. I gently moved in a little closer and shot a variety of photos from different

angles. Available light shots were the most successful, due to high amount of particulate in the water. When the turtle did move, I followed it slowly. Once again, it settled to the bottom and obliged me with some more nice poses. This small turtle turned what would have been a ho-hum dive into a memorable one.

Upon studying the photos back at home and investigating on the internet, the turtle I had assumed was simply a Green Turtle turned out to be a Northern Map Turtle, identified by the markings on its shell, which closely resemble lines on a topographical map. They are quite common in the Great Lakes area and beyond. They are also thought to eat invasive zebra mussels, which is a bonus. []

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1/80 shutter, f4, ISO 500. No strobe.]



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