



X-Ray Mag

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St. Lawrence River
Thousand Islands

Wrecks
San Francisco Maru

Austria
Traunsee

Tech
J2 Cave

Spain
Medes Islands

A Baby Is Born
Sperm Whales

WITU ISLANDS & FATHERS REEFS
Papua New Guinea

Pacific Northwest
Sockeye Salmon

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Sperm Whale, Azores, Portugal. Photo by Kurt Amsler



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COVER PHOTO: Baby sperm whale just born, Azores
Photo by Kurt Amsler

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The price of progress?

The government of the Cayman Islands is currently assessing a "proposed cruise berthing facility", which could boost the country's economy by allowing more and bigger cruise liners to moor in Georgetown. It will, however, also come at a cost, namely, substantial damage to many of the reefs and dive sites upon which the local dive businesses are dependent.

The article on page 5 provides an overview of the stakes and issues at hand.

Exercising due diligence, the government recruited an independent consulting firm to produce an environmental impact assessment. This also included an assessment of the socio-economic impact on the whole community, in particular, on businesses. The findings were published in a

report, which we have had a chance to study.

We understand that tourism is an important component of the Cayman Islands economy, representing 24 percent of the gross domestic product and providing significant employment and entrepreneurial opportunities for residents. Approximately 85 percent of visitors to the islands arrive by sea, predominantly by cruise ship. Thus, it does not seem unreasonable to conclude that improved berthing facilities for cruise liners would bring still more business to the islands.

However, we find it both tragic and a mind-boggling paradox that these proposed facilities should come at the expense of the very assets—the marine resource—that have been the cornerstone

of marketing and profiling of the islands for as long as I can remember, so that's several decades. One of the main issues at hand is the construction's proximity to the reefs, as siltation caused by both the construction and operation will smother the reefs.

We fully side with all the dive and watersport businesses who are now up in arms over this project—and rightly so.

Don't get us wrong. We are not opposed to progress.

On the contrary, we'd like to see it. Progressive thinking takes into account both the economy and the need to look after important natural resources.

— Peter Symes,
Publisher & Editor-in-Chief



News edited
by Peter Symes

NEWS

from the deep

Coupling economy to ecology

“Our economic relationship with the ocean is once again evolving in important ways. As a setting for global trade and commerce, and as a significant source of food and energy, the ocean’s contribution is already important. This century, it is likely to become an economic force.” — The Economist’s Intelligence Unit

Given the damage to ocean ecosystems from existing human activities, the rush to explore new opportunities with the related risk of accelerating ocean degradation has led some to respond with calls to curtail, or even ban, new activities. But, as newly published paper published by the *Economist* investigates there may be an alternative path through the development of a “blue economy”, where economic expansion can take place in alignment with responsible and sustainable management of ocean ecosystems.

Linking ecology to economics

In 2014, China’s ocean economy contributed 10 percent of its GDP employing nine million people while estimates for Indonesia puts theirs at a sizeable 20 percent of GDP, a similar ratio to other low-middle-income countries with large ocean territories.

Nevertheless it is likely, the paper states, that the economic contribution of the ocean is undervalued in many countries. Meanwhile a growing number of nations with an ocean

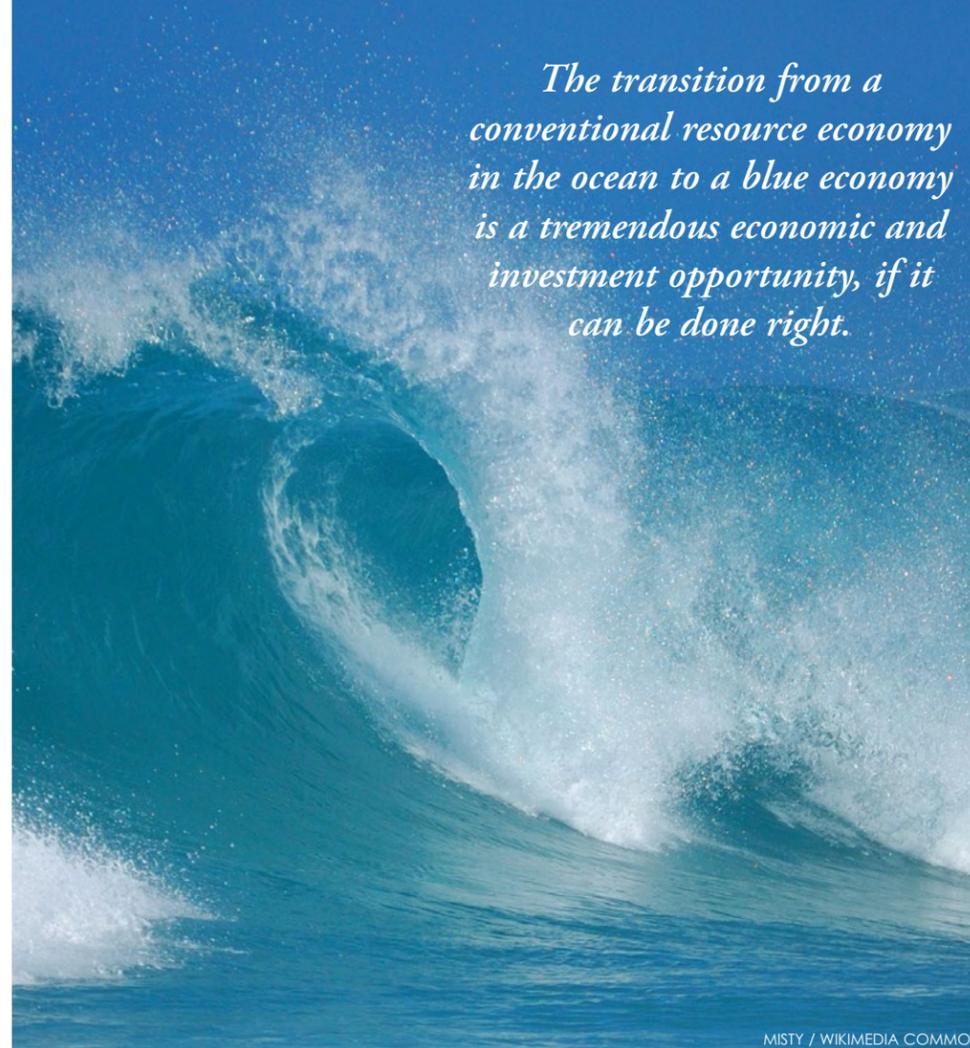
economy are looking to their seas to bolster slowing growth in their terrestrial economies.

Consequently new strategic ocean development plans and policies are being drafted to stimulate growth in and around countries’ exclusive economic zones (EEZs). Should these public policy ambitions prove successful at enabling investment, the scale, size and type of economic activity in the ocean will be of an entirely new order.

Industrialisation of oceans

The significant growth in economy and industrial output since WWII has led to unprecedented and mostly detrimental changes in ocean ecosystems. Against the backdrop of a now soaring global population, growing affluence and consumption, and the need for new sources of food, energy and minerals, trends point to accelerating economic activity in and around the ocean.

Within a decade, most fish will be farmed, much of it at sea,



MISTY / WIKIMEDIA COMMONS

The transition from a conventional resource economy in the ocean to a blue economy is a tremendous economic and investment opportunity, if it can be done right.

and off-shore windfarming is forecasted to increase by a factor ten by 2030. On this timeline—as the report underlines—blue economy is as yet a new paradigm in name only, and little more than an emerging concept and that the transition will be a complex, long-term undertaking.

A long way to go

To address the issues at hand the G7 group of leading economies in June 2015 formulated over 80 goals and targets for solving ocean ills. However, so far only scattered progress has been seen.

Meanwhile a study by the European Parliament finds that the EU’s own Blue Growth strategy—while hailed as one of the better-articulated plans—also falls short in several important respects: it lacks sufficient targets in terms of science, knowledge and technol-

ogy; there are significant knowledge gaps on marine life, seabed resources and the risks and opportunities of further economic activity in European seas; a lack of scientists and other ocean specialists raises questions about how ocean policy can be implemented; and there is limited awareness of the potential of blue growth for businesses.

Despite all good intentions, current approaches to valuing the ocean economy could thus mean that we are still underestimating its contribution, particularly the value of non-market goods and services: ecosystem benefits such as the protection to coasts offered by coral reefs, or carbon sequestration. ■

On the following pages, we report on a few cases in point, with relevance to the dive industry.

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Cruise pier project threatens dive sites on Grand Cayman

Cruise pier project on Grand Cayman threatens to destroy reefs, dive spots and livelihood of local dive businesses. An Environmental Impact Assessment of a new cruise port in George Town, commissioned by the Caymanian government, acknowledges the siltation will harm or kill up to 40 percent of reefs in George Town Harbor, but concludes Seven Mile Beach won't be impacted by the plumes of silt stirred up by the construction and berthing liners.

The nearshore reefs are economically significant to the Cayman Islands, as they constitute the basis and livelihood of the water sports industry that brings cruise and overnight tourists to the Cayman Islands.

The assessment acknowledges

that the development of the proposed project will have significant negative impacts on the marine ecology within George Town Harbour, in particular the coral reefs and associated habitat surrounding the project site. In general, these impacts are directly related

to the areal extent of the project and the volume of dredging, and the operation of large cruise ships in the nearshore area. Project construction will result in elevated turbidity and sedimentation levels in George Town Harbour, in particular during dredging and land

reclamation works. Key ecological impacts would include coral destruction, habitat fragmentation and reduced biodiversity.

Construction

The overall project construction schedule is estimated at 30 to 36 months. This includes two to four months for dredging the berth pockets and filling the land reclamation area.

Discussions with several dredging companies have indicated that a mechanical dredging operation would likely be employed for this project given the volume and type of material to be dredged. Mechanical dredging involves the use of a clam shell or bucket that is lowered to the seabed to extract the soils. The primary source of turbidity is at the dredge itself, as the bucket is pulled up through the water column.

Once in operation the construction will result in reduced circula-

tion in George Town Harbour, particularly when cruise ships are berthed. Berthing and de-berthing of cruise ships at the new facility will result in elevated turbidity and sedimentation levels in George Town Harbour due to "sediment re-suspension" associated with the flows generated by the ships' propellers and thrusters.

Mitigation measures

Turbidity and sedimentation during operations could be mitigated by one or more of the following measures:

- Removal of fines from dredged berthing area after primary dredging by suction.
- Install seabed stabilization or protection in critical areas to reduce or eliminate the effects of propeller-induced sediment re-suspension.
- Implement operational controls, including limits on vessel approach speed and power

"Look, you have to break a few eggs in order to create an omelette. The reality is yes, we're going to have some damage to coral reefs, but there's ways to mitigate that. There are other arguments, certainly, in particular the economic argument in favor of building the cruise berthing facility,"

— Stefan Baraud, local businessman in a statement to Cayman 27

"Belize is getting a pier; Haiti, the Dominican Republic. All of our competitors in this region are building piers or already have piers that the ships can go directly to."

— Minister of Tourism Hon. Moses Kirkconnel



ENVIRONMENTAL IMPACT ASSESSMENT REPORT

Rendering of optimized concept layout of cruise pier project on Grand Cayman as presented in the assessment report

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This house reef at Sunset House Resort, Grand Cayman, could be affected by the proposed construction

application during berthing/de-berthing.

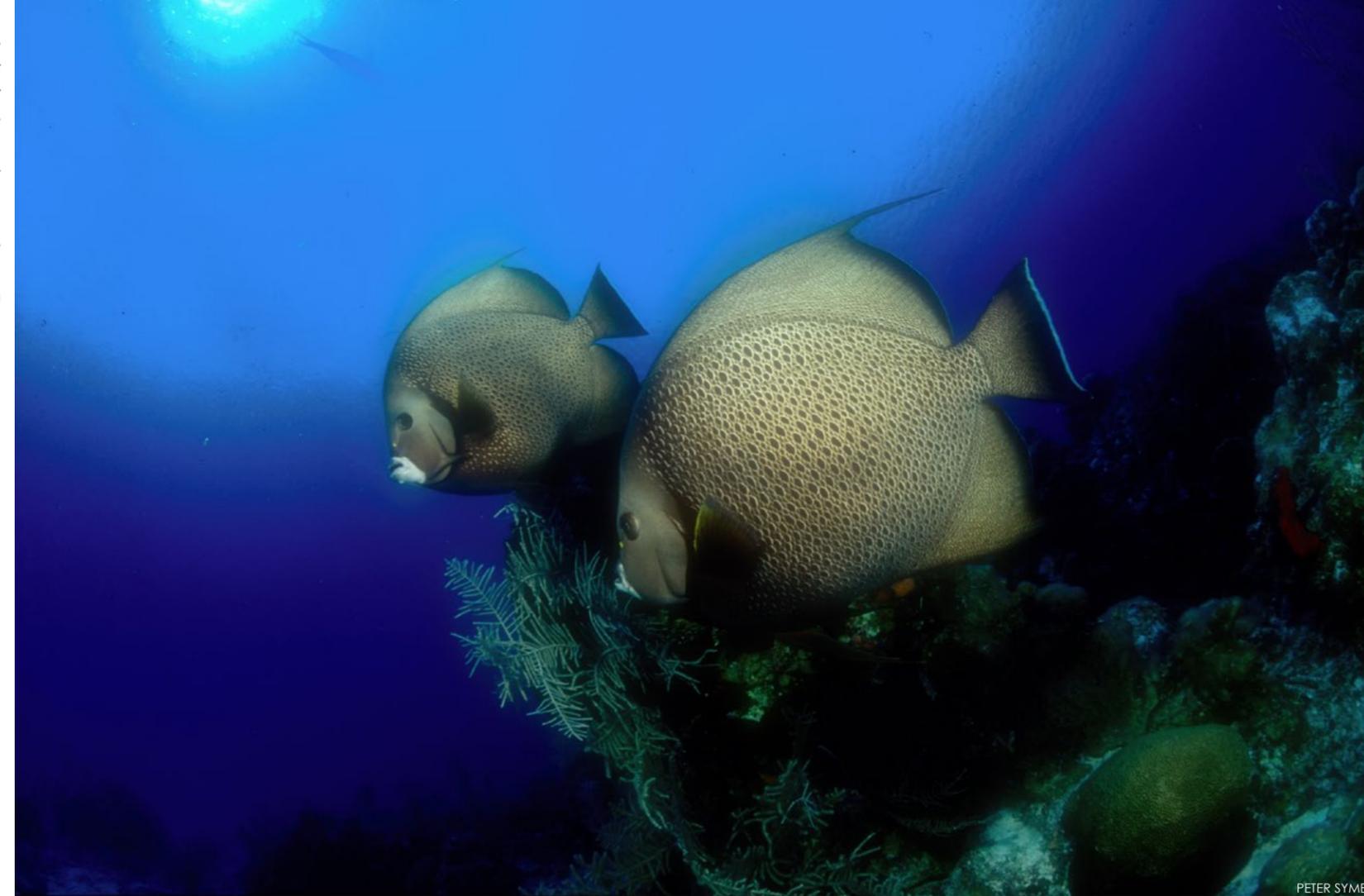
Coral Relocation Program

If the project proceeds, the report recommended that a significant coral relocation program be designed and implemented. The overall objective of the coral relocation program would be to mitigate or compensate for habitat destruction caused by the project.



The environmental impact assessment appears to have galvanized opposition to the project. Around 200 people attended a presentation in June by the government's marine engineering consultants, Baird, with the vast majority speaking in opposition to the plan. The perception of marine-based businesses was generally negative due to potential negative impacts on their operations associated with destroyed and/or damaged reefs in George Town Harbour, and increased travel times to sites in the harbour due to the presence of the piers.

A petition, organized by photogra-



PETER SYMES

pher Courtney Platt, have gathered more than 1,000 signatures, urging the government to drop the plan following the findings of an environmental impact assessment, which concluded that a large area of coral reef would be destroyed as a result of the project. Platt believes a people's referendum may ultimately be required to stop the project. Protesters would need to gather signatures from 25 percent of registered voters in the Cayman Islands to trigger a referendum.

At the public presentation, members of the audience also

criticized the EIA's recommendation to relocate 15 acres of reef, as well as the historic Balboa shipwreck—a 375ft freighter that sank in George Town Harbour during a hurricane in 1932. "What you're proposing about moving

the reef is probably a total impossibility. I don't think it will ever happen. I don't think it can be done," said Peter Milburn, a long-time dive operator who spearheaded the Maasdam coral reef restoration project in 1996 according to a report by Cayman 27.



Keith Sahm, manager of Sunset House resort on Grand Cayman told X-RAY MAG: "Sustainable tourism in

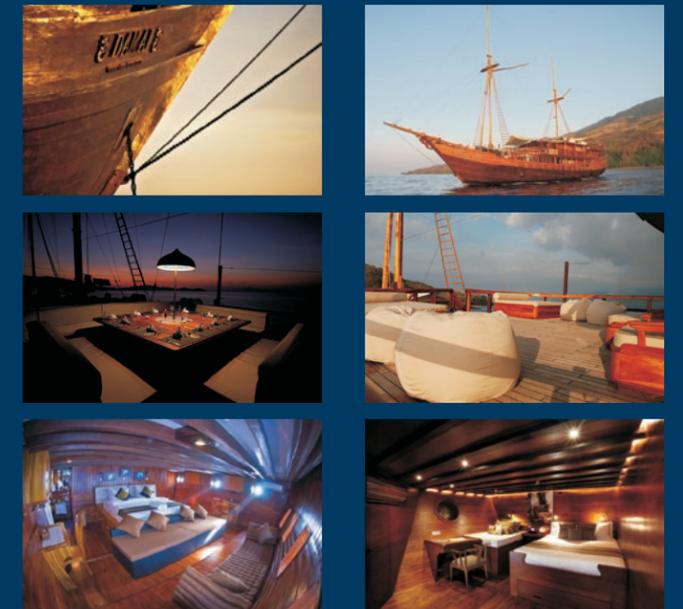
Grand Cayman must balance well-managed use with environmental protection, for loss of its natural resources will mean a loss of tourism and therefore jobs, economic revenue, and the natural beauty that is the island."

The Department of Environment is accepting public comments on the EIA until July 3. After that, the revised document will feed into the final business case.

Tourism Minister Moses Kirkconnell has said that the Cabinet will assess the findings from the report and public consultations before making a final decision on whether to proceed. ■

"What I'm seeing is a death sentence for huge areas of reefs on the west side of the island."

— Sunset House owner Adrien Briggs



• Raja Ampat

• Komodo

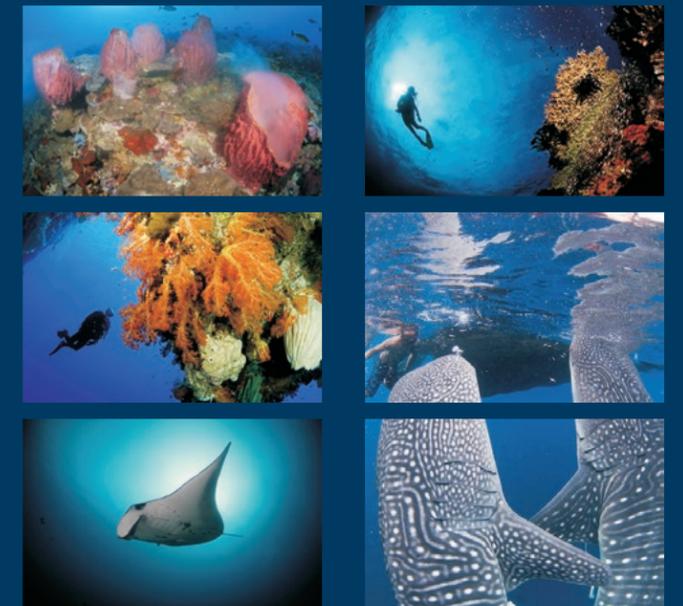


• Forgotten islands

• ...and more



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Vietnam concerned about China's 'illegal reef renovation' in South China Sea

As the Western powers and neighbouring countries are stepping up political pressure over concerns about China's escalated military presence and controversial land reclamation projects in the disputed Spratly island archipelago, as reported in the previous issue of this publication, the former director of Vietnam's Nha Trang Institute of Oceanography, Dr Nguyen Tac An warns that the impact of China's reef reclamation could also destroy the life in the coastal areas.

At the center of the atolls in the

Spratlys are inlets, where there are many species of fish and larvae. From here, they migrate to countries, thanks to the ocean currents. If the inlets are surrounded by sea routes, the probability of larvae escaping will decline and the supply of fish will be ruined because the larvae cannot develop into mature fish," An told Vietnam.net.

"All construction activities at sea have negative effects on coral reefs and in the long run they will destroy the aquatic resources," An said. "For Vietnam, the losses will be huge because most of

the illegally renovated reefs are in Vietnam's Truong Sa (Spratly Islands)."

The United States has issued a strong warning to China over its land reclamation program in the South China Sea. At a recent a security conference in Singapore, Ash Carter, the US defence secretary, condemned the actions of Beijing officials and said that turning underwater land into airfields was out of step with international rules. ■



DO KIEN TRUNG - CC BY-SA 2.0



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The Spratly Islands are a disputed group of more than 750 reefs, islets, atolls, cays and islands in the South China Sea being claimed by Brunei, China, Malaysia, Vietnam and the Philippines, several of which have built military installations in the area,

The Spratly Islands consist of 100 to 230 islets, coral reefs and sea mounts. Approximately 44 of the 51 small islands and reefs are claimed or occupied by China, the Philippines, Vietnam, Taiwan, Malaysia and Brunei. The land is not arable, does not support permanent crops and have not been occupied by humans until recently. The conflict is the result of overlapping sovereignty claims to various Spratly Islands thought to possess substantial natural resources—mostly oil, natural gas and seafood. Countries with territorial claims use military means—airstrips and armed forces—to reinforce their claims.



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Steve and Cindy Moore, April 2015



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Text and photos by Kurt Amsler
Translated by Peter Symes

[ed.— It is extremely rare that the birth of a newborn sperm whale can be captured on film. Kurt Amsler reports on how he took these compelling images.]

— Faial Island, Azores, September 2014. For five days we have cruised the islands of Faial and Pico in the Azores. Nine hours on the small boat is tiresome and long, but necessary for close encounters with the giant sperm whales of the Atlantic.

In terms of passion and endurance, sperm whale photography poses some of the greatest challenges to the underwater photographer, both technically and physically. As well as being extremely shy, their highly developed sensory organs can discern all sound and movement for a distance of several miles. As a result, boats must maintain large distances from the whales, with freediving the only way to approach them.

The day had a promising start, with three sightings and an underwater encounter to within



A Baby Is Born Sperm Whales



“Vigias Baleia” (above) are individuals positioned on the hillside who locate whales for the team on the RIB (below) by using powerful binoculars; Pod of sperm whales acting strangely are, in fact, midwives surrounding a mother in labor (left)

clearly distinguished from the background and I realize what is happening; this not a wounded animal but a mother giving birth!

Parts of skin and the placenta are floating around and I can see the baby, which had left the womb just a few seconds earlier. It is still immobile and supported by five midwives to the surface for its first breath. The mother, still weak, is watching it from below.

Baby's first moments

Newborn whales are not able to swim within the first minutes and would drown without assistance. Therefore, always other females are in attendance as midwives. By this time, the mother has arrived to support her newborn, which is easily 2.8 metres in length.

With every passing minute the baby is

a distance of 50 metres. From a small boat like ours, it is not possible to see the ‘blow’ and the back of whales at the surface. Therefore, we work with so-called “Vigias Baleia”, men positioned in hillside observation towers that are remnants from a time when commercial whaling existed in the Azores.

Scanning the surface with powerful binoculars, they communicate the position of the animals. Suddenly, the radio is crackling again. From the boat driver's reaction, it must be a very good message. A group of about six animals has been spotted approxi-

mately one nautical mile to the south/south-west.

A unique dive with sperm whales

Courtesy of our boat's twin 150 HP motors, we reach the spot quickly and see our quarry immediately. The pod moves very slowly while turning circles, a decidedly strange behaviour. Careful not to scare them away, we cut the motors and maintain safe distance of 100 metres. With a last look at the pod's position, I gently slide into the water.

For the first 60 metres, I go as fast as possible, scanning the blue to catch a glimpse

of the animals. However, there is nothing but a big murky cloud. I then realize it is blood, which appears greenish under water by the loss of red spectrum.

This could explain the pod's strange behaviour—a wounded animal watched over by the others! As the whales' communication sounds intensify, I can see the group about 18 metres in front of me, just below the surface and huddled together. With the sun directly in front of me, it is very difficult to see exactly what is going on.

I then descend to 15 metres and carefully pass beneath the whales. Now they are



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The newborn, just moments after its birth, is supported by five sperm whales acting as midwives, which have been surrounding the mother (left and center) during her labor and delivery of the baby



The baby, which is still immobile after birth, is supported by five midwives at the surface, so it can take its first breath. The mother, who is still weak, watches her newborn from below.



increasingly mobile and able to swim independently over short distances. I can also hear his communication, which has a higher pitch than the others—the voice of a child.

Protective mother

In order not to disturb the animals, I move very carefully and maintain a distance of about 10 metres. Up to this point, the whales have not taken any notice of my presence, but now it seems the mother wants to identify the stranger in their midst.

Quietly but directly, the nine-metre long giant turns in my direction and swims right up to me. Her massive head is getting bigger and bigger as the water displacement pushes me away. Water churns around me and the exhalation noise thunders in my ears! I see the eye looking at me and I feel absolutely no aggression. I am thoroughly overwhelmed by the experience!

Whales communicate perpetually, with their sounds being heard by others over great distances. As the birth was communicated, more and more animals arrive for the event. The giants



The mother is now able to help support her newborn, which is increasingly mobile and able to swim short distances on its own (above and right)

surround me and I am fully accepted!

Presenting a newborn

The mother swims to other groups to present her child. She does the

same to me, stopping and allowing the baby swim towards me—incredible! After about 20 minutes, the baby becomes stronger and moves faster. From time to time, it wants to venture





Protective mother sperm whale (above) comes toward the author to assess whether he poses any danger to her newborn, and apparently accepts him, as do the other whales surrounding her and joining the group; The newborn (left and top right) now wants to venture out on its own a bit more, which mom does not like at all; so, with her huge toothy mouth, she brings her little runaway back to the surface (right)

away on its own, which the mother does not like at all. With her immense toothy mouth, she brings the runaway back to surface.

Sperm whales feed on giant squid, which they hunt to depths of 2,000 metres. More than 40 conical teeth, each reaching a length 20cm, sit in the lower jaw.

As the event comes to its conclusion, more and more whales disappear into the blue of the Atlantic. The mother then descends with her child to their realm below.

Afterthoughts

In my 45 years of underwater photography, I have documented many spectacular and unique situations. However, this experience was the most powerful of all! More importantly for me is the hope that these unique images will spread awareness and encourage people to support the protection of these intelligent and endangered marine mammals in any way they can.

It is shameful that thousands of whales are still

hunted annually, victims of human senselessness, greed and under the guise of outdated traditions. ■

Kurt Amsler's dives with the sperm whales were authorized by the government of the Azores and every precaution was taken not to disturb the animals. For more information, visit Kurt Amsler's website at: www.photosub.com.





Diver swims over Japanese Light Type 95 HA-Go tank on wreck of *San Francisco Maru*

Text by Brandi Mueller
Photos by Brandi Mueller and Rob Clayton

Truk Lagoon (now known as Chuuk) plays host to what is usually considered the world's best wreck diving. World War II ships, planes, tanks, trucks, and military artifacts abound at recreational dive limits in Micronesia's calm, warm waters. The abundant marine life has transformed the former war vessels into stunningly beautiful artificial reefs.

With so many interesting wrecks, it can be hard to choose a favorite. But ask any wreck diver who has been to Chuuk and most likely they will tell you their favorite is the *San Francisco Maru*. The ship is popularly referred to as the "Million Dollar Wreck" because it was (and still is) chock-full of expensive cargo including tanks, trucks, mines, ammunition, aircraft bombs, torpedoes and depth charges.

The *San Francisco Maru* is also popular because of its depth. Sitting in the sand around 62m (205ft), the top deck is at 50m (165ft), and shallowest parts of the ship are the two masts at 32m (105ft). Most of the interesting cargo can be seen between 50m and 56m (170-185ft),



BRANDI MUELLER

The San Francisco Maru *of Chuuk Lagoon*

putting the wreck technically out of recommended dive depths for recreational divers.

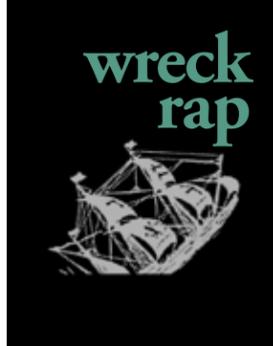
That being said, local dive operators

will lead small groups for dives with short bottom times (and short deco times) while carrying extra air and staging tanks throughout the dive in case of emergen-

cies. With good visibility and little current, the dive has relatively easy diving conditions other than depth, often being the deepest dive most recreational divers

have ever done. For trained tech divers, the ship is a fantastic tech dive with plenty to explore and makes for a great training technical dive as well.





Blue water, white sand and palm trees make up the paradise that is Chuuk. (right); Type 95 light tank—an early model of the HA-Go (lower right)

The ship

The *San Francisco Maru* was built in 1919 to join a fleet of over 50 identical cargo ships owned by Yamashita Kisen K. K. that were involved in world trade. It was commissioned into the Japanese Imperial Navy during WWII and was used to transport war materials between Japan and its Pacific Island territories and occupied islands. The freighter was 117m (385ft) long with an 8m (27ft) beam and 5,831 gross tons. Prior to arriving in Truk, the *San Francisco Maru* suffered damage from an attack at Wewak, New Guinea, on 4 May 1943. From there, it went to Inoshima docks for repairs. The ship arrived in Truk on 5 February 1944.

Operation Hailstone

As of 1944, Truk was a territory of the Japanese and an important operations base for the Japanese Combine Fleet. On 16 to 18 February 1944, the United States launched a massive naval air



BRANDI MUELLER

and surface attack on Truk. Known as *Operation Hailstone* by the United States and *Torakku-tō Kōshō* (the air-strike on Truk Island) by the Japanese; the US military invaded Truk with forces that included five fleet carriers, four light carriers and over 500 planes.

Prior to the attack the Japanese realized the vulnerability of having so much of their fleet in one place. Just a week before *Operation Hailstone* they relocated many of their aircraft carriers, battleships and heavy cruisers to Palau. Despite this action, the United States' attack by air, ship and submarine seemed to have taken Japan by surprise, and *Operation Hailstone* sank

three Japanese light cruisers, four destroyers, three auxiliary cruisers, two submarine tenders, three other warships and 32 merchant ships.

Over 250 Japanese aircraft were destroyed, most of which were on the ground being assembled having just arrived in cargo ships still in pieces. The United States lost only 25 aircraft, and the attack crippled Japanese forces.

The *San Francisco Maru* had arrived in Truk on 5 February 1944 and stayed even when its convoy sailed on 12 February 1944. The ship was shown in a photograph to be anchored southeast of Dublon Island in the 4th Fleet Anchorage (just east of Eten Island) on 17



WIKIMEDIA COMMONS / PUBLIC DOMAIN

February 1944.

The 4th Fleet Anchorage was attacked on Feb 17, but the *San Francisco Maru* did not appear to be harmed on the first days of the air strike. But on 18 February 1944, a TBF Avenger from the USS *Essex*—an amphibious assault ship—dropped a 500-pound bomb



Japanese vessels in Dublon Anchorage

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A diver explores Hold #2 and swims over one of the trucks stored there



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The 75mm (3-inch) bow gun on the *San Francisco Maru* (above); A diver descends down the forward mast of the wreck (right)

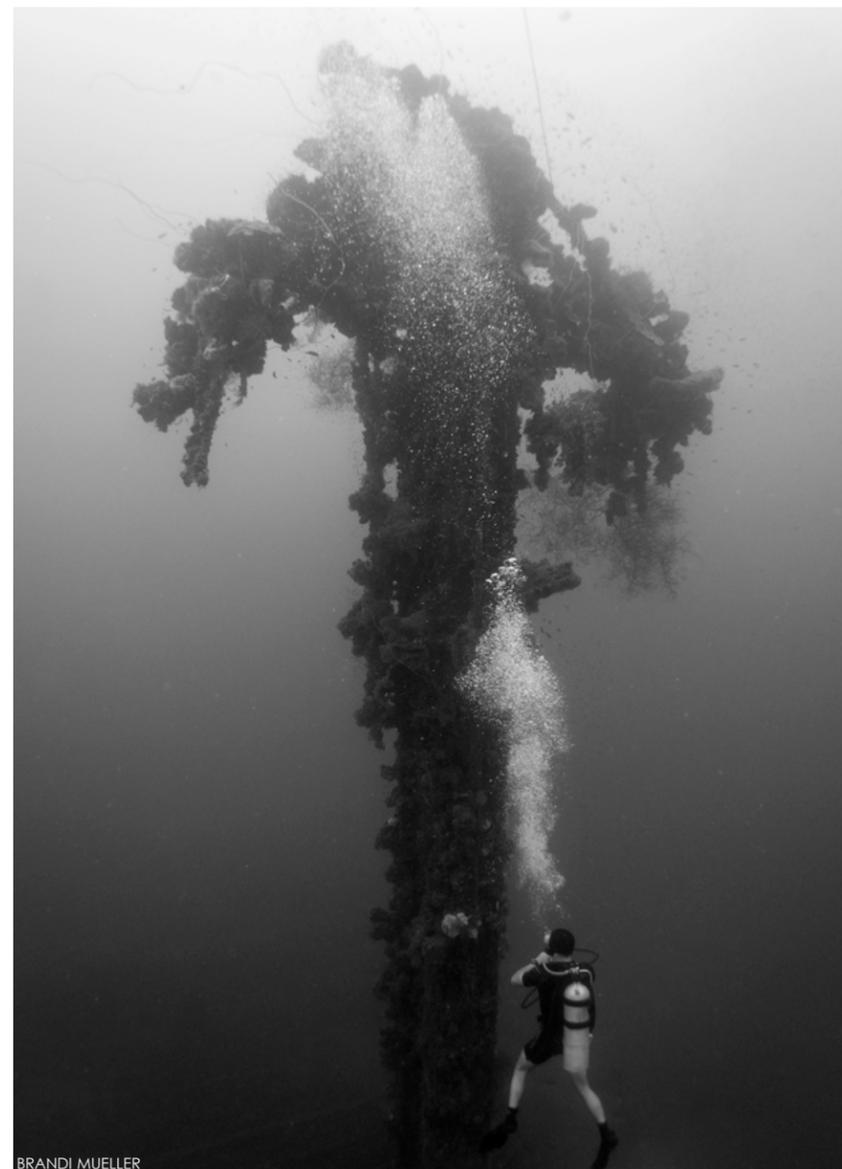
that hit midship, starting a large fire. The ship was seen devoured in smoke and flames, and it sank stern first. Five members of the crew were lost.

The dive

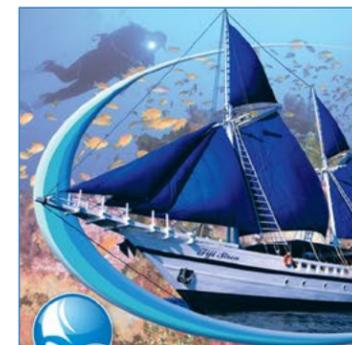
The first report of finding the *San Francisco Maru* underwater came from Cousteau's Truk Expedition in 1969, but it was not dived again until 1973 when a group of Kwajalein-based divers re-discovered it. They identified it by the ship's bell and the name etched on the side of the bridge superstructure.

Since then the *San Francisco Maru* has become a very popular dive, even with (or maybe because of) its depth. The ship rests upright in the sand at around 62m (205ft) in a relatively calm area with good visibility. Liveboards and day boats moor to one of two mooring balls connected to the wreck, which allow divers to follow the lines down to the ship.

Divers descend into the blue and usually cannot see any part of the wreck for the first 15m (50ft). The first view of the ship is usually one of the



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two large, intact masts.

Continuing to descend down the forward mast, divers will notice this ship has very little marine growth on the wreck in

comparison to the other wrecks. This is most likely because of its depth and has left the ship still looking very much "ship-like" as it did over 75 years ago instead



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View of bow of wreck from flatbed truck stored on starboard side of main deck

of encrusted with sponges and corals like many of Chuuk's other shipwrecks.

Once divers reach the top deck the ship turns into a playground for wreck-lovers. One of the first sights is of two Japanese Light Tanks on the starboard side of the deck. One sits partially on top of the other (probably either due to the impact of the bomb or the ship hitting the seafloor). Directly across the deck on the port side is a third tank.

The tanks are Mitsubishi manufactured Japanese Light Type 95 HA-Go tanks with half-inch armor. They would have been manned by three people and could move up to 30mph. Each weighed 7.5 tons and had three guns: one 37mm main armament turret gun in the front and two 7.7mm turret machine guns in the back. The tanks were powered by six cylinder air cooled 110-120hp Mitsubi-

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shi diesel engines.

Next to the two tanks on the starboard deck is a 1.5 ton 4x2 Isuzu Type 94 flatbed truck also on the ship's main deck. The tanks and the truck are just above hold #2, which contains two more partially collapsed trucks resting on the upper tween decks. Below

them fuel drums, ammunition and aircraft bombs can be seen.

Moving forward towards the bow, hold #1 is worth checking out because it is filled with mines. Sadly many have been removed by the locals to be stripped of the high explosive gunpowder and used in dynamite-style fishing.

Those that remain are a unique sight and a highlight of the dive. Hold #1 also contains crates filled with detonators and large coils of cable.

At the bow is a 75mm (3-inch) bow gun that points off the port side. Mounted on a platform with very little growth, it looks as



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Japanese Light Type 95 HA-Go tank on *San Francisco Maru* (above); Mines on the wreck (top left)





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Kids paddle from island to island in homemade canoe (above); The MV *Truk Odyssey* (left)



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to have been tossed around, also probably due to the bomb impact or the sinking. There are also depth charges, anti-aircraft ammunition, shells and mines.

if it could still be used today if necessary. By swimming just a little off the port side of the bow divers can see (or swim to) a large steamroller sitting in the sand at 62m (205ft). It likely fell off the ship during impact.

Most divers, especially non-tech divers, divide the ship into at least two dives and tackle the stern portion of the wreck in a second dive.

Moving towards the aft of the ship, damage from the 500-pound bomb that hit the aft superstructure is visible around midship. Hold #4 has torpedoes stacked as well as single torpedoes that appear

there used to be lantern storage in one of the doghouses, which has collapsed, so several lanterns in various conditions have been placed on the deck.

Throughout the ship divers can also find non-weaponry artifacts including cups and saucers with the markings of the ship's owners and other china. Beer bottles, cooking utensils, medicine bottles, binoculars and more can also be found.

Afurtherthoughts

Overall, the *San Francisco Maru* is in considerably good

shape, bearing in mind it has been underwater since 1944. Its depth has prohibited some of Micronesia's prolific marine life from growing on the ship, leaving it very much how it looked when it originally sank. Due to its depth and that there is so much to see, the ship is best explored in several dives or as a technical decompression dive by those trained to do so.

When diving the *San Francisco Maru* be sure to take into consideration one's personal training and limits, and give adequate time to plan the dive and carry out that plan underwater. With the extensive ordinance on the ship, be careful not to disturb it and be aware of narcosis and decompression, which can both play a role on this dive.

The *San Francisco Maru*, also known as the "Million Dollar Wreck", is one not to be missed while diving in Chuuk. Any diver will be thrilled having seen tanks, trucks, mines,

depth charges and torpedoes all on one dive while also potentially breaking their own personal dive depth records.

On 29 March 2015, the last day of my trip, Typhoon Maysak directly hit Chuuk and did considerable damage to the islands. Please keep the people of Chuuk in your thoughts as they recover and rebuild from this natural disaster that has caused considerable damage to their island, as well as those in other places affected by Maysak. □

REFERENCE: *World War II Wrecks of the Truk Lagoon*, by Dan E. Balley

Brandi Mueller is a PADI IDC Staff Instructor and boat captain living in the Marshall Islands. When she's not teaching scuba or driving boats, she's most happy traveling and being underwater with a camera. For more information, visit: www.brandiunderwater.com.



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Sitting on the starboard side of the main deck next to hold #2 is a 1.5 ton 4x2 Isuzu Type 94 flatbed truck that still has its steering wheel



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Two Japanese Light Type 95 HA-Go tanks stacked on top of one another on the starboard side of the *San Francisco Maru*



400-year-old cannons from Spanish armada found off Irish coast

A number of cannons, timbers and an anchor from *La Juliana*, one of three ships from the Spanish Armada wrecked off the coastline in 1588, have been recovered by divers for Ireland's heritage ministry.

The Spanish Armada was a Spanish fleet of 130 ships that sailed from A Coruña in August 1588, under the command of the Duke of Medina Sidonia, with the purpose of escorting an army from Flanders to invade England. But a combination of mistakes, poor planning and attacks by the English navy resulted in the Spanish fleet being scattered in the English Channel and fleeing up the east coast of England, forcing the fleet to go the long way around the British Isles in order to return to Spain. However, a severe storm in the North Atlantic caused many of the beleaguered Spanish ships to sink off Scotland and the west coast of Ireland.

Heavy storms over the past two years are thought to have uncov-

ered the 16th century vessel, long buried in the sandy sea bed off the coast of Streedagh, in County Sligo. Two other Spanish Armada ships, *La Lavia* and *Santa Maria de Vision*, also shipwrecked in the area, and more than 1,000 people lost their lives.

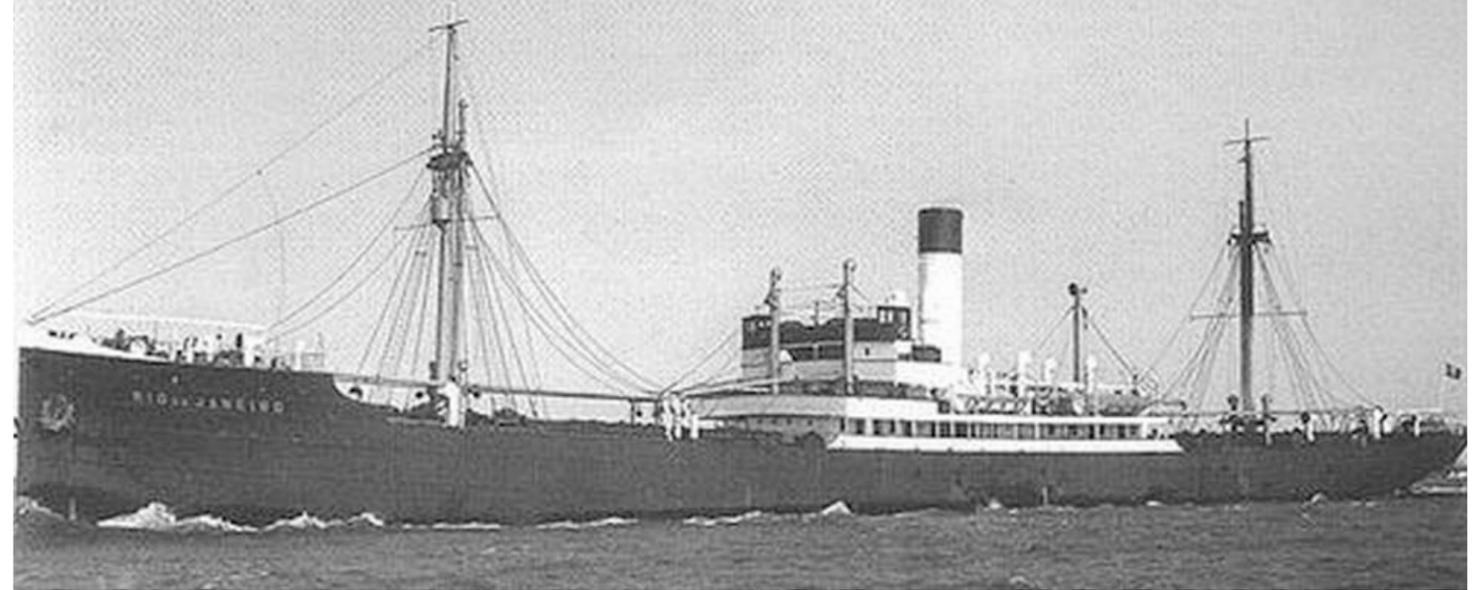
"On current evidence, the other two wreck sites remain buried beneath a protective layer of sand, but the wreck of *La Juliana* is now partly exposed on the seabed along with some of its guns and other wreck material," Heather Humphreys, minister for Ireland's Arts, Heritage and the Gaeltacht, stated in a press release. "We have uncovered a wealth of fascinating and highly significant material, which is more than 425 years old. The National Monuments Service believes that all of

the material has come from *La Juliana*, one of the three Armada ships wrecked off this coastline in 1588.

"This material is obviously very historically and archaeologically significant. My department's priority is to safely recover the artefacts, so they can be conserved and safeguarded by the National Museum, whilst at the same time also recording the wider wreck site.

"My department is now working with the National Museum to devise a strategy to safeguard and manage the site and in particular the remains of *La Juliana*. The Gardaí will continue to monitor the site as this work is carried out."

■ SOURCE: ARTS, HERITAGE AND THE GAELTACHT



MS Rio de Janeiro

Wreck of a WWII German troop transport located off Norway

Some 75 years after it was sunk by a Polish submarine on 8 April 1940, a Norwegian team has located the wreck of *Rio de Janeiro* at a depth of 135m near the town of Lillesand in Southern Norway, the Norwegian Broadcasting Corporations (NRK) reports.

At the time of its sinking *Rio de Janeiro* was carrying a contingent of German soldiers meant for the invasion of Norway, which occurred on the following day, 9 April 1940. Of the 380 onboard, 50 were crew, the rest were soldiers. Of these numbers, almost 200 lost their lives, but 183 survived and were helped by the locals. Survivors told officials they were heading to Bergen, and even though they were wearing military uniforms, the Norwegian government failed to realize that a German invasion was imminent.

"We all went quiet"

"The biggest moment came when we went up along the bow until we could get an overview of the ship. That's when we all went quiet," said Vidar Johannesen from Agder-Tech AS, a commercial enterprise, which together with Adykk—a dive center locat-

ed in Kristiansand—has been responsible for the operation, after a six-year search for the wreck.

"We had an idea about which ship it was, so we were looking for anything that could identify the wreck," Tom Lundal, CEO of Adykk, told the NRK.

There was a lot of wreckage strewn across the seabed, wherein which the starboard lantern was found and retrieved. The lantern was imprinted with a serial number, which along with the size of the ships' outline and its contents, left no doubt about the ship's identity.

The Norwegian receiver of wrecks stated to the NRK that the ship is considered a gravesite, which

is not to be disturbed. However, it has been authorized that *Rio de Janeiro's* ship bell can be recovered and put on exhibit. ■

SOURCE: NRK

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Edited by
Scott Bennett

Standardized carry-on restrictions proposed

The International Air Transport Association (IATA), announced a new initiative to optimize the accommodation of carry-on bags given differing carry-on bag sizes and airline policies.

The Cabin OK size guideline, developed by working with airlines and manufacturers, is 55 x 35 x 20cm (or 21.5 x 13.5 x 7.5 inches). This size was calculated to make the best use of storage space in the cabin. If fully embraced by passengers, everyone would have a chance to travel with their carry-on bags on board aircraft of 120 seats or larger even when the flight is full.

A number of major international airlines have signaled their interest in joining the initiative. They will soon be introducing operational guidelines to give Cabin OK bags priority to stay on board the aircraft when all carry-on bags cannot be accommodated in the cabin.

"Cabin OK is all about providing the customer with greater assurances. If you have a Cabin OK bag, you can be pretty sure

that you are within the maximum carry-on limits of airlines around the world. If you are traveling on an airline participating in the program, you will have the best chance that your bag will be with you in the cabin, even on a full flight," said Thomas Windmuller, IATA's Senior Vice President for Airport, Passenger, Cargo and Security.



"For passengers traveling with bags that don't have the Cabin OK logo, there's no need to worry. If it was accepted for travel before, it will be acceptable for travel now, but with the same uncertainty that if the flight is full it may eventually have to travel in the hold," said Windmuller. ■

Be wary of free Wi-Fi

Expensive roaming charges when travelling abroad may make it alluring to log onto free hotspots offered by cafés and restaurants or other public places. However, be aware that the free Wi-Fi may be set up and provided by IT-criminals who are attempting to gain access to your personal information and sensitive data.

It is easy for a hacker to create a fake network, which may appear legit and innocuous while enabling criminals to route traffic through their own hardware whereby they can intercept and steal log-in names and passwords, creditcard or personal data, which can be used in identity theft.

There is a bigger risk to encounter a fake network in areas where many people congregate. A criminal could sit in a café and create a network with a name similar to that of the café. Therefore it is advised to always ask the staff about the exact name and access code.

- Avoid hotspots where no password is required.
- Do not log onto networks requesting you to enter sensitive information.
- Avoid online shopping and by all means never use your credit card.
- Remember to log off from networks where you have entered a username and password.
- Make sure you have updated your anti-virus and anti-malware software and your operating system has the latest security updates. ■

Booking engines could become more expensive

German airline Lufthansa is poised to introduce a surcharge for customers who buy its flights through third-party websites. The €16 (US\$17.80) fee is likely to deter travellers from completing bookings on services including Expedia, Opodo and Momondo.

According to the BBC, Opodo said online travel agencies were opposed to the move and lawyers at the European Travel Agents and Tour Operators Associations (ECTAA) were looking into the matter.

Martin Riecken, a Lufthansa spokesperson, told the BBC that the move was not about preventing anyone in comparing prices but to offer greater transparency and distribute costs more evenly among those who actually pay for the distribution of flight inventory and fare databases used by online travel agents—a cost that, according to Lufthansa, runs into "a high three-digit million euro amount per annum for the Lufthansa Group". ■



Should intelligence agencies be handed all your travel information?

Passenger Name Record (PNR) data is information collected by airlines on their passengers, regardless of where they fly. A PNR will typically contain information of a sensitive nature, such as the passenger's full name, date of birth, home and work addresses, telephone number, email address, credit card details and internet protocol address if booked online, as well as the names and personal information of emergency contacts.

In recent meetings, the European Union's interior ministers and heads of government have expressed their clear wish for the rapid introduction of such a database to be used for search purposes to prevent future terrorist attacks.

However, the blanket retention of data as it is proposed currently is, by many European parliamentarians and consumer groups, neither considered proportionate nor appropriate. ■

Ground breaking anti-malaria drug under development

Scottish researchers have discovered a new compound which, in a single dose, could treat malaria while protecting people from the disease and preventing its spread.

The discovery was announced amidst growing concerns about strains of malaria which are resistant to current treatment. Dr Kevin Read, joint leader of the project, told the BBC that new drugs were "urgently needed".

The new compound targets part of the machinery that makes proteins within the parasite that causes malaria. It is now undergoing safety testing, with a view to entering human clinical trials within the next year. ■

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Medes Islands

— *Opulence Under the Waves on Spain's Costa Brava*

Text by Peter Symes, with Marco Daturi
Photos by Marco Daturi and Peter Symes



Above water, the uninhabited Medas Islands stand out as rugged and barren.

At a glance, the Medas Islands doesn't look like much—some 50 odd acres of craggy outcrops sitting close to shore, just opposite the small fishing village and resort town of L'Estartit, along the Spanish coast of Costa Brava. Little, if anything, gives away the fact that it is a marine national park boasting some of the most renowned diving in the Mediterranean.

It is commonly heard among European divers that they only care about venturing to the tropics because they believe there is so little to see in the Mediterranean. That is certainly not the case with the Medas Islands, which are covered by lush forests

of colourful coral in which lots of other life has taken up refuge and there are schools of fish patrolling the steep coastline.

The islands were declared a protected area and marine reserve by the regional government in 1983 and are now one of the most important marine reserves in the Western Mediterranean. It is actually an archipelago made up of seven islands and several islets. Meda Gran is the biggest and only sizeable island that dominates the group; the rest are merely rocky outcrops and pinnacles sticking out of the sea.

L'Estartit and the Medas Islands are located just an hour's drive south of the border to France and a couple of hours' drive north of Barcelona, the capital of Catalonia—a semi-autonomous region in northeastern Spain and second largest city in the country, making it easy to get to even on a long-haul flight. Despite



Mediterranean anthias





There's a quite nice beach within walking distance (above); Watch out for livestock when driving narrow country roads (left); Lemons are grown in back yards and front gardens (below); The colourful vioscent sea-whip, *Paramuricea clavata* (top right); Dive sites are reached in few minutes (bottom right)

having grown into a popular resort town, L'Estartit has maintained much of its fishing village characteristics being built around the little port. The bigger hotels are mainly on the outskirts and so are several camping sites, but the old center is still made up of smaller buildings and narrow streets with lots of small shops, cafés and restaurants. There are several dive operators in town, so this is also where their diveboats are moored. From the port, it is only a short trip to the islands, which sit only a little over 1km from shore. It is such a short ride that one may just as well get kitted up before departure.



Diving

Soon enough, I found myself taking a giant stride off the diveboat and bobbing around to get my bearings straight. I took note that I was facing south, with Meda Gran on my left, so following the sun would set me on a course, parallel and close to the island.

On this day, the visibility was so-so, but I could make out some pinnacles in the haze just below me. I vented my vest and slowly started to sink towards the bottom. The colors were striking. The corals on the pinnacle below me were different hues of bright yellow, red and purple like a colorful bouquet.

As photographers do, I spent a few

moments getting myself in order, tightening and adjusting straps, correcting my strobe arms and checking one more time that the camera was set correctly and prepared for whatever may suddenly turn up round the next corner. And so I set off, slowly descending along the pinnacle, keeping a close eye out for interesting sea life.

There was absolutely no need to hurry, as the interesting spot could be right where you were dropped off and not necessarily around the corner. Besides, going slow helped me settle down and get into a creative zone. I reached 25m and leveled off in order to conserve some air and non-deco time. Down





Yellow color morph of violescent sea-whip (top left); School of sea bream (top right)



Sponge (species undetermined)

here, the water was a bit cooler, so a wetsuit was definitely required. Residing in Scandinavia, I consider the waters of the Mediterranean comfortably warm, but those who predominantly dive the tropics may beg to differ. In any case, it is recommended that divers use a slightly thicker suit—5mm rather than 3mm—and you should be all set.

Above me, I saw a school of sea bream (*Sarpa salpa*)—recognizable by the golden stripes that run down the length of their bodies—congregating and moving slowly, like wannabe barracudas. Sea bream is quite a common species in the Mediterranean where it can be found down to depths of 70m.

It was only much later I learned that this fish was consumed as a recreational drug when the Ancient Roman Empire existed. The fish itself is apparently not psychoactive, but it may be rendered hallucinogen-

ic when it ingests certain phytoplankton. I bet you didn't know that.

I swam slowly forward, moving slowly across a ledge. There were fans of red coral all the way around it—in the shape of small leafless bushes that grow up to a meter in height—and interspersed between these and affixed to the rocky surface were colorful patches of sponges. It was like diving in a garden and I couldn't help surrendering to the Zen moment.

Then, out of the corner of my eye, I noticed an almost imperceptible movement—an octopus was contorting itself into a crevice while taking on both the colors and the textures of the surroundings, its skin transforming into folds, ridges and nodules. What I have never been able to get my head around is how cephalopods are colorblind, yet they are able to put on these magnificent displays of color and produce any imaginable hue. How can



The common octopus (*Octopus vulgaris*) is found in tropical waters throughout the world



Dusky grouper, *Epinephelus marginatus*, greets diver (left); School of sea breams are everywhere (top left); Bouys marking dive sites (top right); Red scorpionfish (right); Tapas for lunch (below)

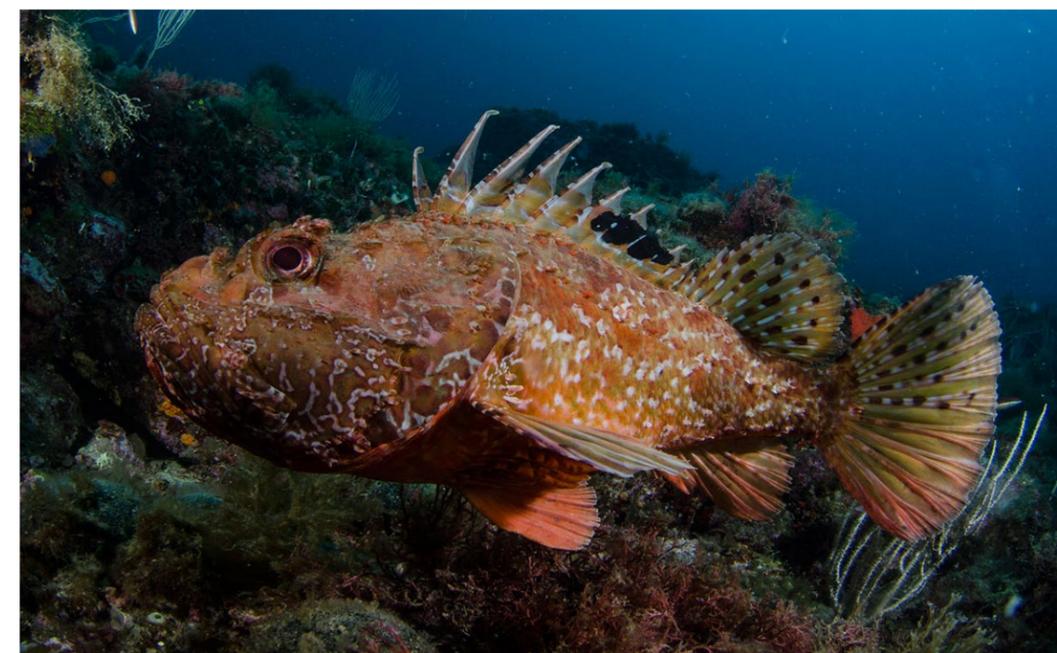
life around these parts so placid. A growl in my tummy reminded me that it was time for lunch, and since the dive time was about up, I found myself returning to the downline, which was suspended from permanently anchored buoys, and started my ascent.

Tapas and siesta

Back on dry land, the town baked

under the strong midday sun, so our party retreated inside one of the many restaurants in town and embarked on a slow, lazy lunch. Around the Mediterranean, you can take your time around meals—and you should. As we sat there, we nibbled on some olives before the dishes started to arrive and looked out over the azure blue ocean; all the worries and stresses in the world evaporated one by one.

We enjoyed several small dishes called tapas, which were originally a variety of snacks or appetizers in Spanish cuisine, but it has become commonplace in bars to make a meal out of these. So there were mushrooms with garlic and some slices of tortilla (which in Europe is an omelet); there was calamari in tomato sauce, cheese, seasoned meatballs, sausages and nuts. Many of these dishes are eaten with a toothpick,



which also helps keep the delicious components together. A glass of cold beer goes very well with tapas, but if you are going out for another dive in the afternoon, it is probably better to stick to juice.

The siesta was originally a midday nap after a heavy meal, allowing for a break during the

hottest hours of the day. In present-day Spain, the midday nap has largely been abandoned during the work week, but nevertheless, everything still seems to slow down during the midday. Shops close for a few hours, as well as museums and churches. Notable exceptions include supermarkets and a few convenience stores

this be and why? Diving always gives me some cause for wonderment.

A stately grouper came around to ogle me in the most uninhibited manner. It was eyeballing me all

over and seemed quite tame, or at least, very accustomed to air-breathing bipeds in weird outfits. I presumed that the protected status of the area probably had a role to play in making the wild-



THIS PAGE: Picturesque scenes from the city of Gerona (above and left); Limestone formations form archways and caves under the islands (right)



cal reports indicate that those who nap have less risk of getting a heart attack. Once again, staring out at the sea, my gaze wandered onto the line of jumbled, red-tiled rooftops on the promontory on the northern side of the bay. Time slid past, and before I could even reflect on "the unbearable lightness of being",

on the outskirts of town, as they mainly serve tourists, so are open all day.

Later on, the town comes back to life and stays lively until late evening. I like it that way, as it also re-energizes one to enjoy the social life in the evening. You can always say that some medi-

a cup of steamy, hot and very aromatic espresso mysteriously manifested itself in front of me.

Limestone formations

The Medes Islands are made of limestone, and as they are subjected to incessant erosion by the sea, a number of archways and

tunnels as well as some cave systems have formed, which is part of the attraction of these islands.

One of the more spectacular formations is known as the Dolphin Cave, which is rather more of a cavern than a cave, as daylight can always be seen at one end of the tunnel that is only about 50m long and a relatively easy swimthrough. It is not a complicated dive as it is quite spacious and with light coming in also from some openings above, it will only deter the most claustrophobic—but do bring a lamp, as you will find corals, scorpionfish, moray eels and probably plenty of groupers in the cave too.

Gerona

In the hinterland, some 25km inland and a 20-minute drive from L'Estartit, we find the historical city of Gerona. The capital of the province of the same name,

Gerona sits at the confluence of several rivers. It is, among other things, famous for its majestic Gothic cathedral that sits on a little hill commandeering the old town. It is also home to some of the best restaurants in the world such as the El Celler de Can Roca, which is number one on the S.Pellegrino & Acqua Panna's list of The World's 50 Best Restaurants in 2015.

The town has quite a checkered history. The Ancient Romans came here and built a citadel. Next, the Visigoths ruled Girona until the Moors conquered the area, after which Charlemagne took the region. During the 12th century, a Jewish community flourished in Girona until the Catholics expelled them in 1492. During the Middle Ages, the town underwent no less than 25 sieges and was conquered seven times, the last time by the French

Napoleonic troops in 1809.

As we wandered down these ancient streets in the old town, one could not help but wonder what all the old walls may have witnessed. Only the modern scooters parked in the alleys and the modern lighting of streets and in shop windows gave it away that it was the 21st century.

It is an excellent place for an upscale dinner, and if you are accommodated in L'Estartit or thereabouts, consider taking a cab or make other arrangements for transportation, so you can also enjoy the excellent wine the region has to offer, if you are so inclined.



CLOCKWISE FROM ABOVE: Cow bream or goldline, a species of sea bream (above); View over L'Estartit and Medes Islands (top right) Common eagle ray; Mediterranean moray eel; Underwater photographer Marco Daturi with Genis Dalmau, owner of Hotel Les Illes Diving and Hotel

More diving

It is not just the Medes Islands themselves that offer good diving spots—although they are the star attraction. The coast-

line on the northern side of the town also offers some good dive sites, all of which are located only a few minutes' boat ride out of port.

The dive boats seem to be mostly either converted fishing vessels, or in some cases, big RIBs. In either case, with the short boat rides in mind, there is little point in having huge spacious vessels. As some of the images show, the boats are comfortable enough—well equipped for the task and they get the job done.

The majority of the dives have a maximum depth of less than 20m (66ft) and a dive time of about



Afterthoughts

Summing it all up, L'Estartit and Medas Islands are a relatively inexpensive dive destination—for divers based in Europe, at least—with lots to offer, not just for die-hard diving nerds but for folks with general interests also in the culture, cuisine, landscapes and history of the region.

There are plenty of activities in the area and good facilities for families who can stay at inexpensive hotels, rent a bungalow or apartment, or stay at some of the



THIS PAGE: Scenes from Barcelona
UPPER LEFT TO RIGHT: Side street café; Detail and exterior view of Sagrada Família, the Basilica and Expiatory Church of the Holy Family by Catalan architect Antoni Gaudí (1852–1926); Quaint side street on picturesque walks in the city; Dancers performing the tango during a festival



LOWER LEFT TO RIGHT: Scenes from the colorful city markets



several camping sites around town. Costa Brava is full of landmarks and sites; the classic metropolis of Barcelona is only some 90 minutes away and can easily be reached on a day trip if someone is up for some power-shopping or digging deep into some culture. The foothills of the Pyrenees are also just about an hour away.

Visitors from overseas, say the Americas, will find that the diving off Costa Brava, in terms of quality, measures up to that of the Caribbean in many ways,

although it is obviously quite different. Many intercontinental flights go to Barcelona, from where one can either rent a car and drive

the last bit, or take the train to Gerona from the station under the airport. There is an airport in Gerona too, but it mostly serves domestic and low-cost airlines, so it questionable whether it is worthwhile getting a through-ticket all the way, in particular, if it involves a longer layover in Barcelona. However, a longer layover may be a great excuse to explore the cultural sites and culinary treasures of this lively and historic city. ■



Austria's
Traunsee

— *Mountain Lake Diving*

Text and photos by Wolfgang Pölzer

While Traunsee is mostly known for its endless sloping rock faces, the deepest lake in Austria has much more to offer. Caves, archways, wrecks and fish-rich shallow waters make it an all-rounder as Wolfgang Pölzer explains in this introduction to one of his favorite haunts.

If ever there was a dive location worth mentioning, with a house reef in a lake far from the ocean, it would be the one found in Austria's Salzkammergut region—more precisely, in the picturesque town of Traunkirchen, on the west shore of Traunsee (Lake Traun).

Here, we find the pretty spa hotel, Das Traunsee, with a dive shop operated by Jochen Kern. In this prime location, Kern has been running a small but excellent dive center for over 14 years. It's got a cosy atmosphere in which a massive wooden table has been set up to make it easy to prepare dive equipment and kit up just by the entry point, making freshwater diving fun and easy.



Diving

The greenish waters are unexpectedly warm as our party descended, following the gently sloping bottom consisting mostly of gravel. Keeping to the right we came to some lush meadows covered with aquatic plants. Following a set line,

we reached our first stage at 13m, a training platform. The remains of an old VW bus sat nearby in the sediment like some sort of artificial reef. At least that is what I could make out from the outline of it, as it was completely encrusted by zebra mussels.

Originally from Eastern Europe, these mussels—which are only about three centimeters long—seem to have found

a heaven of their own in Traunsee. There is nowhere else in Austria where these molluscs are present in such big numbers. Every solid piece of surface seemed to have become a substrate for a booming population of these small filter feeders.

Indeed, the mussels are upsetting the original biological balance, but this situation comes with some advantages for divers. The many millions of small mussels

act as a natural sewage treatment plant by continually filtering nutrients and particles from the water. In turn the visibility is significantly improved, at least until the next heavy rainfall washes a renewed load of nutrients into the lake and the cycle starts all over.

In fact, the VW bus being totally encrusted in a layer of clam shells makes for a great photographic subject. And if

Divers enjoy easy entry into Traunsee from pier near dive center



Zebra mussels completely encrust a submerged VW bus (above and right)

one continues to head left of the bus, there is an increasingly steep slope that soon ends in a vertical rock wall where the small mollusks are densely clustered—only interspersed by yellow-brown patches of freshwater sponges, which incidentally, are also filter feeders.

Crisscrossed with cracks and small overhangs, the drop-off ended in a plateau at a more sport-diving-friendly 30m range. Visibility improved and was a good five meters better than at the surface. Despite the depth, a lamp was not required to see.

As if we were taking an elevator, we slowly floated back up over five floors to the warmth in sunlit shallow water. Here we came across a boat wreck, and in between the sunken trees, a rich community of fish seemed to



thrive. We spotted several pike hiding among the branches and dense schools of perch swimming in open water. The best chance to get close to them would have been directly from beneath the

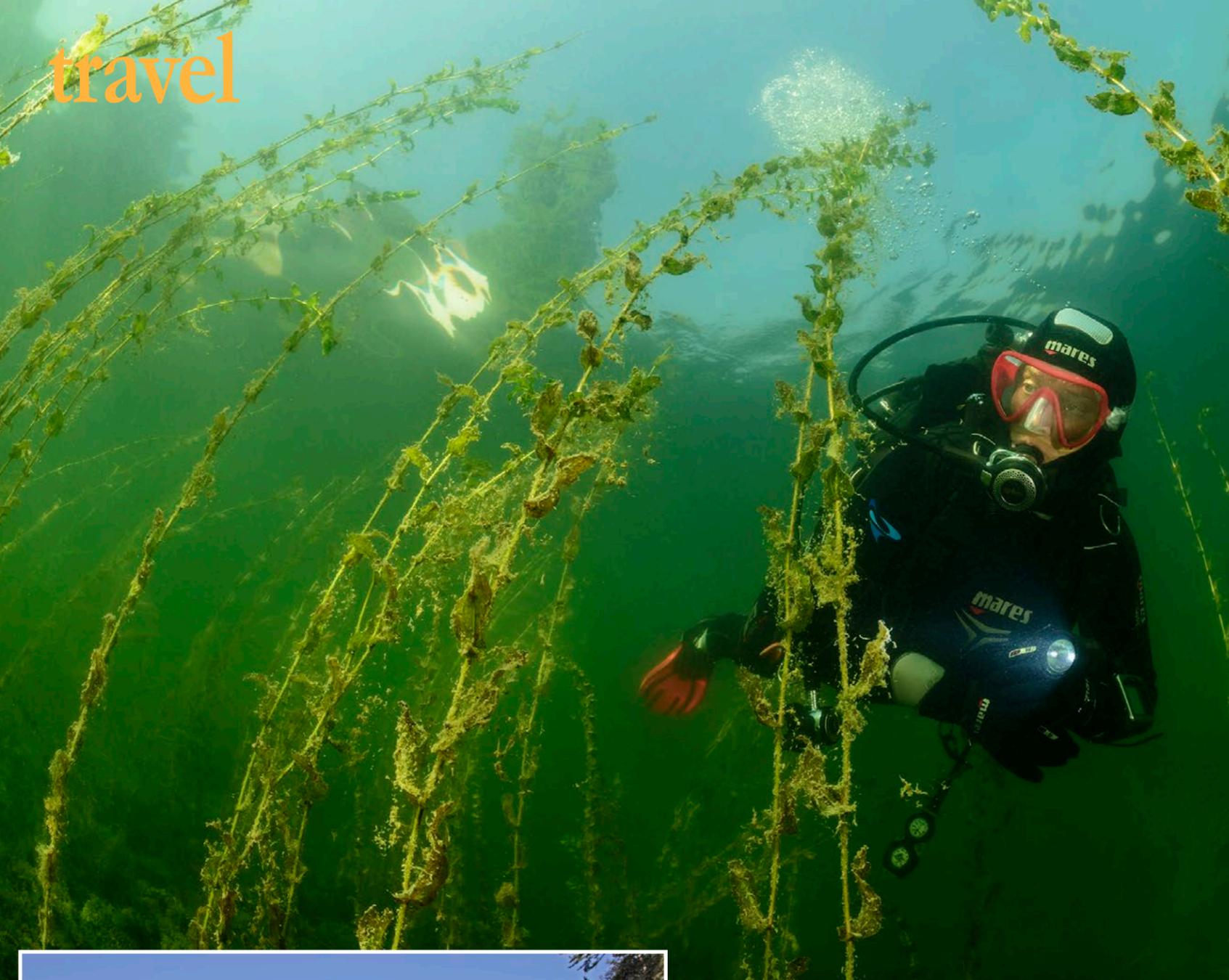
jetties of the hotel.

After a dive of 94 minutes, we headed to the surface again; it was such a varied dive that time just flew by. And we hadn't even been to the Monastery Meadow



Diver with fronds of lake plants (above); The village of Traunkirchen on the shore of the lake (top right)

Diver in plant-rich shallows (left), with school of perch (below) and submerged branches encrusted with zebra mussels (bottom right)



dive site—a shallow plant-rich patch of water full of fish. “That’s a good excuse for a night dive,” said Kern. “It is a right soup of fish and I guarantee there is eel.”

Diving by speedboat

After a delicious lunch on the hotel terrace, enjoying a romantic view of the lake, we took a speedboat out to our next dive.

It so happens that the vast majority of dive sites of Traunsee are not accessible from land, such as the bluffs that run for kilometers on the east coast. Interspersed by big boulders, steep, rugged drop-offs plunge vertically into the lake and continue down to a depth of 100m, making it a paradise for underwater hunters and technical divers.

Speedboat takes up to six divers quickly to 16 dive sites on the lake



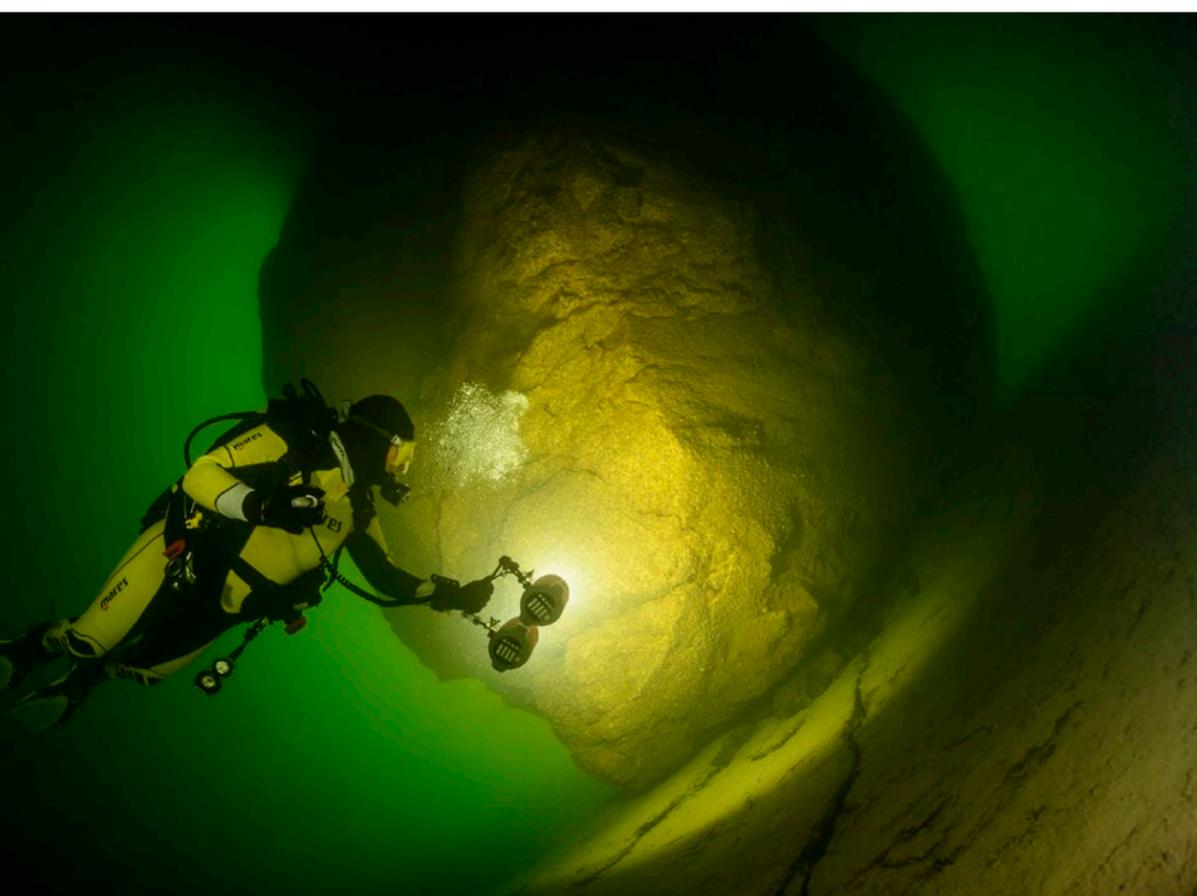
Diver under huge boulder caught in a crevasse at Bat Bay dive site (left); Divers moored at one of 16 dive sites on Traunsee (right)

word for it and promised to come back.

About the lake

Traunsee offers fascinating and very varied dives, with the most beautiful cliffs in the country, as well as fish-rich shallow waters. It is worthwhile visiting Traunsee any time of year, even in winter, as the lake never quite freezes over, making it unsuitable for ice diving. With its altitude of over 400m, it is considered a mountain lake—so make sure your dive computer goes into altitude mode.

Traunsee is not only the deepest lake in the country, but next to the neighboring Attersee, it is also the second largest lake of Austria. The elongated, trough-shaped basin is longitudinally traversed from south to north of the Traun. This explains



Diver sheds light on huge submerged boulder lodged in a crevasse at the Bat Bay dive site of Traunsee



Bat Bay. In matter of a few minutes by speedboat, we crossed the Traunsee and stopped in front of an imposing rock face, which rose up in front of us. Bat Bay is the promising name of this dive site. “Hold on tight to your camera and lamp,” warned Kern, “because what is lost here will be gone forever. There is more than 100m to the bottom. Focus on your entry, do a last check and descend.”

I kid you not, the wall along which we were now descending was absolutely vertical, as it slid past us on our way down. At 20m, we halted our descent

and swam to the right. Once more, the surfaces were covered with dense mats of zebra mussels, which reach out a few millimeters into the open water to catch plankton. Aside from the mussels, there was no other life in sight.

After traversing some more rock for a few minutes, the rock face suddenly stopped, and we stared down a huge abyss that opened up before us. Somewhat hesitantly, we floated into the darkness. Only when our eyes adjusted to the dim light did we realize that we were floating through a giant archway. Or more precisely, we were in a vertical

canyon in which a 20m-wide boulder was jammed into the crevasse right over our heads. Looking back towards the open water, it was a highly unusual sight to behold on a freshwater dive.

“I’ve got a good dozen more similarly spectacular diving spots to show you” Kern exclaimed, as we returned to the boat. “For example, just recently we discovered a snow-white steep wall that drops off vertically from 10 to 60m and has a surface that is smooth as silk—it is just awesome,” said Kern. We took his

THIS PAGE: Scenes of diving in Traunsee's underwater realm, with schools of perch under the pier, a sunken row boat, large freshwater sponges and mussel-encrusted branches and beams

its high susceptibility to bad visibility after long rains or snowmelt.

Another feature is a stable saltwater layer in very great depths (160-170m) at the bottom of the lake. This feature connects the meromictic nature (a term meaning it has layers of water that do not intermix) of Traunsee, so the lake's body of water is never completely circulated. The layer of salty water is a result of more than 400 years of salt production in Ebensee during which time calcium chloride was let out into the lake.

During summer, a visibility of five to 10m can be expected, but during autumn and winter, it can occasionally be double that distance. However, snowmelt and prolonged



to mention, the ubiquitous zebra mussels.

Dive operator

Since 2000 Jochen Kern has managed a SSI-affiliated dive shop in conjunction with the famous lakeside hotel, Das Traunsee, located in the picturesque village of Traunkirchen. Set in a prime location directly on the lake, the center not only has an extremely diverse reef right outside, but its quick dive boat can easily bring up to six divers to any of the 16 other dive sites on the east and west shores within minutes.

The shop offers SSI certification, and on request, PADI courses from Open Water Diver to Instructor Assistant. Children need to be a minimum 10 years of age. Tech training is offered up to the level of SSI Normoxic

rainfall can reduce visibility to very modest values.

Among the highlights, in addition to countless spectacular cliffs, are the many fish and plant

species in shallow waters. There is a myriad of bass and pike as well as rudd, trout, eel, chub and carp. In some places, large freshwater sponges can be seen, not



TRAUNSEE FACTS

LOCATION: Salzkammergut resort area in the State of Upper Austria

SURFACE AREA: 24.4 sq km; 12.1km long, 2.9km wide

AVERAGE DEPTH: 91.3m

MAXIMUM DEPTH: 191m

ALTITUDE: 422m above sea level

WATER TEMPERATURE: up to 22°C (~72°F)



CLOCKWISE FROM LEFT: View of the lake from the dive center; Easy access for all levels of divers; The four-star hotel, Das Traunsee, on the edge of the lake; Close-up detail of pike fish; Location of Traunsee on map of Austria (left inset)



Trimix diver. Also, more recently, courses in sidemount diving are offered. A small number of sets of sports diving equipment is available for rental.

The center is open daily from 9:00 AM to 5:00 PM from early July to mid-September, and in June from Thursday to Sunday only. During off-season and winter, the dive center is only open on weekends and by request. For more information and rates, see: www.tauchschule-traunsee.at.

another dive shop on the eastern shore in Gmunden. See: www.tauchschule-neptun.at.

Regulations and fees

The Traunsee can be dived for free at any time without a diving permit. However, there are zones where a diving ban exists, which include the spacious Gmundner Bay (culture zone), the areas around the Monastery of Traunkirchen and south to the end of the village as well as the area around the piers for liner shipping. The dive card, which is 15 Euros (~US\$17) per year, is not mandatory at the Traunsee, however, it is recommended and serves the maintenance of free diving at many lakes in Austria.

With an additional fee of 5 Euros (~US\$6), you can buy a permit to use toilets and hot

showers in the hotel as well as changing facilities and free drinking water or tea at the base, in addition to the great infrastructure around the lake (to purchase this permit, go to the website: www.arge-tauchen.at).

Accommodations

The most convenient and safe choice of accommodation is the four-star spa hotel Das Traunsee in the town of Traunkirchen. In the hotel is the dive center, with optimal access to the lake. Comfortable, double rooms are

available. For rates, see: www.dastraunsee.at.

Landhotel Post is a much cheaper choice. It is a three-star hotel in the neighboring village of Ebensee. Double rooms are available at the 70-room hotel. For rates, see: www.hotel-post-ebensee.at.

Camping Traunsee is yet a cheaper option. It is a small campsite in the neighboring town of

Altmünster. For more information and rates, see: www.camping-traunsee.at.

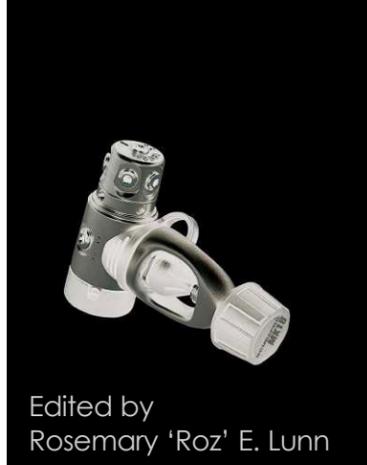
Topside excursions

Traunsee is surrounded by the beautiful mountains of Hölleengebirge where the two mountain peaks of Feuerkogel (1,592m) (www.feuerkogel.net) and Traunstein (1,691m) meet. Mountain bikers and hikers come here as well as paragliding or climbing enthusiasts. For those who prefer to stay at sea level, there is the famous Gmunden

Ceramics, the Schlosshotel Orth and a lake cruise on the *Gisela*—Europe's oldest paddle steamer, which is not to be missed! See: www.traunseeschiffahrt.at ■

Wolfgang Pölzer is a widely published underwater photographer and dive writer based in Austria. See: www.underwater-photos.net. For more information on Traunsee, see the guide book, Tauchreiseführer Austria by Wolfgang Pölzer and Barbara Lackner (ISBN: 3-900323-73-9), which can be purchased for 20 Euros (~US\$23) at www.taucherland.at.





Edited by Rosemary 'Roz' E. Lunn

POINT & CLICK ON BOLD LINKS



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Equipment



Nomad LTZ

DiveRite, (an original manufacturer of sidemount equipment) has augmented their line with the launch of the Nomad LTZ - a light weight, robust, feature-rich sidemount specific BC – suitable for cave, wreck and open water diving. This BC features an optional vertical weight plate that goes inside the rig that can hold up to 6.8 kg /15lbs of lead. Divers needing extra weight for diving in salt water, or when diving aluminium cylinders simply place weights in relevant pockets to optimise their trim.

Dive Rite state this weight plate can be retro fitted to other Nomad LT BC's. A number of divers can struggle with securing their sidemount tanks if they are switching tanks that have different sizes / diameters. DiveRite has taken the guess work out of "what bungee length do I need today" with their innovative Nomad Ring Bungee system that ensures that one size fits all. To lengthen or shorten the ring bungee, simply move the connection point of the bungee on the daisy chain loops located on the inside of the Nomad LTZ. DiveRite.com



Virgo

SI Tech has launched a classic style, chunky, dry glove ring system called the VIRGO. This allows the diver to change wrist seals instantly in the field, without gluing. The system has three colored rings for use with different thicknesses of glove. You simply insert the correct color ring inside the glove: green for use with thin gloves, blue for use with medium gloves and yellow for use with thick gloves. SI TECH states that no alignment is needed to attach the glove or seal, because the system uses a 360-degree swiveling connection. Sitech.se

SAV-7 EVO2

TUSA has just launched the the latest iteration of its diver propulsion vehicle—the TUSA SAV-7 EVO2. This hands-free scooter has a useful depth rating of 70m (230ft) and features the patented Hands-Free Riding Saddle. You sit on this DPV as you would a horse, with your legs akimbo, thus leaving your hands free to take photos while you navigate by twisting and arching your body. What has been improved on this model? Three things: speed, range and runtime. The design of the rotational speed adjustment function has been reviewed to make it quicker and more responsive, and the DPV is now capable of 4.5km per hour (2.8 mph). TUSA has also substantially increased the range, torque and burn time by exchanging the lead-acid battery for a high performing, long-lasting lithium-ion battery (complete with an LED Battery Life Indicator). The Evo2's figures are quite impressive: a range of 7,200m (4.5 miles), with a burn time of 120 minutes. Available in black. Tusa.com



Mantis M1

Many divers are engaged with their personal physiology and want to self-track certain activities. With the launch of Scubapro's Mantis M1 this may be possible.

Scubapro states it has designed "the first and only wristwatch-style dive computer to incorporate Human Factor Diving (a combination of human factors, ergonomics, biometrics and wearable technology) into its design, enabling you to live your life in dive mode, and create detailed, real-time, self-tracking reports on how your body is functioning, both above and underwater". This feature-rich computer has a stopwatch, an alarm clock, an altimeter that alarms if you go to altitude too soon after diving, and a switchable chronograph with lap memory for running or swimming. Underwater, the UWATEC ZHL-8 predictive multi-gas algorithm "is the only dive computer algorithm that includes a diver's breathing rate, heart rate and skin temperature as an indicator of workload during a dive, and adjusts the decompression plan to avoid risk factors". Scubapro.com



Plan the dive. Dive the plan.

The fundamentals of dive planning are a process that every diver should follow. When it comes to recording your proposed plan, what do you do? Advanced and technical divers (both OC and CCR) have a new choice—along with the various bail out options—thanks to Deco-Decals. A range of self-adhesive, traffic light color-coded slate stickers that fit pretty much every scuba diving wrist slate available (Size: 200mm x 118mm). Each Deco-Decal is logically laid out, in an accessible format for training scenarios or everyday diving up to 70m (230ft) diving, and is available in both metric and imperial. The reusable decals (lasting approximately 10 dives) are varnished and durable, and you simply write on them using an ultra-fine tipped waterproof marker. Once you have completed your dive and want to input fresh data, just wipe the decal clean with a Magic Sponge or Magic Eraser or similar product. Deco-decals.com



A photograph of a swimmer in a pool, viewed from above. The swimmer is in a streamlined, horizontal position, wearing a white cap and goggles. The pool is filled with clear blue water, and the tiled floor is visible. The lighting is bright, creating a high-contrast scene. The swimmer is positioned in the lower-left quadrant of the frame, moving towards the right. The pool's lane lines are visible on the right side.

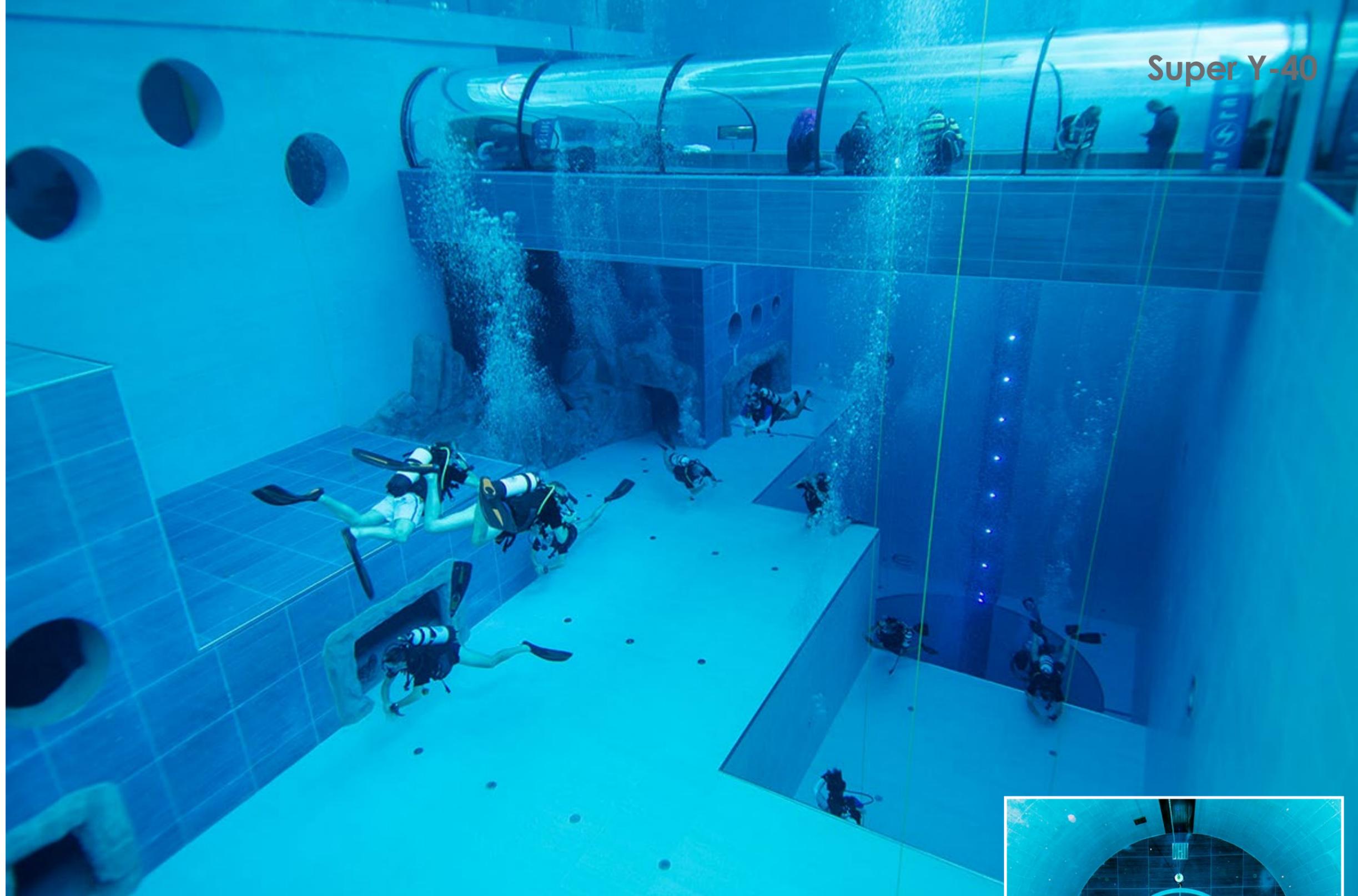
Italy's Super Y-40

— *A Record-Setting Pool*

Text and photos by Marco Daturi
Translated by Peter Symes

It took only a year to transform the idea of a super pool—40 meters deep—from concept to blueprint and alluring 3D renditions, before it opened its doors to the public in June 2014.

The pool sits within the complex of the four-star Hotel Terme Millepini in Abano-Montegrotto Terme, Padua, Italy, where it is fed by the same unique thermal water that also feeds the resort's swimming pools and spas. The cylindrical pool, which was designed by Italian architect Emanuele Boaretto, features artificial caves and a suspended, transparent underwater tunnel for guests to walk



through. It includes platforms at various depths, which provides ideal circumstances for training. Classrooms adjacent to the pit can be used for pre-dive briefings or training courses. The water is maintained at a constant temperature of 32-34°C, so it is not necessary to use any suits.

"The best parts are underwater," said Marco Mardollo, technical director of Y-40, inviting us to try a dive after a brief tour of the facility. Y-40 is pronounced "epsilon minus forty" to make it easier to memorize and pronounce for foreigners as the locals in Abano Terme mostly come in for the spa treatments.

The first impressions were intriguing. From the lobby, which has a bar, showroom and space for relaxation, there is a clear view of the deep pool. At a depth of five meters, there is a glass tunnel crossing the pool. Our party paused for a while to take in this most unusual scenery. It was like some sort of human aquarium—fun and





Super Y-40

definitely original.

Across from the underwater tunnel, a hallway branches off into two classrooms—each of which can accommodate up to 100 people—and changing rooms, which can also be accessed from the first floor where one enters the water. This is also where all the rental equipment is kept, including a full kit of Aqualung gear. We dipped our toes in the water and found it pleasantly warm and inviting. We had just donned the basics: fins and masks, regulators and stabilization jackets (BCD), but no wetsuits or weight belts. It felt almost unreal when one is used to kitting up with heavy wetsuits or drysuits for a dive in cool waters.

Diving Y-40

Once submerged, we saw the platforms at five and ten meters right below us as well as the fantastic glass tunnel we had walked through only minutes earlier—only now, we were the ones being observed by some other spectators. It only seemed fitting then to shoot straight down the deep duct and hit the 40m mark. At this respectable depth, we

were not accustomed to be able to see the surface, but in this case, we could.

Time flies when you are having fun, but as we were only allowed a few minutes at this depth before our computers began calling to us, reminding us that our decompression obligation was imminent, we begrudgingly started our ascent along the string of safety lamps.

On our way up, we couldn't help but poke our heads into the artificial caves that were constructed for use in training cave or technical divers. We couldn't really stick around too long, so we continued our ascent and headed towards the glass tunnel, which was now full of people watching the divers—only now, there were also lots of children having a blast watching the

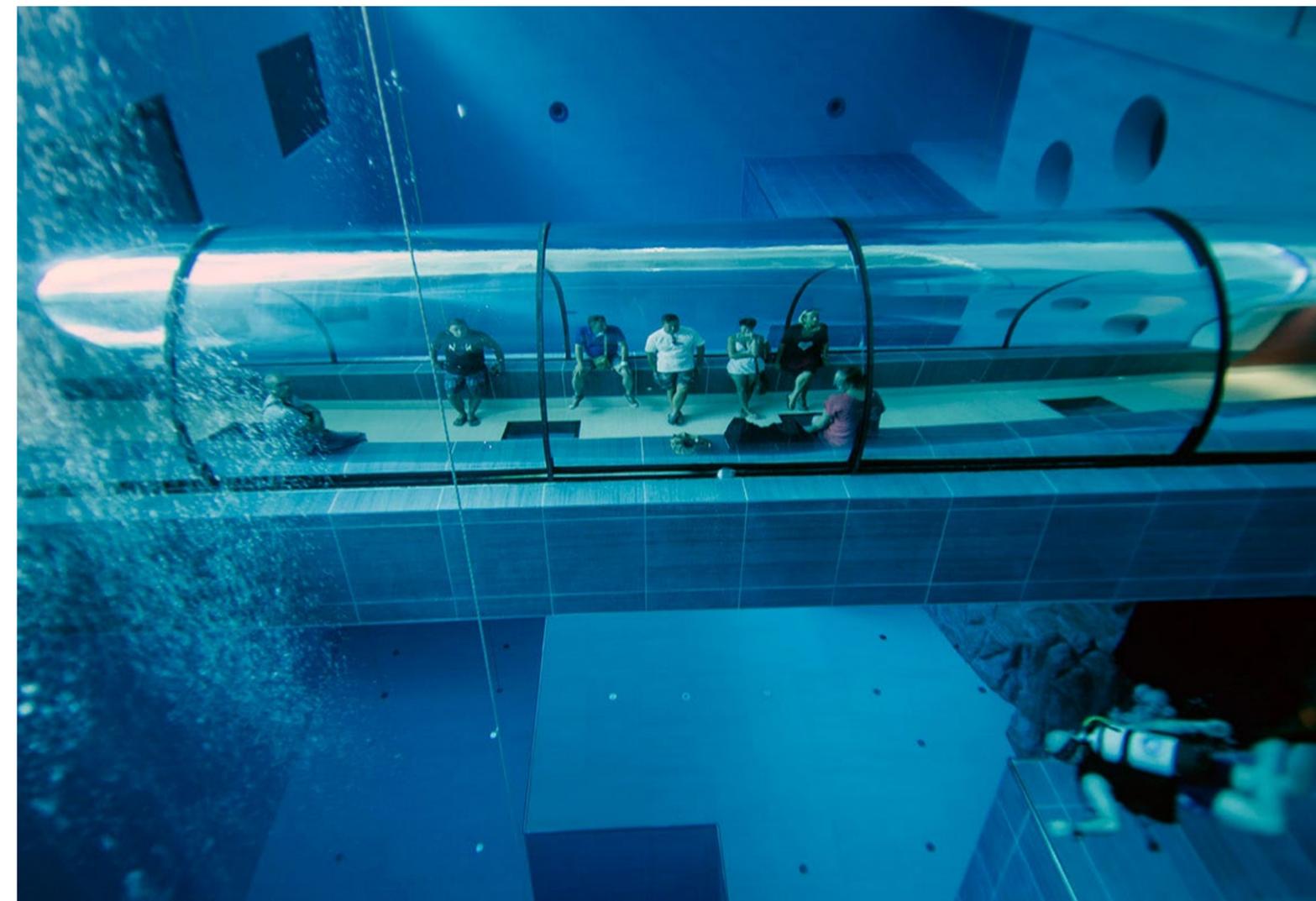


LEFT TO RIGHT: Entrance to Y-40 pool; Dive course conducted in pool; Exterior view of building housing Y-40; Training for cave divers

underwater scene. We were not putting on any show, but the kids seemed quite entertained nonetheless.

Visionary thinking

Y-40 came into being thanks to visionary, risk-taking entrepreneurs as well as an architect with foresight. The modern complex design using lots of glass is much more than just a record-setting pool but is a showcase of what innovative thinking can make possible. The modern complex where the thermal waters are also used to heat the compound comprises facilities for relaxation, gyms, a hotel and restaurant as well as the Euganee Spa—one of the great spas of Europe. ■



Underwater walkway allows visitors to watch divers in action in super pool Y-40



Pacific Northwest
**Sockeye
Salmon**

Text and photos by David Hall



feature

Male sockeye salmon at night, Adams River, British Columbia, Canada (right and previous page)

— *Sockeye Salmon "vignette"* from *Beneath Cold Seas: The Underwater Wilderness of the Pacific Northwest* by *David Hall*

We walked nearly a mile along the riverbank before finding a place where we could easily enter with our heavy equipment. The rotting carcasses of dead fish lay along the banks, and the associated stench was overpowering. It was late September 2010, and we had come to photograph an enormous migration of sockeye salmon, the largest run of sockeye in a century. We had already photographed in quiet, shallow creeks, capturing images of individual fish or small groups arriving at their final destination hundreds of miles from the sea. Today, our goal was more ambitious: to capture underwater images of the huge aggregation of salmon battling the swift current of the Adams River.



Like other Pacific salmon species, sockeye are compelled to return to the same freshwater stream

in which they were hatched, in order to spawn. During a long and arduous journey upstream,

they stop feeding. Their bodies undergo extensive anatomic and metabolic changes, triggered by

their entry into freshwater. Silvery blue in the ocean, the sockeye become bright red with yellow-

green heads. The males develop sharp, curved teeth, a prominent hooked upper jaw and a





Chinook and sockeye salmon in Adams River, British Columbia, Canada

humped back. Guided to her destination by an acute sense of smell, the female excavates a shallow nest in the gravel bottom. She and her mate release eggs and sperm into the nest, then move a bit further upstream to repeat this process one or more times. Battered and exhausted, both parents die within a day or two. In the end, their decomposing bodies are consumed by various organisms, bringing significant nourishment to the forest ecosystem.

Snug in our drysuits, marine biologist Conor McCracken and I entered the chilly water, underwater cameras in hand. The swiftly-flowing river was

150 feet (46m) wide at this point, with a slippery gravel bottom. At first, we waded along near shore, where the water was knee-deep. Weaker salmon hugged the shallows, some of them bearing wounds from collisions with sharp objects and encounters with predators, but also from infighting among pugnacious males.

As we moved into deeper water, the current grew stronger, tugging at us and our cameras until I could barely stand. I sensed dozens of fish going past me now, a fleeting hint of red glimpsed through the bright reflections on the water's surface. Cursing silently, I thought of the Polaroid sun-

glasses that I had left behind in our cabin. I attempted to photograph the sockeye as they went past, but repeatedly mis-timed the exposure because I could not see the fish clearly. To make matters worse, the swift current was playing havoc with the two electronic strobes attached to my camera housing, forcefully moving them out of position. This was clearly not working and the sun would soon drop below the horizon.

I noticed that Conor had found shelter in the lee of a huge cedar tree trunk that lay in the middle of the river. I moved toward him, but soon found myself in water up to my waist.



Salmon



Male and female sockeye salmon (above); Cormorants in Hussar Bay (top right)



Salmon

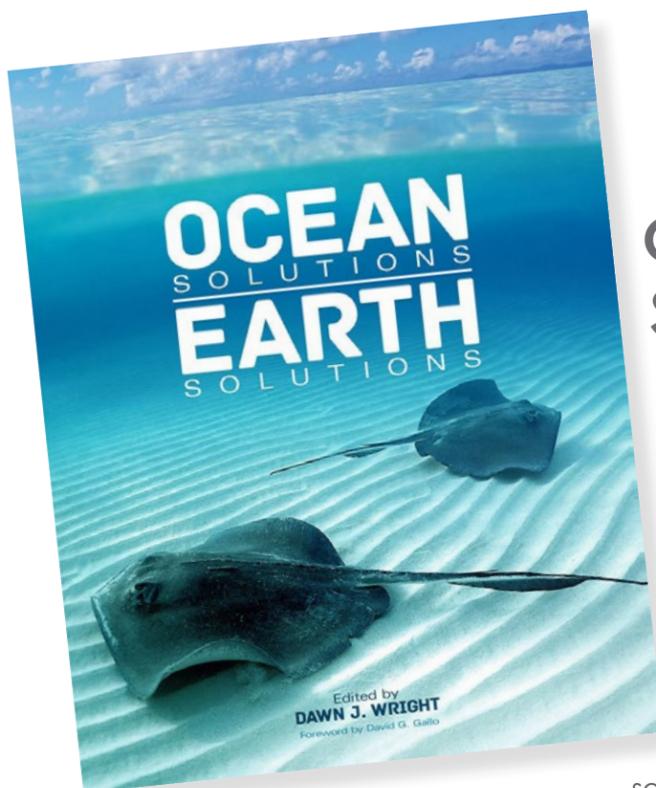
The pull of the current was now overpowering, gradually pushing me downstream. Barely able to stay on my feet, I fleetingly imagined being swept head over heels and carried downriver. Seeing my predicament, Conor quickly anchored himself with one arm wrapped around a sturdy branch and pulled me into the shelter of the great tree trunk, a pool of relatively calm water in the middle of the swiftly flowing river. It was an odd feeling, perhaps akin to being in the eye of a hurricane.

I was now surrounded by salmon. I could not see them clearly in the rapidly fading light, but felt them brushing past my legs as they swam upstream. One fish leaped out of the water, striking me in the chest and almost knocking me off my feet. Uncertain what to do next, I pointed my camera downstream and made a test exposure. The image that came up seconds later on the back of the camera showed a virtual wall of sockeye facing me from just inches away. The sky had turned purple and pink, and the flash units lit up the surface of the water turning it a deep red, like an intricate oriental carpet. I began to photograph and did not stop until the light had all but disappeared. ■

David Hall is an underwater photographer based in New York, USA. His book, Beneath Cold Seas: The Underwater Wilderness of the Pacific Northwest, won the 2012 National Outdoor Book Awards Winner for "Design and Artistic Merit". Visit: www.seaphotos.com

Sockeye salmon at night in the Adams River, British Columbia

Edited by
Catherine
GS Lim



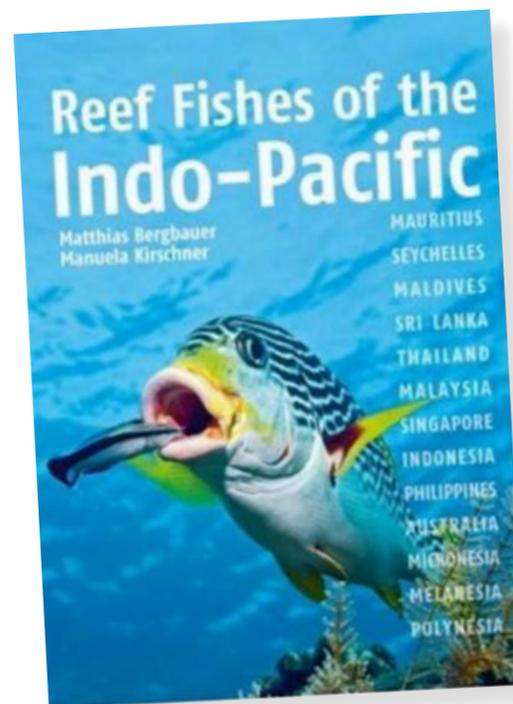
Ocean Solutions

Ocean Solutions, Earth Solutions, edited by Dawn J. Wright.

The oceans today face many challenges that require the development of realistic science-based solutions and strategies.

Presenting the best from the inaugural Esri Ocean GIS Forum, this peer-reviewed book explores ocean components and their relationships, patterns and trends over time and space. Included is an online supplement with digital object identifiers, geoprocessing workflows, GIS tools, mobile apps, Python scripts, etc.

Paperback: 380 pages
Publisher: Esri Press; 1st edition
Date: 10 July 2015
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ISBN-13: 978-1589483637

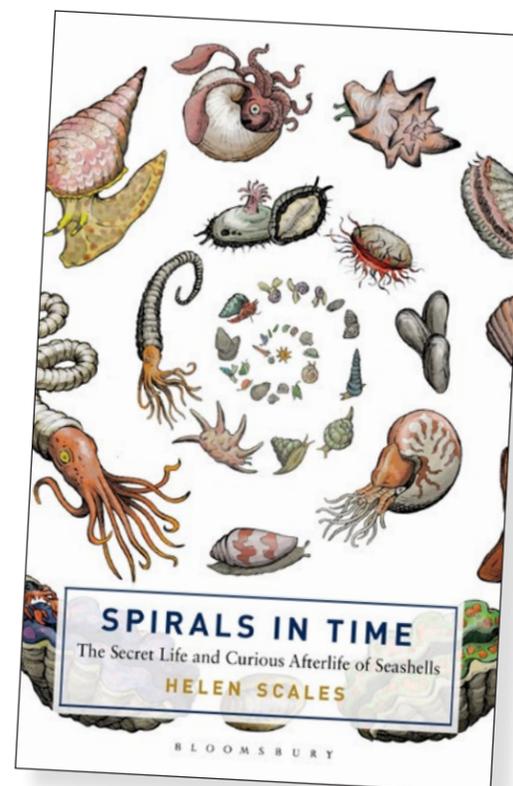


Fish ID

Reef Fishes of the Indo-Pacific, by Matthias Bergbauer and Manuela Kirschner.

More than 40 percent of all known reef fishes swim in the crystal-clear waters of the Indo-Pacific region. This book adds to the diving experience by providing detailed information on over 800 fish species, covering their identifying features, size, biology and distribution, with close-up photos (sometimes with juvenile and sub-adult variants). There is also a chapter on behaviours such as mimicry, cleaning stations and the symbiotic relationships between various species.

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Publisher: John Beaufoy Publishing
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ISBN-13: 978-1909612310

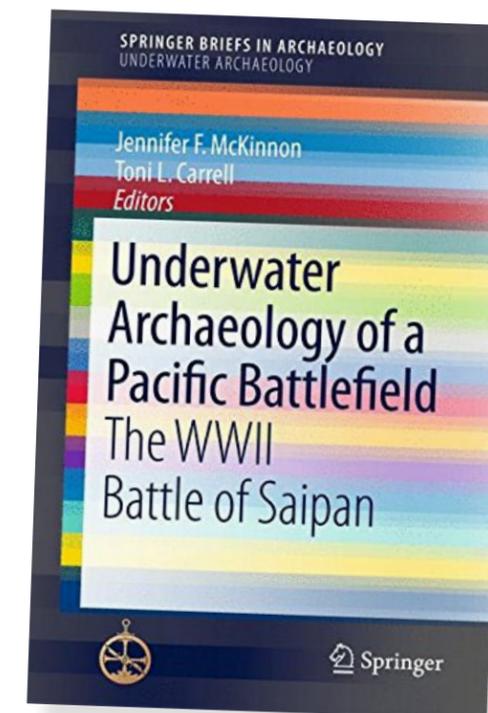


Seashell Secrets

Spirals in Time: The Secret Life and Curious Afterlife of Seashells, by Helen Scales.

With a history spanning millions of years, the shells of molluscs have evolved scientifically over time, giving rise to their present colours, shapes and sizes. They have become an integral part of our cultural—and for some, daily—lives, in the form of trinkets, jewellery, currency, cultural symbols, etc. Indeed, there is so much more to seashells—some aspects of which can be found in this comprehensive and well-researched book.

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WWII Battle of Saipan

Underwater Archaeology of a Pacific Battlefield: The WWII Battle of Saipan (SpringerBriefs in Archaeology), edited by Jennifer F. McKinnon and Toni L. Carrell.

The Battle of Saipan took place in June 1944 during the World War II. This book outlines the process of how the Battle of Saipan WWII Maritime Heritage Trail was established. It details how archaeologists, managers and the community painstakingly took the scattered wrecks of aircraft, assault vehicles and battleships and gave voice to the troops who had fought in the battle.

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opinion

Text by Simon Pridmore

Photos by Peter Symes

Scuba instructors and divemasters may be heroic, caring people, but they don't always make perfect role models!

Myth vs. reality

Your first dive instructor is a golden god of the sea! He or she has the answers to all the questions, sees everything that goes on, is always around to offer help when you need it, and, most impressive of all, can move around underwater effortlessly like a fish while you flail around awkwardly. Nothing is ever a problem; life is fun and full of high fives.

As you gain more experience, you realise that the tanned, blond deities that greet you when you arrive at dive resorts may have only been there a few weeks and could have fewer dives logged than you do.

This is of course all part of the scuba diving industry. We sell a certain relaxed, carefree lifestyle. Advertising for scuba instructor training entices candidates with images of gorgeous coral reefs (your future office), cool dudes and chicks in sunglasses (your future colleagues) with the wind blowing in their hair as their speedboat carries them off to the next dive site (conference room).

The reality, of course, is very different. After the customers have returned to their hotels, the real work begins: filling cylinders, washing and fixing equipment, doing the paperwork, preparing for the next day's classes and dives,

nursing aches and pains, and reviewing the day's work to see where mistakes were made or what could have been improved. Believe it or not, it is work!

We do not tend to show the work that goes into preparing for a dive because that is not what the customers want to see. The perfect dive operation can be compared to a duck, serene and effortless on the surface, with lots of unseen

paddling going on beneath. This misleads many into believing that when you become expert, you do not have to prepare so assiduously or take so many precautions. The truth, as professionals often learn by bitter experience, is that the more familiar you are with a procedure, the more instinctive it becomes but the more careful you have to be to guard against complacency and carelessness.

Preaching and practising

You will see many examples where professionals say one thing and then appear to do exactly the opposite. For instance, an instructor will tell his or her beginner students about the inherent risk in diving a yo-yo profile with frequent ascents and descents, and then on dive four of their course, he or she will escort all six of them individually as they practice emergency

out-of-air ascents to the surface from 6m (20ft) to the surface, going up and down several times (yes, like a yo-yo) in that part of the water column where the pressure change, and therefore the risk, is greatest.

Similarly, no diving manual would ever condone the practice of doing a deep bounce dive incorporating substantial physical stress followed a few minutes



Don't Always Copy the Pros





later by a longer dive to the same depth, but this is something that divemasters in some areas do, several times a day, as they set the shot line into a wreck and then ascend in order to pick up the group and guide them around the site.

The fact that contradictions exist between what we preach and what we practice does not mean that our advice is flawed and that the practices are safe. Nor does it imply that we are indeed mythological “dive gods” and that somehow the laws of physics and physiology do not apply to us.

It is true that, when they dive 20 to 30 times a week, every week, professionals develop a high level of dive fitness. They are also aware of the risks involved in some of the work they are required to do and mitigate the risks wherever possible, for instance, by ensuring their equipment is in perfect shape and

keeping themselves well rested and hydrated.

However, it is also the case that the risks sometimes carry painful rewards and, unfortunately, although this is certainly not something that the scuba diving industry advertises widely, professionals are more frequent visitors to the recompression chambers than their amateur counterparts. Most long-term dive instructors have aches and pains accumulated over years of submitting their bodies to constant pressure changes.

The paradise conundrum

A beach on a remote tropical island may seem like paradise when you visit for a couple of weeks but limited entertainment opportunities, overconfidence and maybe the fact that they have swallowed some of the “dive god” propaganda themselves can induce those who have to live and work in paradise to do some pretty dumb things. Don't try any of these things at home, or anywhere else for that matter!

5 dumb things dive pros do

1. Put their scuba gear on by placing it in front of them, tucking their arms through the shoulder straps and throwing it over their head, and possibly straight onto the head of anyone walking or sitting behind them at the time.

2. Make a forward roll entry from the deck or dock in full scuba

gear to show how superior they are to the mere mortals with their giant strides and back rolls.

3. Make an ultra deep single tank bounce dive on air on their day off when there are no students or customers around and when, therefore, they imagine the universal rules of physics have been temporarily suspended.

4. Strap on a used cylinder at the end of the day to “use up the air” or to “pop” down and free the boat anchor, instead of using one of the perfectly good full cylinders available.

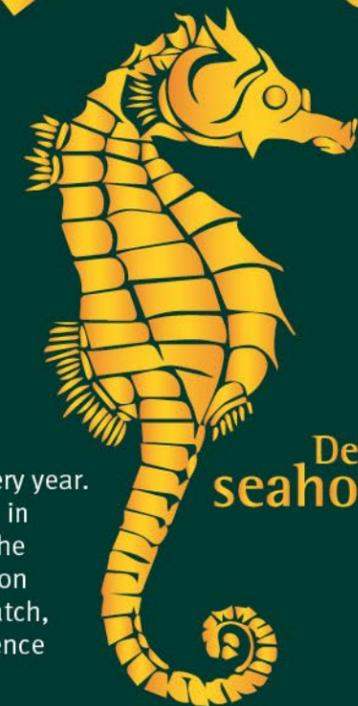
5. Stroke or feed marine animals with teeth, spines or stinging cells. Whether the pros do this out of boredom or out of a misguided desire to entertain their customers, this behaviour is not good for the animal. Neither is it good for other divers who subsequently pass by and may be attacked by the animal, which has come to associate divers with harassment and/or food. ■

Simon Pridmore has been part of the scuba diving scene in Asia, Europe and the United States (well, Guam) for the past 20 years or so. His latest book, Scuba Confidential, is available in paperback, audiobook and e-book on Amazon. His forthcoming book, Scuba Professional, was released in June.



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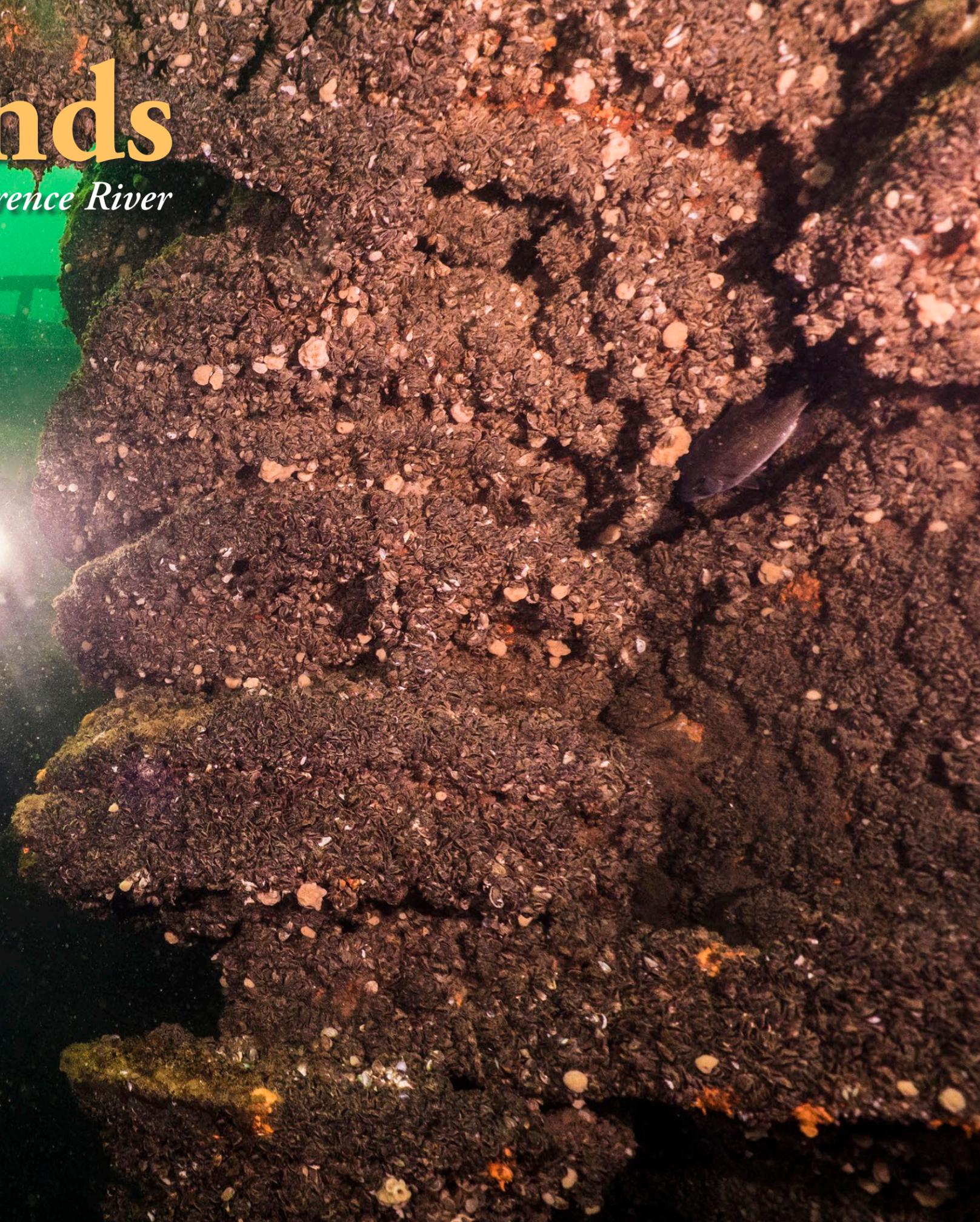
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Thousand Islands

Text and photos by
Larry Cohen and Olga Torrey

— *Wrecks of the St. Lawrence River*





LARRY COHEN

Diver explores *Keystorm* wreck (above) and its ladder under the forward wheelhouse (top right) as well as the anchor chain (right)

New York, New York—the city so nice they named it twice. There are so many activities in New York City, but scuba diving? No dive boats leave from Manhattan, but with three dive clubs and many dive stores, New York has a large diving community.

Heading off shore from Brooklyn, Long Island or the New Jersey shore, there

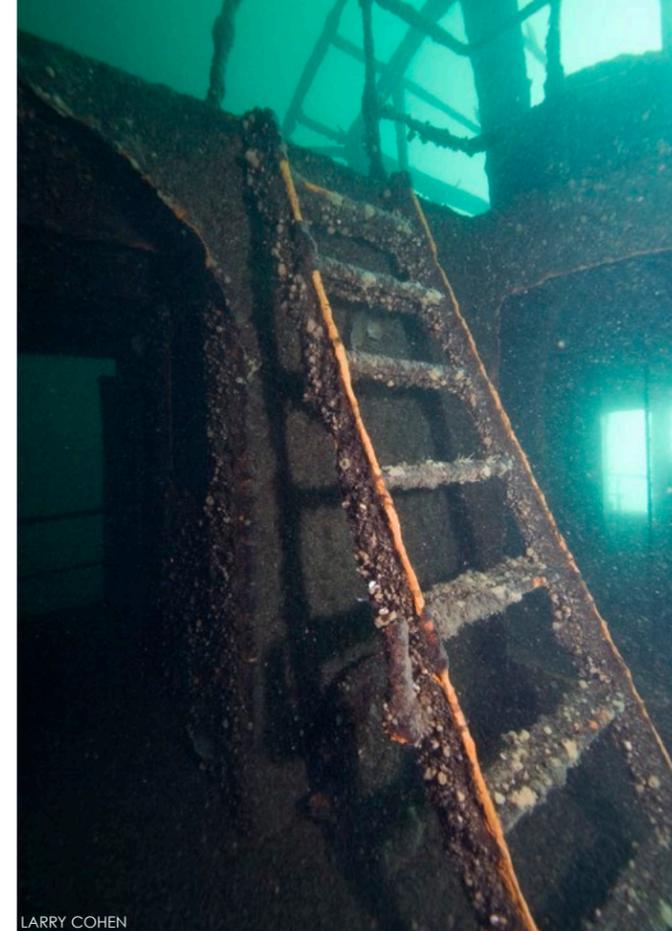
are a number of dive boats that visit the shipwrecks in the area known as Wreck Valley. Many of these shipwrecks are one to four hours off the coast. The problem is weather plays such an important role. Even if the sun is shining, strong winds could cause high seas. However, there is an alternative and ample wreck destination within reach.

Just a six and half-hour drive from New York City is the Thousand Islands region of the St. Lawrence River. This international waterway connects Lake Ontario to the Atlantic Ocean. Many ocean-going vessels use this seaway known as “Highway H2O”. Due to the fact that some of the shoals come up shallow, many ships run aground and sink.

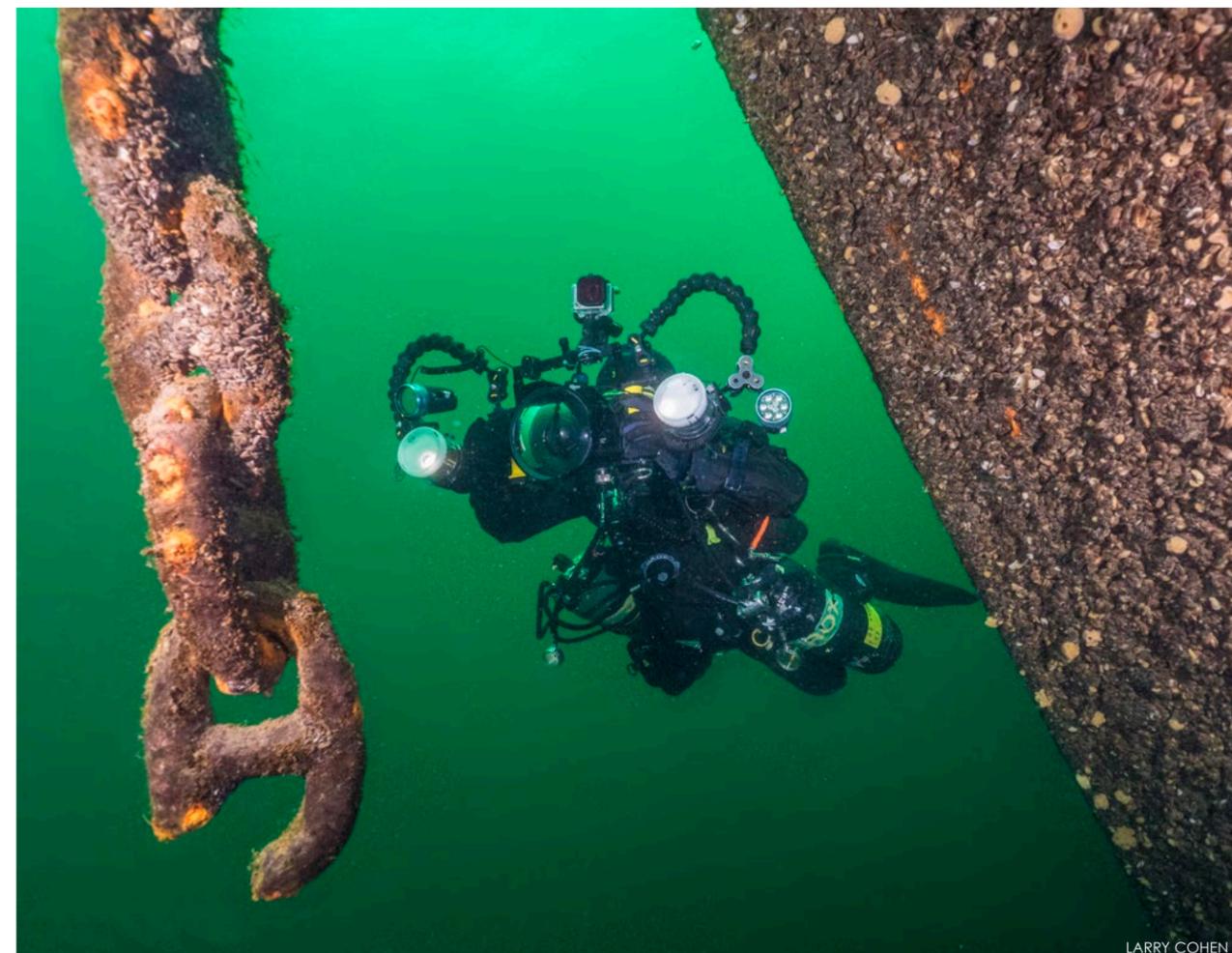
Thousand Islands

Within a day’s drive from New York City is a wreck junkie heaven, with numerous shipwrecks to explore along the St. Lawrence River on the US-Canadian border, in the area called the Thousand Islands. Larry Cohen and Olga Torrey give a sampling of the wrecks in the region popular with both the American and Canadian diving communities.

PREVIOUS PAGE: Diver at the forward anchor winch on the wreck of the *Keystorm*



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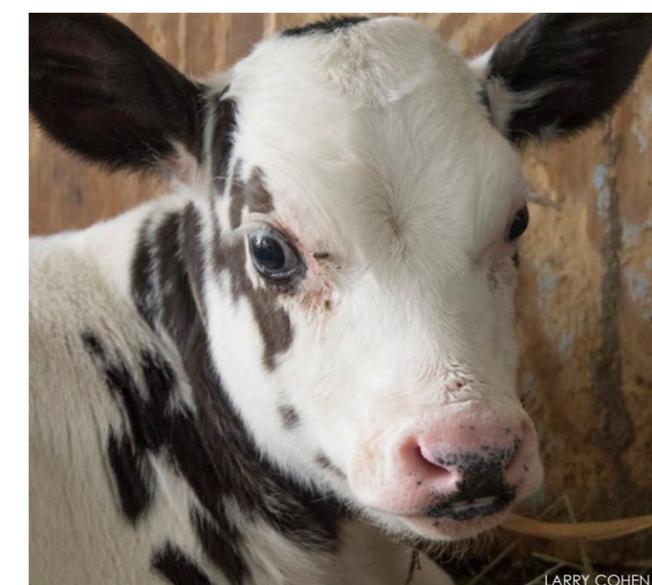


The world's shortest international bridge connects two small islands in the St. Lawrence River—one US, and one Canadian (left); Ocean-going vessel on the St. Lawrence River (above); Boldt Castle (below); Portrait of young cow; there are many farms in the area (lower left inset)

LARRY COHEN



LARRY COHEN



LARRY COHEN

Collisions and mechanical problems had been also responsible for many of the area's shipwrecks. Best of all for divers, even when the wind is blowing, the river gets very little chop. It is rare to get blown out on the river.

Zebra mussels were accidentally introduced into the river from the water dumped from ballast tanks of ships from western Europe. These non-native mussels have caused many environmental problems, but they are filter feeders and have improved the visibility in the river.

The area includes communities

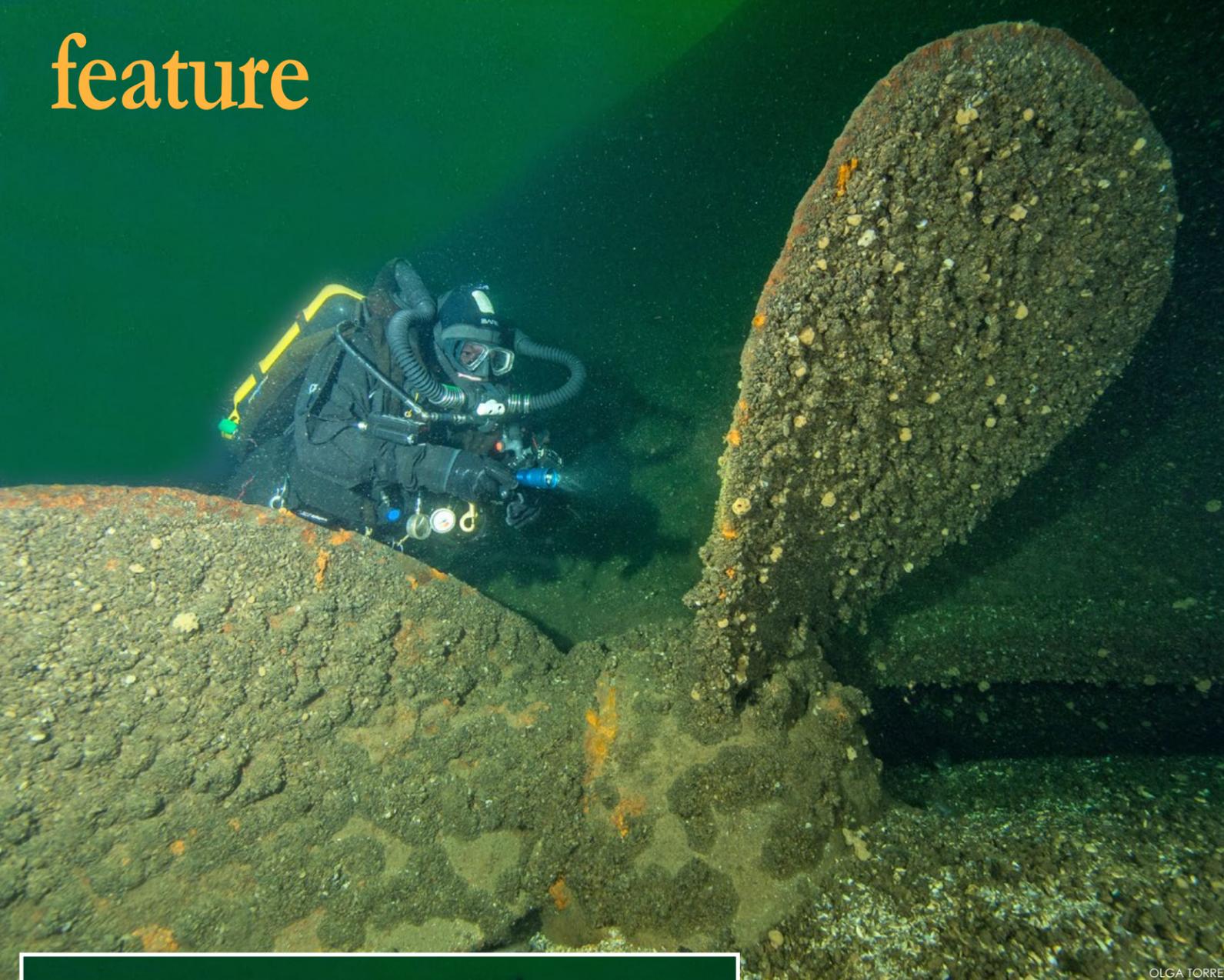
on both the New York and Canada borders along the St. Lawrence River and the eastern shores of Lake Ontario. There really are nearly 2,000 islands in a 50-mile area on the St. Lawrence River.

The area includes islands as large as Heart Island where Boldt Castle is located. George C. Boldt, millionaire proprietor of the Waldorf Astoria Hotel in New York City, set out to build a full-size castle. The structure was to be a symbol of his love for his wife, Louise. She passed away before the castle was finished. Boldt stopped construction and never

returned to the island. In 1977, the Thousand Islands Bridge Authority completed the castle. In contrast, two of the smallest islands—one US, the other Canadian—are connected with the world's shortest international bridge.

The community of Clayton, New York, is home to museums including the Antique Boat Museum, the Thousand Islands Museum and the Thousand Islands Arts Center. Angler fishing is a popular activity, and there are many farms in the area. Traveling along Route 12, it feels like one has traveled back in time to the '50s.





LARRY COHEN

Penetrating *Keystorm's* forward wheelhouse is easy (above); Diver at *Keystorm's* propeller (left), at the bow (right) and at the aft funnel (lower left inset)



OLGA TORREY

SS *Keystorm*

One of the premier wrecks on the New York side is the steel freighter *SS Keystorm*. This cargo steamer built in England is 78.6m (258ft) long with a 13m (42.5ft) beam. On 12 October 1912, while bound from Ashlabula, Ohio, to Montreal with a load of coal, the vessel struck Scow Island shoal in a fog near Alexandria Bay, New York. The pumps were put in operation, but it was too late and the ship sank five hours later. The *Keystorm* sank stern first and rolled over onto her starboard side. All the crew was rescued. Her cargo of

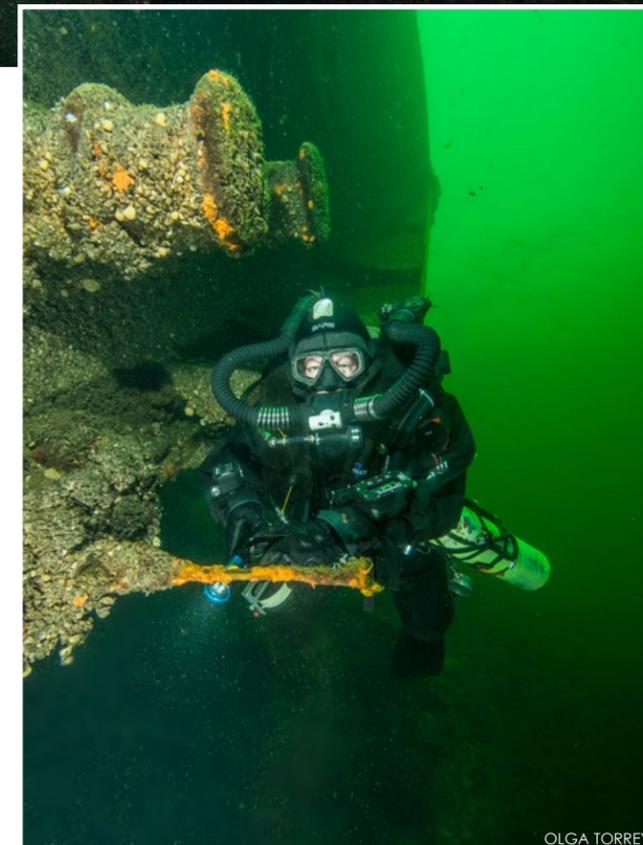
coal was salvaged, but attempts to raise the ship failed.

Now the ship sits on a slope, with the bow in 7.6m (25ft) of water and the stern in 35m (115ft). There is plenty to explore on this picture-perfect, intact wreck. As you come down the mooring line, one sees the port side of the bow, with the anchor chain hanging down. Swimming to the deck, which is vertical, one sees the winch and other machinery. As divers swim aft, they see the massive forward wheelhouse.

This area could be a dive all in itself. The openings and ladders

around this rounded wheelhouse is a perfect location for taking photographs.

Behind the wheelhouse are three large cargo holds and a 15.25m (50ft) long mast. Behind the mast is a large funnel by the aft wheelhouse. From here, one could swim to the stern over the port side to the propeller, which is half-buried in the silt. This is the ultimate multi-level dive. It is best to enter the water and swim directly to the propeller and work one's way back up the wreck. This will minimize deco, but if your computer is set for a deep stop, be careful not to miss it.



OLGA TORREY



LARRY COHEN



Thousand Islands

LARRY COHEN

CLOCKWISE FROM ABOVE: Wooden planking and brass pikes on *Islander* wreck; Diver explores the *Islander*; The bow of the wreck; Artifacts could still be found on this shore dive; Freshwater fish call the *Islander* home

The *Islander*

On the other end of the spectrum is the wooden sidewheel steamer *Islander*. This ship was built in Rochester, New York, in 1871 and is 38m (125ft) long with a 6m (20ft) beam. The *Islander* served as a mail carrier and gave river tours. On 16 September 1909, the ship caught fire while at dock at Alexandria Bay.

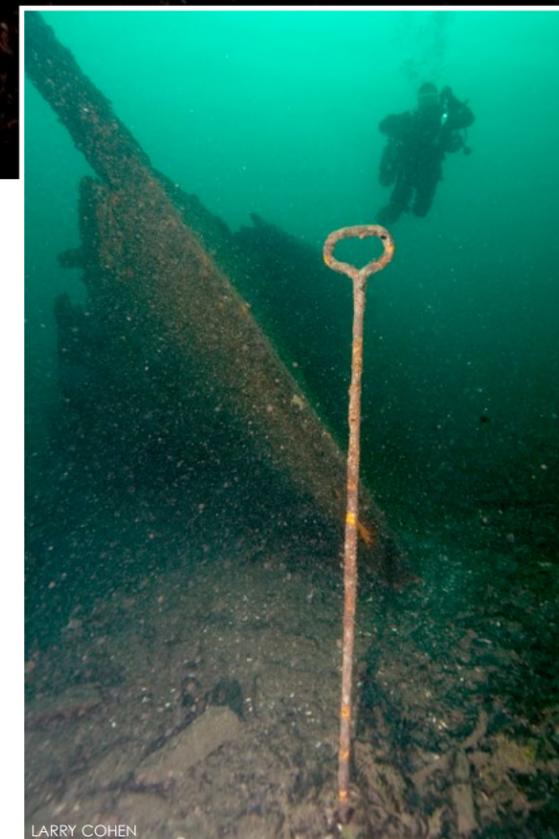
This is a very easy shore dive. There is a parking area, gazebo and ramp to the water. All you do is walk in the water and you are on the wreck. She is partially broken-up, resting upright parallel to the shore's slope. The bow faces upriver. The port rail is at 9m (30ft), and the starboard rail in 13.7m (45ft). There is a debris field surrounding the wreck at 18.28m (60ft).



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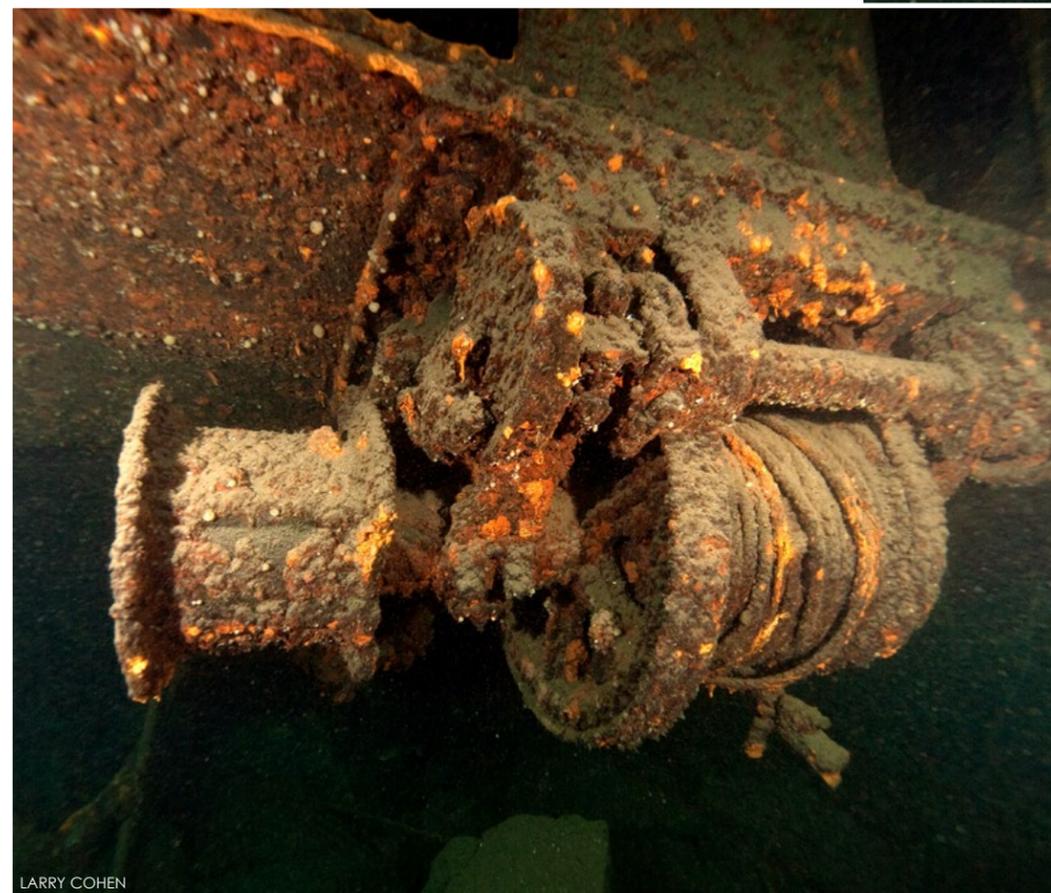


Thousand Islands

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COUNTER-CLOCKWISE FROM ABOVE: The wreck of *America* sits upside down; Diver at propeller; *America's* rudder; Small wooden boat next to the wreck; Winch on the *America*

The *America*

Having to get back on a dive boat, a trip to the Thousand Islands is not complete without visiting the 28m (92ft) long steel drill barge *America*. The vessel sank due to an explosion on 20 June 1932. She sits upside down in 22.86m (75ft) of water in a shipping lane. The marker buoy is about 30.5m (100ft) from the wreck. Divers follow the chain to the shoal where they come to the barge in 16.76m (55ft) of water. Care must be taken since the bottom is a heavy layer of oily silt. The barge is a large structure and the vessel is easy to penetrate. Up on top, one can see the two propellers. The current could be very strong on this part of the wreck.



LARRY COHEN



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CLOCKWISE FROM LEFT: Diver at the *King Horn's* capstan; The mast can still be seen on the *King Horn*; Diver explores the machinery on the *Vickery*; Diver swims over the wreck of the *Vickery*; Diver over the wreck of the *King Horn*

The King Horn

The *King Horn* is a 41.45m (136ft) x 7.6m (25ft) two-masted schooner that was refitted as a barge. The barge ran aground while in tow in 1897. She was loaded with grain. The intact steel hulled with wood planking wreck sits in 29m (95ft) of water. The helm capstan, and other machinery could still be seen on the wreck.

A.E. Vickery

The *A.E. Vickery* was a three-masted schooner built in 1861 in Three Mile Bay, New York. She is 41.45m (136ft) long and has 7.92m (26ft) beam. On 17 August 1889, the vessel struck a shoal while transporting corn to the Wisers Distillery at Prescott, Ontario, the makers of Wiser's whisky. Now sitting upright in 35m (115ft) of water, *A.E. Vickery* is relatively intact. The wreck is always in a heavy current, but one could swim the length of the wreck inside.



LARRY COHEN



LARRY COHEN

This is just a small sampling of the wrecks in the Thousand Islands region of the St. Lawrence River. In both Canada and New York, there is plenty to explore from a boat or right from shore. ■

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Larry Cohen and Olga Torrey are well-travelled and published underwater photographers based in New York City, USA. They offer underwater photography courses and presentations to dive shops, clubs and events. For more information, visit: Liquidimagesuw.com.



LARRY COHEN



Night Lenses — *The Third Option*

Text and photo by Wolfgang Pölzer

Divers who need to use contact lenses, or masks with corrective lenses, and do not want to undergo laser surgery may consider a fourth but lesser known option in the form of so-called night lenses. Wolfgang Pölzer shares his experience.

Contact lenses can be displaced, or even lost, if a diver has to remove a mask underwater or hand it up to someone on the dive boat or RIB in order to get back on board after a dive. Masks with corrective lenses can be lost this way.

Meanwhile, lasik surgery—the most expensive option—while gaining in popularity, is not without issues for divers. It involves corrective surgery wherein a laser is used to reshape the cornea to correct myopia, hyperopia and astigmatism. Aside from having to wait for several months after the procedure to allow for healing before resuming underwater activities, there is also a scarcity of documentation with regards to how the artificially thinned cornea responds to the large pressure differentials associated with diving. Laser surgery may not be the best choice.

Enter an alternative in the form of

so-called *night lenses*, which, as the name implies, are lenses that correct eyesight during sleep. Individually prescribed contact lenses shape the cornea during the night, so in the morning, wearers see more clearly without eyewear or contacts.

Depending on the degree of correction needed, it can take from three days to two months to achieve

the desired effect. Once sharp vision has been attained, sharpness lasts for at least 24 hours. Those having lesser visual problems may even only need to wear them every other night.

Advantages

The big advantage over conventional contact lenses or glasses is that the wearer will only have foreign objects in,

or on, the eye for about half the time! Also, no dust gets into the lenses while you are asleep.

In contrast to surgery, this method is completely reversible! If you tire of wearing them at night, they can just be left out, and the cornea will gradually return to its original state in a matter of a few weeks.

The advantage for divers is obvious.

They can now enjoy having a sharp vision while diving without the worry of displacing or losing their contact lenses at awkward moments on a dive. No longer do they have to suffer the itchy grain of dust in the eye while diving. Divers with prescription dive masks no longer have to walk around wearing them on the boat, nor do they have to worry that they will drop their precious mask while stepping off a dive boat.

History

It is actually not a new idea. Already, in the 16th century, the Chinese had figured out how to place small sandbags, or flat stones, on the closed eyelids at night to improve their daytime vision. Present-day methods are fortunately

much more comfortable and way more precise.

A sophisticated scanner is used to measure each eye accurately. Then the measurements are used to produce individual lenses, with a precision of one-thousandth of a millimeter. In comparison, conventional contact lenses are only manufactured with an accuracy of one-tenth to one-hundredth of a millimetre.

As the required equipment is much more expensive than the usual apparatus, only selected opticians who have undergone additional training offer these measurements. In many places, night lenses are not widely marketed.

The technique was already declared safe by the World Health Organisation 20 years ago, but in many countries, it still lives in the shadows. Currently, it can be used to treat myopia down to minus 6 diopters, astigmatism of 1.5 diopters and hyperopia of plus 1 diopter.

Constant research suggests that in the future this range may be slightly expanded. In Switzerland, they are working on lenses that can simultaneously correct myopia and presbyopia, which is good news for divers over 50. ■

Wolfgang Pölzer is a widely published underwater photographer and dive writer based in Austria. See: www.underwater-photos.net.



Night lenses help correct your eyes while you sleep so you don't have to wear lenses while you go diving





Text and photos by Lawson Wood

First described in 1837 by the German naturalist Eduard Rüppell, the great hammerhead shark (*Sphyrna mokarran*) is the largest of the hammerhead shark family and can reach a length of over 6m (20ft), although some specimens have been seen to be much larger than this. However, with overfishing, the great hammerhead is usually observed to be much smaller than this. Large congregations have been seen off the Galapagos, Cocos Island and a few small islands in the Indo Pacific—that we know off. I say that, only because there are so many island groups and atolls in the Indian Ocean and the Pacific that are never dived, that we have no idea of what can be found there.

The curious shape of the hammerhead shark has aroused much speculation over the years and it is now widely recognized that the shape of the wide hammerhead shape (called the cephalofoil), has

adapted over the millions of years to be aid-specific to their main prey—stingrays, eagle rays and other bottom-living species including various crustaceans, cephalopods (squid and octopus), bony

fish and other small species of shark. When attacking the rays, the shark, with its underslung jaw and outward-facing teeth, uses its wide head to pin down the ray and is then able to attack and eat

the poor ray from above.

The wide head has a broad, fairly flat-edged shape of the cephalofoil, and its eyes are located at the outermost forward points. Whilst the eyes are very

wide apart, they also face forward, allowing the shark much more spatial awareness of what is ahead of it. This position also protects the shark's eyes whilst it is in attack or feeding



The Great Hammerhead Shark



THIS PAGE: Views of a great hammerhead shark, Bimini, Bahamas. The wide head of the great hammerhead has a broad, fairly flat-edged shape of the cephalofoil, and its eyes are located at the outermost forward points. Whilst the eyes are very wide apart, they also face forwards, allowing the shark much more spatial awareness of what is ahead of it.

including hammerheads, were seen to be participating in the feeding frenzy.

The great hammerhead shark is viviparous and is able to bear litters of around 55 pups every two years. Heavily fished for the high monetary value of its large dorsal and pectoral fins, it has been assessed as "endangered" by the International Union for Conservation of Nature (IUCN).

Habitat and migration

The great hammerhead is generally found between the

mode. Their distinctive shape is very obvious, compared to the arched cephalofoil of the scalloped hammerhead and the smooth hammerhead. The great hammerhead's head shape is around 27 percent of the body length, and its large dorsal fin is usually sickle-shaped.

Congregations

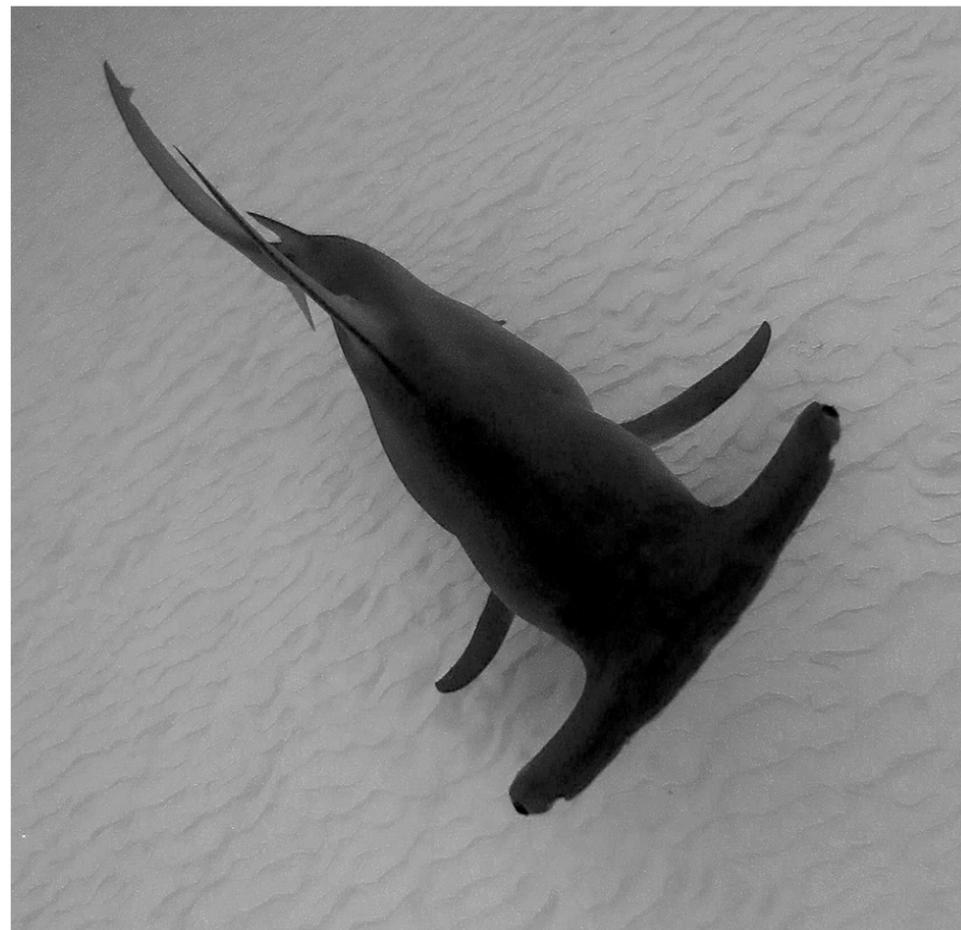
It is not known why hammerhead sharks congregate in large numbers, but in other aspects of marine ecosystems, generally fish, which congregate in large numbers, either do so for protection to confuse their predators or to feed, mate and breed. The former attribute is difficult to comprehend as these sharks are bottom feeders, although they have been observed (by me) to take injured fish in mid-water. As far as protection against other predators, there can surely be very few predators that would be

prepared to take on a school of great hammerhead sharks, which may have several hundred in one group.

As far as the breeding and mating aspect is concerned, many fish (and mammals) never feed whilst mating and giving birth, which may account for the hammerhead sharks swimming in open water and not within their usual habitat of bottom feeding (similar in fact to their main prey species, the rays).

An endangered apex predator

Highly regarded as one of the apex predators in the ocean and once regarded as a "man-eater", the great hammerhead shark has no known attacks on human beings, although there is a widely reported (but unconfirmed) series of attacks during WWII when an American ship sank with badly wounded servicemen in the water and many species,



The great hammerhead's head shape is about 27 percent of the body length

Hammerheads



latitudes of 40°N and 37°S, although it is known to be seen outside these broad confines. The sharks range from North Carolina to Uruguay, including all of the Caribbean and Gulf of Mexico. (I have personally seen them off Cayman Brac in the Cayman Islands, in the Red Sea, Malaysia and Indonesia, and, of course, off the shore of Bimini where they feed in the various movements of the Gulf Stream.)

They are found off the coast of Morocco and as far south as Senegal. Most regions of the Mediterranean have records of sightings, and they may use this large inland, protected sea as a breeding ground (like the basking

shark). Great hammerheads are found off Layang Layang in Malaysia, Australia, French Polynesia, California, Costa Rica, Trinidad and Peru, off the Galapagos, Scicorro, Malpelo and Cocos Islands and pretty much every other coastal location in between. In the winter months in Cayman Brac, small groups enter the protected inner lagoons in search of eagle rays; and my buddy, Mike, and I had a very close, in-your-face encounter with a HUGE beast on a night dive.

More often found in shallow coastal waters, the species is known to be migratory and will follow fairly regular routes where

shark tales



Great hammer-head shark encounter at Bimini in the Bahamas

Hammerheads

Bahamas by Stuart Cove, there were found to be a huge number of different species of sharks found throughout the islands, depending on the time of year and location.

Nurse sharks are a fairly common species found throughout the Caribbean region and are seen on most dives around the Bahamas reefs. In Bimini, a few large nurse sharks had been observed fairly close to where there was a bull shark experience being conducted in the inner channel. Stuart Cove tried baiting these nurse sharks away from the bull sharks in clearer water and, low and

behold, a small number of great hammerhead sharks also showed up to partake in the free meal being offered. [Whilst some may not agree with the idea of baiting sharks for the entertainment of divers, it is always undertaken with the greatest care and respect for the animals and the divers; safety as always, is paramount on all of these types of dives.]

The location for this amazing encounter was off the west coast of South Bimini and only 1km (¾ mile) outside the Bimini Bay Resort's marina. In just 6m (20ft) of water, a spur of the Gulf Stream pushes in unhindered, over the flat and featureless sandy seabed. The current is variable, and as a safety precaution, an anchored line is placed on the seabed first to allow divers to settle on their knees on the seabed and use the rope (at

there are high numbers of prey species, such as the rays and other bony fish which inhabit the Gulf Stream.

Biology and behavior

Great hammerhead sharks can weigh around 230kg (500lb), but a heavily pregnant female caught with 55 pups weighed 580kg (1,280lb).

Normally, great hammerheads are solitary hunters and are usually given a wide berth by other reef fish, but a number of other fish including various jacks have been seen to rub against them to perhaps rid them of parasites. Various pilotfish and remoras usually accompany the sharks, but

whenever food is introduced into the environment, several sharks may congregate in the same area and appear to feed together quite happily.

Most of the great hammerhead's electro-sensors—the Ampullae of Lorenzini—are located under the cephalofoil, and the shark can be seen sweeping its head in a side-to-side movement as it searches for prey. The ray's "stingers" do not appear to harm the shark and caught sharks have been found with large numbers of stingers inside their mouths, behind the 17 rows of their triangular-shaped teeth.

Serving as a kind of hydrofoil, the shark appears to use its

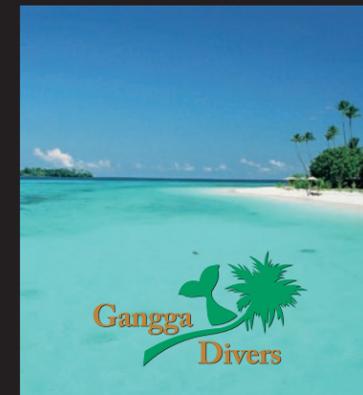
cephalofoil's shape to pivot quickly over its prey and take quick bites out of the pectoral fins of the ray to disable it before attacking it at its leisure.

Shark encounter

Stuart Cove, located on New Providence Island in the Bahamas, has run very successful shark encounter dives for many years, mainly with Caribbean reef sharks (*Carcharhinus perezii*), which are quite docile and easily led and fed when feeding is introduced into an arena-type of area. UNEXSO on Grand Bahama Island first championed this encounter; however, on further research and observations carried out in the



Diver photographing great hammerhead shark



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Hammerheads



waist level) to keep one in position whilst waiting for the sharks to arrive, attracted by the scent of the bait in the water.

As this was the first time that Stuart Cove had ever tried this, it was unclear what the reaction of the sharks would be to having bait and divers in the water and whether the presence of a few large nurse sharks would affect their behaviour. Starting at about 1 p.m. and staying in the water until dusk (around 5:30 p.m.), we were treated to one of the most spectacular sites I have ever witnessed.

Diving with hammerheads

Once we were all in position and hooked onto the line, the current was constantly pushing at our backs, and the baiter was sending fish scraps, blood and scales over our heads. Soon, three very large nurse sharks (*Ginglymostoma cirratum*) appeared, and these were surrounded by literally dozens of large remora, all of which were competing for the scraps.



Nurse shark (above), Bimini, Bahamas; Diver with great hammerhead (top left)

Great hammerhead shark peers upward towards a pair of freedivers at the surface, Bimini, Bahamas

They were rather skittish at first, but would come up to the barrier of photographers before turning away.

After around 30 minutes, the first of the great hammerhead sharks appeared. Also wary, they soon began “hoovering” up the larger fish scraps off the seabed, coming closer and closer to the line with each pass. Our adrenaline was really pumping by now, and whilst trying

to regulate our breathing, the sharks paid us no heed whatsoever, and soon couldn't even care less that there was a barrier of anchor line and divers. They would pass under the line, directly in between divers; they would circle behind us and soon were all amongst us— incredible.

I guess the fear factor had gone by that point and we were soon witnessing behaviour



THIS PAGE: Freediver Liz Parkinson with great hammerhead shark at Bimini in the Bahamas

scene was absolutely epic!

Unlike the shark arenas elsewhere in the Bahamas where one could gauge the direction of the reef sharks' movements, out here on a flat sandy seabed, the sharks' movements were much more unpredictable, ranging from mid-water passes to bottom feeding to just swimming all over the place; and in most cases, coming so close to us that we could do close-ups of their eyes and teeth!

Afterthoughts

This great hammerhead shark

Hammerheads

encounter run by Stuart Cove is destined to become the "Next Big Thing" for underwater photographers. Sign up now! I already have—for a return trip, combining it with a couple of Stuart Cove's other shark encounters at Tiger Beach for tiger sharks and lemon sharks and Cat Island for oceanic whitetip sharks. ■

Lawson Wood (Lawsonwood.com) was hosted by UNEXSO (Unexo.com), Stuart Cove Dive South Ocean (Stuartcove.com) and the Bahamas Ministry of Tourism (Bahamas.com).

that had never been seen before in the wild. Two 6m (20ft) great hammerheads and one smaller one at around 4m (13ft) were making passes all around us in the search for food, and as the afternoon wore on, their actions were bolder and our resolve had relaxed as we enjoyed this incredible encounter.

On day two, the current was much less and a few of the divers had left, allowing us more time in the water and more freedom of movement. Whilst we still kept behind the anchor line and close by the stern of Stuart's dive boat (just in case!), soon we were free swimming to get the best shots of the sharks and get the other divers out of the frame. Another incredible afternoon was spent and the sharks were much more at ease around us, as we were with them. There were also three freedivers in our small band of happy underwater photographers, and they were soon duck-diving down and swimming amongst us too—*what an experience!*

By day three, our numbers were halved as others had to leave—shame!—leaving only four photographers, plus our freedivers; the current had virtually stopped and we dispelled with the need of the safety anchor line. For almost five hours that day, we swam and twisted and turned and interacted with these mighty sharks like never before. We stayed underwater until our air or memory cards ran out and the little time that I took to get ready and enter the water again was so slight that my dive computer didn't record the multiple dives.

Liz Parkinson, one of the freedivers, was soon amongst us and swimming alongside the sharks as they passed between us. Liz admitted that she had reservations at first about swimming alongside the sharks, but her fears were soon dispelled. She said she loved every minute of the encounter. Liz proved to be a superb, yet unplanned model. With brilliant sunlight overhead and crystal clear water, the



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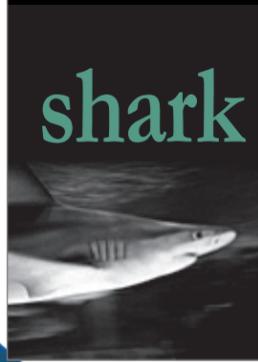
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Why sharks are so fast—it's in their blood

Some shark and tuna species can swim twice as fast thanks to the warmth of their blood.

Sharks and tuna fish evolved the ability to elevate their body temperatures by up to 20 degrees compared to the surrounding water to enable them to swim faster, a new study has found. Compared to their cold-blooded counterparts these fish could swim an average of 2.5 times faster.

What are the ecological benefits driving the evolution of warm muscles in fishes?

Results suggest that warm muscles enhance power output and, thus, cruising speeds, which may enable longer-distance migrations and potentially greater access to seasonally available resources.

In addition, fishes with aerobic red muscle endothermy often exhibit greater tolerance to broad temperature ranges, enabling them to venture further into regions with cooler waters. However, the estimated cost of transport of fishes with red muscle endothermy is twice that of fishes without it. This high energetic cost of red muscle endothermy in fishes is offset by the benefit of elevated cruising speeds, which will in turn increase prey encounter rates.

These warm body temperatures in shark and tuna are also a good example of convergent evolution. Tuna are bony fish, and are only distantly related to sharks, which have skeletons made of cartilage. The two split from a common ancestor more than 450 million years ago. ■

Tiger sharks go on some very long swim-about

Migrating tiger sharks spend their summers in the mid-Atlantic and return to their favourite spot around the tropical Caribbean for winter.

Researchers fitted 20 male and four female tiger sharks with satellite tags. These tags sent information about an individual's position when it came to the water surface.

Previously, it had been thought that tiger sharks remained around coastal areas, but some of the 24 sharks were tracked over 7,500km (4,660 miles) each year in a round trip to winter in the Caribbean's coral reefs and spend the summers in the mid-North Atlantic's open waters.

Creatures of habit

Remarkably, the sharks followed

the same pattern each year and returned to almost the same small area in the Caribbean each time. Such epic annual migrations are more similar to those of birds and turtles than other fishes.

Tiger Beach explained?

Tiger sharks tagged in Bermuda displayed extensive space-use throughout the northwest Atlantic. None of the tiger sharks were recorded entering the Caribbean Sea, nor crossing the mid-Atlantic Ridge. In contrast, during summer the majority of sharks adopted a temperate, oceanic habit, with most occupying open water north/northeast of Bermuda.

The animals repeatedly spent the winter off Caribbean islands or nearby locations including the Bahamas, Turks and Caicos Islands and Anguilla. They then travelled northwards into the middle of the Atlantic Ocean, with some reaching as far north as the US state of Connecticut.

There was a more dispersed distribution of locations in both spring (sharks generally moving north) and autumn (generally moving south), representing migratory transitions between the winter insular and summer oceanic phases. ■

Great white shark has over 50,000 followers on Twitter

Mary Lee is a great white shark who has become a bit of a celebrity up and down the US Eastern Seaboard. Mary Lee was among a group of sharks tagged by a team of researchers from Ocearch in 2012. Ocearch is a nonprofit organization that has been researching great white sharks and other large predators for years.

A satellite-enabled tag was fixed to Mary Lee's dorsal fin. Researchers are then sent a ping each time her fin breaks the surface. The transmission then sends back an estimated geo-location.

The data relates to the migration patterns of the sharks, their biology, health and habitat, and can be used to promote conservation in view of their declining numbers to protect their future while enhancing public safety and education.

As of this issue, on June 23, Mary Lee has been tracked over 21,300 miles and was located a couple hundred miles north of Bahamas. The whereabouts of Mary Lee and other tagged sharks can be followed on www.ocearch.org/#SharkTracker. ■

Papua New Guinea

— *Witu Islands, Fathers Reefs & Kimbe Bay*

Text and photos by Scott Bennett





Diver peers through arch of corals at Fathers Arch dive site



Kimbe Bay, Papua New Guinea. PREVIOUS PAGE: Heron Ardeadoris, Lesley's Knob

When it comes to superlatives, diving and Papua New Guinea certainly go hand in hand. Sharing the world's second largest island with Indonesian West Papua, the island nation is positioned at the easternmost extremity of the Pacific's famed Coral Triangle—an undersea Eden boasting an unrivalled diversity of life.

Anchored off the east coast in the Bismarck Archipelago, New Britain is home to some of the country's finest diving. At more than 500km in length, the country's largest island is home to world-famous Kimbe Bay. Encompassing a huge sweep of the north coast, it is home to 900 fish species and some 70 percent of the coral species found in the entire Indo-Pacific.

Starting from Walindi, I embarked

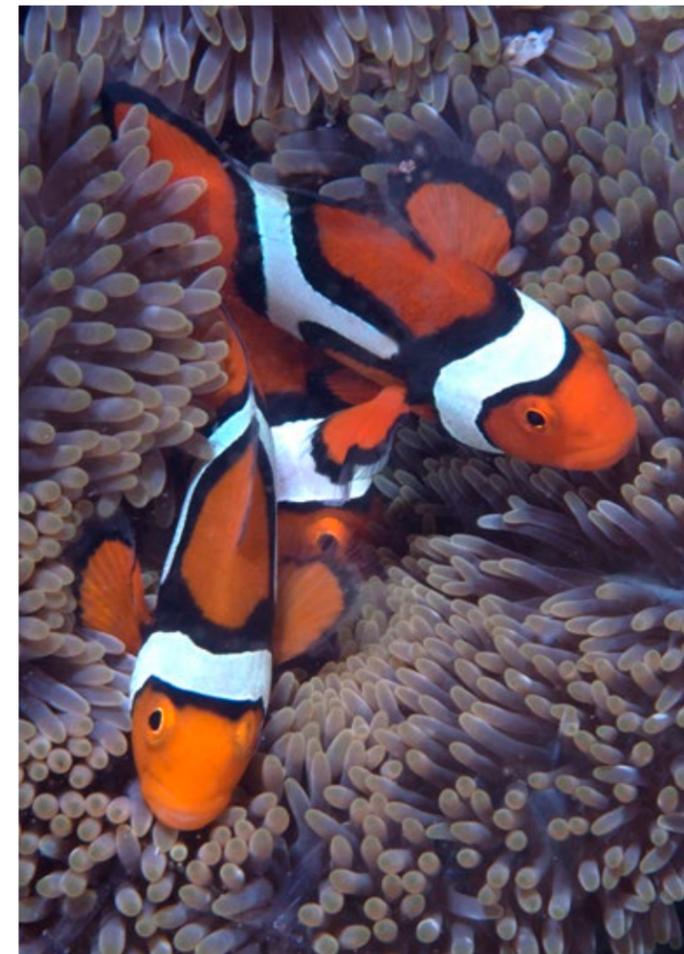
upon a nine-day itinerary that is one of the signature trips of the liveaboard *FeBrina*, taking in Kimbe Bay, the Witu Islands and Fathers Reefs.

Not wishing to run afoul of prospective flight delays, I opted to arrive almost two full days early. On hand to meet me was owner Max Benjamin, who, along with wife Cecilie, runs Walindi Plantation Resort.

Arriving at the bar for a pre-dinner drink, I met Josie Wai Wai, who would be one of the two divemasters on the trip. Also on hand were dive centre managers Dan and Cat. "Would you like to dive tomorrow?" asked Cat with a smile. Now that was a no brainer!

The next morning after breakfast, I assembled my photo gear and headed for the dive centre. Kimbe Bay is one of my all-time favourite dive locations, and I was thrilled to get in some extra dives prior to the trip.

Conditions were the epitome of perfection, with a clear, blue sky and glassy sea. Providing a dramatic backdrop was the string of volcanoes



Clownfish trio, Dickie's Place



Fan corals at Vanessa's Reef

dramatic photographic backdrop to the reef's dramatic palette.

Joelle's Reef. An isolated seamount, its summit was a gaudy patchwork of anemones, hard corals and giant orange sponges. A pinjalo school cruised the reef top while big-eye trevalley and barracuda patrolled the perimeter. The dive's undoubted highlight was the anemones. Resplendent in hues of crimson, blue, magenta, yellow and white, every single one had tentacles withdrawn. One apparently brown specimen was revealed by my strobes to be blood red, resembling a large tomato. Sheer photo bliss!



The liveaboard MV FeBrina

on a tour of the boat and I met the rest of the crew.

That first evening, we were to sleep on board but have dinner

at the resort. After settling in, I had a chance to meet a few of the other guests from Belgium, New South Wales and the United Kingdom.

Getting around the vessel was

Vanessa's Reef. We concluded the day at Vanessa's Reef. The uppermost section features a plateau bursting with gorgonians, corals and sponges. Descending to 26m revealed some truly imposing sea fans, with specimens easily three metres across.

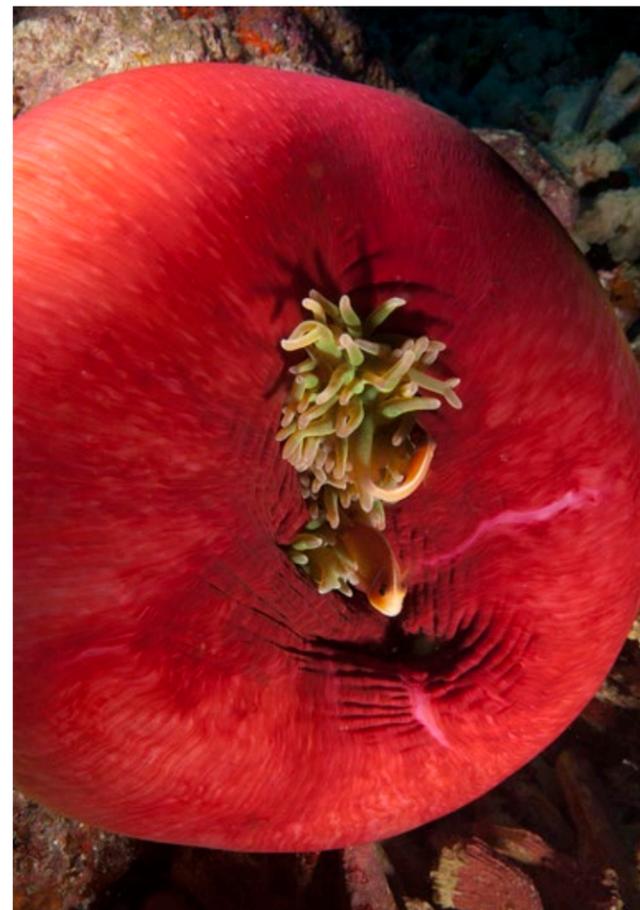
Returning late in the afternoon, we encountered a pod of melonhead whales basking on the surface. They allowed a surprisingly close approach before vanishing en masse. Naturally, I had left my

unhoused camera back in the room. A few weeks earlier, a pod of orcas had been observed here. Kimbe Bay never ceases to amaze!

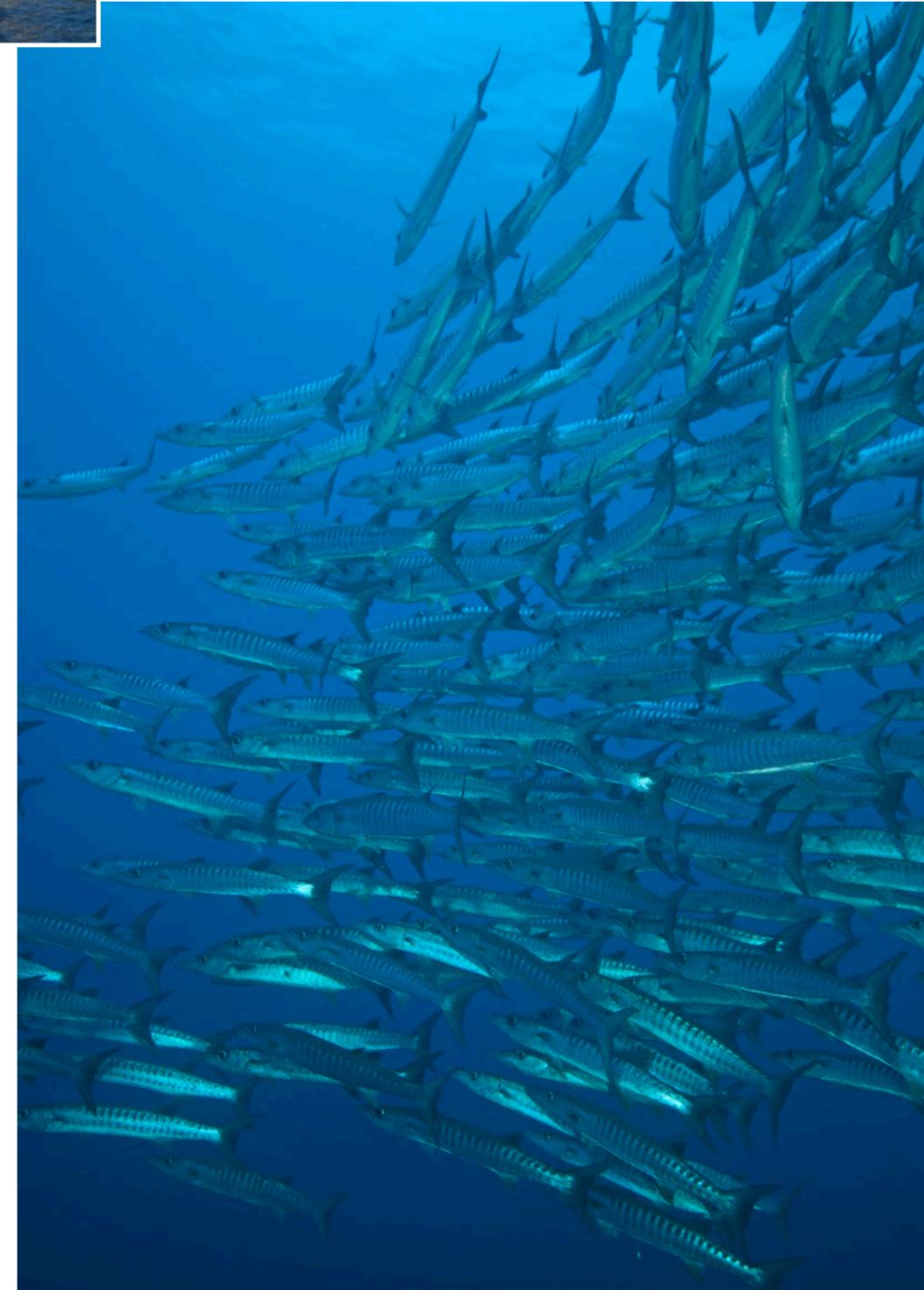
The liveaboard

While few liveaboards are synonymous with their owners, the *FeBrina* is one very notable exception. Skipper Alan Raabe is a true Papua New Guinea legend, having dived the country's reefs for over 20 years.

Bags packed, I headed down to the boat just after 5 p.m., where I met divemasters Josie and Andrew "Digger" Joseph. After unloading my gear, Josie took me



Red anemone at Joelle's Reef



School of barracuda at Otto Reef

flanking the bay's perimeter. Mt Gabuna, located directly behind the resort, was also active, a fact made clear by the sulphurous aroma that wafted through the previous evening.

Diving Kimbe Bay

Otto Reef. Our first destination was Otto Reef, a 45-minute trip

from the resort and unique in having one of the only male names in the entire bay. The precipitous walls were a coral wonderland, as massive plate coral slabs jostled for space with staghorn, table and brain corals. Tangles of rope sponges cascaded from the walls, while high above, a large school of chevron barracuda created a



Diver at Zero Wreck in Kimbe Bay

bay's western extremity, I was thrilled to discover our second dive would be a Zero wreck. Nicknamed "Zero" by American troops during the Second World War, the Mitsubishi A6M5's were among the most famous of all Japanese warplanes. Featuring a wingspan of 11m and attaining speeds of up to 564 km/hr, they were often utilized during kamikaze raids. Resting at a depth of 15m on a bottom of silt, the Zero wreck was discovered in 2000 by a local fisherman.

It is believed the pilot bailed out before it hit the water. Although visibility left a lot to be desired, it was nonetheless fascinating, being my first ever aircraft wreck. An anemone perched atop the pilot's seat proved especially photogenic.

Anne Sophie's Reef. This dive site teemed with mammoth orange sponges, barrel sponges, fans and soft corals. I was immediately drawn to a peculiar silhouette in the blue. On closer inspection, I discovered it to be a large Napoleon wrasse. The moment I put my strobes into position, it beat a hasty retreat. Foiled again!

Tropical treatment

Before dinner, Alan removed my bandage, revealing a red welt that looked decidedly more unpleasant than on the previous day. My scrape had transformed into a full-blown tropical ulcer with a skin infection directly beneath it. One would assume that salt water would actually help with the healing process.

Although true in cold salt water, it

not without the odd mishap. After unpacking, I attempted to climb back up the steps carrying my empty duffel bag. Struggling up in the confined space, I opted to go back down, only to miss a step and scrape my leg on the steel step. It didn't look pretty, but Josie patched me up. Not exactly the most auspicious start to the trip!

More Kimbe

With everyone finally on board by mid-morning, we set out for a day's diving in Kimbe Bay. First up was Vanessa's Reef and I was more than happy for a return visit.

Zero Wreck. As we headed to the



Breaching dolphin off bow of liveaboard *FeBrina*

PNG

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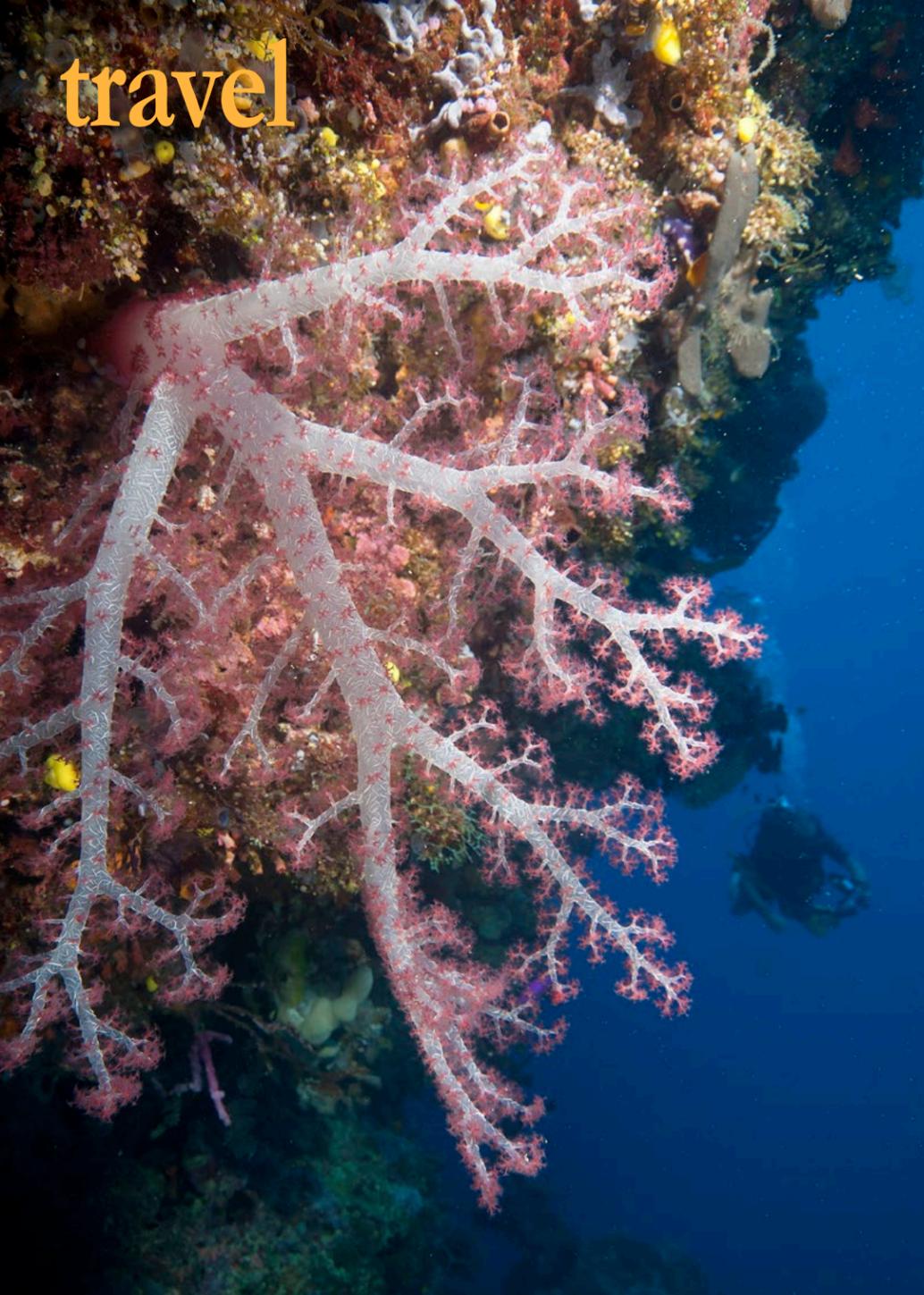
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Hingebeak shrimp at Wire Bay (left); Diver and soft corals on Witu Drift (far left)

beans and toast was soon waiting in the dining area along with a perpetually full pot of brewed coffee. Talk about service!

Drift featured a stunning wall with a sheer wall plummeting to the sandy bottom below. Visibility was exceptional at over 30m, the best of the entire trip. Electric soft corals and anemone-clad barrel sponges shrouded the walls along with a dazzling array of fish,

Witu Drift. After breakfast, the wonders kept coming. Witu

Islands. Situated at the northwest of Kimbe Bay, these outlying jewels are legendary for their big fish action and 30+m visibility. Swept by strong currents, Witu boasts a variety of outer reef slopes jam-packed with hard coral gardens along with submerged pinnacles and steep drop-offs radiant with soft corals.

The next morning, a pounding on my door roused my slumber. "Time to go diving," enthused Josie from the hallway beyond. After a dive brief and a much-needed jolt of coffee (two, in my case), everyone was raring to go.

Goru Arches. This site was located on a coral ridge some 20 minutes from our overnight anchorage. Divemaster Digger and I hit the water first and headed straight for the arches. Being the day's first dive, we stood a good chance of encountering the school of bumphead parrotfish that frequently spend the night near the arch. Sure enough, they were in attendance and I managed to get close enough to nab a few images before they dispersed.

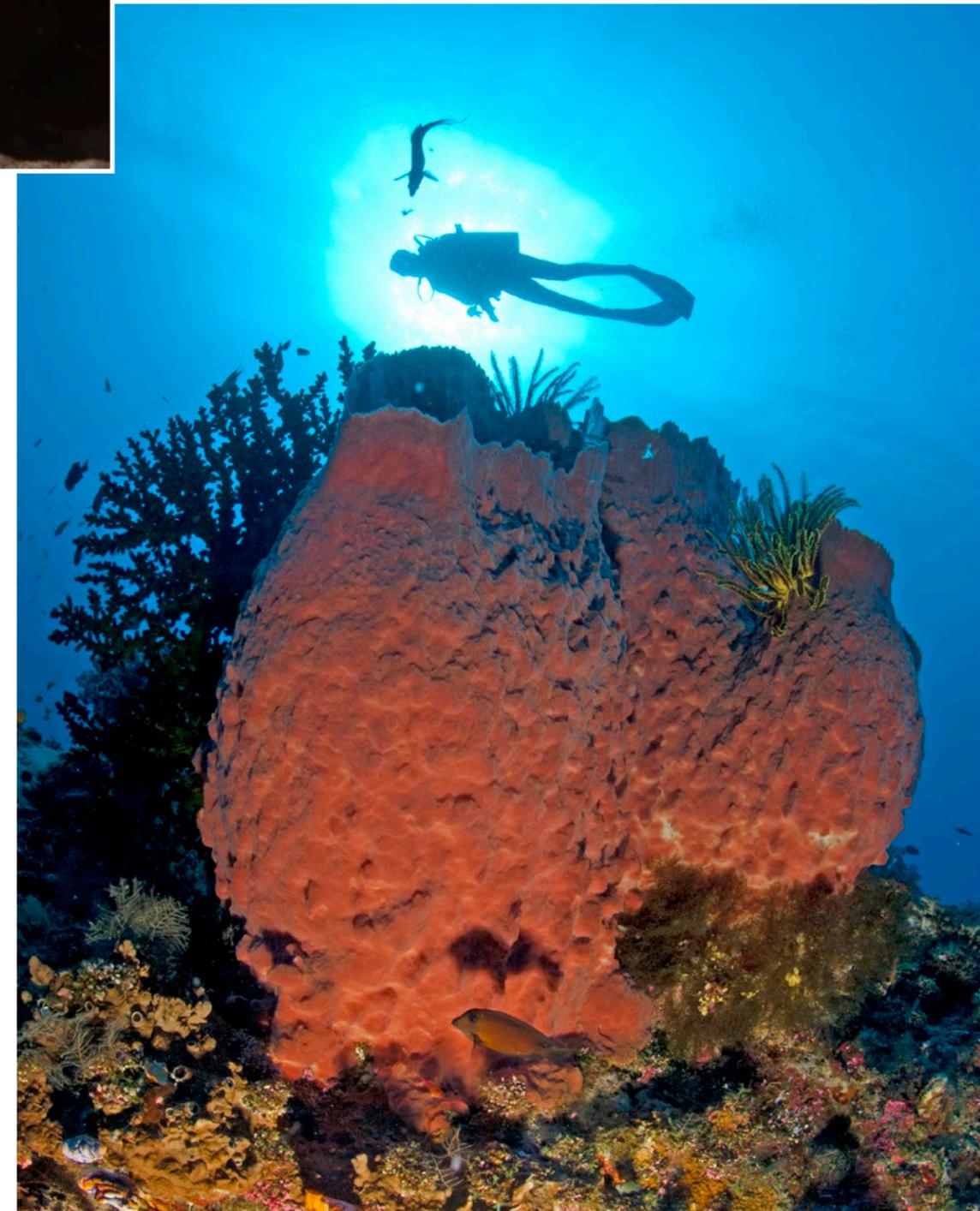
Or so I thought. Back on the boat, I discovered that my housing's focus selector knob had

accidentally been bumped to manual, resulting in a slew of out-of-focus images. Curses!

Ablaze with colour, Goru's twin arches left me grasping for superlatives—framed with sweeping crimson sea fans in hues of crimson, white and orange. Soft corals of pink and lavender played host to legions of feather stars while the seafloor was dotted with whip corals, squat barrel sponges, orange sponges and the occasional green tree coral.

The abundant fish life included midnight snappers, shaded balfish, oblique-lined sweetlips, racoon butterflyfish and giant squirrelfish. With so much to take in, it was difficult to know where to aim the camera. Fortunately, a second dive here ensured that I was able to get the missing images.

Back on board, I hadn't even removed my wetsuit before a crewmember approached to take my breakfast order. A full hot breakfast of bacon, eggs,



Diver and large sponges at Arches

is another story in the tropics, with Kimbe Bay's 31°C water being a briny soup of toxicity. Combined with constant friction due to constant removal of my wetsuit, conditions were ripe for a nasty infection. "We'd better get you on antibiotics right away," he intoned seriously. By this point, everyone gathered to stare and cringe at my contusion. Nice.

Mealtime quickly proved to be a trip highlight. From the tiny gal-

ley, liveaboard staff created an array of culinary wonders. Dinner was served à la carte along with a complimentary glass of wine. Dishes ranged from roast lamb, to pizza and Indian-style curry. An unexpected bonus was a bread-maker, which ensured freshly baked bread and rolls daily.

Witu Islands

Around 11:00, we set out on our overnight departure for the Witu

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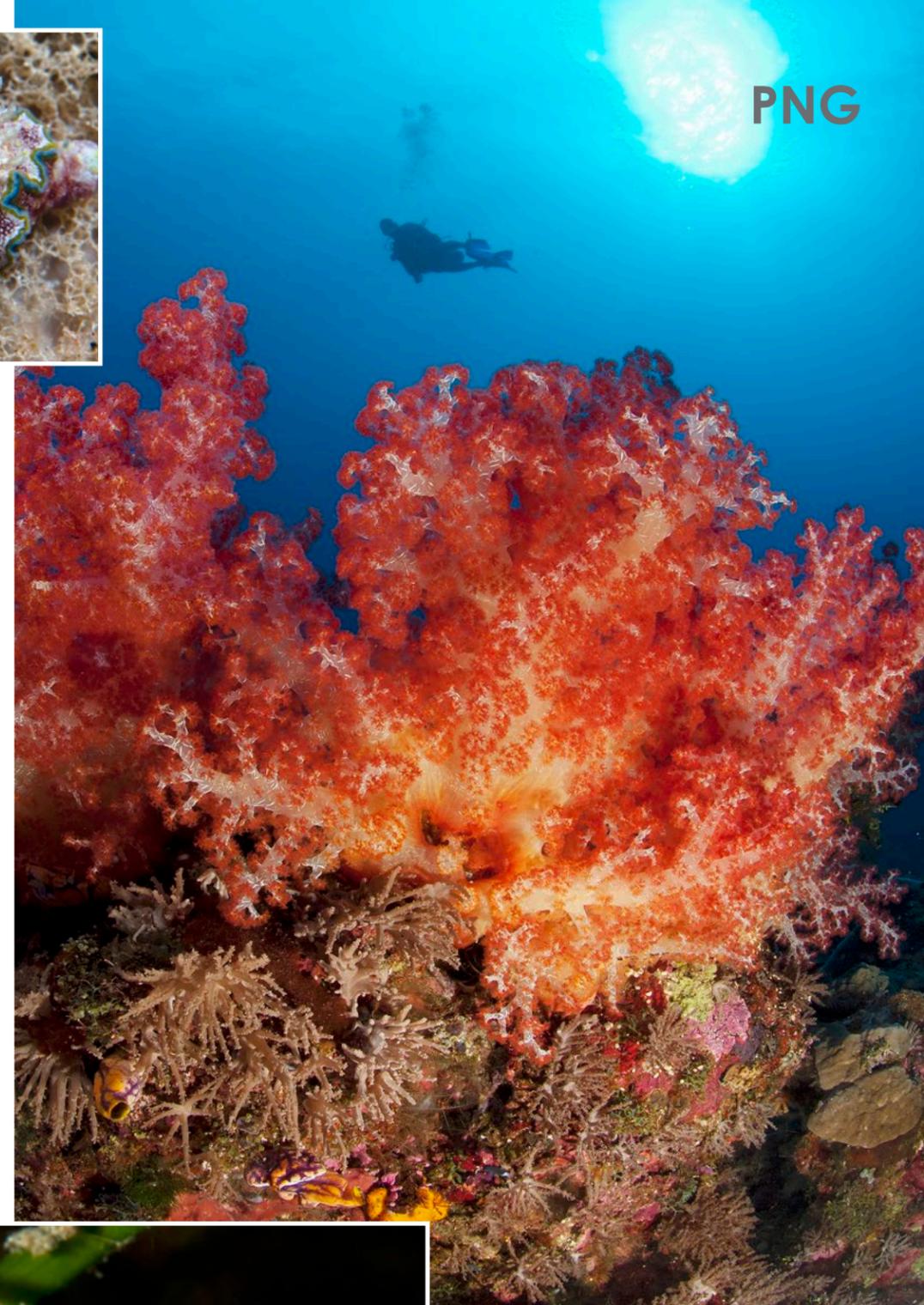
Glossodoris cincta nudibranch on night dive at Wire Bay (above); Diver and soft corals at Arches (right)

including humpback snappers and oblique-lined sweetlips. Feather stars gripped barrel sponges as bannerfish buzzed and soft corals abounded.

Wire Bay. After exclusively shooting wide angle since Walindi, I was eager to indulge in some serious macro photography. Wire Bay was just what the doctor ordered, with Garove Island revealing the remains of a massive sunken volcanic caldera. Wire Bay's black sand proved a mecca for muck diving, yielding a kaleidoscope of strange and remarkable creatures. The non-stop critter parade included leaf scorpionfish, nudibranchs, hingebeak shrimp, Steinitz' shrimpgoby, bicolor angelfish, false clownfish, spinecheek anemonefish and pink anemonefish.

After the dive at Wire Bay, a dugout canoe full of kids appeared alongside. With curly hair tinged with blond and flashing dazzling smiles, they made for especially pleasing portrait photography. It is one of the world's universal consistencies that goes beyond language and culture; put kids in front of a camera and wait for the show!

A night dive at Wire Bay proved equally



PNG



Pygmy pipehorse at Wire Bay, Witu Islands

magical, the blanket of darkness revealing a different cast of enchanting characters. A crab posed atop an old tire, while anemone hermit crabs and moon snails traversed the substrate on their nocturnal forays. I spent the ensuing 71 minutes glued to my camera's viewfinder. Digger and I played hide-and-seek with a diminutive whip coral goby that





Whip coral goby on night dive at Wire Bay (left); Divemaster Digger on live-aboard *FeBrina* (below)

ble, not only searching out prime underwater views but also assisting novice photographers with their photo techniques.

Having been working on the liveaboard for 15 years, Digger has dived with some of the world's premier underwater photographers, from David Doubilet to Howard Hall. In 2010, he even had experience filming underwater with an IMAX camera for a production on Papua New Guinea.

proceeded to retreat to the coral's opposite side just as I got its eyes in focus. A couple of bigfin reef squid hung near the surface as juvenile big-eye trevally fed beside the boat.

With such an action-packed itinerary, nightlife was definitely not a feature of liveaboard daily life. Dinner finished, everyone was pretty much wiped out and in bed by 9 p.m.. By the time photos were downloaded and edited, I had the entire dining area to myself by 9:30 p.m.

Dickey's Knob. The remaining dives at Witu were no less spellbinding. Dickey's Knob featured a large bommie rising to within 5m of the surface. The dive brief bore an ominous note as Josie announced the reef top was covered with highly toxic corallimorpharians. Despite their nondescript olive brown appearance, the small anemone-like creatures produce a mass of white filaments called "acontia" possessing stinging nematocysts packing a powerful venom. Easily capable of piercing a wetsuit, the resulting pain can last for four to six weeks. Hearing that bit of information made me want to give the dive a miss. But Josie assured me that I wouldn't become a large burning welt,

and with some trepidation, I decided to take the plunge.

We started deep at 26m, with Digger bottling for sharks. In no time, six grey reefs cruised in for a look, but the extremely low light meant no photos. For the remainder of the dive, I was so conscious of trying to avoid a corallimorpharian collision that I nearly overlooked everything else! One of the reef's distinguishing characteristics was black coral, commonly encountered here but not in Kimbe Bay. Yellow damsels encircled knotted fan corals as hordes of snappers and surgeonfish swarmed about. Just off the wall, a small chevron barracuda school cruised the blue. In fact, it seemed every site in Witu had a barracuda school. Was it possible to be blasé about barracudas?

Originally from Alotau at the southern tip of the country, Digger easily ranks as one of the best dive guides I've ever met. Possessing a broad grin and mischievous sense of humour, his photographic knowledge proved impeccable.



Photography tips

One of the trip's most pleasant experiences was being re-acquainted with a piece of photo gear that had been neglected in recent years: my 10.5mm wide-angle lens. After a few dives produced less than satisfactory results, the lens was quickly relegated to the occasional above-water shot. However, at Digger's insistence, I decided to give it a shot. "Trust me, you're going to love this lens," he promised. After a crash course in strobe placement, I couldn't wait to get started.

Dickie's Long One. This dive site (I do



Soft corals at Dickie's Long One, Witu Islands



Leaf scorpionfish (left), crab-eye goby (right) and commensal shrimp (far right) at Dickie's Place, Witu Islands



quite unexpected. Their curious erratic motion reminded me of a pulsating cartoon heart.

With air waning and buoyancy zilch, we spotted an odd little ghost pipefish in 3m of water right under the boat. Green with a series of knobby protuberances, it looked like a cross between a robust and Halameda ghost pipefish. I had just enough time to fire off a pair of images before my tank drained entirely.

to a blade of seagrass with its tail, I marvelled at how Digger even saw it in the first place! Even with a close-up filter attached, it was but a mere wisp in my camera's viewfinder. Closer scrutiny of the area revealed them to be quite abundant and I even found a few on my own.

Amid some feather stars congregated at the end of a sunken log was a pair of ornate ghost pipefish. Photographing a dark pipefish against a dark feather star at night was the epitome of challenging. I fired where I thought they were and



PNG

not even want to know the origins of the name) featured an exceptionally beautiful wall with a precipitous drop to the sandy bottom below. Soft corals and anemone-clad barrel sponges shrouded the wall as a dazzling array of reef fish swirled about. Humpback snappers cruised in a wide band along the wall below along with congregations of oblique-lined sweetlips.

Positioning my camera close to a soft coral so it was practically brushing my domeport, the results could be summed up in one word: Wow! Compared to the 10-20mm, the images were tack-sharp from corner to corner. Digger's close-up wide-angle techniques were a revelation and for the remainder of the trip, the 10.5 was virtually glued to the camera! Digger was definitely right.

Dickie's Place. Another superlative muck site was Dickie's Place. Situated just offshore from Dick's house, the black sandy bottom housed a critter contingent to rival the famed Lembeh Strait of Indonesia. Descending no deeper than

18m, Digger's eagle eyes discerned a bevy of critters including leaf scorpionfish, saw blade shrimp and commensal shrimp, crab-eye gobies, spotted sand gobies and razor wrasse, which ensured my camera's shutter fired incessantly for the ensuing 84 minutes.

Digger overturned a clump of broken coral to reveal a pair of strange pulsing red objects. Initially baffled, I realized they were a pair of file clams. Previously, I'd only ever seen them ensconced within a rock face crevice, so seeing them out in the open was

A subsequent dive at night proved equally enthralling. Scanning the sandy bottom, Digger's torch beam came to rest on a crusty filament amid some scraggly blades of seagrass. His insistent torch beams indicated this was no mere strand. Eyes straining, I soon discerned it to be a pygmy pipehorse. Anchored



Dwarf scorpionfish on night dive at Dickie's Place



Ornate ghost pipefish on night dive at Dickie's Place



Diver and coral reef at Lama Shoals, also known as Krackafat (left); Sunrise over Father's Volcano (right)

ised result, the dive was certainly exciting with a maelstrom of fish whirling in all directions. Trelvalley, sharks, tuna... you name it and it was there!

On the second dive, the jacks had dispersed and were hanging about in smaller groups near the surface. A Napoleon wrasse hung just off the wall, maddeningly out of camera range. I was beginning to think I had a Napoleon photographic curse!

At the dive's conclusion, an unexpected hazard was provided by legions of jellyfish congregating around the mooring line. While I miraculously emerged unscathed, nearly everyone else got stung, requiring a painful treatment of hot water and vin-



PNG

hoped for the best. Happily, there were many more easily photographed subjects about. A dwarf scorpionfish lumbered across the substrate as lizardfish grinned and anemone hermit crabs scuttled.

At the dive's end, I was led towards a coral cluster on the sand. Atop it sat a crab with a serious sense of design. Sporting spindly purple limbs with a couple of ascidians affixed to its head, its camouflage was flawless. Even when reviewing my images back on the boat, I could barely tell

what I was looking at, in the photographs.

Lama Shoals / Krackafat. For some strange reason, a number of the Witu sites bore names pertaining to sexual euphemisms. Krackafat, also known as Lama Shoals, was no exception. An Aussie slang term alluding to gratification, this seamount the size of a football field was supposed to be so exciting that it would... well, you know. While I can attest the dive didn't procure the prom-



Soft corals at Lama Shoals, otherwise known as Krackafat

egar, which Digger applied with almost callous glee.

After breakfast, a dugout canoe appeared with some women and children with a woven basket of coconuts, bananas and flowers, which we traded for rice, noodles and some soap. Even out of the water, it seemed like there was never any rest for my camera. After several fantastic days, it was time to move on.

Fathers Reefs

Anchor hoisted, we set out for our overnight voyage to Fathers Reefs. Arriving before dawn, the trip's most far-flung destination proved to be its most dramatic. Dominating the horizon was the soaring silhouette of Ulawun Volcano. One of the country's most active, its lofty 2,334-metre summit is the highest in the entire Bismarck Archipelago.

Underwater, the scenery was no less impressive with a succession of coral pinnacles ascending from the depths of the Bismarck



Napoleon wrasse at Shaggy's Reef (left); Diver and feather star arch at Killibob's Knob (right); Grey reef sharks at Shaggy's Reef (below); Pyramid butterflyfish at Killibob's Knob (lower left)

sharks buzzed about like bees, all eager for some of the fishy morsels in Digger's perforated baitbox. The entire procession was quite orderly, with not one shark displaying an iota of aggression, yet swooping close enough for full-on portraits.

In no time, other interested parties appeared, all wanting a piece of the action. Red bass and bluefin trevalley circled expectantly, while a massive Napoleon wrasse kept



PNG



Sea. Famed for its pelagics, Alan reckons Fathers Reefs is home to the healthiest shark population in all of Papua New Guinea. Over the years, a few specific locations have been designated as shark-feeding sites, with the sharks quickly becoming habituated to the entire process.

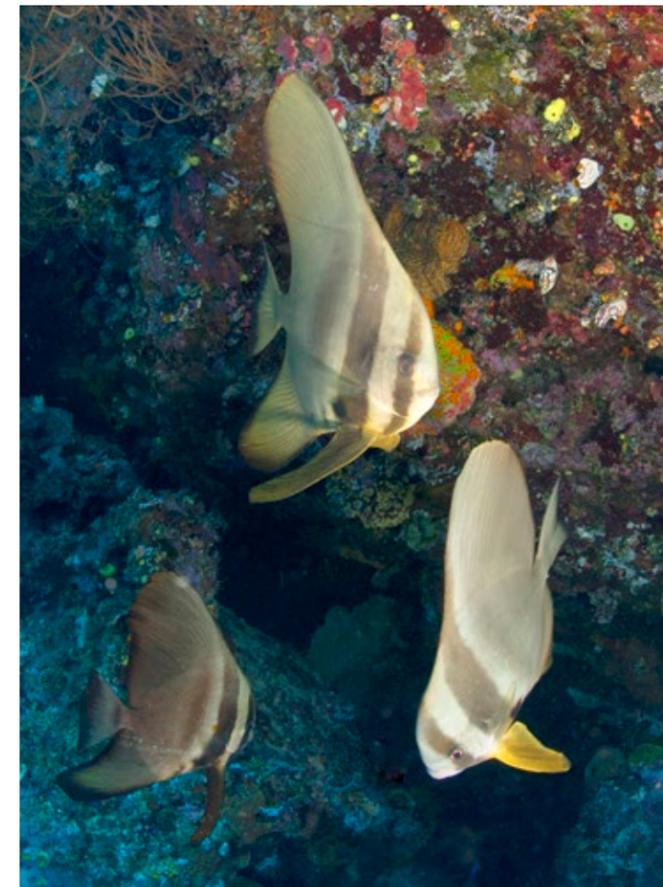
Norman's Knob. Our Fathers Reefs experience commenced with a pair of morning dives at Norman's Knob, one of the area's myriad of coral-shrouded seamounts. From squat lobsters in feather stars to big-eye trevalley and blue-spotted groupers, the site proved equally photogenic for wide-angle and macro alike. As at Otto Reef, the anemones all had tentacles withdrawn, with specimens of different colours sitting side by side. Talk about a photographer's dream!

Shaggy's Reef. Finally, it was time for our shark dive at Shaggy's Reef and it did not disappoint. No sooner had we hit the water when the first silvertip shark appeared, dutifully following us to the feeding site like a faithful dog. Being the last to arrive, I quickly took position along the ridge top amphitheatre where the show had already started. Along with the silvertip, whitetip and grey reef



to the periphery. The latter proved especially tolerant and with perseverance, I was finally able to get my long-cherished Napoleon image!

Killibob's Knob was another brilliant shark dive, although the star attractions were definitely more on the rambunctious side. A muffled exclamation of "Hey!" caused me to turn to see a tiny whitetip snap-



Batfish at Jayne's Gully



Reef scene at Jayne's Gully (far left); Saron shrimp at Lesley's Knob (left); School of batfish at Killibob's Knob (right); Silvertip shark at Shaggy's Reef (below); Indian Phidiana nudibranch at Lesley's Knob (lower left)

shrimp, an extravagant species featuring a white body with orange spots accented by a row of bristles along its back. Another check on my photographic wish list.



Fathers Arch was reached via a rope spanning a yawning chasm plummeting to over 50m. With the site's deepest portions approaching 40m, it was put in place to guide divers from the wall near the mooring platform to the site. Without it, an excursion down the wall would quickly consume valuable bottom time.

The actual arch was long and narrow, somewhat reminiscent of a scene from the American southwest. After firing off some shots, Digger motioned me to follow and he showed me the entrance to what I perceived to be a cave. Urging me to enter, the interior



was stunning. Luminous soft corals cloaked the walls, while light from the surface above entered through a rooftop opening. Aiming upwards, I was able to get a shot of Josie passing overhead with a torch.

Swimming back along the line, I saw Digger motioning me over to the wall. There, on the rock face was a white Heron *Ardeadoris nudibranch*. With his assistance, I tried something new: wide-angle nudibranch photography. Back on board, I was more than pleased with the results. Thanks, Digger!

ping at a diver's hand.

I guess that adage about small dogs applies equally to sharks; It's the small ones you have to worry about! Sharks weren't the only ones looking for a handout, as a large free-swimming moray quickly joined the fray. It seemed especially perturbed by my firing strobes; at one point, I looked up to find it staring me in the face.

Considering it had a body thicker than my thigh, I made a hasty retreat. Heading back to the boat, Digger removed his fins and walked along the mooring line like a tightrope walker. The school of batfish that greeted us on our arrival were still there. It certainly begged the question as to what they do all day.

Lesley's Knob. After the shark adrenaline rush, the subsequent two days at Fathers Reefs proved equally enthralling, with an array of photo ops to overload my rapidly filling hard drive. For me, one of the trip's most memorable aspects was the anemones. Never in my life had I seen such an astonishing array of colours. One specimen at Lesley's Knob had its tentacles withdrawn entirely, resembling a gelatinous magenta ball.

A night dive revealed scorpionfish, slipper lobsters, cuttlefish and a variety of nudibranchs, some of which I had never seen before. The definite highlight was a saron



Diver and whip coral at Susan's Reef, Kimbe Bay (left); Cuttlefish at Inglis Shoals, Kimbe Bay (below inset)

Hawksbill sea turtle at Jayne's Gully (right); Pink anemone and anemonefish at Lesley's Knob (lower right)

and the Aussies added a touch of drama to the sedate periods between dives. One day during lunch, we were treated to the extraordinary sight of twin waterspouts, which fortunately remained a safe distance from the boat.

By mid-week, Alan had pretty much reverted to his colourful self, entertaining us with anecdotes that would send the political correctness police into a tizzy. All the while, the live-board staff produced a never-ending array of tasty between-dive snacks. Thank goodness for stretchy waistbands!

Return to Kimbe Bay

South Emma. Back in Kimbe, we visited a number of sites. An early morning dive at South Emma featured a swim-through at 30m. Alas, attempts to shoot divers exiting the cave failed miserably, but it was Digger to the res-

cue. Leading me deeper, we came across a photogenic stand of whip corals.

Nearby, an elephant ear sponge and a large broken barrel sponge made for some dramatic images and the swim-through was quickly forgotten. At the mooring line, dramatic coral clusters made for interesting foreground subjects with the *FeBrina* silhouetted above.

Joelle's Reef / Inglis Shoals. The remainder of the day was spent visiting seamounts Joelle's Reef and Inglis Shoals, both swarming with reef fish and pelagics alike. A night dive at Kirsty Jane's revealed bumblebee shrimp, basket stars, spaghetti worms and a long-clawed squat lobster. A

snake-arm anemone protruded from the sand, its tentacles methodically transporting morsels of food to its mouth. After eight diving days, it was almost sensory overload! We spent the

night anchored in Kimbe Bay as a glorious sunset set the sky ablaze.

At the end of the last night dive, everyone climbing up to the dive platform got hit with an unexpected surprise: a burst of cold water from the hose! After a solid week of water attacks by the Aussies, Digger got his revenge. On the last morning of diving, the Aussies found their wetsuits in a bucket in the ship's freezer, with Digger laughing uncontrollably.

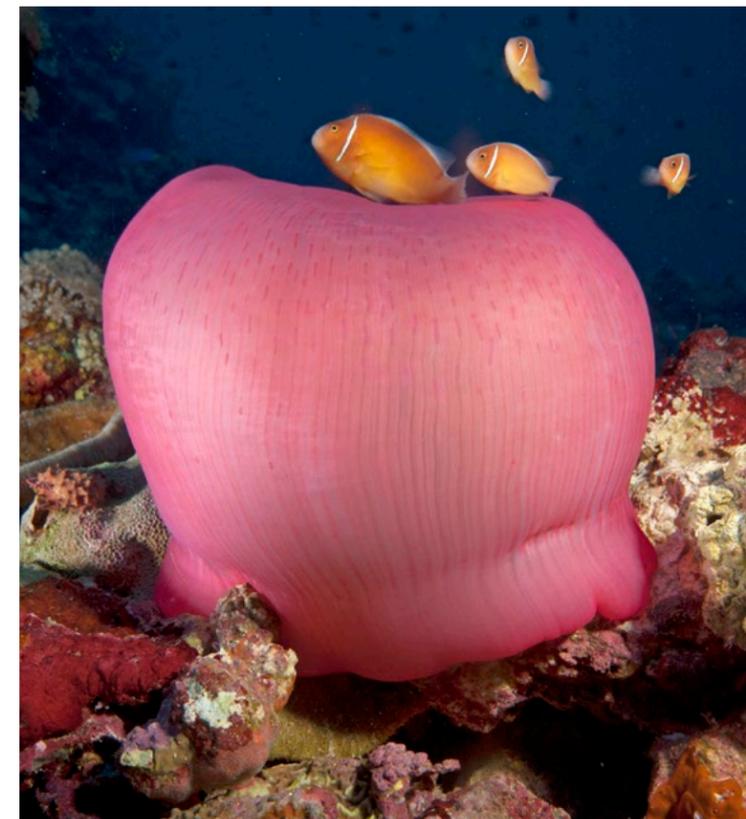
Susan's Reef. For our final pair of morning dives, Alan saved one of the best dives for last. Distinguished by its extrav-

agant forest of red whip corals, Susan's Reef was my favourite site. Colours dazzled with eye-

Jayne's Gully featured sheer walls plunging to the depths, with colourful sponges and gorgonians sprouting from amongst the crevices. A highlight was a pair of friendly hawksbill turtles. Small yet utterly fearless, they practically

bumped my domeport, providing some of my favourite images from the entire week. By mid-afternoon, it was time to head back to Kimbe Bay for our final two days of diving.

Water attacks between Digger



Pygmy seahorse at Kirsty Jane's (left);
Stonefish at Inglis Shoals, Kimbe Bay (below);
Sunset over Kimbe Bay (bottom right);
Curious moray eel at Inglis Shoals (lower left)



along the entire coast. Our guide was a natural born twitcher, spotting endemic blue-eyed cockatoos, eclectic parrots and Blyth's hornbills.

spa. Just the ticket after nine exhilarating days of diving!

Afterthoughts

The following day, we took a four-wheel drive trip to the "hot river", a stream warmed to 43°C by a volcanic spring. The red mud found along the riverbank provided a natural exfoliating treatment, giving us our very own jungle

In retrospect, sensory overload could be used to describe the entire trip. With wrecks, reefs, sharks and muck, the nine-day trip was truly spectacular and encapsulated the best that Papua New Guinea had to offer. Combined with the outstanding service by Skipper Alan Raabe and his superb crew, it was truly sad to say goodbye. Next time, however, I will let someone else carry my bag back up the stairs! ■

popping exuberance, while between 8-15m, a trio of massive gorgonians dripped with feather stars. Sponges and a plethora of other growth enveloped every square centimetre of the reef, creating a photographer's dream.



Topside attractions

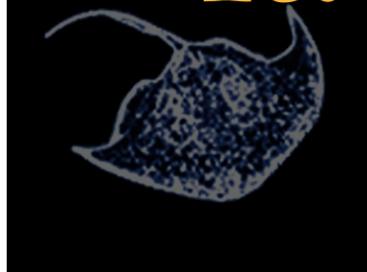
After a superlative stay in New Britain, it was time to head for my next destination. With travel plans proceeding smoothly up to that point, my suspicious side deliberated it was time for something to go awry. And sure enough, it did. Two days of cancelled flights from Hoskins extended my stay at Walindi. (Mind you, I can hardly think of a better place to be marooned!)

Still, this travel cloud had a silver lining. Prior to my attempted departure, I had lamented I had never got to experience any of Walindi's terrestrial attractions. Happily, I got my chance.

The first afternoon, I embarked on a bird-watching hike with some fellow divers. Trudging uphill along the thickly forested trail, we emerged to an open ridge top that provided commanding views



fact file



Papua New Guinea



SOURCES: US CIA WORLD FACTBOOK, XE.COM, PAPUANEWGUINEA.TRAVEL/DIVING

History Papua New Guinea is a developing country in the Southwest Pacific. The eastern half of the island is the second largest in the world. In 1885, it was divided between the United Kingdom (south) and Germany (north). In 1902, the United Kingdom transferred its half to Australia, which occupied the northern portion during World War I and continued to administer the combined areas until independence in 1975. After claiming some 20,000 lives, a nine-year secessionist revolt on the island of Bougainville ended in 1997. Today, Papua New Guinea relies on the assistance of Australia to keep out illegal

cross-border activities from Indonesia primarily, including illegal narcotics trafficking, goods smuggling, squatters and secessionists. Government: constitutional monarchy with parliamentary democracy. Capital: Port Moresby

Geography Oceania, Papua New Guinea is a group of islands east of Indonesia including the eastern half of the island of New Guinea between the Coral Sea and the South Pacific Ocean; Along its southwestern coasts, it has one of the world's largest swamps. Coastline: 5,152km. Terrain: mostly mountainous with rolling foothills and coastal lowlands. Lowest point: Pacific Ocean 0m; Highest point: Mount Wilhelm 4,509m.

Climate

Tropical climate with slight seasonal temperature variation; the northwest monsoon occurs December through March; the southeast monsoon

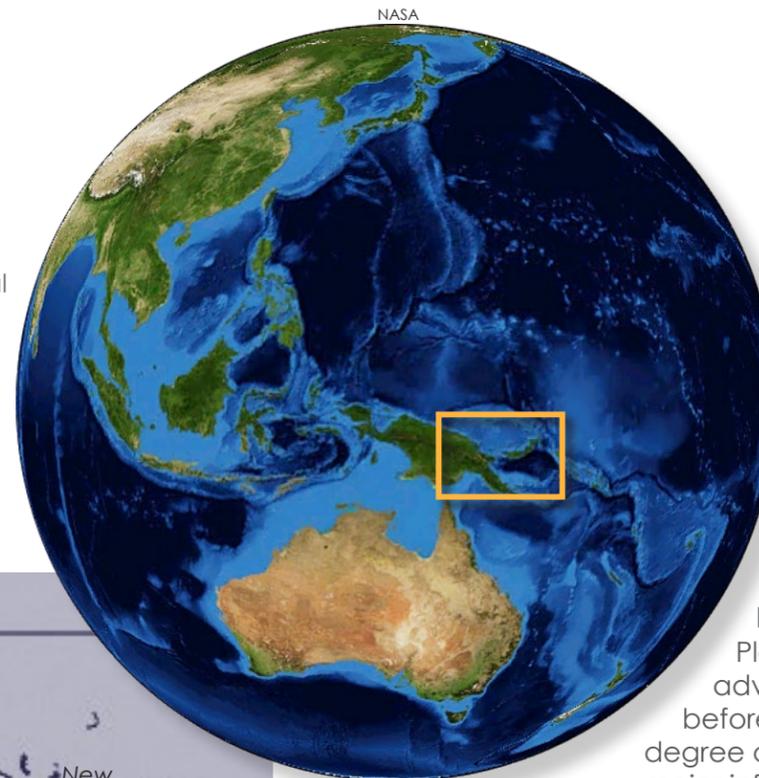
occurs May through October. Natural hazards: active volcanism, as PNG is situated along the Pacific "Ring of Fire". The country experiences frequent and at times severe earthquakes, mud slides and tsunamis.

Economy

Natural resources abound in PNG. However, getting to them has been difficult due to the rugged terrain, issues with land tenure as well as expensive infrastructure development. Around 85% of the population live on subsistence farming. Two-thirds of export income comes from mineral deposits such as copper, gold and oil. Estimates of natural gas reserves come to about 227 billion cubic meters. Construction of a liquefied natural gas (LNG) production facility planned by a consortium led by a major American oil company could develop export of the resource in 2014. It is the largest project of its kind in the history of the country

and could help the nation double its GDP. Transparency will be a challenge for the government for this and other investment projects planned. Other areas of development by the government include more affordable telecommunications and air transport. Prime Minister Peter O'Neill and his administration face challenges that involve physical security for foreign investors, building investor confidence, increasing the integrity of state institutions,

RIGHT: Global map with location of Papua New Guinea
BELOW: Location of Kimbe Bay on map of Papua New Guinea
BOTTOM LEFT: Paddlefin triggerfish at Inglis Shoals, Kimbe Bay



bettering economic efficiency through privatization of state institutions operating under par, and continuing good relations with Australia, which ruled PNG when it was a colony.

Environment

Growing commercial demand for tropical timber is causing deforestation of the PNG rain forest. It also suffers pollution from mining projects and severe drought;

Population 6,552,730 (July 2014 est.) Ethnic groups: Melanesian, Papuan, Negrito, Micronesian, Polynesian. Religions: Roman Catholic 27%, Protestant 69.4%, Baha'i 0.3%, indigenous beliefs and other religions 3.3% (2000 census). Internet users: 125,000 (2009)

Language Melanesian Pidgin serves as the lingua franca, English is spoken by 1%-2%,

Motu is spoken in the Papua region; there are 715 indigenous languages—many unrelated.

Health & Safety

Papua New Guinea has a high crime rate. Please check state advisory consular information before travelling to PNG. The degree of risk is very high for major infectious diseases; food or waterborne diseases include bacterial and protozoal diarrhea, hepatitis A and typhoid fever; vectorborne diseases including dengue fever and malaria are high risks in some locations (2004)

Currency

Kina (PGK). Exchange rates: 1 USD=2.78PGK; 1 EUR=3.12PGK; 1 GBP= 4.37PGK; 1 AUD=2.15PGK; 1 SGD=2.05PGK

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EVACUATION INSURANCE is compulsory for some PNG dive operators, liveaboards and resorts. See DAN for information and travellers insurance: www.diversalertnetwork.org

Websites

Papua New Guinea Tourism www.pngtourism.org.pg





tech talk

Expedition members at Camp 3 in J2 Cave, Sierra Juárez Mountains, northeastern Oaxaca, México

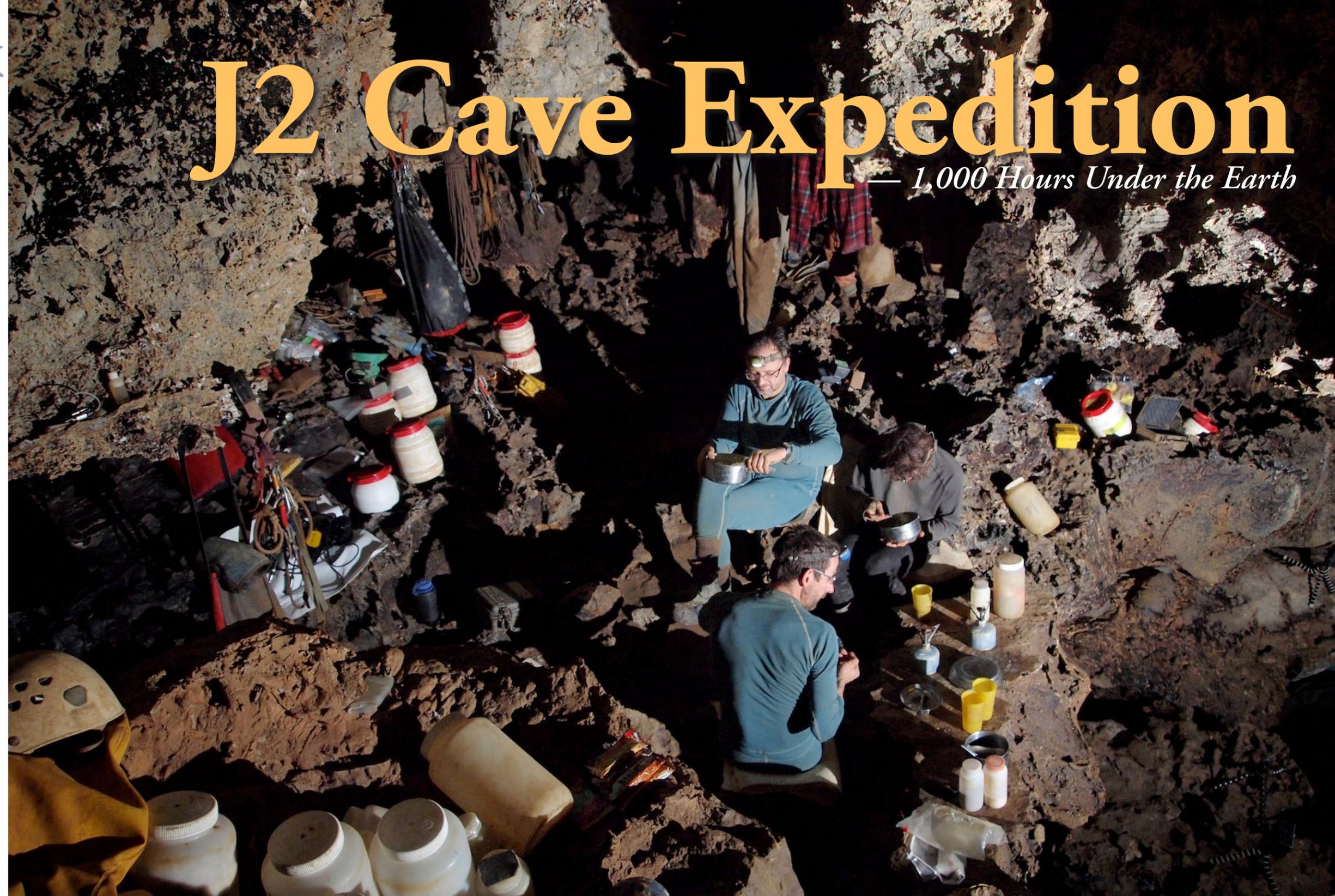
Text and photos courtesy of Phil Short

After my speech at the International Tech Meeting 2012 (technical diving convention in Bratislava, Slovakia), deep cave explorer Bill Stone asked me to join him for lunch. As a result of that lunch, during the course of the next 12 months, I prepared for the trip of a lifetime!

In a full hour of one-on-one discussion with Bill outside of the lecture hall of the Rebreather Forum 3.0 convention in Orlando, Florida, later that year, we discussed how the trip was moving forward. The time was counting down, and then before I knew it, I was in the cloud forest of southern Mexico about to go underground.

The trip? I had been invited by Bill to be a full-time team member and lead diver on the 2013 project to extend the J2 Cave (using the Last Bash entrance) beyond the point reached in Sump 4 during the 2009 expedition.

Having now returned, many of my caving and cave diving friends ask, "Wow! Three months in Mexico! How many times did you get to go caving?" And I smile inside at their reaction when I say, "Oh, five." Not many, but it includes once for 19 days, once for five days, once for 21 days and two separate one-day trips, totaling over 1,000 hours under the earth.



J2 Cave Expedition

— 1,000 Hours Under the Earth

Getting there

It all started on arrival at Mexico City Airport with Marcin Gala and the crew from Room 608 media company, who would be filming the entire expedition for the Discovery Channel as an episode of the Curiosity series. After clearing customs

with their 17 bags of film gear, we loaded two mini buses and set off for Faustino's Ranch (via a night spent in Paulo) at the base of the mountain that would be home for the next three months, beneath which was the 15-plus kilometer labyrinth of passages that was J2/Last Bash.

After a long drive, the last three hours of which were on dirt roads, we arrived late so I slept in the field behind the ranch on the floor in a Bivi-bag to be awakened by a friendly pig at 07:00 the next morning! After coffee, breakfast and a team briefing, we set off up the moun-

tain with Bill and a group of team members to the site that would be our base camp.

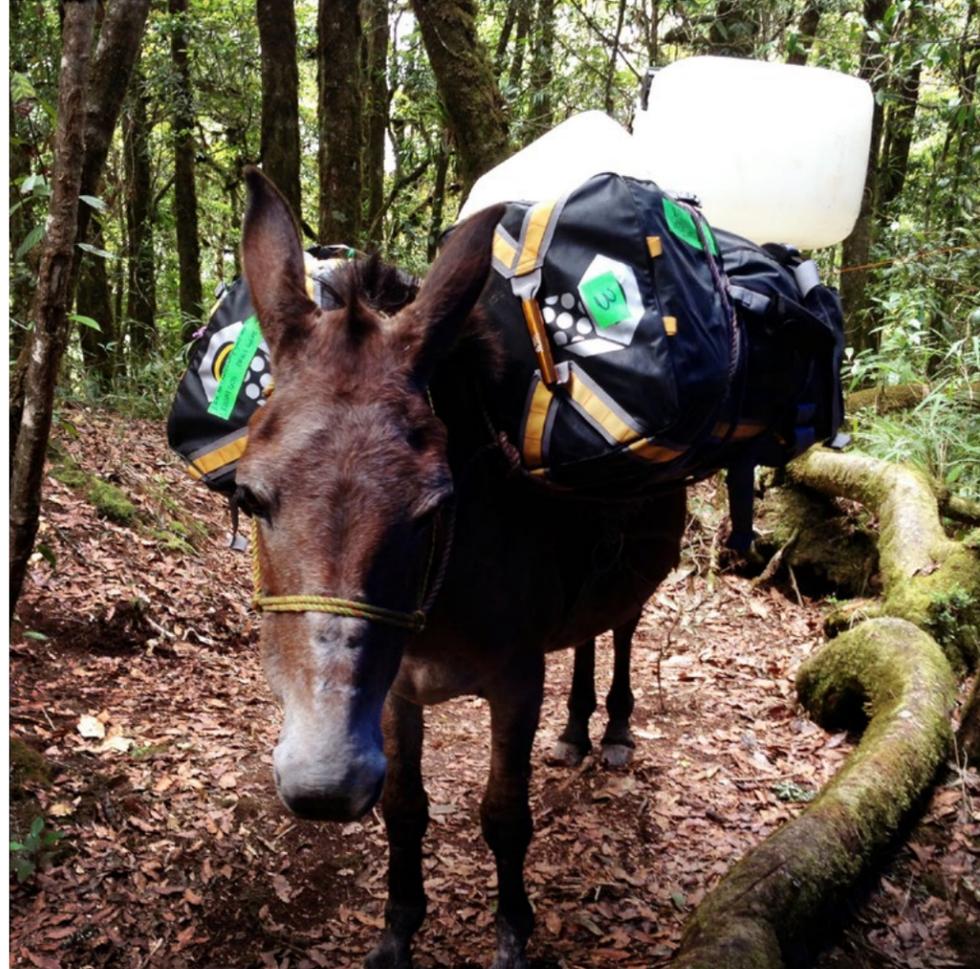
The walk from the ranch took us through 'slash and burn' fields ever higher until we reached the tree line and entered the cool green gloom of





tech talk

Donkey transport to J2 Base Camp in Sierra Juárez Mountains, northeastern Oaxaca, México



the cloud forest that shrouded the mountaintops and continued to climb. Eventually, the winding muddy trail between the trees flattened out and there was no more up, but no view due to the density of the forest. We were on a flat top to a summit, which would be home for the next three months.

Preparations

We spent the day initially clearing personal spaces for our tents and covering them with tarps. Then, working as a team, we cleared a large area for a workshop tarp and a kitchen tarp, building and setting up the kitchen, digging a latrine and clearing a fire pit. We spent our first night around the base camp campfire, looking for-

ward to the adventures ahead.

I spent the next eight days hiking from base camp down to the ranch, rigging, testing and packing dive gear, then hiking back

up to base camp. The idea was to, day by day, acclimatize to the 3,000m altitude of base camp and to build up my fitness by carrying all my gear in increasing loads up the hill on my back. This seemingly crazy idea really paid off when the cave trips started.

The heavy gear was delivered to base camp daily by donkeys and drivers from the ranch including our water in 20-liter drums (treated with microdyne) as there was no water source near base camp. The growing pile of dive equipment bags was delivered again by donkey directly to the cave entrance some 200m below base camp.

In camp, we had a "re-belay" assessment and practice circuit in a rope circuit up and back down a giant pine tree, with a two-meter-square "dive platform" rigged in the crown. The idea was to use this to assess each team member's rope skills on arrival



Bill Stone at J2 Base Camp

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and to allow practice. But it also gave us the opportunity to climb up through the oppressive green gloom of the cloud forest, to enjoy the clear blue sky above the roof of the forest and get some sun, watch a sunrise or a sunset, or just chill out. This platform became our sanctuary between trips underground.

Scouting out the cave

On day nine, I hiked down to the Last Bash entrance with Marcin for my first journey into the cave. The entrance is a small crack against a cliff wall at the head of a muddy gully, and to be honest, very uninspiring! But after a traverse and several tight vertical rope sections, it gradually opens out. One enters a small

horizontal room and then it goes vertical again on a very large passage in the form of a 170+m vertical pitch with 19 rebays getting larger and larger as one drops deeper and deeper into the earth.

From here after, we had a brief respite from the rope on a large ledge. The drops continued, bringing us eventually to a short wet horizontal section ending in another pitch at 300m depth from the entrance. At this point (the limit of the rigging teams work so far), we tested the cave telephone wire by connecting to it and calling base camp, and turned to head out, arriving back on the surface after a seven-hour trip.

I was excited to go further but realized the enormity of transporting the now complete pile of fifteen 20+kg bags of dive gear to the end of the cave to go diving. This first foray into the cave had merely scratched at the surface of the 1,000+m of descent and 8,000+m of horizontal cave to reach Sump 2, our first dive site.

After several more days of packing and preparing equipment whilst the rigging team continued their work to reach "The Bivi" camp at -500m of depth, a three-man team entered the cave to sleep at The Bivi and enlarge the squeezes beyond by digging away rocks, gravel and other flood detritus.



The next section of cave beyond The Bivi consisted of a small, wet stream passage with some small rope sections and three major squeezes—a fun "sporting" section of the cave for a normal weekend cave trip, but a nightmare for transporting three month's worth of equipment through the cave. Expedition team members John, Elliott and Corey did a fantastic job of enlarging the extremely unpleasant flat-out wet squeeze and the two very tight vertical squeezes before the main carry of gear began.

Phase 1

On day 15, Marcin and I headed into the cave for the push in "Phase 1". With a support team, we went from the Last Bash entrance to Camp 2A. (Camp 2 was originally in the J2 section of the cave but was moved to the 2A location at the convergence of Last Bash and J2

when the connection was made). We spent the night there before continuing on an exhausting 11-hour trip to Camp 3 the next day, through a gigantic "borehole passage" and a beautiful section of active steam where Marcin had to repair, re-rig or replace all the ropes on the vertical sections.

The next morning, we returned to Camp 2A to start bag hauling from there to Camp 3. Bag hauling is tough, the cave is like the worst obstacle course ever and an intense gym work out whilst cold and wet for eight to 12 hours at a time! Basically, you pick up one or two 15 to 20kg bags and walk, climb, crawl and struggle through the earth, then go back and get more. In some sections, like the Boulder Choke "Breakdown" of Donde Homek, a team spreads out through the very tight and constricted passage and passes the bags man-to-man in a chain,

which speeds things up.

On the move

The next eight days were spent moving between camp 2A, Camp 3 and the Sump 2 base until all gear for the Phase 1 push was at the sump. The dry cave ends at the base of another rope pitch on a rock bridge above the lake of Sump 2. Here the underwater passage is so large that there is no sound or visual indication that this is the J2 River, so the sight is a crystal clear turquoise blue lake five meters below the rock bridge, and I have to say, it was so inviting!

The 2009 Dive Platform was in good condition, stored on the "Rock Bridge". We initially rigged it on the Rock Bridge as a worktable to build the two Poseidon MKIV CCRs (closed-circuit rebreathers) and the other dive kit before lowering it to water level and rigging it as a kitting-





Camp 2 in J2 Cave in the Sierra Juárez Mountains of northeastern Oaxaca, México

up dive platform. So eventually, on March 10, we had two assembled and pre-dive checked MKIV CCRs, four OC (open circuit) bailout cylinders, food and camp equipment, survey and caving gear, and our personal dive gear ready, and were able to lower all to the platform, kit up, slip into the water and dive off into Sump 2.

Sump 2

I have been privileged enough to dive many sumps in caves around the world and to also visit and dive some of the world's most beautiful resurgence and spring sites, but this was a combination. As I dropped down the dive line, descending below the dive platform and the flood of filming lights, the crystal clear water revealed a 10m-wide, 4m-high borehole tunnel disappearing off in front of me, with grey limestone

walls, stripes of calcite "lightning" and a white gravel floor reflecting our lights.

The sump was dived and passed by USDCT team members on previous expeditions, and the thick hand line and telephone cable were intact throughout the sump. The thick hand line was laid to ease the bag hauling required to transport camp, cave, dive and survey gear along with food through to the dry cave and Camp 4 beyond. On this dive, both Marcin and I each had a full sump tackle bag and a SANTI dry-bag clipped to our sides.

Sump 2 is the first sump reached when entering the J2 system by the Last Bash entrance, and at less than 150m in length and a maximum of 7m in depth, was a straightforward dive. On passing the sump, I unpacked and connected the telephone to the tel-

ephone cable and called back to our support crew at Sump 2 "upstream" dive base to inform them that we were through, safe and staying. Then Marcin and I stowed our MKIV CCRs safely, shutting them down, and climbed a huge hall of boulder breakdown, passing over the top to enter a continuing dry, mud-floored borehole passage leading down to the site of Camp 4.

Flooding a suit

At this point, I de-kitted and poured several liters of water out of my drysuit, wrung out my under-suit and base layer, and informed Marcin that the dive through Sump 2 had resulted in a total flood of my suit! Not a big deal with the 15°C water temperature and the short dive time of passing Sump 2, but it would be a big deal for the continued

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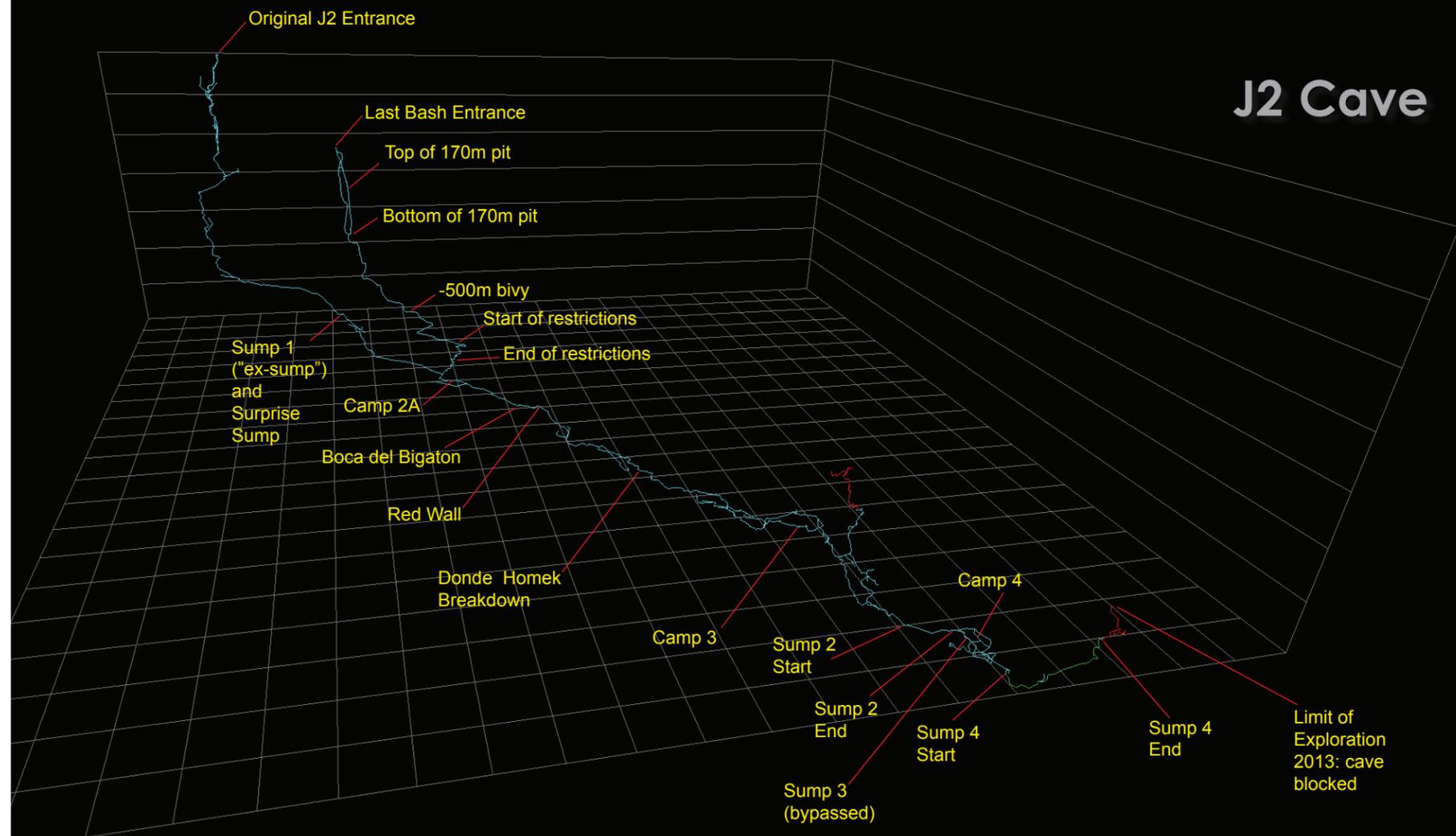
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tech talk

Annotated 3D map of J2 Cave in Oaxaca, Mexico (right); Expedition members make a radio call to Base Camp from Camp 3 in J2 Cave, Mexico (below)



exploration of the cave if I could not find and fix the issue.

As it turned out, the silicon neck seal had been punctured twice, like a vampire bite under the chin where the suit had been hung over a line but touching the floor at Sump 2 dive base, over the last few days of equipment preparation. But we were saved! Thanks to the custom design of the J2 SANTI cave drysuits, the neck and wrist seals were quick to remove and replace, along with numerous other cave specific features.

The next morning, I kitted up in Marcin's drysuit and undersuit and passed back through Sump 2, de-kitted and climbed the ropes to the Rock Bridge to retrieve the seal replacement kit and tools and a

spare dry undersuit (along with another bag of gear for further work beyond the sump) before returning back through the sump to Camp 4 and Marcin to replace the neck seal and sleep in the wet undersuit to dry it. Back on schedule!

Onward to Sump 4

We then had to strip down the MKIV CCRs and all other dive gear to manageable size and weight loads for carrying between just the two of us. (No support here on "the dark side of the moon".) We traveled the one kilometer to Sump 4 (a dry passage enabling the bypass of Sump 3). This led to five loads each (10km of caving) followed by equipment rebuild and test on the next



day, followed by a rest day.

Being beyond a flooded section of cave that is 8km horizontally and 1km vertically for several days with just one other human being for company is a humbling experience. It does feel seriously remote, and during the expedition, Marcin and I spent a total of 12 days in a five-day, and then a seven-day exposure alone.

Week three

On the first day of our third week underground, Marcin and I set off into Sump 4 following Jose's dive line from 2009 into the right-hand branch, and with only one line break to repair, soon arrived at 300m of penetration—the end of Jose's line and the 2009 explorations. The passage to this point was stunning, meandering left to right in a large, clean, washed passage with white gravel and sand floors, undulating in waves and heavily rippled from water flow. Visibility, as with Sump 2, was crystal clear, and with our

Light Monkey video lights, we got a stunning view of the passage.

At this point, I tied on a new line reel and swam on into the unexplored passage, each meter heading further into a piece of the planet never before illuminated or seen by human eyes! As the line rolled off the reel and the passage continued to ascend and descend over gravel and sand dunes and meander to the left and right, it became obvious that as I was going deeper, the sump was not about to surface into dry cave as soon as I had hoped. Soon, the familiar tug on my wrist—as the last of the line fed out of the reel—confirmed 120 meters of new passage at the crest of a large sand dune with three ways on ahead.

The way on

I tied on a second reel and checked the right passage first, with no obvious way on. The left passage started to progress, curving to the left and ascending, but proved to be an oxbow looping back

to re-enter the main passage above our own line 50m behind us, so I rewound this section of line and set off into the middle passage option, which immediately enlarged—"The way on!"

Reaching our deepest point yet at 12m with the second reel emptying rapidly, we arrived at a wall of flowstone steps blocking the passage from wall to wall, which we ascended step by step to surface in a small chamber of flowstone around four to five meters high, four meters wide and two meters across. We were through the fourth sump, but was there a way on?

Removing our masks and hoods to talk, all we could hear was the roar of fast flowing water! A waterfall! The J2 River! Excitement rose.

Marcin de-kitted whilst I held all his gear, remaining in mine, and after crawling carefully to protect his drysuit through a hole ahead at water level, he could soon be heard and his light seen to my right. A two- to three-centimeter





air space allowed us to talk and for me to see his light. Dipping my head into the water, having replaced my mask, I could see a square hole led through to Marcin's legs in a small chamber beyond.

The small hole turned out to be a perfect Phil-in-a-MKIV-with-two-bailouts size (with a bit of shoving and scraping). After I passed Marcin's gear through to him, we were able to de-kit and safely stow our gear to see what lay beyond.

Discovery

We first swam in a deep water canal of crystal-clear, fast-flowing water between flowstone walls with a stalactite-decorat-

ed ceiling before the water got shallow and we could walk downstream to a huge stalagmite. We squeezed around it to the left along with the water into a huge borehole passage beyond.

Here, the water cascaded vertically in a waterfall down a fissure on the right wall and ledges led up to the right to enter a high-level, large, ongoing passage. We had passed the primary initial objective of the expedition, Sump 4, and found continuing dry cave beyond that was now dropping deeper into the earth on day 29 of the three-month expedition! We were, to say the least, ecstatic.

After filming all we had found, we returned to our dive gear, kitted up and

made a very enjoyable return dive along our own line filming en-route to Lake T41, the Sump 4 dive base, to de-kit and return to Camp 4 for several coffees and a "double dinner"—having been away for 14 hours—and to telephone base camp with our great news.

The next step

There was now a lot to consider! The sump, hoped to be short and straightforward, had turned out to be 510m long and posed logistical challenges for the continuation of exploration, so we needed to head out and debrief to allow the team to reach a decision as to the best way forward.

Gear at Sump 2
base awaiting dive
haulage through to
Camp 4

Of course, heading out is not as simple as it sounds. The day after the push dive to pass Sump 4, we had to disassemble the MKIV CCRs into three manageable loads and then carry all the gear back through the one kilometer of cave to the downstream side of Sump 2. This took a whole day after which we spent a final night (for this trip) at Camp 4, and left early in the morning for the dive out with empty food containers, flat charging batteries and trash.

Refresh and renew

We were met by our support team, who not only quickly hauled our gear from the dive platform to the rock ledge above, but also had a pot of fresh coffee on the go for us (especially appreciated as we had run out of stove fuel beyond the sump and been on water and food bars for the last two days!) along with cheese, sausage and salmon jerky. From here, a night at Camp 3 followed by a night at Camp 2A, saw us reach surface four days after the push dive of Sump 4.

The morning after our exit, Bill called a dive team meeting to discuss the new plan in light of what we had found. Fortunately, our support team continuously fed me with coffee and pancakes with maple syrup, as they said that after 19 days underground, I looked like a POW—and indeed, the meeting was going to take a while!

The end result was that we would revert to Florida cave style tactics in dealing with this sump, using the dive line as our reference only and swimming lighter, neutrally buoyant loads of essential equipment through to explore the cave beyond. We would now take equipment to establish an emergency Bivouac beyond the sump if needed, to allow cooking and hot drink preparation and

J2 Cave

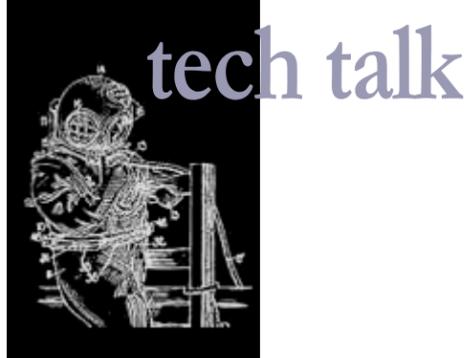
to enable continued exploration, rather than the original plan to run a thick haul line and telephone cable through Sump 4 and establish a Camp 5. Other than those logistically driven changes, we were back in business.

Resupply

Before a return trip could be mounted, however, we needed to resupply the cave with food and charging batteries for all camps and resupply Camp 4 (beyond Sump 2). To facilitate this, we agreed that Bill and one other support diver would do a resupply trip to Camp 4 with all the gear required for forward exploration, whilst a support team would carry the gear for this resupply and all resupply for the cave. Due to a shortage of manpower at this phase of the three-month project, I volunteered to go back in four days after exiting and carry gear to Sump 2, support Bill in preparation and kit up to dive Sump 2, and then exit... No rest for the wicked!



Phil Short after 21 days underground



Expedition members making their way along the J2 River inside the cave (right); Phil Short diving in Sump 4, J2 Cave, Mexico (below)

J2 Cave



Setting off

With the support team, I entered the cave and arrived at Sump 2, via a night at Camp 2A and a night at Camp 3, to help Bill with his resupply dive by lowering gear to the dive platform, packing the haul bags with all equipment required for the next exploration trip, weighting them as close to neutral as possible, and helping the divers kit up. Bill and his team set off with a bag each, dived through Sump 2 and emptied the bags returning to the dive platform for me to repack so they could be returned back through the sump, getting four bags full of gear through Sump 2.

Bill and his team then spent the next two nights at Camp 4. They hauled

all the resupply gear to Camp 4 and the exploration gear to Lake T41—the entrance to Sump 4. The support team and I returned back to Camp 3 for one night and then decided to do a direct exit from Camp 3 in one long day. We started early the next morning, arriving back in base camp exhausted after a four-day trip, only four days after a 19-day push! I spent the next seven days in base camp eating, reading, eating, sleeping and eating!

The big push

We were now ready for the main push trip to survey the sump, explore the upper high-level passage and the continuing river passage beyond Sump 4. After

a necessary seven days at base camp to recover from the first two trips resting and eating, I headed back into the cave with Nick and a bag of personal and resupply gear for a direct trip to Camp 3 on the April 1.

Marcin and a new support cave team joined us at Camp 3 the next day with more gear. We then started to prepare gear and pack loads at Sump 2 base to get ready for our dive through on April 5.

Our dive through Sump 2 was enjoyable due to Bill's resupply trip to Camp 4 for us. We had a single manageable load to carry through the sump, so we could have a look around and shoot some video. Once through, we de-kitted and moved to Camp 4 for the night and the next day, we again stripped down the rebreathers and carried all dive gear and other equipment in five loads each through the dry sections between Sumps 2 and 4, bypassing Sump 3 to rebuild all at Lake T41 by Sump 4 to dive on.

Valuable lessons

We had learned our lesson on the previous push and knew that especially now, two months into the project, rest days were important to recover between days of intense gear hauling in order to be ready to dive. We spent the next day at Camp 4 reading and sleeping. On the following day, April 8 (a week after entering the cave), we were ready to go.

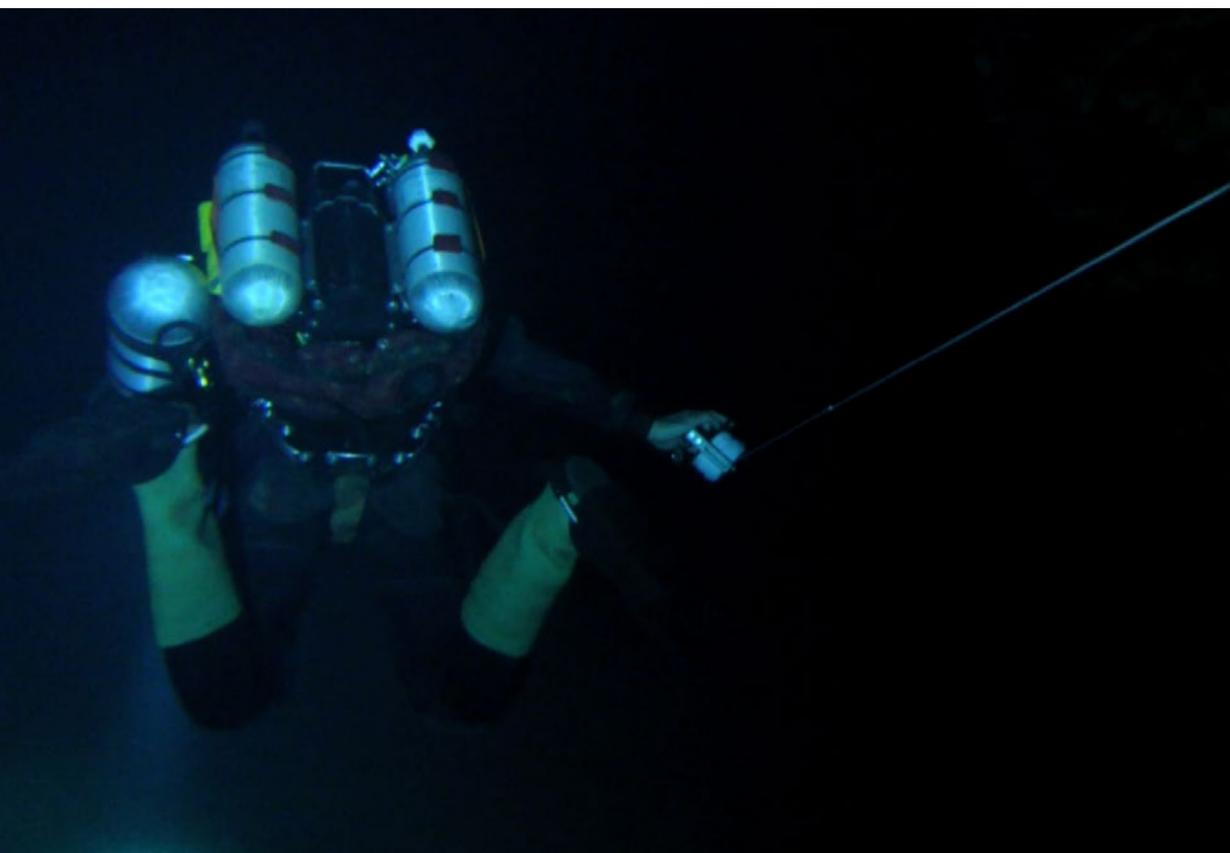
The dive through with gear was tough due to the drag, but we had managed to make the two bags almost perfectly neutral. So with a carefully slow swim pace, we passed the 510m sump again in 40 minutes. On reaching the far side, we exited through the previously noted squeeze to the passage right and de-kitted, shutting down the rebreathers and storing our dive kit on the flowstone ledge. Still in our drysuits, we swam down the canal and entered the main chamber found on the initial push to estab-

lish our emergency bivouac, where we changed from dive suits to cave gear and made a hot drink, whilst preparing the survey and vertical gear.

Taking readings

We first set off into the large borehole upper passage to the downstream left, running up above the water flow. I moved ahead to the furthest point of direct sight and tied on a tape survey station marker. I labeled it whilst Marcin took distance readings followed by distances to Left, Right, Up and Down (LRUD) of his position and a sketch of the passage to construct a high accuracy survey (map) of the passage we were exploring. In this manner, we continued in the large borehole tunnel with a sand or dry mud floor for 150m where the passage ended with a ceiling to floor flowstone formation.

At this point, we returned to our emergency bivouac to kit up in our vertical





gear and prepare the drill, hangers and rope to explore the vertical cave taking the J2 River. Sadly (as with many other flood-related battery issues on the trip), upon plugging the battery into the drill and pushing the trigger, we found the drill to be dead and unusable! But thanks to Marcin's rigging skill, we were able to rig and descend the 11m drop into the fissure to join the J2 River passage below.

J2 River passage

This section of passage was beautiful, with dark grey or black limestone covered in lightning streaks of white calcite and the crystal clear J2 River cascading along from pool to pool. After the first pitch, we carefully (in light of the remoteness of our situation) scrambled our way down the river passage until our progress was halted by a lake in the river that was the width of the passage and appeared to be eight to ten meters long, with undercut walls and deep water.

Now, as Marcin and I were in our thermal base layer and vertical gear only, we looked at each other and questioned, "What now? Go back for the drysuits or go for it?" Of course, we grinned at each other like kids at Christmas and went for it, trying to use hand holds along the walls to hold our chests out of the water (and failing).

We soon reached the shallow water stream continuing down beyond this point. This stream led on to a second pitch—more like a series of cascades—and a final drop into another lake. Here, Marcin again rigged on three natural belay points and descended with me following to pass another lake to a small

chamber where all the water disappeared through finger-width slots in the floor. Looking above, a climb over flowstone steps to the left led up to a squeeze so small it required removal of our vertical gear. It then led to a small chamber beyond, in the base of a loose, unpassable and again, in light of our extremely remote situation, rather scary breakdown.

After a thorough search around to confirm no other ways on through or around the breakdown existed, we returned to our bivouac base, frozen, to make hot drinks and reflect. We'd reached the end of J2—covering 1,000m of new, previously unexplored cave between the new submerged section of Sump 4, the high-level passage, and the stream way. Time to start the long journey out.

Heading out

We packed up and moved all gear to the downstream side of Sump 4 and kitted up for the return dive. We dived through Sump 4 and returned to Camp 4 together, after a 14-hour trip, and made a huge and well-needed meal with coffee before sleeping.

The next day was a needed rest day spent in Camp 4 eating, reading and sleeping. The following day, we returned to Lake T41 at Sump 4 to empty and repack the MKVI sofnoime canisters, do a pre-dive check and pre-breathe of the rebreathers, before heading back into the sump for the survey dive

Survey dive

Firstly, we swam the 510m length of Sump 4 slowly, side by side, with

Marcin against the left passage wall and me against the right. We used video lights to check the walls from floor to ceiling for any potential missed passages.

I had two areas in my mind where there were potential passages, both on the passage right, noted on previous dives. The first was a parallel tunnel running for 20m within the original 2009 project section of passage; and the second was at the point where, on our exploratory dive, the first line reel had run out (420m into the sump).

At this point, I followed a side passage to the right, which climbed a gravel and sand bank to drop into a continuing rift passage that curved sharp to the left to re-enter the main passage on our line after 30m of oxbow. This was the same area the previous left of passage oxbow had been noted on the exploration dive of Sump 4, showing this area to be in fact three parallel passages, all inter-connecting.

Having reached the downstream side of Sump 4, we turned and with two compasses, two depth gauges and a measuring tape—which we used from survey station to survey station, gathering depth, bearing, distance and passage distance to Left, Right, Up and Down (LRUD)—we made a high grade survey of the sump to complete the data collection. This turned out to be a 150-minute run time dive and gave us an intricate knowledge of the sump.

Leaving the cave

Enough fun! Time to work. The inevitable next step was to pack up and remove all gear from the cave.



Marcin and I were joined by two support divers at Camp 4, after they dived through Sump 2 on the open circuit, to pack and carry all gear across the one kilometer of cave from Sump 4 to Sump 2 before the four of us made eight-man dives, hauling bags through the sump, clearing all gear and the Camp 4 content from beyond Sump 2.

Once through the sump, the cave support team met us to haul all gear up from the dive platform and finally the platform itself. We made an improvised bivouac for the night at the Sump 4 pitch head. The next morning, we stripped and packed all dive gear into loads of 15 to 25kg, making 17 separate bags.

Marcin and I stayed in the cave after our push and survey dives in order to assist the first cave sup-

port team in hauling all these bags back to Camp 3 and then on to Camp 2A, before finally exiting the cave after a 21-day final trip into J2, via the Last Bash entrance.

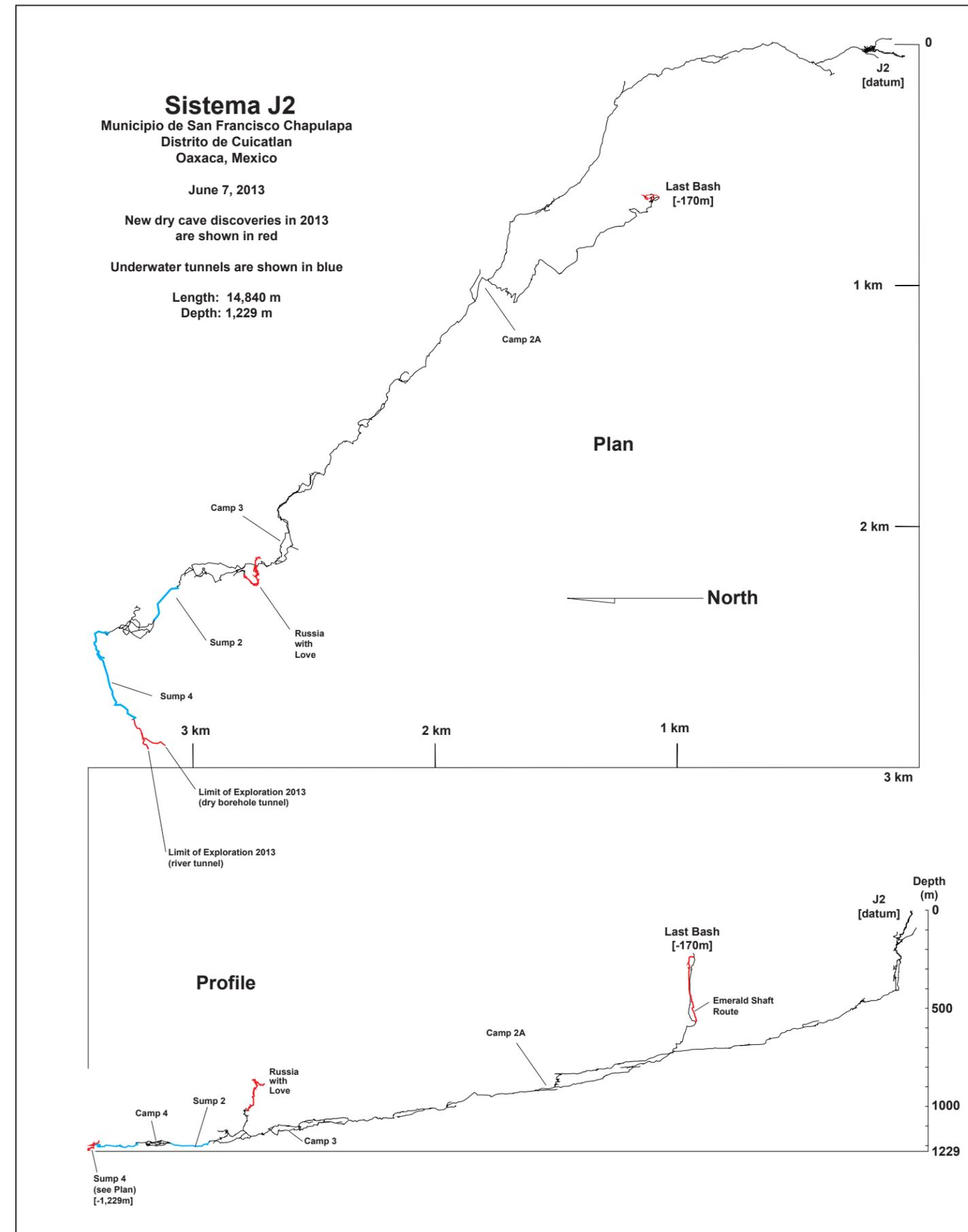
Over the next week, the remaining support teams cleared the rest of the cave of all equipment, breaking down the camps. In all, 40-plus bags were removed from the cave.

Afterthoughts

We emerged from 42 nights underground, 12 of which were spent camped beyond sumps. With 45 days spent in the cave out of 70 days in Base Camp, high in the cloud forest of southern Mexico, it was time to head home to the UK. We were tired, 8kg lighter and very happy with what we achieved in our "1,000 hours under the earth".



Phil Short is professional cave diver, deep wreck diver, technical diver and instructor. He is Training Director of IANTD UK specializing in training Instructors, Instructor Trainers and scientific, government and media teams. He was part of the first UK deep wreck team, DEEP. In tandem with Kevin Gurr at Phoenix Oceanering, he has worked on many film documentaries for British television including the BBC and Chanel 4. He currently works with VR Technology Ltd as a technical support consultant, test and development diver on Ouroboros, Sentinel and Explorer rebreathers, and continues with deep wreck and cave diving research projects as well as ongoing projects with the British Cave Diving Group. For more information, visit: www.philshorttechnical.co.uk.



Phil Short hears waterfall in J2 Cave (left); Systeme J2 map and cross-section (above)



photo & video

Edited by
Don Silcock

A decent image, only the colors do not cut it. A classic color problem easily corrected by retrospective white balance. Do not delete.

Text and photos by Rico Besserdich
Translation by Peter Symes

The more photos we shoot, the more we also have to sift through the numerous images, and the more challenging it becomes to pick out a selection that represents a specific location or subject matter well. Which ones to keep and process and which ones to bin is the question. Rico Besserdich gives you some pointers.

Opportunities are there to be seized. For most divers who do not have the opportunity to dive every day but go on just a few trips every year, it is about making the most of it when you have the chance. And on a typical dive trip, there are only so many opportunities to capture great images. So, just go for it when you have the opportunity, as you may not get another try.

In the earlier days, underwater photographers would usually run out of film before they ran out of air, but present-day still photographers would be hard pressed to fill a memory card before the dive is over, even if they tried.



Selecting Images

— *What to Toss & What to Keep*

Nonetheless, or perhaps for that very reason, it is only too easy to accumulate hundreds or even thousands of images from diving on weekends at the local beach or lake, or going on a two-week liveaboard in some remote area. Memory cards and hard drives have never been so cheap, resulting in the

price for storage falling to only a few cents per gigabyte. For example, an 8Tb hard drive, which I have seen on sale recently for 250 to 300 Euros (US\$279-335), can store hundreds of thousands of images. So there you have it.

In the bigger picture, it is clearly not the price of storage that is holding us

back. In turn, it begs the question of whether it is really worth it to hold on to vast quantities of images, most of which are of secondary quality or outright outtakes. Obviously when it comes to what should be presented to other people, a selection should be made. Not even your most ardent fan will endure sitting

through thousands of your images.

Beginners have a propensity for keeping most, or sometimes even all, of their images. Professionals, on the other hand, go over their images very rigorously and hit the delete button extensively, striving only to keep what meets the highest quality requirements.





One photo series in Adobe Lightroom's library module (left); The free Lightroom plug-in, Show Focus Points, shows where the image is focused, which is, in this case, highlighted by the red and black rectangles (below)

At the high end, professional editing software such as Adobe Lightroom, Adobe Photoshop Bridge (part of Photoshop) and Apple Aperture are popular choices among serious photographers, but these come at a price. As for image viewers, there are free versions such as FastStone Image Viewer (www.faststone.org), which will display all popular image formats including RAW and DNG (Digital Negative). It is also possible to view images with the computer's native file viewer, but these are often quite limited in regards to displaying RAW or DNG image files.

As a minimum requirement, the viewer should be capable of 100 percent magnification zoom. Present-day screens are often capable of at least the classic HD resolution, which is 1920 x 1080 pixels. In comparison, a photo taken with a 10.1 megapixel camera in 3:2 format will have 3888 x 2592 pixels, which is significantly larger than the display size of the monitor. Thus, to evaluate the image in detail, it must be zoomed in to 100 percent. Use the mouse or arrow keys on the keyboard to



Goliath Grouper Photo Competition 2015

In an effort to increase awareness on the plight of [Atlantic Goliath Grouper \(*Epinephelus itajara*\)](#) and to further their Federally protected status, the [South Florida Underwater Photography Society \(SFUPS\)](#) is holding the first international photo competition in support of the species.

Atlantic Goliath Groupers were on a fast track to extinction but thanks to conservation efforts they thrive in South Florida waters. Every year from August through October hundreds return to local waters off West Palm Beach County for a mating ritual of collective spawning. Start planning your underwater photographic expedition to swim with one of the friendliest fish in South Florida.

THE PHOTO CONTEST:

- Categories:** 4 Photo and 1 Video
- Dates:** August 1 - October 31, 2015
- Location:** Palm Beach County, Florida
- Prizes:** Dive Travel Packages, Scuba Equipment, UW Photo Gear, and More
- Sponsors:** Reef Photo & Video, Palm Beach County Diving Association, Ocean Arts Media, Nova Southeastern University, Florida Dept. of Environmental Protection and many more

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scroll around and take a closer look at specific areas of interest. The devil (and sometimes, an angel) is in the details, and therefore, it is essential to take a closer look.

3) Ensure your monitor is calibrated. This is very important! Your screen must be adjusted to

It is, however, not just a matter of how strict your selection criteria should be set. The process of selecting images should also be a time for reflection and self-critical analysis, as well as an aid to identify weak points, potentially leading the way to improvement and creative development. Rather than just being frustrated over less optimal images, you should view the results as pointers as to what can be done better the next time. Photography does not, by no means, end when the shutter button has been pressed.

Selecting means making choices and most of them are rejections, but whether you choose to keep 10, 100 or 900 out of 1,000 images is down to both technical criteria and personal preferences such as:

- Technical criteria, e.g., exposure, sharpness, composition, etc.

- Personal preferences, e.g., sentimental value or other emotional connections

Selection and storage

For starters, your camera is definitely not the right place to store your selection of images. Whether

submerged at a safety stop, on the boat, on the lakeside or in the waiting hall of the airport, the small size of the LCD display on the camera and its limitations in color and contrast range make it unsuitable to properly assess images, let alone make any final

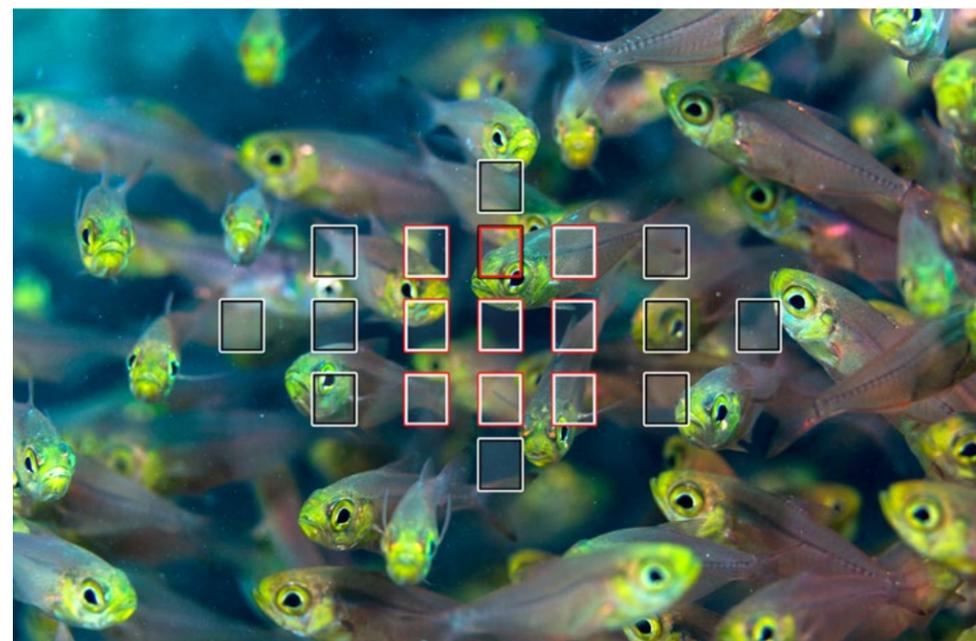
selection. You should only use it for deletion of completely blurred or vastly under- or overexposed images and images you took before the dive to test lighting and exposure settings if you need to free up space on the card.

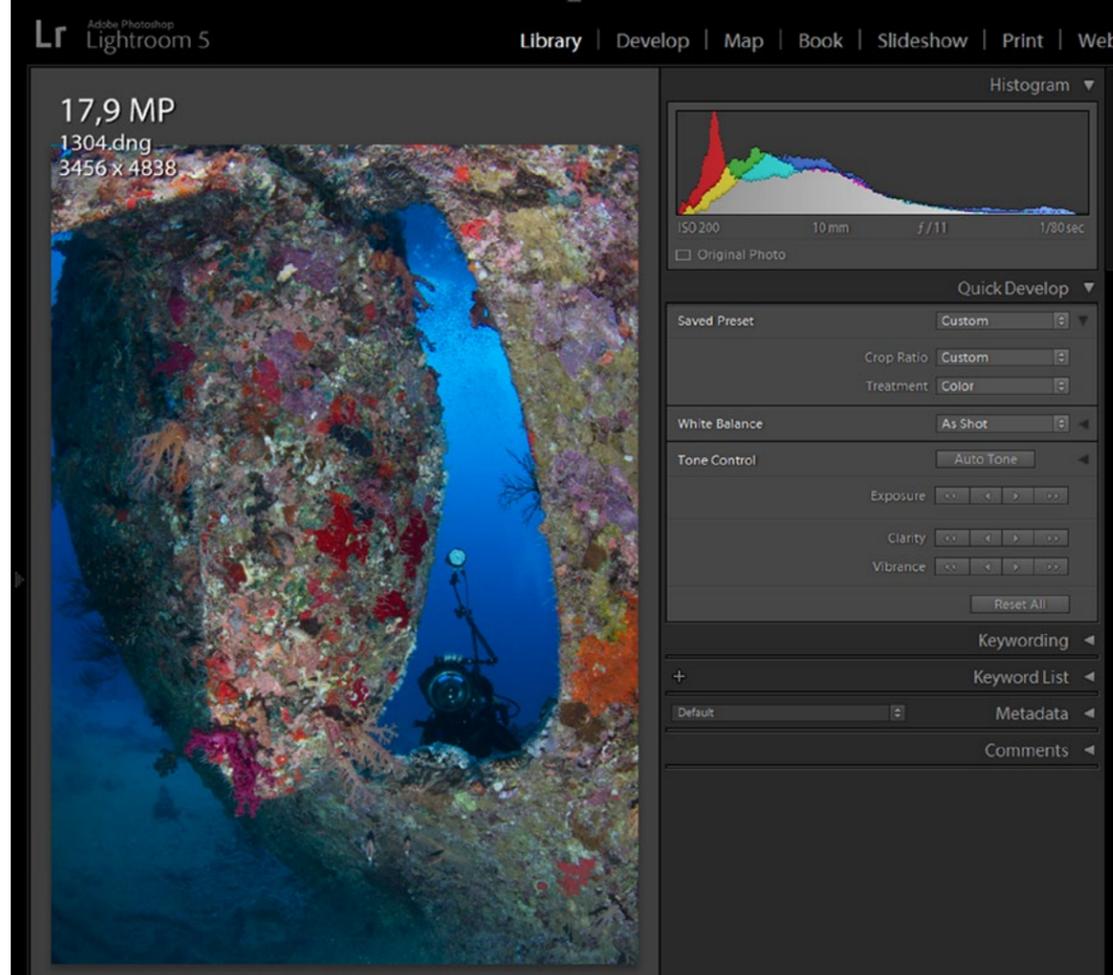
Images are best viewed on a computer screen when making a selection. Sometimes, positive surprises will stand out that quite simply were not visible on the small camera display, and images that may appear botched at first glance may turn out not to be.

Requirements and preparations

1) Transfer the images to a computer (ideally a desktop) and place them in a folder from where they can easily be accessed.

2) Ideally, you should already have an image editor or viewing software on your computer.





Selecting Images

Lightroom offers an additional window in the image preview that shows the histogram, which facilitates an analytical assessment of exposure (left)

• While the purely technical aspects of a photo such as exposure or sharpness can be relatively easy to assess, the emotional evaluation and selection of images is subject to constant fluctuations. This is just human. The way we look at pictures and emotionally assess these changes from day to day, depends not only on personal circumstances and mood, but is also influenced by our immediate surroundings such as music, light, or perhaps a glass or two of red wine.

• Right after we return from a diving holiday or come up from a dive, we are all euphoric, which affects the way we view and select the recorded images. Shortcomings are generously overlooked because the positive memory of the experience overshadows the tech-

displaying color, brightness and contrast correctly. Do not assume that the factory setting of a computer screen means it is correctly calibrated.

Ideally, the monitor should be calibrated with the use of an external calibrator, such as the Spyder4Pro Datacolor or the Pantone Huey Pro, which are relatively inexpensive. There are also free, but less precise, online calibrators that can be found by googling "monitor calibrators". Once the monitor has been calibrated, the viewing, judging and selecting of images should then take place under the same light conditions under which the monitor has been calibrated. Note that monitor calibration should be repeated regularly, ideally every four to five weeks.

4) Take your time and enjoy it. Mindful of the often considerable investment in terms of time, money and effort put into taking the images in the first place, this process deserves your undivided

attention and that you set aside the time required. Working in a hectic or noisy environment is rarely conducive for creative processes, so it is better to wait until you can find some peace and quiet, and you feel up to concentrating on the task at hand.

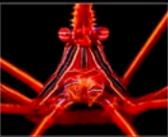
Don't expect to be able to select more than 100 images out of 1,000 in an hour. In fact, a serious selection process should take place over several rounds, for the following reasons:

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bethwatsonimages@gmail.com


www.bethwatsonimages.com
bethwatsonimages@gmail.com

With an image like this (unedited RAW image directly from the camera) there's not much to quibble about. Of course, it is selected and retained for future use on the hard drive



photo & video



Encounters (left)—an unprocessed RAW image directly from the camera. As part of a larger concept or idea, this image remains on the hard disk.

Hermit crab (below)—an unprocessed RAW image directly from the camera. Perhaps no winning picture, but homogeneous and harmonious. Maybe an article about hermit crabs will be written in the future; therefore this image will be retained until further notice.

in doubt, leave it for a while and come back to take another look later, be it the next day or even months later. At times, matters are better off left to simmer and mature for a little while. Classification Look at your images one after another. Don't hurry but make a close examination. For a systematic approach, use the following short checklist to make a crude sorting:

“Don't know”: Leave image and have another look at a later stage.

1) Is there anything of apparent interest in the image?

Interest can be aroused in many ways. Often, this is done by the subject matter (animals, wreck diving, underwater landscapes) or also by image statements (conservation, documentation) and image moods (light effects, color effects). Sometimes, it's even a combination of all. Obvious outtakes, such as shots taken with the lens cap on and test shots, should be deleted right away.

2) Does the image appeal to you?

Often, a purely intuitive first impression manifests itself before and independently of a more objective technical assessment. Sometimes, an otherwise technically perfect picture may not appeal to us, while a technically imperfect picture may immediately make an impression. An image with an emotional appeal should be retained, and if possible, be reassessed at a later stage (as per the fourth point above).

3) Does the image serve your intention?

This is aimed at photographers with a specific objective in terms of specific techniques of photography, or on photographing special motifs. These cases often produce a whole series of images, and it is up to the photographer to decide whether the results fulfill the preset criteria.

If a specific photographic approach has been followed on a dive, it often results in an extensive series of relatively similar images. This is normal. In these cases, it is often better to look at each series in isolation and pick out those

nical deficiencies. However, it may also work the other way round. For example, a dive that was initially perceived as unsuccessful may dispose the diver to just erase the taken images in a bout of bad mood—even if they are good.

• Emotions are not the sole factor that affects our visual perception and judgment. Photographic training does, too. Thus, images that we first found to be without significance can take on a completely new dimension once we have taken the time to delve into the composition, for instance, and perhaps discover altogether new qualities in an image initially destined for the trash bin.

It is nearly impossible for anyone to dissociate from emotions, but the understanding and recognition of the role that emotions play and how they affect our decisions in selecting images is a considerable insight that cannot be underestimated. Ideally, we should be able to set aside all vested emo-

tions and assess images solely from a purely objective point of view, but in reality, getting even close requires a lengthy learning process and a lot of practice.

Therefore, whenever you find yourself

tematic approach, use the following short checklist to make a crude sorting:

“Yes”: Continue to the next image.

“No”: Delete image or mark for deletion.



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individual images that best meet the objectives.

4) Is the image correctly exposed, and if not, can it be corrected?

Evaluate the histograms to assess whether the image has been correctly exposed in relation to the photographer's intentions insofar as these are apparent. What is deemed correct exposure largely depends on these intentions, but while these cannot always be



Lens corrections are a useful tool. The photo (far left) has a typical error made with a fisheye lens. The photo (left) is the same image after the lens correction is applied (using Lightroom 5.3). It's still an unchanged RAW image, only the lens correction was applied.

formats record and preserve the complete set of image information captured by the image sensor in contrast to the ubiquitous and popular but also 'lossy' JPG format, which compresses the file, reducing the available data. Consequently, images saved in RAW or DNG stand a significantly better chance of being successfully corrected than those saved in JPG format.

5) Are the colors what you intended, and if not, can they be corrected?

Unless they were intended to be shot using only ambient light, underwater images captured without flash (i.e. because of a misfire) or the use of artificial light-

Selecting Images

ing, are usually lost causes if they are taken any deeper than 5m (15ft). If there are no colors present, there is none to be recorded, in which case, no software can ever put colors back into the image. A slight color cast is a different matter. This can usually be corrected by subsequent adjustment of the white balance, provided you work with RAW or DNG files.

6) Is the image sharp and the focus where you want it to be?

To properly assess the sharpness of the image, it should be viewed at 100 percent magnification, bearing in mind that even when the image fills the entire screen, it is most often scaled down and thus appears sharper than it really is.

How sharp a picture must be is to some extent a matter of personal taste and preferences. Completely blurred images belong in the trash bin, but if there are any sharp areas in the image, the question is whether this focus is where it matters. If the choice of focus area has been completely left



known, the histogram is generally a quite useful tool.

This is where Adobe Lightroom has one of its strengths. When viewing the images in the library module, the histogram is displayed for each image, allowing for a quick and easy assessment of how it is exposed.

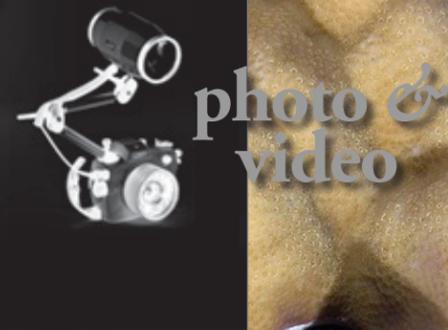
Such software also

An unprocessed RAW image directly from the camera. This image is part of a series. However, it is a case for the trash, because the focus is wrong and the lionfish is swimming out of the picture.

provides options to correct some exposure-related problems, which can be attempted, such as improving contrast. To what extent the issues at hand can be fixed and whether the image can be improved, also hinges on the dynamic range of the camera used, the overall tonality of the image itself, and in particular, on the file format with which the image was recorded. RAW or DNG

Malfunction of strobe flash (did not fire). As a result, blues and greens dominate the photo and there's no photographic information. Due to the 20m depth there is no color, nothing to save. A clear case for the trash.





Sense or nonsense? This image was marked for deletion due to lack of significance. Still not deleted two years later, it ended up being published in a campaign to protect the oceans. The theme of the illustration: Corals are not very happy about what happens in your home. Image potential sometimes takes time to mature.

100 percent magnification to assess the image in detail. Noise artifacts may be reduced in software but often at the expense of overall sharpness, in which case it becomes a subjective choice as to striking the right balance.

Since no lens is flawless, it is also worth looking at correcting lens

for the camera to decide, the outcome can sometimes be surprising.

Tip: A free plug-in for Adobe Lightroom provides information on whether and where in the image the camera focused. (www.lightroomfocuspoints-plugin.com).

7) Are the noise, lens distortion and other optical errors within acceptable levels or can they be reasonably corrected?

Unsilently noise in the image may result from shooting with higher ISO-settings, the extent of which depends both on how high it has been set and the quality of the camera. As above, use

errors such as chromatic aberration, distortion and vignetting. As these errors are known and generic in many cases, image editing software offer lens correction filters, which will amend some of these issues. Once again, these work primarily for images saved in RAW or DNG and offered mostly for dSLR and mirrorless cameras.

8) Does the composition work?

Is there a recognizable composition? Is it pleasing? Can the image be improved by cropping it in any way? Composition is a complex matter, and there is much more to it than the well-known rule of thirds. Suffice it to say skillful composition matters just as much as the subject matter itself.

Even in cases where you have answered "no" on the initial sorting checklist, I still recommend that you retain a copy of the image somewhere on a hard disk. Because over time, with experience and knowledge, you will come to view your images in a different light, and at times, discover previously unknown potentials and qualities.

Tip: Some photo viewers and editors provide the option to assign a grade to images i.e. by a number of stars. The more stars, the better the picture. This feature is useful to perform a crude first sorting of your images into, say, a first choice, second choice and third choice, thereby avoiding the risk of deleting some of them too hastily.

While some of the points on the checklist are relatively straightforward, other points will require a bit more effort in terms of critical review, consideration and perhaps even reflection on your own photographic work. The latter process is, however, a quite important one, as it will also enable you to evolve as a photographer, even with the camera sitting idle in the drawer waiting for the next dive. ■

Rico Besserlich is a widely published German photographer, journalist and artist based in Turkey. For more information, visit: maviphoto.com.

Dehaze feature lets you rescue cloudy images

Text and photos by Peter Symes

The new Dehaze control in Adobe's Photoshop CC and Lightroom CC helps eliminate fog and haze in photos, including underwater shots.

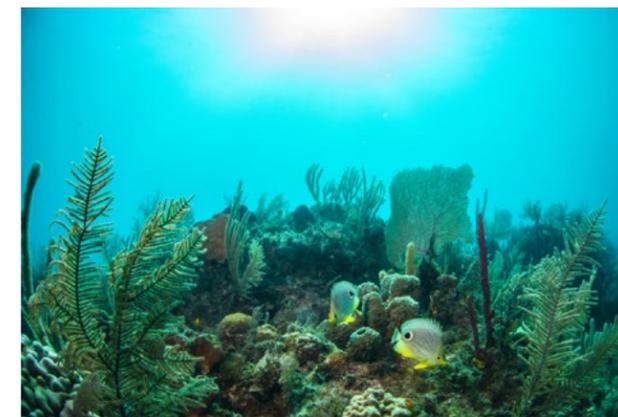
Before the Dehaze feature, one would need to raise the contrast, clarity and saturation levels to get the image recovered to where they need it to be. For the best results, you'll want to set the white balance for the image

before using Dehaze. Then, in the Effects panel, move the slider to the right—to easily remove the haze from the original scene.

Photoshop's healing brush also gets an update—processing enhancements will now allow effects of the tool to be seen immediately. Also new is an update to existing lens blur effects that will make it possible to add noise back to a scene once blur has been applied and grain has been smoothed out.

Further to Rico Besserlich's

article, "Selecting Images", in this issue, I subjected a couple of discarded images to a little Photoshopping in order to test these new features. In none of these cases did I spend more than a few minutes. The new Dehaze function is found under Camera Raw Filter (only works on RAW files) along with sliders for, among other things, colour temperature, tint, contrast and exposure, which I adjusted first before applying any Dehaze and, hey, presto! ■



Reef scene from Grand Bahama (left). There did not seem to be much particular matter in the water, but shooting straight into the sun could have

enhanced an existing haze or created artefacts such as a lens flare.



White grunt (left) shot in silty waters near Blue Heron Bridge in the U.S.

French grunt shot near Blue Heron Brigde in Florida, USA. The left image is a crop from the original jpgs saved by the camera. On the right, contrast and saturation has been adjusted before applying the dehaze.

state of Florida. This image has been improved mainly by applying the Dehaze filter.



Edited by
Don Silcock

PRODUCT SHOTS
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Aquatica A5Dsr Housing

Aquatica has announced the imminent release of its new housing for the Canon 5Ds, 5Dsr and 5D Mk III. The A5Dsr housing features improved ergonomics such as a control extender arm for ISO control plus an oversized, brightly colored button for record start/stop. Available as an option with the A5Dsr housing is the integration of Ikelite's TTL circuitry. The new housing is available in July at a retail price of US\$3,400.



Nauticam NA-D7200 Housing

Nauticam has released its housing for the new Nikon DX D7200 DSLR camera. The NA-D7200 is said to be 15 percent lighter than its predecessor, the NA-D7000 housing, and features improved ergonomics, pre-installation of the electronics for Nauticam's vacuum system, a redesigned camera saddle with a vacuum system reset button and access to the camera's programmable Fn button. The NA-D7200 will retail at a price of US\$3,300.

Sea&Sea Housing for Sony A7II

Sea&Sea has announced the release of its new housing for the Sony A7II full-frame mirrorless camera. Also released with the MDX-A7II housing is a conversion ring that will allow the use of Sea&Sea's NX ports in addition to its standard ML ones. The MDX-a7II is fully compatible with Sea&Sea's internal Optical YS-Converter, which converts the camera's electrical flash triggering into an optical signal. It is available as an optional extra. The Sea&Sea MDX-a7II retails at US\$2,896.



Mangrove MVHS-X70 Housing

Aditech has announced the release of its new housing for the Sony PXW-X70 and the HDR-CX900 camcorders. The Mangrove MVHS-X70 housing uses a total of 12 electromagnetic external push-buttons to provide LANC control for 25 camera functions. It also features a 3.5-inch TFT LCD rear screen and an optional AUO 3.5-inch, 16:9 ultra-high resolution monitor. The Mangrove MVHS-X70 is available now at a retail price of €2,065.



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PRODUCT SHOTS
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Sealux HC-X1000 Housing

Sealux has announced it is shipping its new housing for the Panasonic HC-X1000 4K camcorder. Constructed of aluminum and featuring a large 5-inch rear display and all-mechanical controls, the new housing ships with a flat port, but dome ports can also be used as required. The HC-X1000 housing also features internal close-up and neutral density "flip" filters.



FROM WETPIXEL | WETPIXEL.COM

Ikelite EM5 II Housing

Ikelite has released its housing for the Olympus OM-D E-M5 Mark II mirrorless Micro 4/3 camera. Manufactured using Ikelite's signature polycarbonate material, the housing features the company's TTL system and full compatibility with its magnified viewfinders. The polycarbonate material used for the housing allows Wi-Fi transmission so that images can be downloaded directly from the camera onto compatible devices without having to open the housing. Ikelite has a selection of ports available for many of the Micro 4/3s lenses popular for underwater photography. There is a pdf chart with full details of lens compatibility available.



Nauticam EM5 II Housing

Nauticam has also released its new housing for the Olympus OM-D E-M5 MII mirrorless Micro 4/3 camera. The NA-EM5II housing features one button access to the OM-D's Super Control Panel together with fiber optic strobe triggering plus the option of attaching 45-degree or 180-degree viewfinders for use with the camera's electronic viewfinder. The NA-EM5II housing is available now at a retail price of US\$1,450.



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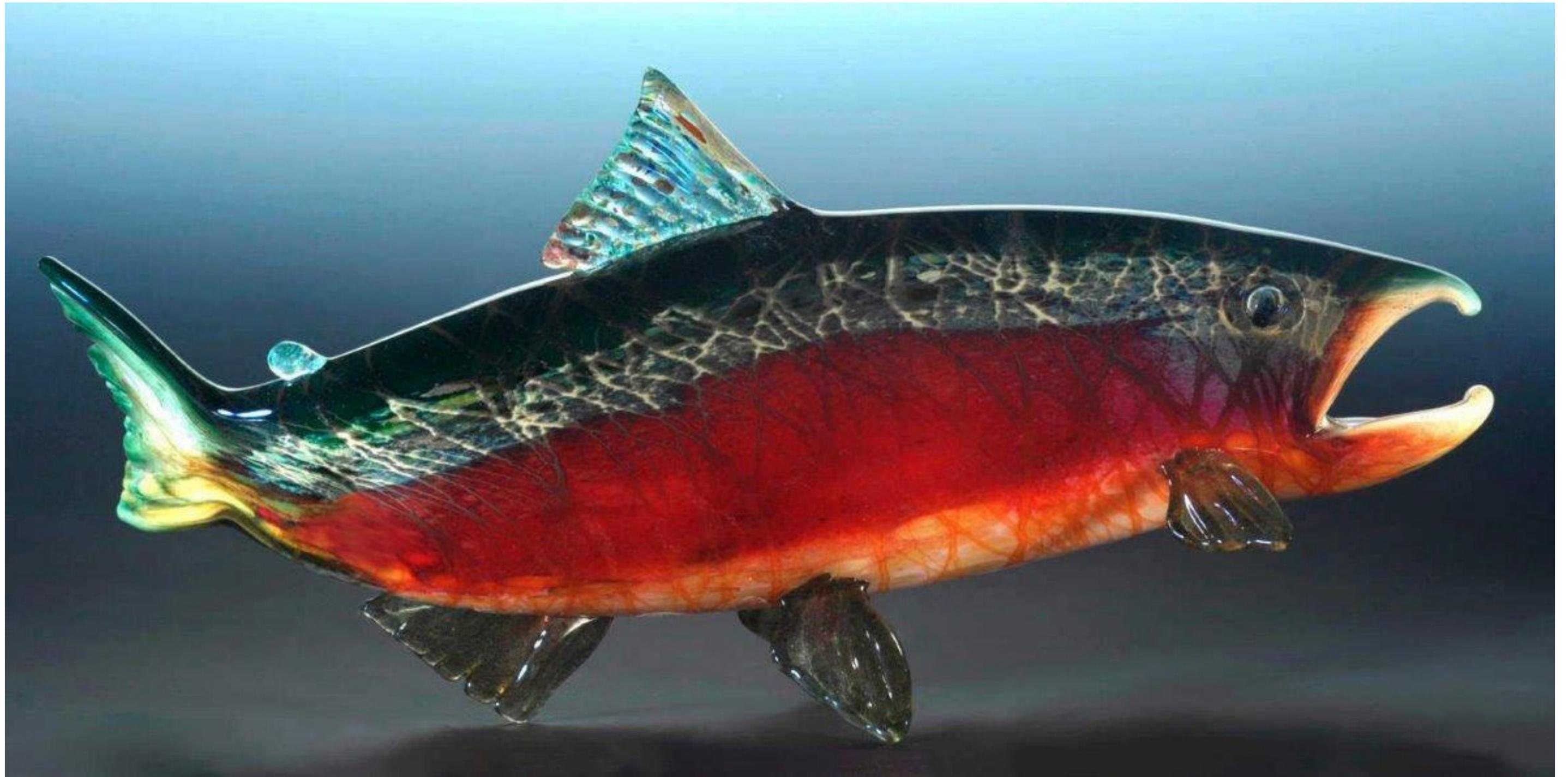
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Andy Nichols



P O R T F O L I O



PREVIOUS PAGE: *Salmon*, by Andy Nichols. Blown glass, 18x7x4 inches. THIS PAGE: Close-up detail of blown glass sculptures of salmon by Andy Nichols (left); *Fish in Grass*, by Andy Nichols. Blown glass, 20x20x20 inches (below)

Andy Nichols

things are new, like babies, and some things are opening up. Then I started seeing how things fit together technically.

X-RAY MAG: What is your artistic process? How did you develop your glass salmon?

I think that having the scuba diving experience really sparked my imagination, but I think it takes more than that—it takes studying it. It's so funny, when I first started making fish in my garage, just because I loved fish, they weren't really any type of fish—it was just a fish idea. I remember my kids were young at the time, and they said, "Dad, your fish really sort of suck. Why are you making them?" And I said, "Well, because I think they're fun!"

end of a pipe—it just has to be something, and you couldn't wait around. It was the most difficult thing I had ever tried. I think the challenge just drove me to want to do it.

X-RAY MAG: Tell us how you developed your glass sculptures and artistic style. How did you come to focus on ocean-related themes in your work featuring forms of fish and coral reefs?

AN: Luckily, the restaurant I worked for was owned by a medium-sized company with several hotels and

certified. Most of my scuba diving was in the Puget Sound area (in Washington State) up near Seattle. So when I started doing glass, I thought, well, one, I love ocean-related things—fish and texture and color—and two, it seemed that there was a good market for it.

My very first big job was a big chandelier for one of my previous employers' premier hotels on Cannon Beach. It was the very first job where I used blown clusters of seashell-shaped pieces. So that is how it all got started.

My shell sculptures developed along the way, with different textures and in the way they were shaped and how they opened. The more you look at ocean life and how things are tightly packed together, the more you see that some

restaurants. When I got my little glass-blowing shop going in my garage, which I ran on the side for about two years as a hobby, and I left the restaurant business, the people I worked for realized that this was my passion. So, they actually came around to help support me and started buying glass for their hotels and restaurants.

I think that part of the connection I have with ocean-related stuff came from a time when I worked for two years in 1988 and 1990 on the Oregon coast. I was just fascinated with the ocean.

When I was a kid, I wanted to be an oceanographer and took some classes in the subject. My family had a beach cabin in a small town on the Oregon coast. We would go fishing in the ocean, and I just loved it.

When I was working at a restaurant on the coast, I took scuba classes and got

kids grew up in a house full of just-about-whatever-you-wanted-to-do-it-could-be-done attitude. After school, I really didn't know what I was going to do, so I fell into the restaurant business, and I did restaurant work for about 20 years. While I was doing that I continued to do some artwork on the side as a hobby.

When I was in high school, my mother owned a stained glass studio, so I was around that quite a bit. I learned how to do stained glass windows and some fusing.

Then I took a glassblowing class back in the late '90s, and it was just the most fascinating thing to me. In all the other art forms I had done, like painting and stained glass, you could take your time... you could stop, step back and look at it... maybe come back to it tomorrow. But glassblowing was an immediate thing. You have that hot glass at the



Text edited by Gunild Symes. All artwork and photos by Andy Nichols

American artist Andy Nichols creates vibrant sculptures of migrating salmon, fish and coral reefs in blown glass. After 20 years in the restaurant business, he opened his own glass studio in the Dalles, Oregon, where he continues to develop his own unique, signature style.

X-RAY MAG: Tell us about your background and how you became a glass artist.

AN: Well, art is sort of my second career. I actually studied art in school and my mother was an incredible artist, so we



Then, after about two years, I thought my fish were getting better. I set out to show one of my fish sculptures to a guy who had a brewery store in the next town over, where they sold beer supplies and glassware. The guy wasn't there but an elderly man was at the counter, and he asked, "Well, what do you want?" and I said, "Well I came to show this guy what I do," and he said, "Well, show me."

So I unwrapped the fish and he looked at it and said, "What the heck? What is that?" and I said, "It's a fish!" And he said, "I've never seen a fish like that." And I said, "Well, it's an artistic interpretation." And he said, "You need to go home and do some homework." Turns out he was a fish biologist, retired. And I thought, "You

know, you might be right."

And from that point, I really started collecting books and articles and magazines and posters... mostly with a focus on salmon, everywhere I went. The Dalles, where I live, is on the Columbia River, and the Columbia River Gorge is just quite beautiful. So I am right in the heart of salmon country.

I soon realized, the more you get to know them [the salmon], the better you understand them. Where does that fin really go and how does it move? Now, many who come in to see my salmon sculptures say, "Wow, your fish are there! You got it!" And I say, "Oh, not even close! I'm on this journey and there are some things about them that I've not figured out or captured yet." It's a lifetime jour-

ney. I'll understand them someday, maybe, but if I can capture the shape of a salmon's mouth or the wiggle of the fish, it gets me excited, because I feel like I've captured a little bit of the essence of their world.

X-RAY MAG: Do you go out and study the salmon in nature?

AN: About six years ago a friend of mine found for me this really cool underwater live feed video camera. It's not a filming camera but it's got a live feed. It has 60ft of cable with which you can lower a camera down and it has a monitor and a battery pack. It even has night vision. So you can actually go and just get down in there and watch the salmon. I use it when I go camping, in small

streams and smaller rivers where the water is really clear. You can put that camera in places and just watch the fish come right up through the rocks. I've taken it to fish hatcheries and watched a bunch of fish close up, wiggling together and going in and out of the picture.

I met a marine biologist, a young lady in our area. She came to the studio and we collaborated on a salmon skeleton project. She pulled up some information for me and really explained the anatomy of the fish. The challenge was how do I take glass and make something like that?

X-RAY MAG: What is the process in creating a glass fish sculpture?

AN: Well, it's very tricky. The kind of glassblowing I do is off-hand glassblowing. Basically there's a hot furnace with liquid glass in it at the studio, and then we fire up another gas-fired furnace to keep it hot. The fish is four dips of clear glass with glass colors, mostly powders and frits (glass bits) added into the layers. I use some silver leaf on most of the fish.

Basically you take the blow-pipe and gather some glass on the end of the pipe. Some people ask me, "Well, do you have a mold for the fish?" And I say, "No, it's basically wet newspaper and my hands that sort of squeeze the glass and pull on it and cut it to achieve that shape."

The fish takes about two hours. In the first hour, it's not very fish-like—it's just a lump of glass, then I put all the colors in, and then I blow that out into a bubble and



Close-up detail of blown glass sculptures of salmon by Andy Nichols



Blown glass and metal fish sculpture by Andy Nichols. 6x3 ft, exhibited at Primary Elements Gallery, Cannon Beach, Oregon

portfolio

Spawning Sockeye with Eggs, by Andy Nichols. Blown glass, 18x48 inches



stretch it. All the fins, except for the tail fin, are added on separately. And this is where it gets tricky and this is where if I had an assistant on the fish, it would help me, but I've been able to achieve the fish without any help so far, and for the size they are, that works, but if they got any bigger or more complicated, it would require more people.

People ask, "How long does it take to make a fish?" And I usually say, "An hour and 45 minutes to two hours." And they say, "Well, that's really fast and looks so complicated." And I remind them that in the glassblowing world, you have to keep it hot the whole time. You can't let it cool or the glass will break. So I can only stay out of the furnace for about 40 seconds. So for almost two hours, every 40 seconds, I am in the furnace and out of the furnace. It's

really a lot of standing up and sitting down and torching. Normally, you're all sweaty and wet after a fish, no matter what time of year.

Then the fish sculpture goes into a kiln to slow cool over night. So whatever product I make during the day, I don't see it or touch it until the next day. That process is called annealing. Blown glass has to be annealed, and the thicker the glass, the longer the annealing.

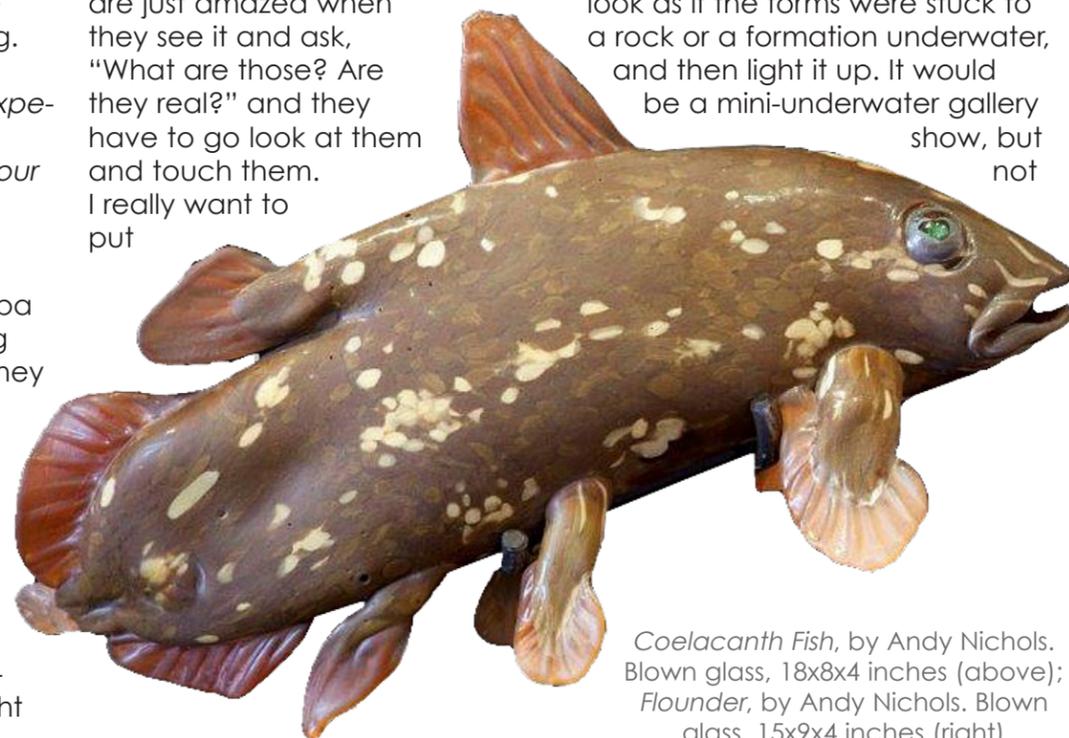
X-RAY MAG: How does your experience scuba diving influence your artwork and where are your favorite places to dive?

When I moved to the Dalles, I was sort of away from my scuba diving. I found that as a young artist I didn't have a lot of money to do that, so I sort of fell out of my whole scuba diving thing. About three or four years ago, it was driving me nuts and I went and took a refresher class. And then about a year-and-a-half ago, I bought new gear, because all my gear was really old. For the first time, I bought

a drysuit, and I have a whole new set up that I have not used yet. So, my goal is to get back in the water and get inspired a little more.

There's some beautiful places in the Puget Sound area where the water clarity is pretty good, certain times of the year. There's really a ton of marine life and things to see. I've only done a little bit of warm-water diving, not as much.

So my goal is to get back into the water, and because the artwork has sort of developed while I have not been diving, I have some really fun ideas that I want to try that I have not tried. For example, I made a big 4x6ft wall hanging with 450 of blown glass shell pieces, along with some cast starfish. People are just amazed when they see it and ask, "What are those? Are they real?" and they have to go look at them and touch them. I really want to put



Coelacanth Fish, by Andy Nichols. Blown glass, 18x8x4 inches (above); *Flounder*, by Andy Nichols. Blown glass, 15x9x4 inches (right)



Andy Nichols

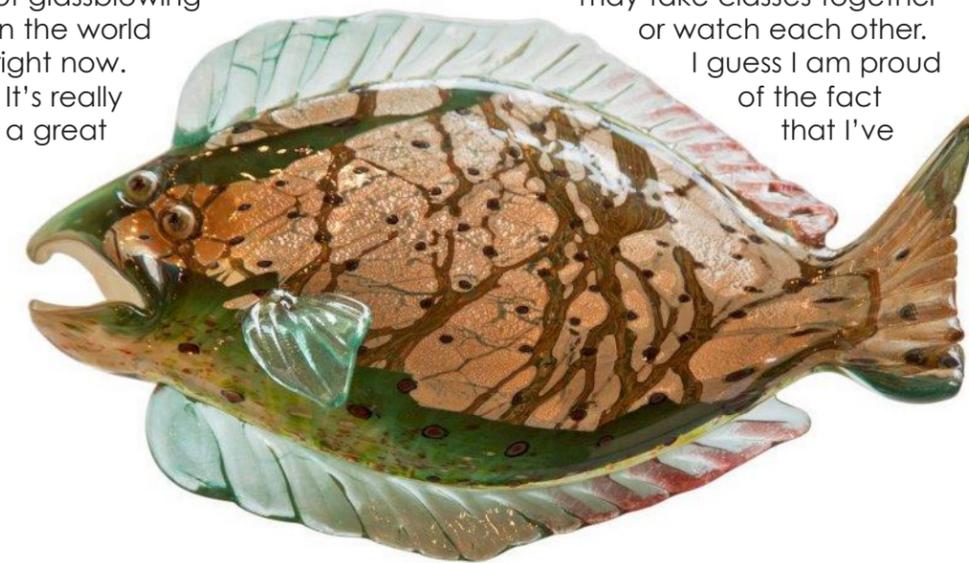
permanent. The soft glow of those forms underwater would be really spectacular.

X-RAY MAG: What are the challenges and benefits of being an artist today?

AN: It's funny, Seattle is really close by, and it's really the hub of glassblowing in the world right now. It's really a great

place for a lot of glassblowers, and I am sort of on the outskirts. I've had people say to me, "Well, you haven't worked with Dale Chihuly," or, "You haven't worked with one of his spin-offs..." It's really a who-you-know kind of thing.

The glass community sometimes is really small. Many glass artists may take classes together or watch each other. I guess I am proud of the fact that I've



portfolio

never seen anyone make a fish yet. It was all trial and error for me, and I think that it makes my fish different from anybody else's. I worked really hard to create fish over a long period of time. Perhaps I would have gotten a lot better, faster, if I had worked with those people in Seattle. But in a way, it gives me something a bit different.

X-RAY MAG: Do you feel like you have to keep coming up with something new?

AN: Yes, I think like in any business—and I probably picked this up in the restaurant business—you can't have the same menu all the time or people will go to another restaurant. It really has to be fresh. You have to stay up with what's happening, you have to have new items, and it needs to change and evolve all the time.

One of the other challenges I face is that I'm not a fast typist and so much of the business requires being in the office to communicate and write proposals or network. My sister is a really cool encaustic artist/painter and she's really good at media. So she's just miles ahead of me on social networking and promoting herself. She might spend one-and-a-half to two hours on the computer or in the office, whereas I am more likely to say, "I just want to go build things."

X-RAY MAG: What are your thoughts on ocean and freshwater conservation and how does your artwork relate to these issues?

AN: People often say, "Oh, you must fish a lot." And I say, "No, I don't anymore." I want to get down there and get with the fish, but I don't want to fish anymore. Our world is changing quite a bit, and I feel for the fish. The Columbia River has a whole bunch of dams on it that make it hard for

the fish to do their normal thing. There are chemicals and run-off from all the farming around here that makes life a challenge for the fish.

There are two different groups that I help and donate to. One of them is called Water Watch. I donate a glass fish every year to their auction. Water Watch is a water environmental group that tries to educate and help with water quality and the survival of the stock, the fish. They've taken out a couple of small dams. There are small dams on little rivers in Oregon used to generate power, but they don't anymore, and the dams never had fish ladders, so the fish never got beyond them. [Water Watch] worked hard to take out those dams and get those steams back to normal.

The other group is called the Coastal Conservation Association. They help with coastal issues, garbage, how we use the beaches, crabbing and fishing techniques, to make sure we are doing it the best way we can.

There was a really good effort I heard about, and I was so excited, I wanted to know more about it. There was some money that was found by the NOAA organization, and NOAA actually went out and hired a couple of boats to go pick up ghost crab pots. In the last 50 years, crabbing has become really big business on the upper west coast. A lot of people don't know this, but a lot of crab pots

Sea shell piece by Andy Nichols (above). Blown glass, casted glass 20x48x36 inches, exhibited at the Nichols Art Glass Gallery, The Dalles, Oregon



Andy Nichols



Blown glass shell shape chandelier by Andy Nichols. Approximately 375 pieces, 400 lbs., exhibited at The Ocean Lodge, Cannon Beach, Oregon



Close-up detail of blown glass shell shape chandelier by Andy Nichols

are lost, and then animals get caught in them and can't get out. It's a sad thing. So NOAA went out with really cool technical equipment and looked for ghost pots.

Humans are a crazy group. We take a lot, and we don't think about what's best, or about the longevity of the things we enjoy, or even about what we eat.

X-RAY MAG: How has your experience in the restaurant business helped you in the art world?

AN: The restaurant business is really a

Sea Wall, by Andy Nichols (right). Blown glass, 6ft x 7ft x 32 in, Casted glass panels with 450 blown glass shell shapes, exhibited at the Nichols Art Glass Gallery in The Dalles, Oregon

Andy Nichols



my passion and just the love of it, it will happen. And I always believe that, "If you build it right, they will come." But it has to be right, it has to be really good, and it has to be good all the time.

X-RAY MAG: What feedback or insights have you gained from the process of showing your work to various audiences?

AN: I love the idea of

sharing the experience of glassblowing with people, especially young people, because a lot of people don't get to see glassblowing, and it really can open their minds. These days, in our area, there's not a lot of money in the schools for things like the arts, so we do field trips for kids from either grade school or high school. Kids can watch glassblowing demonstrations at our viewing counter at a you-can-touch-me distance, and then I explain what's happening. ■

For more information about the artist, visit: www.nicholsartglass.com.

crazy business. It's very fast-paced and to make money at it is very difficult. You need good volume, and you have to have really tight controls on your food and labor costs to really make it work.

Those ideas were really ingrained in me. So when I started doing glass, I noticed in other glass studios, there were people standing around to open the door, or four people wanting to help the artist, but only helping a little bit. And I kept thinking, "Who's paying for these people?"

That's a lot of wasted time.

So when I started with my own studio I thought well, if I had a counter-weight on my lid, I could open it up with one hand, or if I had a hanger, I could hang it up and go grab something else and come back... little things like that. Do all you can by yourself until you REALLY have to have a second person.

The other thing I learned working in the restaurant business in the hotels, which really were trying to have a fancy place, crunching the

numbers on the spreadsheet was not what the owner advised. He said, "Stop. No, just go out there and make the best food and have the best service ever, every single time. If you do that, the money will come."

So I really realized that if you work really hard to have something nice and you do it well, the money will come. I like money, but I'm really motivated by just making good art. I don't really worry about the money, because I think that through



Close-up detail of Sea Wall by Andy Nichols (above and upper left)