



GLOBAL EDITION
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South Africa
Sardine Run

Egypt
Soma Bay

Norway
Culinary Diving

Greece
Hilarion Mine

Canary Islands
Gran Canaria

UW Photo
Swimming Pools

JORDAN'S ARTIFICIAL REEFS

Aqaba

COVER PHOTO BY WOLFGANG RIESS

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COVER PHOTO: *The C-130 Hercules turboprop military transport aircraft lit up at night—it is one of the new artificial reefs in the Red Sea at Aqaba, Jordan.* See the interactive 360° photo by Wolfgang Riess at: eDive360.com

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Close-up detail of sea urchin, Gran Canaria, Canary Islands. Photo by Christian Skauge



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Pay attention to briefings

editorial

The international dive community was shocked and grief-stricken when the news broke of the devastating fire that consumed the award-winning California-based liveaboard *Conception* and the 34 people who perished, including divers and crew members. The accident struck close to home, as many of us have taken dive trips on liveaboards at some point. Some among us had even been on that particular vessel.

The thought occurred to many of us that "it could have been me." The divers on board who likely died of smoke inhalation were much like any of group of divers we might know. Then, reflection set in. How could this have possibly happened? Should one worry

about going on a liveaboard again? Is it safe?

The matter of investigating the accident rests with authorities such as the National Transportation Safety Board (NTSB), the Marine Board of Investigation (MBI) and the US Coast Guard (USCG), and their work is still ongoing. Until this process has come to a conclusion and findings and recommendations have been published, it is best to refrain from speculation.

That said, it is our understanding that the vessel was reportedly in compliance with applicable regulations and had been regularly inspected to that effect. This fact seems to raise the question of whether or not the said regulations are suitable for present-day liveaboard operations—at least those that applied to *Conception*,

which was built in 1981, almost four decades ago.

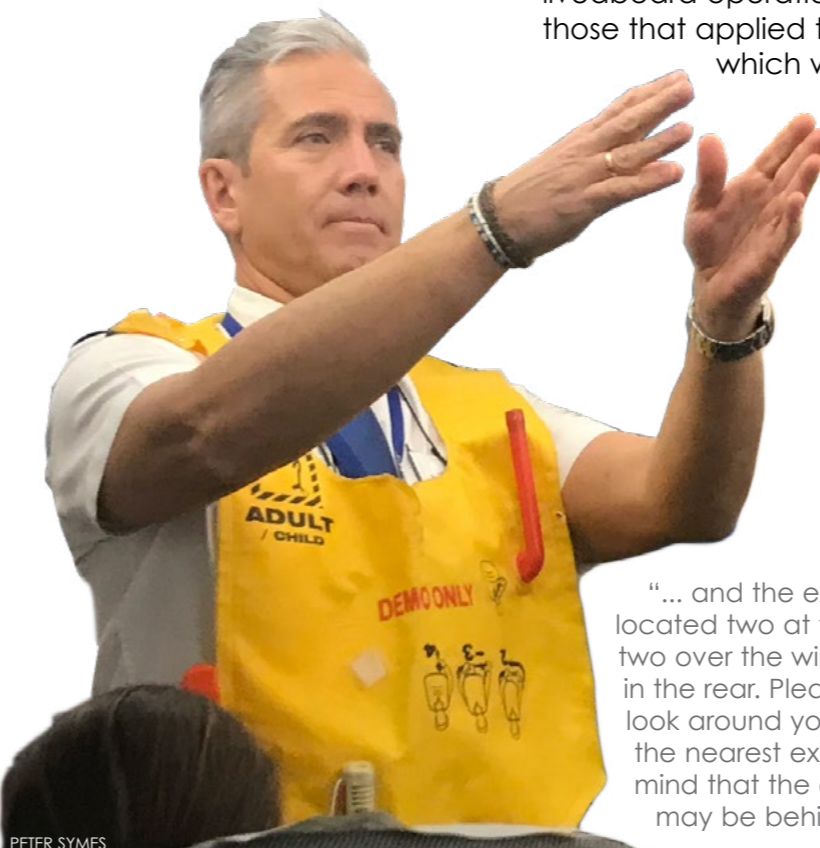
Operators respond

We have spoken to a number of liveaboard operators, and while their vessels are far more modern in the first place, each one of them have further reviewed their safety measures, procedures and policies. Changes these operators mentioned they made after their review included adding more hatches and escape routes as well as additional crew on watch, and prohibiting charging of batteries in cabins or at night.

As guests on board a liveaboard, and day boats for that matter, we also need to take responsibility for ourselves, paying proper attention to the safety briefings provided at the onset of the trip and making a note of where the escape routes are—just like one should do when boarding an airplane.

Travelling by air has become very safe in no small part because airlines and manufacturers of aircraft have learned from past accidents and continually develop better safety products and protocols. It is both encouraging and reassuring to learn that liveaboard operators seem to have adopted a similar mindset and have already taken the lessons from the *Conception* to heart by implementing improved measures and protocols. With all that being said, I think we should also focus on enjoying our next dive trip.

— Peter Symes
Publisher & Editor-in-Chief



"... and the exits are located two at the front, two over the wings and two in the rear. Please take a look around you to locate the nearest exit, bearing in mind that the closest one may be behind you."

PETER SYMES



Edited by
Catherine GS Lim

NEWS

from the deep

ALDO FERRUCCI



Red corals in the Mediterranean Sea

Red coral recovers in Mediterranean protected areas

Mediterranean species such as red coral, with a hard and striking red skeleton, is key for formations of encrusting corals and algae, as it gives it physical structure, increases its complexity and serves as protection for several

species, which feed on the coral-ligenous habitat.

According to a recent study, protection measures implemented in Marine Protected Areas (MPAs) in the Mediterranean Sea have helped colonies of red

coral to partially recover to levels reminiscent to those of the 1980s in Catalonia (Spain) and of the 1960s in the Ligurian Sea (Italy).

The study, conducted by researchers from the Institute of Environmental Science and

Technology at the Universitat Autònoma de Barcelona (ICTA-UAB), illustrates the effectiveness of the marine protection.

Before such protection was implemented in the last decades, the disappearance of red coral led to less biodiversity, ecosystem complexity and greatly reduced its capacity to sequester carbon.

Using historical data from the northwestern Mediterranean Sea, the study showed how the red coral colonies reached their minimum health status in the 1990s, when the larger, tree-like colonies were overexploited and subsequently depleted. The findings also show the contribution of red coral to carbon storage, with the coral's carbon sequestration capacity being halved in just a few decades due to direct harvesting.

Commenting on the study's positive conclusions, lead author Miguel Mallo said that the findings reflected the performance of only a portion of the region's red coral population. He added that "in the most recent decades, the vast majority of red coral studies, and thus, data available,

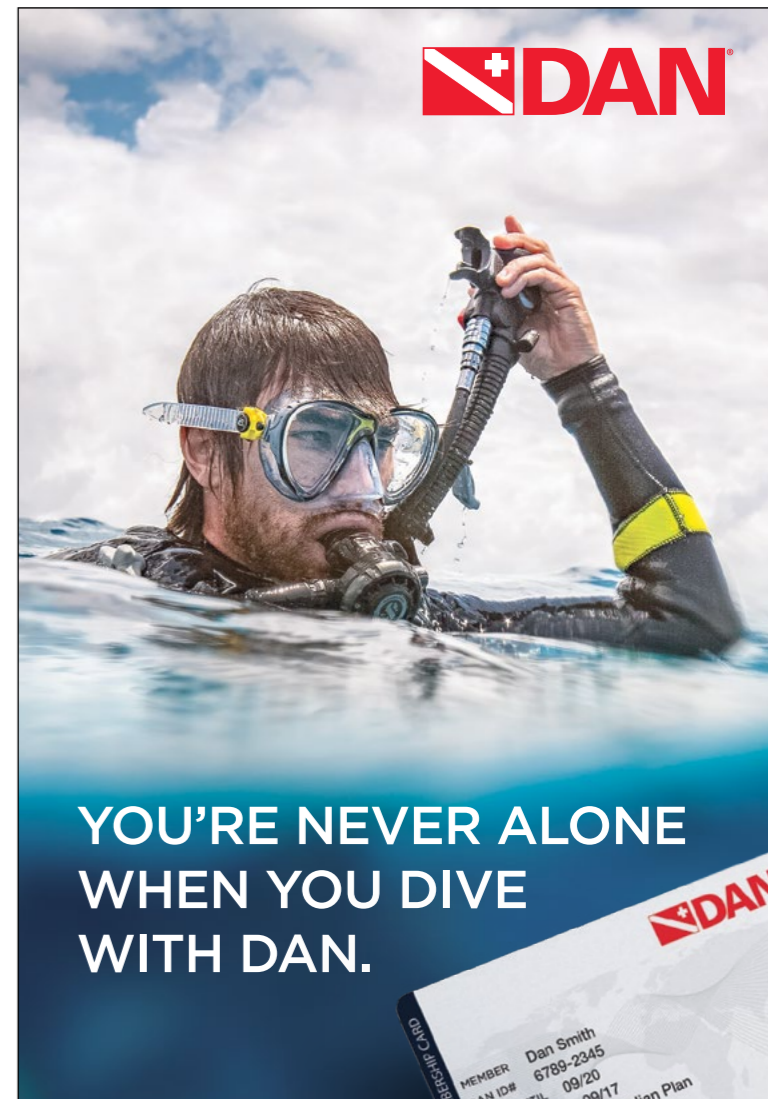
Although the implemented protection measures have proven to be effective, "these results have to be treated with caution, as they only reflect a part of the existing red coral population of the region."

were concentrated in few areas coinciding with Marine Protected Areas, leaving unstudied the colonies of other locations that do not benefit from protection measures, with worse health status."

Senior scientific researcher and co-author Sergio Rossi explained that "the very slow growth and low reproductive rates of red coral, combined with its continuous harvest and intense periods of over-exploitation, makes the majority of the actual red coral small in size and unable to do its function in the habitat, thereby affecting several species." Since ancient times red coral has been heavily harvested, being used to make jewellery, ornaments and also in trade. Some past civilisations even consumed it in a bid to boost fertility, healing or spiritual abilities.

"The positive note is that the protection measures can be effective relatively quickly. This is important because it gives to these ecosystems greater capacity to resist and recover following climate events in this rapidly changing Mediterranean Sea," said ICTA-UAB researcher Patrizia Ziveri.

■ SOURCE: EUREKALERT



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Edited by
G. Symes



COURTESY OF MIDE

Malaysia International Dive Expo 2020 is open for registration

Since 2006, MIDE has continued to grow, contributing to the dive industry both in Malaysia and abroad. Now in its fifteenth year, the show, which will be held 12-14 June 2020 in Kuala Lumpur at the Putra World Trade Centre, expects an increase in visitors this year, with the inclusion of new exhibitors in water-sports.

Over the past 15 years, the show has welcomed around 180,000 visitors, with an average of 10,000 visitors each year, of which 90% were divers. Attending industry professionals last year included dive operators, manufacturers, distributors, entrepreneurs and tourism boards, many of whom made use of a new B2B networking platform MIDE created just for them.

B2B networking platform

This dynamic tool, connecting businesses based on specific brands, products and services, will again assist exhibitors in MIDE 2020. Exhibitors will be able to make the most of their three days at the expo, using this tool to schedule on-site meetings while previewing buyer and seller profiles.

Forums & presentations

Other features of show include a focus on dive education through a series of presentations, including the annual Ocean Rescue Forum, with its 2020 theme: "Responsible Diving." In addition, there will be an all-female line-up of presenters in underwater photography, sharing their stories, insights and challenges as women in this field. Technical divers will find the cave diving forum a valuable resource for tips on safety, equipment and destinations. There will also be a forum on diving for persons with disabilities, in which panel speakers

will share their life-changing stories in this field. Visitors will also find a wealth of information on safety in diving with tips from DAN World.

See the video

For a glimpse into MIDE, watch the recent video of the show, which includes overall shots, speakers and highlights, as well as short interviews with participants and behind-the-scenes time-lapse photography. Go to: https://www.youtube.com/watch?v=Czs_2QCvER.

Visitor & trade registration

Visitors can avoid the cues by pre-registering now. Pre-registration for the B2B networking platform is also open. Go to: mide.com.my. Exhibitors can register today before space runs out. Email: info@mide.com.my. For updates, follow MIDE on **Facebook** and **Twitter** @ MIDE Expo. The expo will be held in Dewan Tun Razak Hall 1, Jalan Rahmat, Putra World Trade Centre, Kuala Lumpur. ■



2019 LBO Winner 2nd Portfolio
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2019 LBO Winner 2nd Creative
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2019 LBO Winner Best of Show
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Edited by Peter Symes



PIXABAY

Ocean currents speeding up

The world's oceans seem to have been speeding up in recent decades.

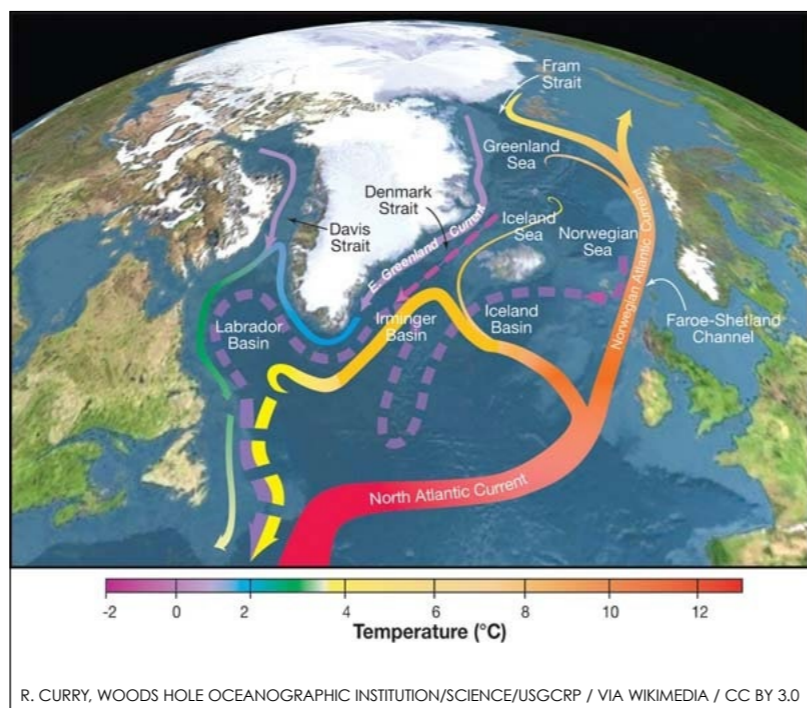
A strong acceleration in the global mean ocean circulation over the past two decades has been described in detail in a paper recently published in *Science Advances*. This acceleration of global circulation extends into the deep oceans on a planetary scale.

Seventy-six percent of the top 2,000 metres of the ocean appears to have sped up since the 1990s, largely because of an increase in surface wind speeds. Wind forcing is the major source of the mechanical energy of the global ocean circulation, which redistributes the earth's energy and water masses and influences global climate. Therefore, an accurate assessment of changes in ocean circulation is key to understanding global climate change.

The acceleration of global mean ocean circulation is substantial and statistically significant. Researchers found that between 1990 and 2013, the energy of these currents increased by 15 percent per decade. The acceleration is far larger than that associated with natural variability, suggesting that it is principally part of a long-term trend. The trend is particularly prominent in the global tropical oceans, reaching depths of thousands of metres.

Meanwhile, the Gulf Stream seems to be slowing, causing the North Atlantic to cool. But

because this current—also known as Atlantic Meridional Overturning Circulation (AMOC)—is driven by cold water sinking and flowing southward, its slowing does not negate the possibility that winds could increase other currents. ■ SOURCES: SCIENCE ADVANCES, NATURE



Map of the Atlantic Meridional Overturning Circulation (AMOC)

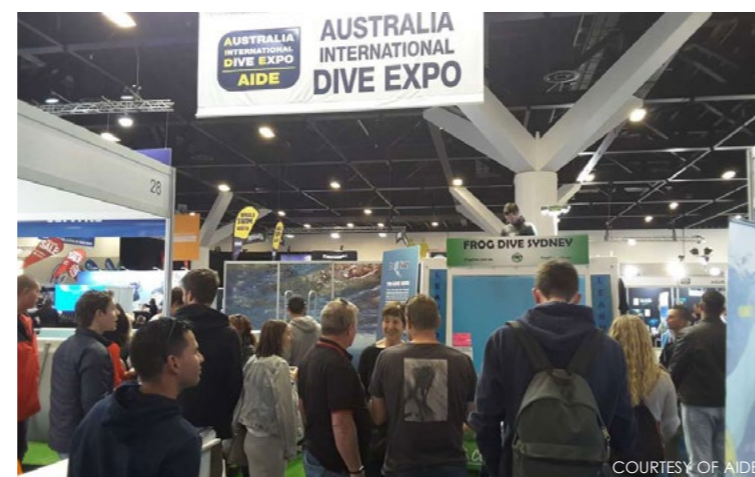


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THIS PAGE: Scenes from AIDE 2019 where visitors listened to key speakers, experienced try dives and met exhibitors

Australia International Dive Expo 2020 registration is open

Now in its fourth year, AIDE is back as part of the Sydney International Boat Show (SIBS) at the International Convention Centre in Sydney's Darling Harbour from 30 July to 3 August 2020. In addition to providing the scuba diving market a boost, growing its community by inspiring visitors to explore the underwater world, AIDE aims to give opportunities for the public to learn more about various aspects of diving and our planet's marine ecosystems.

Now housed in a new space on Level 4 of the exhibition center, AIDE has a new setup and ambience over the five-day event, including a dive education program with presentations and forums on scientific diving, ocean rescue, dive medicine and women in underwater photography. With over 60,000 divers and boaters visiting the boat show every year, exhibitors enjoy extensive exposure, with ample opportunities to interact with visitors, making sales and reaching new audiences.

Welcoming students

Reaching out to the next generation, AIDE and SIBS will again welcome over 400 students as part of the dedicated school program for New South Wales Marine Study

Schools, with various presentations and demonstrations.

Watch the video

Get a sneak-peek at AIDE, including highlights and features of last year's show and quotes from participants. Go to: <https://www.youtube.com/watch?v=kg8yve58HbM>

Exhibitor registration open

If you are interested in exhibiting at AIDE 2020, you can now register at australiadiveexpo.com. Email: info@australiadiveexpo.com.

Want to visit the show? You can now pre-register at: australiadiveexpo.com. For more information and updates, follow AIDE on Facebook and Twitter @AIDE Expo.



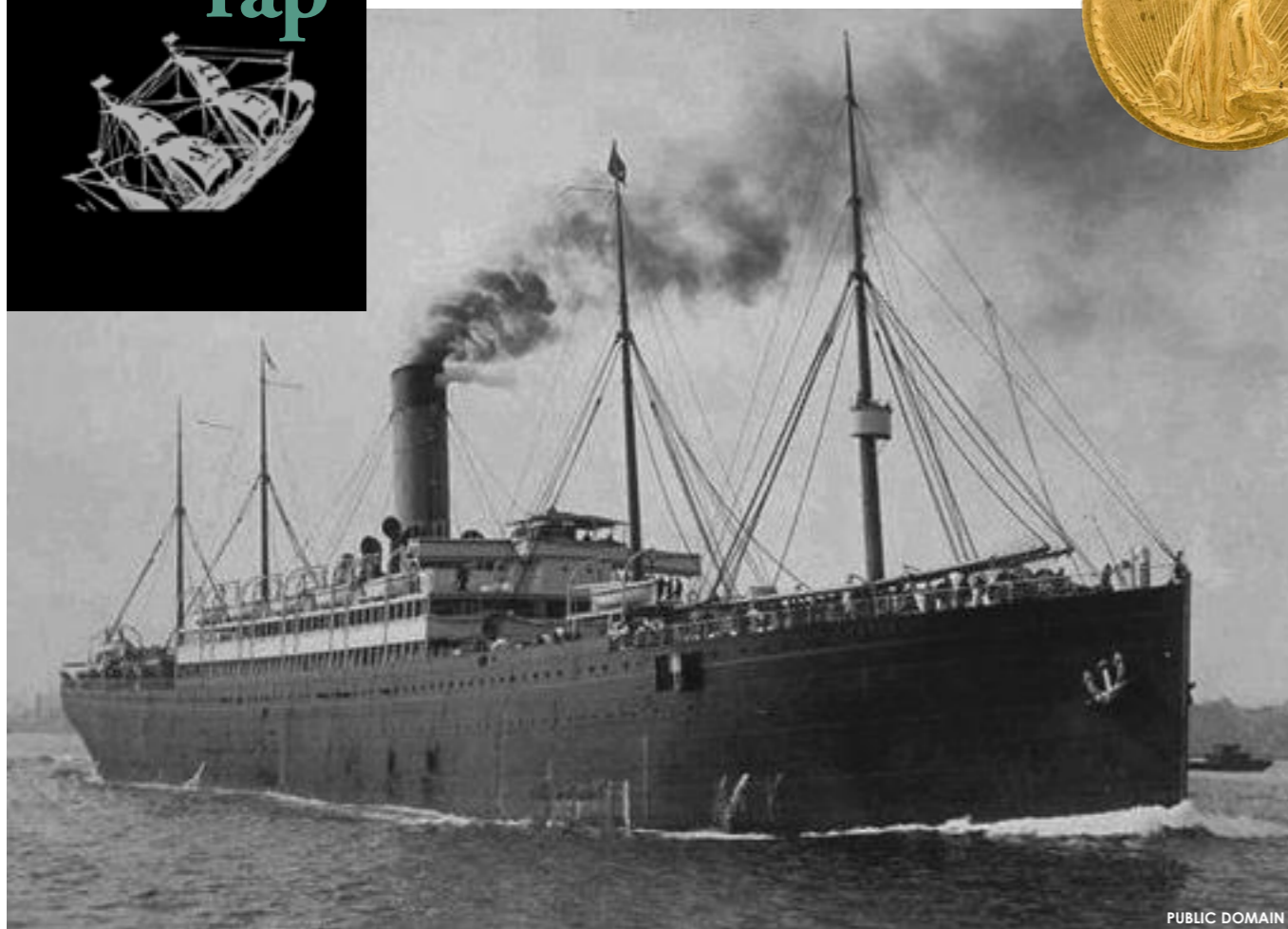
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wreck rap



PUBLIC DOMAIN

RMS Republic. Did she, or did she not, carry a cargo now worth billions?



A double eagle is a gold coin of the United States with a denomination of \$20.

day, suggest *Republic* was carrying a considerable treasure of gold and/or other valuables when she went down. In addition to a \$265,000 US Navy payroll and a consignment of silver ingots, it is also alleged that it carried to the bottom of the sea a politically sensitive and secret shipment of gold, which had been consigned to the Czar of Russia: a \$3,000,000 (1909 face-value) five-ton shipment of mint condition American Gold Eagle coins. However, independent confirmation that the ship carried a fortune remains elusive.

Confirmation?

Meanwhile, Captain Martin Bayerle of Lords of Fortune LLC, remains confident he is onto something. "We have since unequivocally confirmed one cargo, the US Navy's 1909 payroll and operational expense shipment of \$800,000, today's

value very conservatively \$200,000,000."

Capt. Bayerle discovered the wreck of the RMS *Republic* in 1981. A salvage effort conducted in 1987 was successful in targeting and excavating the target area, but failed to locate the gold, however. The crew excavated the target area but ended up in the ship's wine locker, finding hundreds of pre-1900 bottles of wine and champagne.

Following the salvage attempt, the 1987 joint venture disbanded and any artefacts brought up were sold at auction. After acquiring ownership of *Republic* on 1 August 2013, Bayerle published the bulk of his significant research into the mystery of RMS *Republic* by releasing a book entitled, *The Tsar's Treasure: The Sunken White Star Liner With a Billion Dollar Secret*. He is also star of the History Channel show "Billion Dollar Wreck." ■



SS Florida survived the collision and was repaired in 24 days.

SOURCES: EIN PRESS-WIRE, WHITE STAR LINE, COINWORLD

Wreck holds cargo worth over US\$7 billion? Treasure ship mystery may soon be solved

Lords of Fortune, a salvage company based in Miami, Florida, states it plans operations in 2020 to recover gold estimated today at more than US\$7 billion, which the firm asserts was aboard the RMS *Republic* when it was lost. The liner sank in 82m (270ft) of water south of Nantucket Island, Massachusetts, on 24 January 1909 after a collision with the liner SS *Florida* during thick fog the previous morning.

In the early morning of 23 January 1909, while sailing from

New York City to Gibraltar and Mediterranean ports with 742 passengers and crew aboard and Captain William Inman Sealby in command, *Republic* entered a thick fog off the island of Nantucket, Massachusetts. Out of the fog, the Lloyd Italiano liner SS *Florida* appeared and hit *Republic* amidships on her portside, at about a right angle. Six people died in the collision, but no more lives were lost as passengers were distributed onto other vessels that came to the rescue.

Captain Sealby and a skeleton crew remained on board *Republic* to make an effort to save her. Attempts were made to take *Republic* under tow; however, on 24 January, *Republic* sank, stern first. All the remaining crew were evacuated before she sank. At 15,378 tons, she was the largest ship to have sunk up to then.

Treasure or no treasure Irrepressible rumours from that date, which continue to this



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Precautions to observe when using rechargeable lithium-ion batteries aboard dive vessels

As result of recent tragedies, the US National Transportation Safety Board (NTSB) and the US Coast Guard (USCG) have issued safety recommendations that include limiting the unsupervised charging of lithium-ion batteries and reducing potential hazards from the use of power strips and extension cords.

Lithium-ion batteries are found in a wide variety of consumer electronics that we often bring with us on our trips—including smartphones, tablets and cameras—each of which have to be charged at frequent intervals. Quality lithium-ion batteries are safe if used as intended. However, a high number of heat and fire failures have been reported in consumer products. With more than a billion mobile phones and computers used in the world every day, the number of accidents is small but failures are bound to happen. Li-ion batteries that have been exposed to stresses

may function normally, but they become more sensitive to mechanical abuse.

Overheating

If a Li-ion battery overheats, hisses or bulges, immediately move the device away from flammable materials and place it on a non-combustible surface. If at all possible, remove the battery and put it outdoors to burn out. Simply disconnecting the battery from a charger may not stop its destructive path. A small Li-ion fire can be handled like any other combustible fire.

PADI recommendations:

In a press release distributed to the dive community on 29 January, PADI recommended observing the following guidelines regarding onboard use of electronics and charging:

1. Charge only in areas designated by the crew in a dry place and away from flammables. On many vessels, this requirement may include use and storage of your cell phone and/or other personal devices.
2. Use only manufacturer-designated chargers for each device and follow all instructions. Pay attention to battery groups (age, state of charge) and input power requirements. (The voltage fluctuation common to many boat generators may be an issue).
3. Do not leave charging batteries or devices unmonitored.
4. Remove batteries from chargers as soon as they are charged and disconnect the charger from the power source. Allow batteries to cool before charging and before use after charging.
5. Store batteries as specified by the manufacturer. Do not store batteries in a charger and use the contact cover

to prevent an accidental battery short, which can cause a fire.

6. During charging and storage, use a lipo-safe bag or another suitable protective container as practical.
7. Immediately disconnect any battery or device and its charger from the power source if it becomes abnormally hot, emits a smell, swells or does anything else unusual. Similarly, do not charge or use a battery that has been wet or may have impact damage. Do not re-use these damaged batteries, and keep them in a fire-safe location until they can be disposed of properly at an appropriate facility ashore.
8. Do not overload circuits by charging too many devices at once; doing so can create a fire hazard within the boat's electrical system. Take turns charging small groups of devices, and strictly adhere to limits established by the crew. Never "gang load" by plugging power strips into other power strips.
9. Confirm the use of power strips and extension cords with the crew before use. If berthing requires a medical device (e.g. CPAP), confirm you can use it with the crew or boat operator before departure. ■ SOURCES: NTSB, USCG, PADI

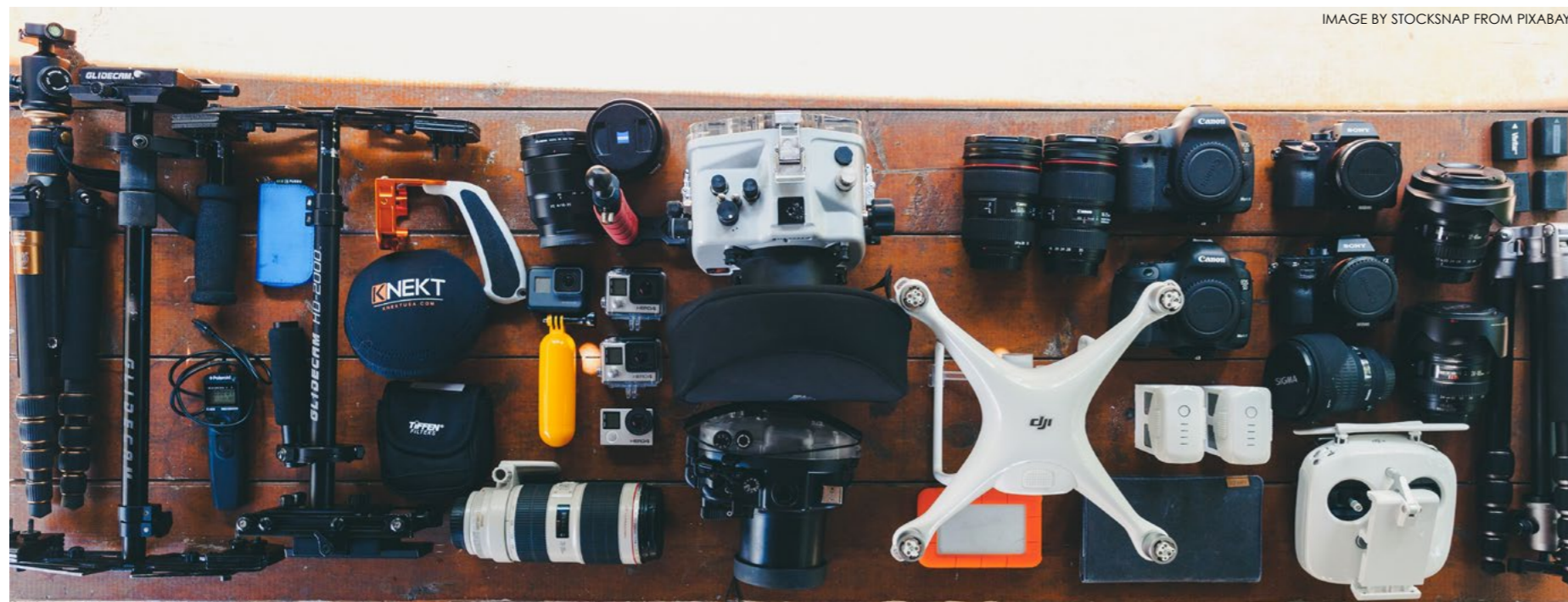


IMAGE BY STOCKSNAP FROM PIXABAY

We divers do tend to bring a lot of gear with batteries with us on our dive trips. Some people bring more than others.

Edited by
Scott Bennett



PHOTO-ILLUSTRATION COMPILED WITH IMAGES FROM PIXABAY

Coronavirus outbreak affecting dive travellers

With China under lockdown, the coronavirus is certainly at the forefront of the news. With over 44,000 people infected and nearly 1,100 deaths (at the time of this publication), the situation is certainly serious. It is a new strain and its potential for mutation is a huge unknown. However, it is not the first time something like this has happened and certainly will not be the last.

Not to downplay the seriousness of the situation, a degree of perspective must be employed. According to the US Centers for Disease Control and

Prevention (CDC), it is estimated influenza has resulted in 12,000 to 61,000 deaths annually since 2010. Where I live in Canada, there have been four confirmed coronavirus cases and no fatalities. As the situation unfolds, the media is not doing the situation any favours. Governments are encouraging people to remain calm, but the media is stoking the fear. Then there is the Internet, where conspiracy and misinformation run rampant.

Without doubt, the outbreak is having an impact on the travel industry. Recently, a group of divers from the United States were on their way to Truk in Micronesia via Manila and Guam. In Manila, they were denied entry aboard the aircraft, being told they would be forced to enter quarantine in Guam for fourteen days. This

was apparently due to the recent arrival of the virus in the Philippines.

Check before you leave

Dive travellers must be aware of the situation not only in their destination but anywhere they may transit through. Before leaving home, check with your travel agency, foreign ministry, state department or embassy of the relevant country or countries. Also be mindful that information and precautionary measures may change on very short notice. While travelling, be diligent. Even at the best of times, aircraft are depositories for germs. Washing your hands and common sense are imperative. One thing is certain: Living in fear is not the answer. Travel safe! ■

SOURCES: CDC, READER REPORTS



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Farewell to Arms Aqaba

Diving Jordan's Artificial Reefs

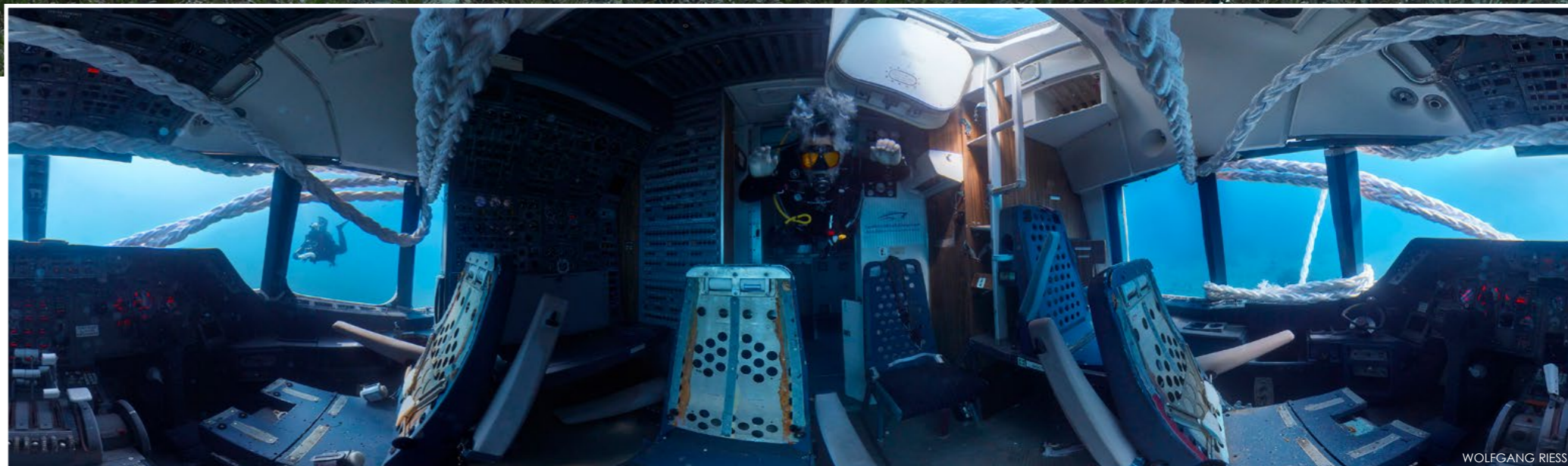
Text by Peter Symes. Photos by
Wolfgang Riess and Peter Symes



WOLFGANG RIESS

Off Aqaba, Jordan, the collection of artificial reefs keeps growing. Airplanes, tanks, armoured vehicles, artillery, and other decommissioned military hardware, have been placed along the coastline to end their life cycles as attractions for visiting divers. In this article, we walk you through, or dive rather, the latest additions, including those of the “Military Museum.”

Oh, and this time, we present the locations in 360-degree panoramic photography by Wolfgang Riess, which can be fully explored and turned about in a browser by clicking on any of his images (Internet connection is required).



WOLFGANG RIESS

INTERACTIVE PANORAMAS: Click on each panoramic image by Wolfgang Riess in this article to go the interactive 360-degree photo on his website. The recently scuttled Lockheed Tri-Star aircraft's cockpit (above) and exterior (top) in 360° photography





WOLFGANG RIESS

Panoramic view inside the Lockheed Tri-Star aircraft—enough of the interior has been left in place to make it an interesting dive (above); Diver with C-130 Hercules military transport aircraft (right)

My relationship to the Middle East is like a long-running but complicated love affair. I keep being attracted to it and keep coming back. Each time I step out of the airplane when I arrive there, I am embraced by a pleasant, complex, and—dare I say—almost sensual scent so full of notes, most of which I have never been able to identify. There seems to be a whiff of charcoal and smoke from shisha (the molasses-based tobacco concoction smoked in a hookah) mixed in with scents of spices, flowers, trees and the sun-baked sand. It is a very characteristic compound smell, which I find pleasant. Also, the people are just really nice and welcoming.

I have always felt reassuringly safe in Jordan—which is in stark, but nice, contrast to the impressions frequently painted by the press that makes a living reporting on strife. It does frequently torment me, not only that lasting solutions to the conflicts elsewhere in the region remain so elusive, but also that these headlines tend to discolour the general perception

of what the region has to offer visiting travellers—which is a lot.

Jordan remains one of my personal favourites, not just because I always feel comfortable there, but also because of the treasure trove of historical sites and landscapes that can be found to supplement and contrast the diving. The atmosphere here has a timeless feeling to it, transcending centuries. The passing of time is felt, yet it seems to stand still. One passes through the rhythms of the day rarely glancing at a watch.

I am just as much a dive geek as the next, but I really enjoy the majestic expanses of the red Wadi Rum desert—which is even more spectacular if you can watch the sunrise or sunset painting it in delicate rosy, pink and purple hues. The tranquillity of the desert just seems to seep into one's soul, soothing the spirit. Time easily seems to come to a standstill or has little meaning. And after nightfall, the starry sky is as clear as it can get. Gazing at the stars and the Milky Way arching across the sky never gets old.



WOLFGANG RIESS

The hidden city of Petra, a UNESCO World Heritage site just a two-hour drive from Aqaba, continues to intrigue me—even more so after reading a book on its history, putting it into a wider context. One has to be completely ignorant not to appreciate how much history has taken place here. But I digress. This is,

after all, a story about diving, so let me get on with it.

Dive sites

Perhaps the main defining characteristic of diving in Aqaba today is the ever-budding collection of artificial reefs, onto which additional aircraft and vehicles are

steadily being added. The latest addition was the Lockheed Tristar, the scuttling of which we reported in issue #93.

Cedar Pride. The sequence of wrecks, purposely sunk to become attractions for divers, started off by accident with the wreck of the *Cedar Pride*, a freighter that



Tanks and tracked vehicles were placed in tactical battle formation (above and right); Click on the map (top right) to go to the interactive map of dive sites along the Red Sea coast at Aqaba.

caught fire while at port in 1982. It was damaged beyond reasonable repair, so it was scuttled a couple of years later to become an artificial reef. I suppose one thing led to another, and eventually various ex-military hardware such as the “tank,” which is actually an armoured self-propelled anti-aircraft gun battery, was scuttled in shallow waters.

C-130 Hercules. Then the C-130 Hercules, a former four-engine propeller transport aircraft donated by the Royal Jordanian Air Force, was scuttled under much media frenzy in November 2017, in fairly shallow waters close to the aforementioned tank. In fact, both dive sites and that of the nearby shipwreck of *Al Shoruk* can all be visited on the same dive. The C-130 aircraft is a model that has been operated by more than 60 nations, and more than 2,500 have been built since the aircraft first took flight in 1954. The newest version, the C-130J Super Hercules, is still in production. The sunken Hercules rests on a sandy seabed at a depth of just 12-17m, which provides ample time for underwater photography

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during the shallow dive. It is easy to penetrate and explore inside and out.

Military Museum. Following the sinking of the Hercules came the sinking of a growing collection of ex-military hardware, comprising a couple of Vietnam War-era Cobra combat helicopters, a Chieftain battle tank (known as *Khalid Shir* in Jordan), self-propelled anti-aircraft batteries, armoured personnel carriers, a tracked ambulance and various other vehicles with wheels or

tracks. This collection is also known as the “Military Museum.”

In July 2019, a total of 19 former military machines were placed along the coral reefs and positioned to imitate a tactical battle formation. They have been placed in a location with little coral growth and not much marine life. Eleven of decommissioned pieces of military hardware were settled in the 20-28m depth range, and the remaining eight are at depths of 15-20m. The scuttling took seven working days, to ensure that the whole process

did not affect the surrounding marine environment. The placement of these vehicles serves to both alleviate pressure on the natural coral reefs from increased tourism and to create new artificial reefs as well as dive sites.

The Military Museum is indeed unlike any other dive site I have ever seen. No location I am aware of has such a collection of artificial reefs in one spot. It is not an overly complicated dive. It is not very deep, there is little to no current, and it is close to shore in a quite sheltered position.

That said, one should never be complacent, since mishaps can also happen in shallow water and on easy dives.

Beach and boat access

The artificial reefs off Aqaba are placed so many can be reached from the beach or at least by a short boat ride from the port, which is probably the most comfortable and convenient means of getting you and all your kit to the dive site anyway. Being on a boat also means you have a safe place for all



WOLFGANG RIESS



PETER SYMES

A Huey Cobra attack helicopter with other parts of the Military Museum site just visible in the background (above); Chieftain tank (left); Huey Cobra helicopter (right)

a helicopter, which usually is the thing that does the hovering overhead. Cobras were in use during the later stages of the Vietnam War and have been regularly featured in war movies and documentaries. The Cobra remains in service in several countries.

I had never seen one this close up. Granted, it had been stripped of its weapons, radome and other bits and pieces. In other words, it essentially had all its fangs and claws removed, but there it was—a machine that has seen active combat. This is a much better use, I think—making peace (and reefs), not war. As I swam about and gazed inside the narrow cockpit, it struck me how compact it was—like a sports car. The surrounding seabed was quite dull though—unsurprisingly, I might add, since a dull spot was deliberately chosen

for the Cobra's sinking to avoid impacting any living reefs.

Howitzer. Next in line was a M115 203mm (8in) howitzer—a type of artillery that sits at a slant with its barrel pointed skywards. For some reason, I could not help feeling that there was something defiantly dignified about this structure as it was now forever confined to its watery grave where it will surely never see another conflict but still insists on pointing its barrel towards a virtual enemy which will never come. The M115 saw US service in World War II, the Korean War and the Vietnam War.



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Chieftain tank. As I moved forward in a northerly direction parallel to the coast, the shallower parts of the reef in which the group of tanks and other vehicles had been placed in battle formation came into clearer view. The Chieftain tank was a massive

vehicle weighing in at around 55 tons and equipped with a large 120mm gun. It was the main battle tank of the United Kingdom from the 1960s to 1980s and is still being operated by several countries—including Jordan's armed forces. The Chieftain found a

your stuff—and they serve lunch. The location at the northern tip of the Gulf of Aqaba is very sheltered, so I cannot imagine that there are ever days where divers “blow out.”

Diving

Huey Cobra helicopter. As soon as I jumped in, I could see one of the Huey Cobra helicopters right beneath me. How odd to descend upon and hover above



WOLFGANG RIESS

Divers at the tank formation at night (above); Diver with the M-115 203mm (8in) howitzer (left); The Huey Cobra helicopter, backlit with several high-powered lamps (right)



PETER SYMES

large export market in the Middle East where it saw all of its operational experience, including the largest tank battle of the Iran-Iraq War (1980-88). The Chieftain also fought at the Battle of the Bridges during the 1990 Iraqi invasion of Kuwait.

And so it went, as I swam from one piece of military hardware to the next. One can hover around all these pieces of aircraft and vehicles in three dimensions as if one was playing some computer game, except that this installation remained completely still and frozen in time, slowly becoming overgrown with coral and algae. It is a fun and unique dive during which one is constantly reminded of the folly of Man. The structures also provided ample opportunity to play with light at night, which Wolfgang Riess' images on these pages demonstrate all too well. So, doing underwater photography on a night dive is up next.

Night dive

After enjoying a delicious barbeque aboard the dive boat while the sun set across the Sinai Peninsula on the other side of the bay, we rigged up for a night dive at the Military Museum. The sight of a bunch of underwater photographers, intensely focused all at the same time, was something to behold.

Nobody talked as cameras were checked and loaded up with full batteries, and housings were rechecked one extra time. Lamps were hung or placed on the seabed just behind the helicopters, which provided an eerie and ghost-like silhouette. I got all my gear set, was checked by a buddy and went in the water with a muted splash.

My first task was to get the camera properly configured. I had strobes mounted and ready to fire, but upon taking a test shot, I saw that given the size and distance to the subjects, my strobes mostly produced a haze of



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backscatter, which completely ruined the shot. So, I decided to switch them off and figure out which camera settings would best cope with the very low light conditions.

Photography challenges

I am talking about night photography with 25m of water overhead. I needed a shutter speed that was fast enough to freeze action and capture a sharp

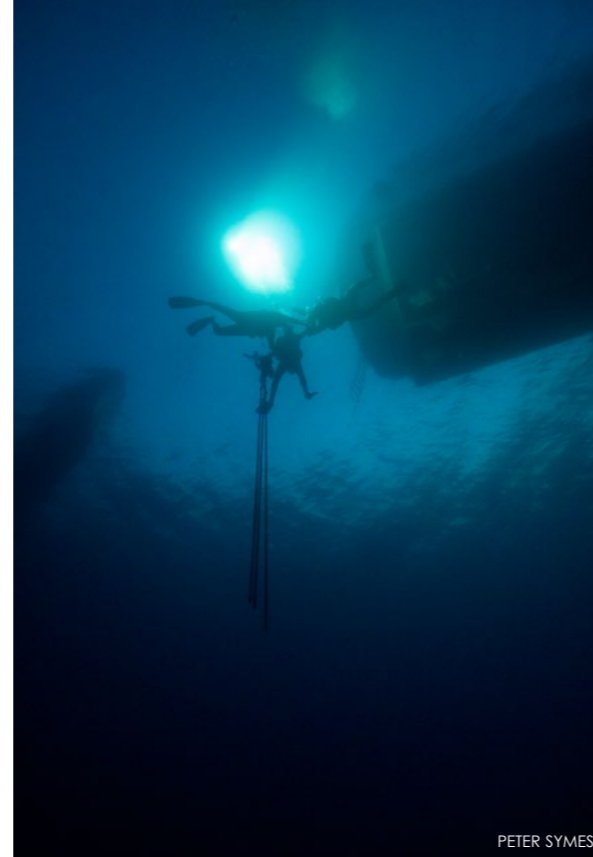
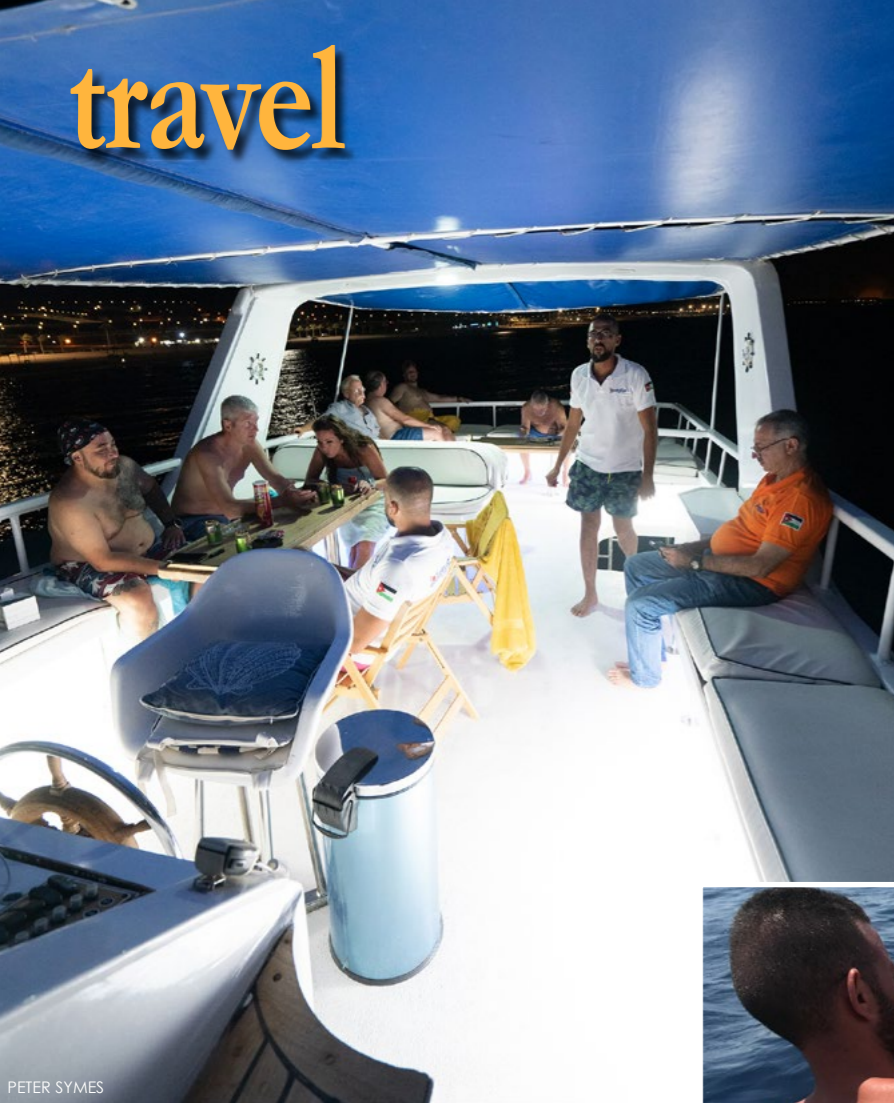


image but an ISO low enough to avoid images from becoming too noisy (grainy). Meanwhile, three-dimensional structures, such as the helicopter with its blades sticking out, really called for closing down the aperture to get a decent depth of field. This was a bunch of conflicting requirements. One or more had to suffer.

I was using my mirrorless Sony A7RII, as it has some pretty good low light capabilities, which go a long way. It also has IBIS—sensor stabilisation—which helps reduce camera shake at slow shutter speeds. However, objects that move will still blur at slow shutter speeds. So, IBIS is mostly useful with static subjects and not in images of divers moving about like Energizer bunnies on too much coffee. So, I went for a combination of settings, which I gathered would be the optimal compromise.

As it is not easy to look through a camera at night, in particular when wearing a dive mask and peering through a camera inside a housing, I had to rely on

autofocus. In fact, I could not make out a damn thing, aside from some blotches of light on my camera's back LCD—my eyesight has definitely become middle-aged, struggling in low light.

The camera apparently also struggled to find focus, as I could frequently hear the lens hunt for focus—moving back and forth without locking onto anything. That I was descending in free water without any downline or fixed reference, trying to maintain a steady slow decent with only a few visual clues—such as

periodically looking up towards the boat while trying to keep the camera pointed in the right direction and getting the chopper properly framed—was a piece of real hard work and full-fledged multitasking.

It got a wee bit easier at depth, as the pressure differential got incrementally smaller. I got a better bearing on the helicopter as I moved closer. The tricky part was sensing my buoyancy and keeping it steady despite having so few references. Unsurprisingly, several shots were not in focus, or not where I wanted them to be. The depth of field was not something to brag about either. But I managed to pull

can beforehand and then improvise as circumstances turn out to be different than anticipated.

On the contrary, Wolfgang Riess, who was on the same dive, just nailed it as it appeared. Hats off to him. He has turned 360-degree imagery into a high artform. I am thus only happy to cede the bulk of the stage in this article to him, so-to-speak. I appreciate meeting someone who is more skilled or cleverer than I am in some particular area or field. It is inspirational and an opportunity to learn something new (well, at least in principle, because I will most likely not have the time nor the opportunity to practise this specialised skill set).

View of the sunset over Sinai, as the day came to a close with a good dinner on the Kempinski Hotel's beachfront—food was always good and fresh (above); Grilled fish with fresh salad and hummus for lunch (left); Barbeque on the dive boat between dives (lower left); Divers ascend under a moonlit sky (top center); Chilling on the dive boat's sundeck before a night dive (top far left)

off several keepers.

That is how it often goes in challenging situations. One has to prepare as best as one

Ending notes

Getting back to the night dive, I swam around the dive site for the duration and ended up with a decent collection of useful shots before it was time to ascend. Looking up, I could see the moon silhouette the dive boat above me. What a magnificent evening. The day, and my short but joyous visit to Aqaba, was about to come to an end.

After cleaning up and disassembling our gear, we gathered for a last dinner together on the beach in front of the excellent Kempinski Hotel, which was one of the best I have stayed in over the years. The dinner, which included some Jordanian specialties, was simply stellar. And the talk among us, as musicians played, a belly dancer performed and we enjoyed our beers, was all about pictures and photography techniques. What else would you expect when a group of photo nerds gather around a table? Until next time. ■

Wolfgang Riess' website can be found at: www.edive360.com

South Africa's Sardine Run

Text and photos by Claudia Weber-Gebert

& the Interaction of Predators





Hundreds of long-beaked common dolphins and flocks of gannets pursue the sardine swarms during Sardine Run (above); Gannet gulps down a sardine (right)

This natural spectacle takes place almost every year on the eastern coasts of South Africa and Mozambique—the so-called “Sardine Run.” To this day, the reason why it occurs cannot be precisely defined. There are various scientific theories, but some of them contradict each other. Factors involved in this, the world’s largest migration of South African sardines (*Sardinops ocellatus*), include the two major ocean currents—the Agulhas and the Benguela—plus wind speed and rain as well as air and water temperatures.

In some years, however, the Sardine Run is not observed. During these years, it was thought that the Sardine Run did not take place due to climatic conditions. But just because one cannot see it on the surface does not mean that the sardines are not migrating. It is quite possible that this migration then takes place at greater depths and/or farther away from the coast.

“Normal case” scenario

Here is a rough summary of what happens during a normal year: The Agulhas Current brings warm water from the Indian Ocean along the eastern coast of Africa. The Benguela Current, which pushes cold water northwards from the Antarctic to the Cape, is averted by the warm water of the Agulhas Current at the Cape and thus flows along the western



coast of South Africa. Towards the end of the summer in the Southern Hemisphere, the speed and strength of the Agulhas Current decreases. This gives the Benguela Current the opportunity to transport cold water in a narrow strip along the continental shelf on the eastern coast of Africa to the KwaZulu-Natal coast and to push off the Agulhas Current. The sardines, which prefer the colder water, follow this cold and nutritious current in huge masses to the KwaZulu-Natal



Dense schools of South African sardines form the world's largest migration each year during the Sardine Run
PREVIOUS PAGE: Bryde's whale and dolphins hunting and feeding on sardines





Cape gannet (above); Dense school of sardines (top left); South African coast (right)

coast and Mozambique.

These swarms of sardines can be several kilometres long and are clearly visible from an airplane as long as they are not too deep below the surface of the water. Such a large source of prey attracts a huge number of predators, which benefit from this wealth of food. These predators include dolphins, whales, sharks, seals, penguins and various seabird species such as Cape gannets and Cape cormorants.

However, depending on environmental factors, there are different variants in the Sardine Run's usual scenario. Researchers who observe this natural event can therefore only make limited scientific

statements about it. Years of studies at several locations would have to be carried out simultaneously to get a better overview. And what happens at greater depths in the water column is sometimes hidden from the viewer.

Migration timeline and characteristics

When we speak of the Sardine Run, we are mostly referring to the events that take place off the KwaZulu-Natal coast from June to July. But that is actually the end of this animal migration. The sardines begin to move towards the KwaZulu-Natal coast and Mozambique in January,

beginning at the Cape and False Bay; from February to May, they are in the region of Algoa Bay and East London; and only from May to July are they off the KwaZulu-Natal coast. Sardine spawning has also been observed in the water, which has led scientists to believe that the

main objective of the Sardine Run is probably only sardine reproduction, because not all sardines take part in the migration.

The predators

Long-beaked common dolphins (*Delphinus capensis*) make up the largest

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number of predators. These dolphins reach a maximum length of 2.5m and are very agile, which gives them a big advantage in the Sardine Run. Bottlenose dolphins are rarely observed, and resident groups do not participate here; however, bottlenose dolphins passing by can sometimes be found at bait balls.

In the early months of the year, Bryde's whales (*Balaenoptera brydei*) are the largest predators in the southern coastal regions. Occasionally, one can also find the somewhat smaller Antarctic minke whales (*Balaenoptera bonaerensis*).

From June to July, humpback whales (*Megaptera novaeangliae*) and southern right whales (*Eubalena australis*) are present in the northern coastal areas. But the humpback whales are on a completely different migration, namely towards warmer waters, where they will mate and give birth to their calves. But when the opportunity arises, the sardines are a nice find for them.

Three shark species can also be



found in the Sardine Run: copper sharks, mako sharks and dusky sharks. Great white sharks can also be spotted; however, they are not interested in the sardines, but in the dolphins and seals.

Sometimes, small groups of orcas appear, usually during a full moon phase. How these two things are

related is still unclear. Orcas also only come because of the dolphins. It has been observed though, how orcas hunt the dolphins by isolating individuals from their pods. Other marine mammals that prey on the sardines include Cape fur seals, which only appear in small groups near bait balls, shooting through the



Bryde's whale feeding (above); Cape fur seals (left); Long-beaked common dolphins and gannets (top)



Snorkellers watch hundreds of dolphins (above) corraling sardines into a bait ball (right), as Cape gannets feed on sardines pressed at the water's surface or jumping into the air to escape predators (left).

swarm with great speed and underwater acrobatics.

As for seabirds, Cape gannets and Cape cormorants should be mentioned first among the avian predators. While a larger variety of seabirds can be observed at the sardine swarms, the large brown boobies and Cape cormorants are the predominant species represented.

The sardines themselves measure approximately 25 to 30cm in length. They are too big and too heavy for smaller seabirds to catch, since the birds would then have to fly several kilometres back to their young with the prey. This leaves the sardines almost exclusively reserved for large birds. Gannets are able to dive down to

also known as the "jackass penguin" because of its donkey-like cry—also takes part. They can reach a speed of 25km/h underwater. Unfortunately, they are now endangered as a species. One hundred years ago, their eggs were sold as a delicacy, and their manure was removed from the islands and shipped to England. The nests of the penguin colonies on St. Croix Island were completely destroyed. Today, there are several stations on the South African coast that take care of injured penguins.

Observing the Sardine Run

And now a bit about the adventure: It is pure madness for the observer—a feed-

15m to catch the sardines. The African penguin (*Spheniscus demersus*)—

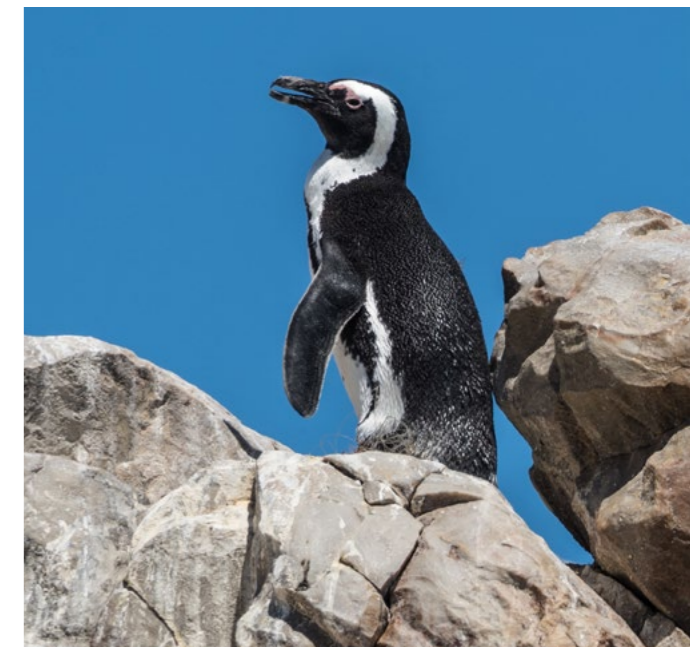
ing frenzy! You go out on a rubber boat for a few kilometres and you do not see much at first—sometimes even nothing—perhaps just a few birds flying somewhere or waiting on the surface of the water. It may be quite disappointing at first, but it is actually a good sign. Because when nothing is going on, the event is at this point probably concentrated somewhere else. And now it is time to follow the signs and find this place!

The gannets and cormorants are a good indicator. Are they still sitting on the water in groups or are they flying in a certain direction? And is there dolphin activity somewhere on the water's surface? It is hard to see when the waves are coming at you. From the boat, you can see for about 3km. It means looking out on all sides and identifying and interpreting the variations on the water's surface. The search can sometimes take several hours!

The adventure begins when you see all the gannets flying in the same direction in large numbers. Now it starts, because this means that the dolphins have started to drive the sardines. It is the long-beaked common dolphins that come together, coordinated from all directions to drive and hunt the huge swarm of sardines.

We were able to follow a pod of approximately 100 to 200 dolphins, which were heading towards the open sea at a rapid pace, followed by seabirds that plunged into the water again and again, catching individual fish. And more and more dolphins came from all directions—all in all, about 1,000 dolphins were involved in the chase, swimming at great speeds even farther out in open sea.

The water seemed to be boiling. The



African or jackass penguin has a donkey-like cry





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Using whistling sounds, dolphins (right) coordinate attacks to force sardines into a dense bait ball at the surface (above)

dolphins appeared in waves to breathe at the surface and thus generated their own waves. Some jumped out of the water, but most saved their energy for spurts of speed. Dolphin babies stayed close to their mothers' sides, which were now in dire need of food. The group stayed close together; it was easier for these dolphins to keep up their speed by swimming in the wake of other dolphins. The dolphins coordinated their movements with whistling sounds underwater—a remarkable communication system that worked for miles underwater, thus reaching all the dolphins in the area.

Our boat positioned itself several times in front of the dolphins and we snorkelled in the middle of the stream of dolphins for a few minutes. The dolphins shot past—beside us, below us, all around us! They did not have time to really notice

us; foraging was their priority. With just a quick glance at us, the marine mammals moved on at breath-taking speed. The sardines were still too deep—only individual fish that got lost had no chance of survival with all the predators on the hunt in the area.

It was almost impossible to take photos at the speed of the animals, especially because we were in a cold current with a lot of plankton. Nevertheless, the experience was indescribable! At approximately 45km from the coast, we unfortunately had to stop the pursuit; the way back would be against the wind and the waves were high. The dolphins raced towards the open sea at an insane pace—always in pursuit of the sardines.

However, our Sardine Run experience did not end here. The next day was a new day, with a new game plan and

new luck! Birds could be seen far off in the distance. After a 45-minute rubber-boat ride into the middle of Algoa Bay, we could see lots of birds, and big splashes of water could be seen in the distance. As we got closer, the water seemed to be boiling with dolphins.

We arrived at just the right time. The dolphins had isolated some of the sardines and pushed them just under the water's surface. Now, the dolphins circled the sardines and kept the swarm under control, forming a "bait ball." The sardines diverged in all directions to escape the dolphins. About 200

dolphins worked together in a coordinated manner to get the best out of the situation. While some of the animals circled the sardines, others shot through the shoal of fish from below, to be followed soon after by even larger predators—Bryde's whales.

With their mouths wide open, four to five of these whales alternated in pushing through the mass of fish, always behind the quick dolphins. The sardines kept jumping out of the water to escape. The whole spectacle was picking up speed. We watched the goings-on from





THIS PAGE: Bryde's whale (above and right) feeding on sardines at the surface as a gannet dives from the air to catch the fish (top right)

a distance, amazed and overwhelmed. None of us had expected just how overwhelming it was to watch, and this was just the beginning of the spectacle!

Again and again, the dolphins coordinated their attacks with whistling sounds, circling the sardines, sometimes on the left and sometimes on the right. The Bryde's whales kept pushing the sardines to the surface. Now, the seals also came to hunt at the edge of the swarm.

Cape gannets shot into the water from the air. These birds can dive and hunt down to 15m, but now that the fish were at the surface, it became easier for other seabirds to partake in this excess of food, and the amount of birds hovering over the event got denser. The water was foaming white due to the predator activity. An almost circular area of about 200m

in diameter seemed to be bubbling.

Over and over, the dolphins shot through the water at high speeds, and the whales catapulted half of their bodies out of the water with their mouths open or slid along the surface to swallow large numbers of sardines. Sometimes, the sardines jumped out again—but there was no escape.

Underwater photography

We attempted to take underwater photos of the action, but the water was cold and thick with the silvery scales of the sardines floating around like confetti. In addition, the water was full of tiny air bubbles due to the frantic activity of the animals. Meanwhile, dolphins shot past, ignoring us. Seals took a quick look at us and disappeared immediately. What

is called a “feeding frenzy” was in full swing, and we snorkelers were right in the middle of it—it was pure adrenaline!

It was difficult to take pictures, but the action-cam was better able to capture what we were witnessing. The feeling was indescribable. We were shoved around by dolphins, which were only focused on hunting. Their whistling sounds could be heard as well.

The whole event found its own rhythm and produced a strange swell in which we swam. The visibility in the water was so bad, however, we could hardly see anything. Not so for the dolphins and whales though, which could perceive every movement and every energy field in the water with their fine senses. They coordinated themselves again and again, and circled the school of





Bryde's whale feeding on sardines (above)



Sardines jump into the air to escape predators below the surface (above); Pod of long-beaked dolphins hunting (top left); Cormorants were observed flying in a chain formation from Bird Island to hunt at Sardine Run (right)

fish. Over and over, the sardines shot towards us, followed by a group of dolphins, and after them, a whale with its mouth open. This process repeated itself continuously at a frenetic speed, which increased over time.

Suddenly, a Bryde's whale below us grazed our fins. It was very close; we only noticed it at the last minute, but the whale knew exactly where we were. Perhaps it also thought we were lame dolphins. It moved past us with its mouth open and its eyes closed. At 15m long and 15 tons in weight, its bow wave lifted us up like a ship's.

The circle drew ever tighter as the sardines huddled together and jumped out of the water. The birds plunged into the water from above, so a sardine's jump into the air was no solution to escape its certain fate. Like vultures, the birds circled in the air, screeching loudly, while the dolphins circled in the water—their speeds increasing, like a whirlwind.

Sharks join the party

The shoal got smaller and smaller, and

after a while, the fish crowded into a compact ball. Copper sharks joined the spectacle. With poor visibility, we chose not to stay in the water. From the boat, we got a better overview of the action and could follow the event more easily and more safely. We saw sharks heading into the bait ball again and again. The sardines sought shelter under our boat, as the sharks' dorsal fins cut through the water's surface next to us.

Normally, in good visibility, this would be an opportunity to go into the water with dive gear and observe what is known as a bait ball—a compact ball of densely packed fish—through which the sharks, dolphins, seals and birds darted, hunted and ate. Depending on the situation, these bait balls can reach a diameter of up to 15m.

For safety reasons, we stayed on the boat; the water was cloudy, with poor visibility—it was too dangerous to be underwater. In this situation, one may



also see sharks with fresh bite injuries. As a snorkeler or diver in this environment, you would always be at the short end of the stick, even if a shark bites you accidentally. The conditions were not ideal for photography anyway. But watching the events from the boat was also an impressive experience.

Last chance for birds

The bait ball was getting smaller. After

so many predators joined the feast, injured sardines could be seen swimming around everywhere. The gannets still plunged into the swarm—always 10 to 15 gannets in quick succession, like a fighter squadron in an air raid. They sighted their prey, folded their wings into a streamlined triangle and plunged at high speeds into the water.

In the meantime, some of the big Cape cormorants also arrived and par-





Sardine Run

Elephant in a South African game park (above); Penguins on St. Croix Island (right); Cormorants on Bird Island (top left); Cape fur seals (left)



ticipated in the battle at this cold buffet. Even seagulls and small seabirds now had a chance to get something out of the remains left by the larger predators. But while boobies and cormorants could actively dive and chase the fish, the remaining seabirds only pecked bits off the surface of the water.

During the whole event, there was a constant rotation of birds. The boobies, which had already caught enough fish, flew in small groups in a chain formation back to Bird Island, where their hungry offspring waited in their nests. As new groups of birds came to hunt, previous groups flew back to the island—a constant coming and going.

One last time, a Bryde's whale rushed through the swarm, suddenly swallowing the sardine ball, which was now quite small, while dolphins circled the whale and snatched the last escaping sardines. There was almost nothing left of the huge mass of sardines that we came across four hours earlier! What a spectacle! What a day!

On the way back to the harbour, we were tired, hungry and thirsty. Nobody had had time to eat or drink during the eventful day, but our cameras' memory cards were full of impressive photos and videos. However, our impressions had not yet been properly processed, as it had been an overwhelming day.

After six days on the water, all the photographers and filmmakers in our group had gotten their money's worth. However, the weather had not always played along. Strong winds and the associated high waves had not always permitted safe passage. Sometimes, we were able to enjoy an alternate option—diving on the wonderful colourful coral reefs along the coast, which supported breath-taking biodiversity.

Visiting penguin and bird reserves, as well as observing seals dozing and warming up on rocky outcrops, were also nice alternative excursions, when the sardines were not "running." In addition, the game parks on land also offered a nice change and opportunities to get photos of big game. We ended our trip to South Africa with full memory cards and hard drives—our wonderful impressions preserved for a lifetime! ■

For more impressions of this adventure, go to the following video link on YouTube: [youtube.com/watch?v=ITWIRT5dA0k](https://www.youtube.com/watch?v=ITWIRT5dA0k).

The next adventure is waiting, so if you want to join me on the next Sardine Run trip, do not hesitate to get in contact with me and I will send you all the details. I will accompany only small groups of six to seven photographers max. The next trip will take place in late June/early July 2020 or later, in 2021. Just email me for all the information and conditions involved in the Sardine Run trips: [weber-gebert@](mailto:weber-gebert@design-buero.org)

design-buero.org. You can also contact me via Facebook at: [facebook.com/claudia.webergebert](https://www.facebook.com/claudia.webergebert).

fact file



South Africa



SOURCES: US CDC, US CIA WORLD FACTBOOK, US DEPT OF STATE, XE.COM

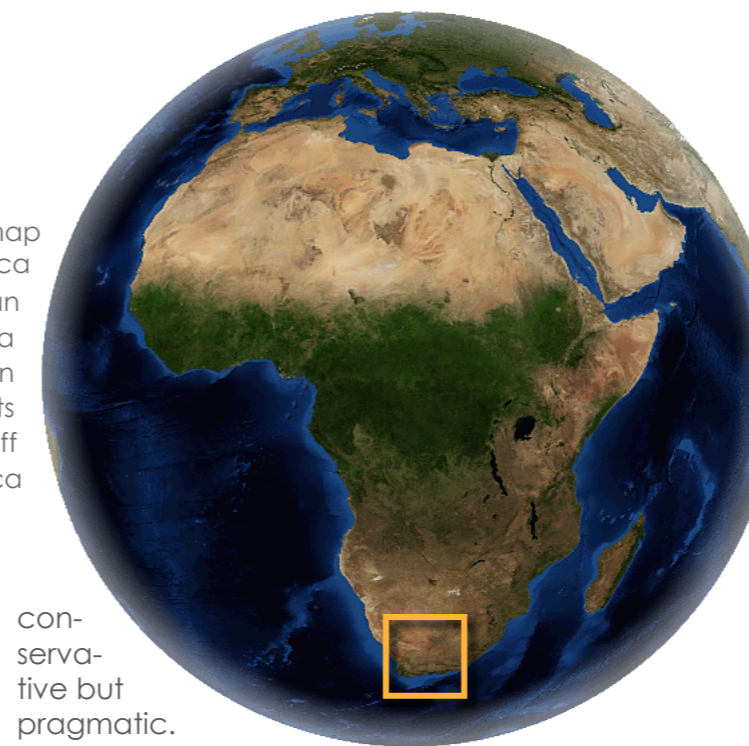
History In 1652, Dutch traders landed at the southern tip of modern-day South Africa and founding the city of Cape Town, establishing a resupply station on the spice route between the Netherlands and the East. In 1806, many Dutch settlers (the Boers) travelled north to establish their own republics after the British seized the area of the Cape of Good Hope. In 1867 and 1886, the discovery of diamonds and gold encouraged wealth and immigration. This intensified the subjugation of the indigenous population. The years 1899-1902 saw the British defeat the Boers resistance during the Boer War; but the British and the Afrikaners, as the Boers became known, governed together under the Union of South Africa. The National Party was voted into

power in 1948 and instituted a policy of apartheid—the separate development of the races. In 1994, the first multi-racial elections saw the end of apartheid and brought in black majority rule. Government: republic. Capital: Pretoria.

Geography Southern Africa is located at the southern tip of the continent of Africa. The country of Lesotho is completely surrounded by South Africa, which also almost completely surrounds Swaziland. Coastline: 2,798 km. Terrain: vast interior plateau surrounded by rugged hills and a thin coastal plain. Lowest point: Atlantic Ocean 0 m. Highest point: Njesuthi 3,408 m. Natural hazards: extended droughts. Environmental issues: extensive water conservation and

control measures are required due to the lack of important arterial rivers or lakes; water usage increases outpace supply; agricultural runoff and urban discharge cause pollution of rivers; acid rain due to air pollution; soil erosion; desertification.

Economy A middle-income, emerging market with a large supply of natural resources, South Africa has well-developed financial, legal, communications, energy and transport sectors. Its stock exchange is the 17th largest in the world. Its modern infrastructure supports an efficient distribution of goods to major cities throughout the region. Since 2004, growth has been strong, as South Africa reaps the benefits of macroeconomic stability and a boom in global commodities. However, there is still high unemployment and an outdated infrastructure limits growth. The country began to experience an electricity crisis at the end of 2007, due to supply problems of the state power supplier Eskom. It necessitated “load-shedding” cuts to businesses and residents in the major urban areas. Remnants of the apartheid period include daunting economic problems, especially poverty, no economic empowerment among disadvantaged groups, and public transportation shortages. The economic policy of the country is fiscally



RIGHT: Global map with location of South Africa
FAR RIGHT: Location of Durban on map of South Africa
BOTTOM LEFT: African penguin
BOTTOM RIGHT: Pair of cormorants at Bird Island Nature Reserve off the coast of South Africa



conservative but pragmatic. It focuses on controlling inflation, sustaining a budget surplus, and—as a means of increasing job growth and household income—employing state-owned enterprises to provide basic services to low-income areas.

Climate South Africa is mostly semiarid with sunny days and cool nights. There are subtropical areas along the eastern coast.

Population 56,463,617 (July 2020 est.) This figure factors in the effects and mortality rate of AIDS. Ethnic groups: black African 80.9%, coloured 8.8%, white 7.8%, Indian/Asian 2.5% (2018 est). Religions: Christian 86%, ancestral, tribal, animist or other traditional African religions 5.4%, Muslim 1.9%, (2015 est). Internet users: 29,322,380 or 54% (2016 est.)

Currency Rand (ZAR). Exchange rates: 1EUR=16.18ZAR, 1USD=14.68ZAR, 1GBP=19.21ZAR, 1AUD=9.87ZAR, SGD=10.77ZAR

Language isiZulu 24.7%, isiXhosa 15.6%, Afrikaans 12.1%, Sepedi 9.8%, Setswana 8.9%, English 8.4%, Sesotho 8%, Xitsonga

4%, SiSwati 2.6%, Tshivenda 2.5%, isiNdebele 1.6%, Khoi, Nama, San and other languages 1.9% (2017 est).

Health & Safety Before your trip, check with your state and health departments for travel advisories and updates. There is an intermediate degree of risk for food or water-borne diseases such as bacterial diarrhea, hepatitis A and typhoid fever. Vector-borne diseases include Crimean Congo haemorrhagic fever and malaria. Water contact diseases include schistosomiasis (2008).

Decompression Chambers
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Web sites
South Africa Tourism
southafrica.net ■



The Gossip Press Said: “Diver Swallowed by Whale” — Here’s What Really Happened...

Text and photos by
Claudia Weber-Gebert

The story of how a diver was swallowed by a whale at Sardine Run showed up in all the media—worldwide. However, I was there, and I can tell you, no, the diver was not swallowed! And, no, we could not see the whale coming. And, yes, all precautions had been taken—and, no, it was not intended!

Many views were shared. Some admiring, others shaking their heads. Critics said all of these activities to see the whales and other animals at Sardine Run should be forbidden; they disturb the animals too much. But according to my obser-

ventions, this is not the case. If you keep calm, you do not disturb the animals. It is a little like watching cows graze in a pasture. Nobody claims that this disturbs the cows. While the animals at Sardine Run might perceive the boat and the people, they are so busy eating that they do not care who is there, observing.

On the previous day, our tour operator, Rainer, pointed out that it could happen—that a snorkeler would end up in a whale’s mouth—but that it had never happened before, and the probability that it would happen was quite low. Nobody knew exactly what would happen then, because no one has ever reported it. However, everyone had been instructed about it and all precautions had been taken.

Unexpected

The next morning, we found a bait ball. The boat stopped, and we first checked conditions and accessed the situation—finding dolphins, sharks, boobies and a lot of sardines. The opportunity was good now to take some beautiful photos of the sharks at the bait ball. So, four of us went into the water.

We were barely in the water five minutes, checking the conditions, when it happened. I was about five metres away from Rainer and two safety snorkelers. The visibility underwater was poor, at a maximum of 3 to 4m. I checked the settings on my camera underwater, looked up and saw a Bryde’s whale shoot up exactly where the others were in the water—and then I saw two legs in its half-opened mouth!

I saw a green weight belt—it was Rainer, who just the evening before had said that it was

highly unlikely that something like this would happen. The whale lifted the snorkeler out of the water, about 2m high. Then I saw the whale dive down, and it passed underneath me. I could not see Rainer; either he was completely in its mouth or out again. I could not tell from my position, with the slight waves on the water’s surface obscuring my downward view. Then I looked across the surface of the water again and saw Rainer—all was well!

How it happened

What had happened was this: The whale noticed its mistake and immediately spat a mass of water out of its mouth, including Rainer. The second snorkeler, Gehard, had been pushed to the side by the whale when it shot upward, and Viktoria, who was to the right of Rainer, was briefly pressed underwater—the whole scenario took exactly 1.8 seconds—as one could later see in the series of photos taken by Heinz Toperczer. Heinz was a few meters away on the boat and just happened to be able to take pictures of it all.

Fortunately, nothing happened to either the whale or the snorkeler. The question remains though, as to who was more scared—the man or the whale?

Whale behavior and bad viz

In all my photos from the trip, I could see that the whales closed their eyes while their mouths were open. The whale could not have seen the man in the water anyway because of the murky water conditions. Of course, the whale was aware of the man, just maybe not that



Snorkeller with dolphins and Bryde’s whale (above), which just took a big gulp of sardines (left), South Africa



he was a human being, but perhaps thought he was a dolphin or seal, which is quite possible due to his size. The whale was probably familiar with the behaviour of the animals around it—that they jumped aside quickly enough when it approached. This was our observation too: First, the dolphins jumped out of the water in an arc, then the whale followed. The strange object in its mouth was spit out immediately. As I have heard since then, this behaviour has been observed several times—dolphins, seals and birds have also been seen spit out by whales.

But at no time would there have been a risk that a human would be swallowed. The throat of a Bryde’s whale is only about the size of a fist, so that fish or maybe a bird might pass through it, but never a human being. The only danger would have come in the form of broken bones and bruises, or if the whale had submerged with a human in its mouth. We prefer not to imagine that.


In any case, this was never the whale’s

intention—baleen whales are not man-eaters! And it was not our intention that one of the groups in the water would end up in a whale’s mouth. We all kept a proper distance from the action. However, the sardine mass was in constant motion, back and forth, drawing predators with it. This could better be seen in clear water, but not in conditions with poor water visibility.

Afterthoughts

My personal impression: It was a wonderful, unique experience to be so close to a whale and to experience just how careful and sensitive these 15-ton colossi really are. Just think: A person who finds a fly in his or her soup might squash it. In the case of the whale, it would have been easy for it to flatten us four relatively tiny snorkelers with one slash of its fluke, but it did not. On the contrary, it was more eager to dive away from us as carefully as possible. These animals are indeed gentle, unique and admirable. ■





Culinary Diving in
Norway

Text and photos by
Susanne Paulsen



Boil pasta al dente with some blue mussels, white wine and olive oil, or put some king scallops on the barbecue with fresh herbs and pesto. Add one part Italian passion, one part fresh mozzarella and two parts delightful diving, and you have a culinary adventure!

The late summer sun was warm, and the easterly breeze promised a comfortable boat ride. We were in Søgne, on the coast of southern Norway, and the owner of One Ocean Dive Resort, the pasta king Carlo Golfetto, welcomed us to his aptly-named Culinary Adventure. It promised to be a tasty weekend, with

interesting dives and delicious meals.

I smile as I think back on our first visit with Carlo. As usual, our group of divers had brought a gas burner and several cans of soup—in our eyes, a delicacy, which could easily be prepared between dives. Carlo looked at us in disbelief, smiled his broad smile, rolled his eyes and made Italian hand gestures.

“No, no, no, you don’t need to bring lunch. This is not a Norwegian boat, it’s an ITALIAN boat,” he said with his charming Italian accent. “Lunch is compresi, don’t worry!”

After the first dive, we understood what he meant: “Compresi” means “included”! There was fresh pasta prepared on board the dive boat—al dente, of course; homemade pasta sauce; parmesan cheese and garlic

bread, served on fine, white china; and genuine Italian espresso to top it off. We did not miss our canned soup for a second, after having experienced this.

A culinary adventure

Carlo has run One Ocean Dive Resort in Norway for 30 years, but his manner is still delightfully Italian. He is known far and wide for his lunches on the dive boat—we just did not know it, the first time we visited him. When he announced he was having a culinary diving adventure event, we did not think twice before signing up. And now, we were here, hungry and looking forward to exciting tastes and cooking tips.

Carlo told us that we would be diving and collecting a lot of what we would be eating. The ocean in the Søgne archipelago is full of precious delicacies.



Fresh caught scallops on the grill (above); Divers on the One Ocean dive boat (top left)
PREVIOUS PAGE: Close-up detail of the eyes of a king scallop, *Pecten maximus*



Close-up of the eyes of a king scallop

During the weekend, we would learn things like how to open king scallops and how to best prepare the catch of the day.

Easy diving, uncomplicated tastes

Carlo watched me as I struggled to get my gear on. Then, he lent a helping hand with my rebreather. "Diving should be easy," he said. "Like a good pasta sauce. Simple flavours are the best. Don't make it so complicated," he said in his endearing Italian-English.

The first dive of the day was on a wall, which ended on a white, sandy bottom at 20 to 25m depth. King scallops were everywhere. We just needed a handful each to use in different recipes we would try

when we got back, so we left the smallest ones.

If you just pick every third scallop, the population will not be depleted. King scallops are particular like that. If all of them are removed, there might not be more of them swimming up from deeper water. They all want to reproduce, and if they smell other scallops in the area, they are attracted to them. And they do actually swim. We learned this and many other interesting facts during the day.

At the bottom of the wall, we found lots of cuckoo wrasse. Some of them were very curious and got close to us, but we left them alone, even though fish soup with wrasse is delicious. This weekend we



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Divers kitted up, ready for a dive



Carlo demonstrates how to open king scallops (above and right)



King scallops on the grill

were picking and collecting, not hunting. The cuckoo wrasse seemed happy, as we left them to their busy schedules.

A little later, we took the mechanical lift back up into the dive boat. Soon, we were enjoying Carlo's fantastic fresh pasta on a nearby island, while our tanks were being filled from the on-board air compressor. Carlo's dog, Echo—which, naturally, was of "Italian make," a Bergamasco—became tired of being divemaster and disappeared into the woods. His ragged fur made him look like a Rastafarian.

The Søgne archipelago is littered with small islands, and many of them have piers where the boat can be moored for lunch. With such easy diving, one quickly becomes spoiled here. Following another beautiful wall dive after lunch, we chugged slowly towards the resort in the

sunshine, the catch of the day in our nets, ready to be prepared for dinner. We relaxed and enjoyed the trip.

As soon as the boat was moored at the dock at Åros Feriesenter, where the resort is located, Carlo fired up the gas barbecue. The culinary adventure was not yet over, even though we were still pretty full from lunch. It did not take long before alluring smells enticed hunger to return.

Carlo showed us the different types of scallops and mussels and told us which ones were delicacies and which ones we might as well have left on the sea bottom. We sat in the afternoon sun on the dock and learned how to open the king scallops, and how to clean and prepare them. Carlo prepared a mix of fresh herbs for different dishes we tried in which the king scallop truly was

king, and we drank wine and cold beer, hoping our bellies never filled up and the day never ended.

Mozzarella and Parma ham

Day two started like the first one, with sunshine, a slight breeze and happy people. Out on the ocean, we chugged along towards the first dive site. The direction was southwest, and the weather permitted pretty much anything. We wondered what interesting edibles we would find today.

Carlo had a surprise for us: The Mozzarella Man. His name was Andrea Maggioni, an Italian who loved cheese so

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Divers enjoy the fresh catch of the day





Divers board the *One Ocean* dive boat (above); Andrea Maggioni prepares a delicious starter course of rolled mozzarella in the tiny galley (left)

with us. He was going diving.

After a nice dive along a wall with several reef terraces, we arrived at a shallow plateau. The sea bottom was sandy and festooned with kelp, and the water was warm. Hundreds of gobies and shrimp darted away from us, as we swam towards shore. They were too small to become a meal, so we left them alone.

The dive boat was already moored by the picturesque little pier, and we got to make lunch together with Andrea. Everything happened in the tiny galley on the dive boat. Andrea had brought fresh mozzarella, which he patted into a flat square, like a thick pancake. He then spread air-dried Parma ham and homegrown rucola on it before it was all rolled up into a delicious, tasty roll.

With his chef's knife, he quickly sliced the roll into smaller pieces. The culinary delight was brought to perfection with some imported olive oil, which Andrea keeps in an unmarked bottle. Secret. A

little flaked salt was sprinkled on top, and we finally got to taste it. He had two varieties: a plain and a smoked mozzarella. We took the first bite. The cheese melted in the mouth and made one's taste buds want to do cartwheels of joy. So easy—and so delicious. Echo followed each bite with longing eyes... but there were no leftovers.



Rolled mozzarella stuffed with air-dried Parma ham and rucola



much he started his own cheese factory in Lillesand, about an hour's drive away from Søgne. He did absolutely everything himself, by hand. Fresh milk from a nearby farm became the most delicious mozzarella—a classic, with a Norwegian touch and lots of Italian love, *con amore*. He used no artificial additives and as little packaging as possible to keep the product as nature-friendly as possible. And now, he was here



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The dive boat stops for lunch (above)—the Søgne archipelago has many small picturesque islands that have piers where boats can be moored; Pasta with fresh caught king scallops and mussels (left); Diver with lion's mane jellyfish (right); Sea anemone (bottom left)



Blue mussels and ricotta with coffee

The second undersea adventure of the day offered yet another great wall. We found more king scallops and some edible crabs on the sandy bottom below. Happy and content, we docked at the dive resort, put our equipment away and made ready for another culinary adventure on the dive boat. Today, we were having pasta with blue mussels in a white wine sauce. Carlo brought us into the galley to show us how he prepared the mussels and what he used to make the sauce taste like heaven.

We could have picked the mussels ourselves, but since they sometimes contain poisonous algae, one always has to call

the authorities to check if they are okay. Carlo had done just that. Since we were advised not to eat mussels from the area, he had had some delivered from a local fisherman, which had been checked and cleared. It was a good idea to make sure the guests avoided stomach problems.

Carlo had the pasta under control. When he said, "three minutes now," it was because the remaining cooking time was exactly three minutes—not three and a half. It had to be perfect. Italian pride was noticeable when he served us, and it all tasted heavenly with the blue mussels. The day was close to perfection.

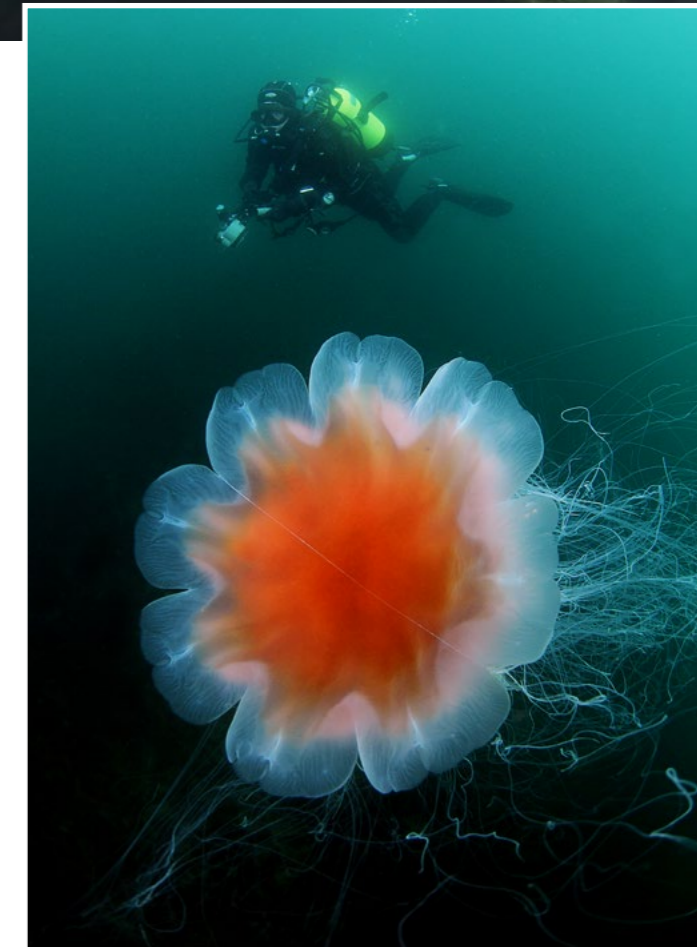
When dessert arrived, it was the famous finishing touch.

Andrea served us homemade ricotta mixed with Italian coffee, which he had lovingly worked into the white, creamy cheese. Perfect. We sat for a long time and watched the sunset before we headed inside. A nightcap and off to bed we went. It had been a long day with lots of impressions, both above and below the surface. Our taste buds were satisfied, but our bodies needed a few hours' sleep to digest it all.

Mackerel and wreck diving

Can it get any better? Yes, actually, it can. When the sun rose on the third day, the ocean was as calm as a freshly-painted floor. Not a cloud in sight. There was talk of a wreck dive. I am

not the greatest fan of wrecks, and besides, one should not eat seafood collected on wreck sites. There is no knowing what pollutants and heavy metals might be present. Still, I wanted to see something else other than spectacular walls for a change, so a wreck was a welcome diversion. The weather was great, and all options were open to us. Several of the wrecks outside Søgne were in exposed locations and could only be visited when Mother Nature offered good conditions. Today, it was perfect.



We decided to visit the Monsøy, an 18m-long fishing vessel built in 1933. The wreck was still partly



Underwater photographer on wreck (left) and sea kelp forest (above)

Norway

FACT FILE

TRAVEL

One Ocean Dive Resort is located at Åros Feriesenter in Søgne in southern Norway, approximately 20 minutes by car, west of Kristiansand.

DIVING

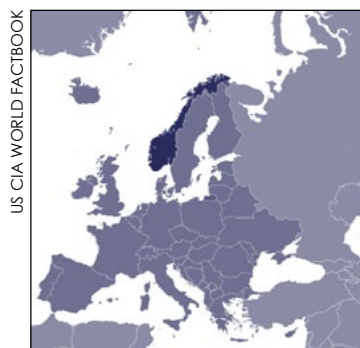
We joined the Culinary Diving Event, where the participants collect scallops and seafood during their dives. The catch is prepared on board the dive boat for lunch, and at the dock for a light dinner later, after returning to the dive resort. The area offers many great wall and nature dives with great opportunities to fill a net with delicacies. There are also many great wreck dives in the area.

FACILITIES

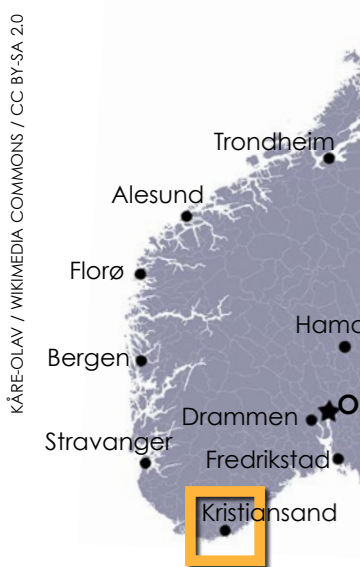
The spacious dive boat has an elevator and on-board air-filling station, toilet and kitchen. The resort has very good air- and gas-filling facilities with trimix automat, a changing/drying room with shower and a large pool. Accommodation comprises small cabins or apartments at Åros Feriesenter. A gas barbecue is on hand to prepare the catch of the day.

SEASON

There is diving all year round, but it depends on what you want to experience. The visibility and therefore the wreck diving is best during the winter, while the fish life and water temperature is at its best/highest in the fall. King scallops and most other delicacies can be found all year round. ■



Location of Norway on map of Europe



Location of Søgne archipelago on map of Norway

intact and was standing on its keel at 27m depth. We descended along a wall and found the pretty wreck on the sandy bottom without any problems. After a few rounds around the wreck, we moved on and found another mighty-steep wall, fringed with kelp along the top. The safety stop became a long one, as the marine life was prolific and there was a lot to see.

When we surfaced, all of us were happy—and hungry. Perhaps Carlo had another secret pier on a beautiful island in store for us? It was soon lunchtime, but first we had to find something to eat—we did not collect anything during the dive! Luckily, Carlo had a plan. He gave us fishing gear! If we could catch some mackerel on the way, it would be a perfect lunch. And mackerel we got! Carlo

made a sauce based on the blue mussels and wine from yesterday, masterfully preparing a special variety—a hot sauce with garlic and chili, sautéed in olive oil.

The last dive completely blew our minds. It exceeded all expectations: a magnificent dive at the very last skerry before the open ocean started—a spot

where one could only dive when the weather was truly perfect. Like today. There was not a crease on the surface; the ocean was calm as far as the eye could see. Below the water, we found a great kelp forest and several spectacular canyons with bright orange dead men's fingers, teeming with fish and crustaceans. It was some of

the best diving we had ever had! When we returned to the dock, we were satisfied with both natural and culinary experiences, yet we still had the day's last meal to look forward to. I'll leave it to you to imagine how good it tasted... After this, there is no way we are going to miss Carlo's culinary diving event next year! ■



The dive boat moored at one of the small rocky islands of the Søgne archipelago

Text and photos by Lawson Wood

Soma Bay

Diving the Egyptian Red Sea





Diver with anthias and soft corals on reef in Soma Bay. PREVIOUS PAGE: Giant clam and hard corals on the wreck of the MV *Salem Express* in the Red Sea



Kite surfers in Soma Bay, with sandy beaches and panoramic views of desert mountains (above); Dusky sweepers or hatchetfish with sea fans (right)

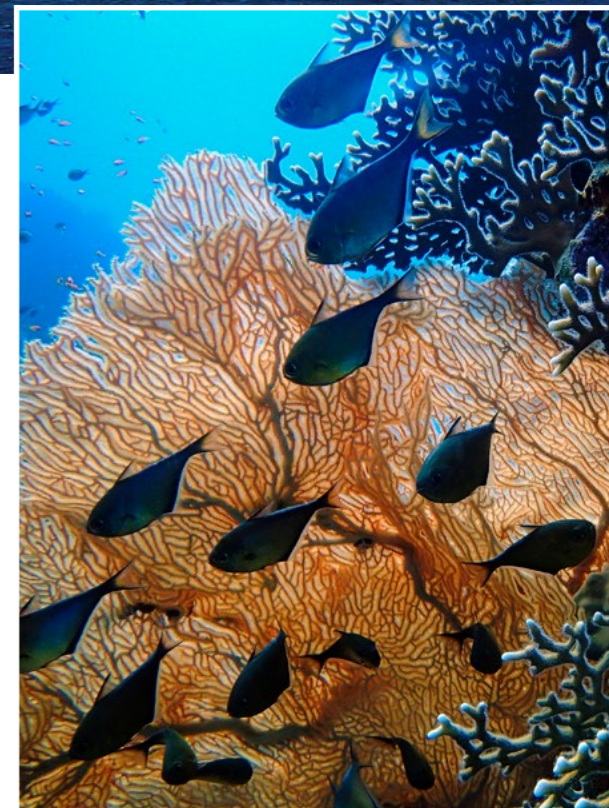
I first visited the Red Sea as part of a marine biological expedition with Dr Paul Cragg back in 1973. After having run safaris out of Israel and ending up living there for several years working on the legendary liveaboard dive boats *Lady Jenny III* and *Lady Jenny V*, my love for the Red Sea has never diminished. Now, some 45 years later, a return trip to the Red Sea was increasing my heartbeat in anticipation.

That first frisson of excitement came at 20,000ft when the plane taking my wife and me to the region started to descend, flying over the Red Sea Mountains of Upper Egypt, and I could see the shores of the Red Sea

beckoning. The route of the Thomas Cook Airbus to Hurghada took us directly over Ras Abu Soma, the destination of our dive resort. Hurghada Airport is big and efficient, and well used to large numbers of tourists. Visa payment, customs and luggage collection is straightforward, and the various resorts, travel companies and dive businesses all have representatives waiting at the gate to collect you. Do not be put off by their rather aggressive stances in trying to nab your custom; just make sure that your transport is ready and waiting for you in advance.

Dive resort and operator

Our hotel for the week was The Breakers Diving & Surfing Lodge at Soma Bay, the only dedicated diving and kite surfing resort in the Middle East. The Breakers has over 170 staff (mainly Egyptian), and food served here inevitably has the Egyptian slant of flavours, but there were plenty of other



dishes too, including Asian cuisine, fried fish and burgers. There were also a couple of bars and roof-top areas for chilling and après dive chatter.

The Breakers' two large dive boats were used for half and full days of diving. The dive boats each had a large saloon, in which divers could hang





Reef diving at Safaga (above); The dive centre has diving and underwater camera equipment stations right on the beach (right).



The author off to plumb the Red Sea depths (above); Windsurfing in Soma Bay (right)

out, check cameras and enjoy a buffet lunch when on a full day out. Dive sites were around a 30- to 90-minute ride from the marina, and a full dive briefing was always provided whether one was diving independently or with a guide. For those who have done some of these dives before, it is always a good idea to listen in, as there are always seasonal vagaries of the critters one can find here.

The diving part of the resort is owned and operated by Orca Dive Clubs, which has several resorts in Egypt as well as in Mauritius, Flores, Bali and Sardinia. With the latest equipment, multilingual staff and a great house reef opposite the dive centre, what more could one ask for? Large dive boats to explore the offshore reefs and wrecks? Oh,

yes, they have those too.

All levels of divers are catered for, from beginner snorkellers and try-divers all the way to mixed-gas and rebreather divers. Many come to increase their diving or training skills, and for underwater photographers like myself, it is the perfect base for exploring the northern Red Sea reefs off the African mainland.

Diving

Over 100km north of Marsa Alam, a number of the dive sites between Sharm el-Sheikh and Marsa Alam were really only accessible by liveaboard dive boats. Nowadays, Panorama Reef, the wreck of the *Salem Express*, and a number of other dive sites around Safaga and the Soma Bay headland, are easily reached. These dive sites

were the focus for our trip.

Once the dive shop paperwork was completed, there was a week's chart on the wall for us to consider, listing full- or half-day dive boats, RIB dives and space to plan our shore diving off the house reef. We just had to put our names down for whatever boat trip we wanted, and always made sure to remove our names if we changed our minds.

The house reef was reached along a 420m pier with two platforms and plenty of ladders to aid entry and exit. Transport was provided by converted electric golf carts, which could transport you, your buddy and all your dive gear and camera equipment. This style of diving, of course, allows you and your buddy to spend extended time



in the water.

The following is just a small example of the superb diving to be found along this stretch of coastline, far from the maddening crowd.

LODGING

Located about 45 minutes' drive south of Hurghada Airport, Soma Bay is the name of the entire headland resort area. There are currently five major hotels here, with plans for more. These include The Breakers Dive & Surf Lodge, Robinson Club (which is German owned and operated, and a bit like a family "Club Med"), Sheraton, Westin, and Kempinski. Each resort has an entirely different look, layout and feel, but our host for the week was the superb Breakers, the dedicated diving and kite surfing resort. You should note, however, that the Westin in Soma Bay has one of the largest spas in the world, with an amazing saltwater hydrotherapy pool—it's like something out of an ancient Byzantine palace. ■





Endemic Red Sea or twoband anemonefish (left); Arabian Picasso triggerfish with bluestreak cleaner wrasse (right)



Jewel fairy basslet or sea goldie

The House Reef. By far, this was probably the most-dived site, and there were countless "ferry" trips up and down the pier every day, transporting divers and their gear. Most notable at this site were those early-morning dives and early-evening dives when the juxtaposition of daytime critters and nighttime denizens shared the reef. Cleaning stations were doing a roaring trade, and both predators and prey lined up to be cleaned of parasites with no thought of "breaking the rules." Dolphins came into the pier area too and were seen regularly.

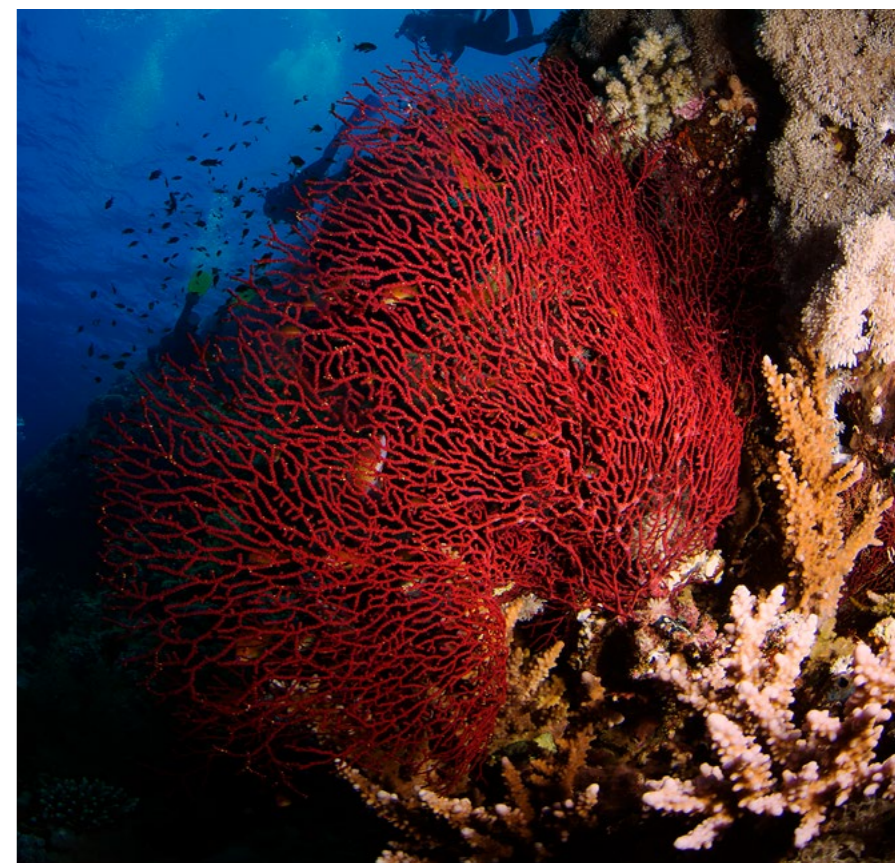
Predominated by small hard corals, this was a steeply sloping reef that descended to around 18m (60ft) before dropping steeply and even vertically in

many places. The more vertical sections had large black coral trees, which hid small schools of glassfish and hatchetfish. Curiously, there were many large bigeye snapper out in the open, when they are usually well secreted away under overhangs. There were a few huge stonefish on this reef, one hiding under the sand, but the other was so well overgrown with algae that it was virtually "invisible" amidst the corals and algae beds. Small mushroom corals littered the reef and there were some huge sections of lettuce coral.

The ubiquitous anemonefish, or clownfish, dotted around large anemones. As we moved to the north, towards the headland and opposite the light-house, we found the same type

of anemone, which fluoresces red underwater, yet only shows green with normal white light flash. Once you get to the 30m (100ft) range, you will find the lyretail angelfish (*Genicanthus caudovittatus*). With the male and female sporting completely different colours, the lyretail angelfish feed on planktonic critters in open water near the reef. Dolphins are seen very regularly here as well as large barracuda and schools of trevally and other large open-water fish, so always keep casting your eye out into the blue.

Panorama Reef. I first dived Panorama Reef back in 1985 while working on the *Lady Jenny V*. Principally here to seek shelter for the boat one night, we found



Large sea fan



Soma Bay

Endemic Fridman's dottyback, *Pseudochromis fridmani* (above); Endemic Abudjubbe's wrasse, *Cheilinus abudjubbe* (left)



Endemic Redback butterflyfish (*Chaetodon paucifasciatus*)

that this large circular reef, with its two shallow platforms, was so good that we stayed the next day too and explored all around the reef as the sun moved around and illuminated the soft coral gardens and gorgonian forests.

Over 33 years later, I set off from the Soma Bay Marina on a full-day excursion to this reef and I had mixed emotions as my buddy Waleed and I dived the wall and east platform in the morning. This reef so reminded me of Jackson Reef up in the Straits of Tiran with its soft corals teeming with orange anthias and staggering amounts of angelfish and butterflyfish.

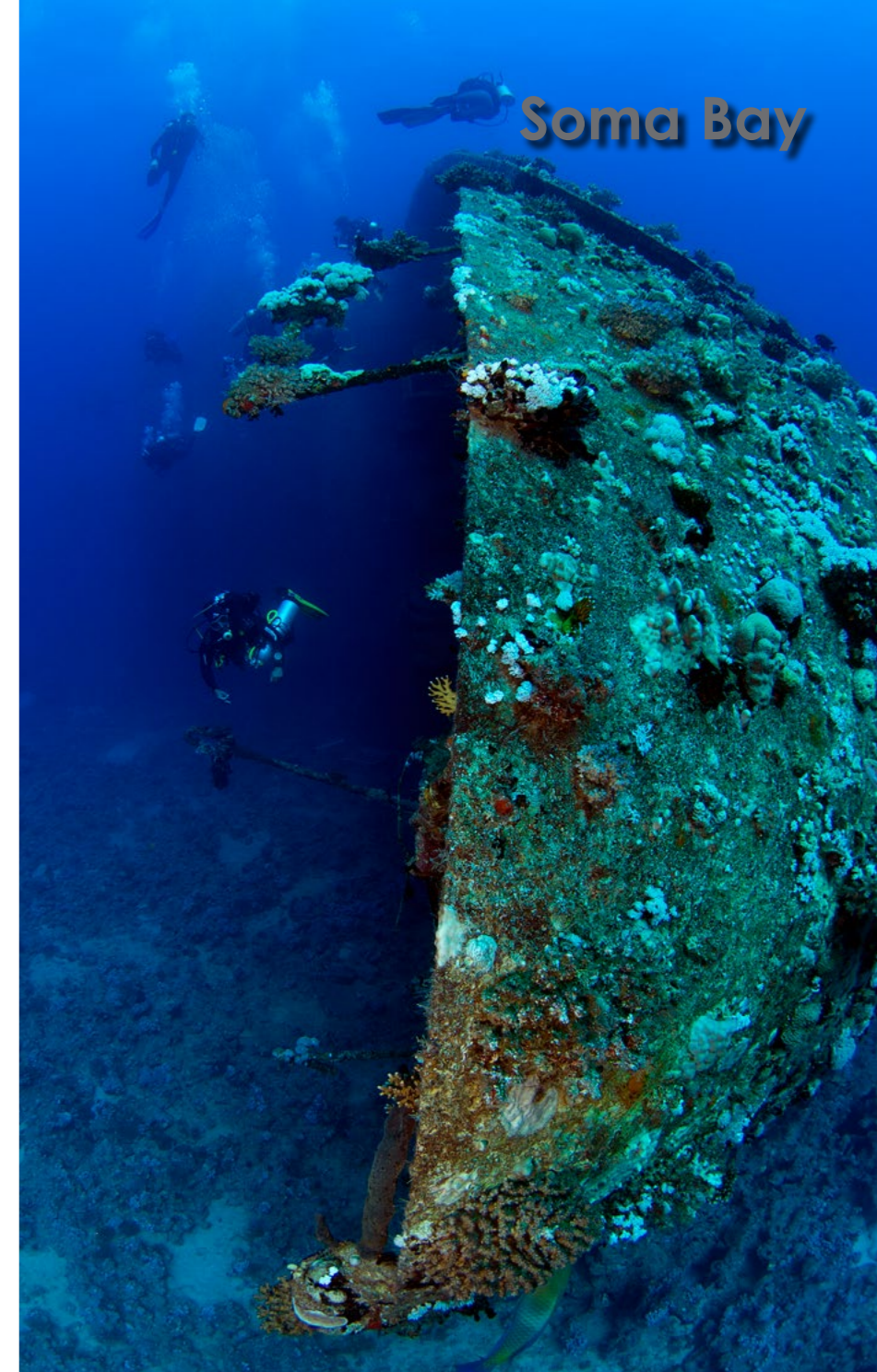
We were on the sheltered side of the reef, away from the current, so there were much fewer sea

fans here than we found later on our second dive in the afternoon, which was a drift dive on the western plateau. I forgot how strong the current was. Skimming over and around the huge stands of gorgonian sea fans that stretched out into the current was fun, but it was difficult to stop and take photographs.

As we approached the bottom corner of the reef, the current virtually stopped, and there were huge numbers of glassfish, lionfish, crocodilefish and all the usual suspects that one would normally find on a Red Sea reef. Panorama Reef also had a large anemone garden with dozens of large anemones, huge numbers of clownfish as well as hundreds of threespot dascyllus (*Dascyllus trimaculatus*).

Gabir Soraya. Only 30 minutes from the marina, this shallow reef comprised a large elongated reef with several small satellite coral ergs, or coral heads, to the south. At only 15m (50ft) maximum depth, the central sandy plain had a small group of garden eels. The narrow passages between the coral heads had small red sea fans and plenty of fire coral as usual, but the schools of butterflyfish and angelfish were a surprise as these fish are normally only found singularly or in pairs.

Sha'b Shear. This rather blind reef was also just a short boat ride from the marina. The dive boat anchored in a coral amphitheatre with large coral outcrops all of the way around, interspaced with narrow



THIS PAGE: Scenes from the wreck of the MV *Salem Express* built in 1964, which sank in the Red Sea in 1991. Over 470 people lost their lives in the shipwreck, which occurred during a massive storm.



canyons filled with anthias and chromis. There were numerous bits of wreckage around these reefs, including a small unknown ferry in this location that was well

raena flavicauda) and numerous groups of sweetlips, butterflyfish and angelfish. This part of Soma Bay was littered with small coral heads, which stretched in a

broken up (rumour has it that this was an insurance job—like so many others). One of the coral heads had a circular tunnel that ran through the reef from the seabed, rising to around 5m. On exiting, we found a large school of yellowtail barracuda (*Sphy-*

huge arc to the north and south. It was these shallow coral heads that became almost invisible to shipping late in the afternoon when the sea was calm and the sun was low.

Tobia Soraya. Around a 30-minute boat trip from the marina, this reef was really a group of small coral heads that were randomly spaced out on a 15m (50ft) sand sea bed. After a lengthy swim around the outside of the reef, our guide Waleed brought us to a coral head that was simply covered in gorgonian sea fans and filled with longnose hawkfish (*Oxycirrhites typus*), glassy sweepers, hatchetfish and hundreds of cardinalfish. There was also a huge stellate pufferfish (*Arothron stellatus*),

which was apparently resident on this reef.

Salem Express. Built in the French shipyards of La Seyne-sur-Mer in 1964, this Ro-Ro ferry was on her way back from Jeddah to Safaga, overloaded with passengers who had been on a pilgrimage to Mecca on 17 December 1991. A massive storm had blown up and at gale force, the ship struck Hyndman Reef where she was holed and quickly sank in the early hours of the morning. Official records state that 470 persons lost their lives, but locally it is widely known that many more were lost as the ship was grossly overcrowded.

Now lying on her starboard side in 30m

(100ft) of water, the *Salem Express* is completely encrusted in small hard corals. All of vessel's parts are accessible for those who wish to explore the ship's interior.

When I first dived the *Salem Express* 25 years ago, two of her lifeboats were on the seabed. Apparently, one has been removed since then, as there was now only one to be seen. Her stern door was now lying on the seabed, creating a huge square opening where divers were able to explore much of the vehicle deck. Both her propellers were intact and made for a superb photographic back-





Soma Bay



Scenes from the wreck of the *Salem Express* (above and top right); Dusky sweeper (*Pempheris adusta*) or hatchetfish on sea fan (right); Divers over reef with anemonefish on anemone (left)

drop as they are covered in small corals and brilliant red encrusting sponge. The ship's funnels had a large "S" on them, but this was getting harder to see due to the corals encrusting the emblem. The ship's bridge was fairly open, and all of the windows were now gone, but her parts were still visible inside.

Her empty davits and railings all hung out into open water, and the seabed was littered with debris, including some children's toys—just another reminder of that terrible tragedy.

There is still a large amount of controversy about whether divers should be permitted to dive the wreck. The Egyptian Government is still considering whether to ban all diving on the *Salem*

Express. But after such an extended period of time, it hardly seems worth the effort. Rather, divers should be given the option as to whether to dive the ship or not—out of respect for the dead, religious beliefs or just not wanting to be there. Whatever the outcome in the future, diving this wreck should be done with the greatest respect. Divers must not touch anything or disturb any of the remains.

Having run safaris here—living, working and visiting the area innumerable times—visiting the Red Sea always holds a sense of nostalgia for me, and indeed, I often think of it as coming home. Coincidentally, the strapline on The Breakers Diving & Surfing Lodge website is also "Welcome

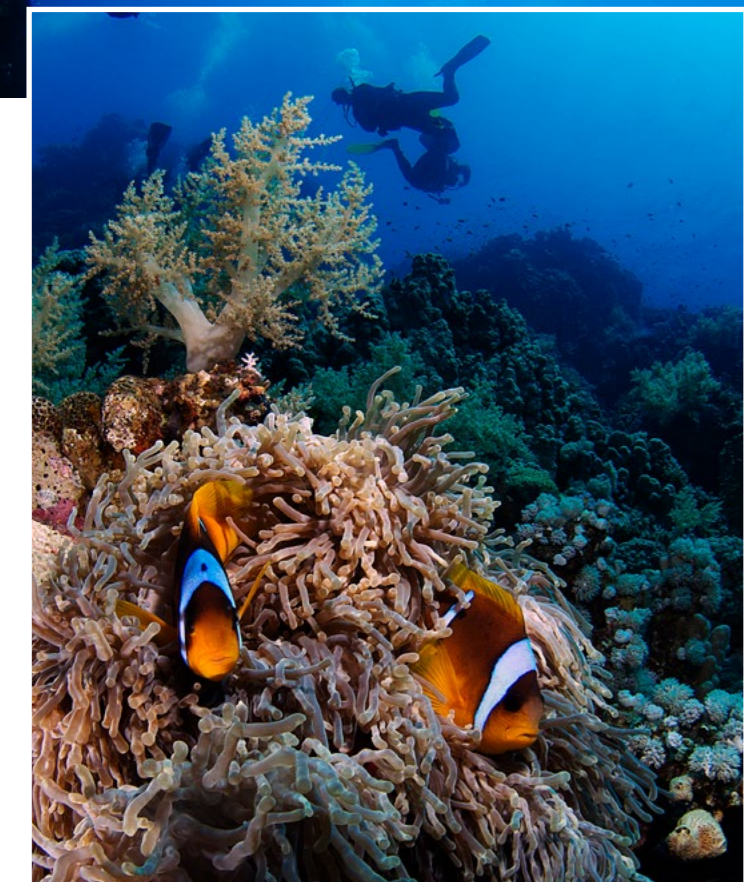
Home." These Safaga reefs should not be overlooked when considering or planning a Red Sea diving trip. ■

Lawson and Lesley Wood were supported by the Egyptian Tourism Authority; Dan Lion of Holiday Designers; Anna Hollingworth and Harriet Shearer of The Communications Group; Marwa Kachmar from Somabay; Wolfgang Jocham and Waleed Abd Elmaksoud from Orca Diving; and Stephan Reichl from The Breakers Diving & Kite Surfing Lodge. Flights were supplied by Thomas Cook. For more information, please refer to Lawson Wood's book, Underwater Guide to the Red Sea, available at Amazon.com.

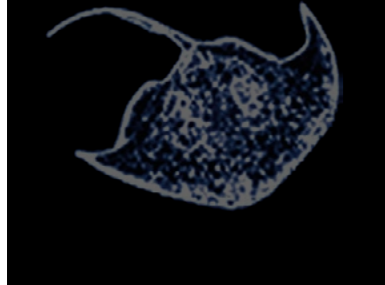
CURRENCY AND EXCHANGE RATES

With regards to currency, US\$, GB£ and Euros are all accepted, but check the prices of the Visas against the exchange rates. Currently, Visas are US\$20, but if you pay in GB£, they will charge you GB£20. So, try and bring the correct currency, or better still, bring Euros, as most visitors to the resort are German, Swiss or Austrian, with visitors from the United Kingdom being fourth down the list.

Most people opt to pay all accounts on a credit or debit card, but again, currencies may be exchanged a couple of times, adding costs to your final bill. Using American Express, currency will be in Egyptian Pounds, which will again be changed to your home currency. When using credit cards, the transaction may start out in your local currency, but then may be changed into Egyptian Pounds before being converted back to your local currency. Confused? The current exchange rate is pretty poor, so do not buy Egyptian Pounds at home before you go on holiday. ■



fact file



Egypt



SOURCES: US CIA WORLD FACTBOOK, XE.COM, STATE.TRAVEL.US, CDC.GOV, CDWC.TRAVEL

History One of the world's great civilisations developed in Egypt, fostered by fertile lands and regularity of the annual Nile River flood, as well as the relative isolation found between the deserts to the east and west. Around 3200 B.C., a unified kingdom evolved, followed by ruling dynasties reigning in Egypt for the next 3,000 years. In 341 B.C., the Persians conquered the last native dynasty. Then came the Greeks, Romans and Byzantines. It was the Arabs who, in the 7th century, introduced Islam and the Arabic language. They reigned over Egypt for the next 600 years. Then, around 1250, the Mamluks, a local military caste, took control and continued to govern after the Ottoman Turks conquered Egypt in 1517. In 1869, Egypt became an important world transportation hub after the Suez Canal was completed, but also accrued a lot of debt. In order to protect its investments, Britain took control of Egypt's government in 1882. However, allegiance to the Ottoman Empire continued, in name only, until 1914. Egypt was partially independent from the United Kingdom by 1922, and in 1952 the country got full sovereignty after the overthrow of the British-backed monarchy. In 1971, the completion of the Aswan High Dam and the creation of Lake Nasser altered the long-held role of the Nile River in the ecology and agriculture of the

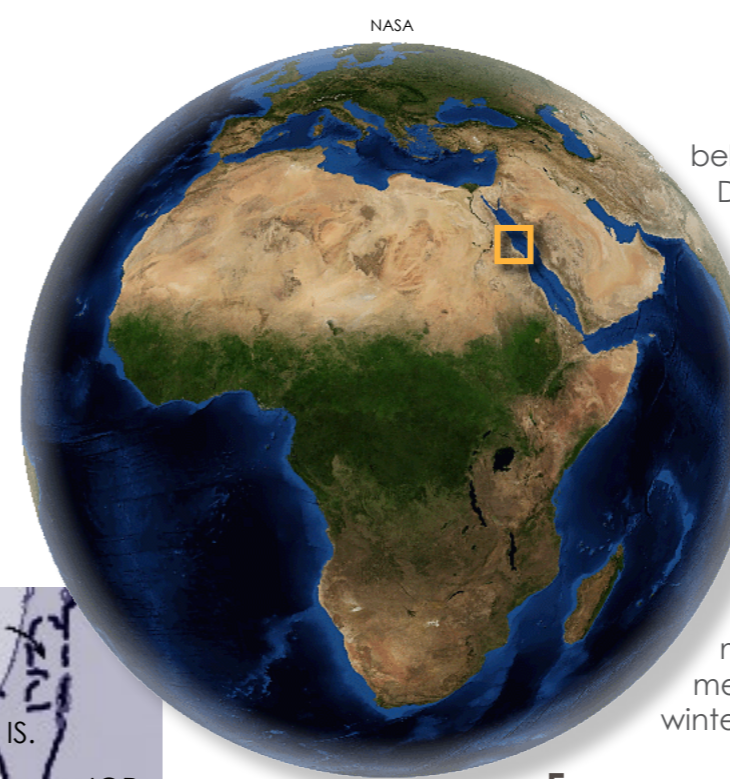
country. Resources were overtaxed and society stressed as the population experienced rapid growth. In addition, there was limited arable land and continued dependence on the Nile. In order to face these challenges, the government implemented economic reform and major increases in investment in physical and communications infrastructure.

The Tunisian revolution in 2010 inspired demonstrations and labour strikes in Egypt, leading to the ousting of President Hosni Mubarak in 2011. National leadership was assumed by the military until 2012 when a new parliament was put in place. Mohamed Morsi was elected president that same year, but violent protests against his government and the Muslim Brotherhood in 2013 led to the military intervening again, removing Morsi from power, who was then replaced by interim president Adly Mansour. In a referendum, a new constitution was approved by the voters in 2014, and Abdelfattah el-Sisi was

elected president. He was re-elected in 2018. In 2015, a new parliament was elected, the first since 2012. A national referendum in 2019 led to constitutional amendments permitting: extension of el-Sisi's term in office through 2024, with a possible third term; two consecutive six-year terms for presidents; presidential power to appoint judicial councils heads, re-establishment of an upper legislative house, one or more vice

in half by the Nile valley and delta, Egypt is primarily a vast desert plateau. Lowest point: Qattara Depression -133m. Highest point: Mount Catherine 2,629m. Natural hazards include droughts, earthquakes, flash floods, landslides, dust and sandstorms, as well as hot windstorms occurring in spring. Environmental challenges include urbanisation and wind-blown sands decreasing agricultural lands; increased soil salination

RIGHT: Location of Soma Bay on global map
BELOW: Location of Soma Bay on map of Egypt



presidents, 25% of legislators to be female and reestablishing the military's role as guardian of the nation. Government: republic. Capital: Cairo

Geography Egypt is located in Northern Africa. It borders the Red Sea north of Sudan and the Mediterranean Sea, between Libya and the Gaza Strip. It also includes the Asian Sinai Peninsula. Coastline: 2,450km. Terrain: Cut

below Aswan High Dam; desertification; coral reefs, beaches, marine and aquatic habitats threatened by oil pollution, agricultural pesticides, raw sewage and industrial run-off.

Climate Egypt has a desert climate—hot, dry summers with moderate winters

Economy Nile valley is where most economic activity takes place. Highly centralised during the rule of former President Gamal Abdel Nasser, Egypt's economy opened up significantly under former Presidents El-Sadat and Mubarak. From 2004 to 2008, Cairo pursued economic reforms aggressively in order to attract foreign investment and foster GDP growth. However, living conditions for the average Egyptian stayed poor and exacerbated public discontent despite the increase of economic growth in recent years. Unrest took place in January 2011 and the Egyptian government dramatically increased social spending to ease public dissatisfaction. However, economic growth slowed significantly due to political uncertainty, which reduced government revenues. The hardest hit sectors were tourism, manufacturing and construction. Foreign exchange reserves are being used by the government to support the Egyptian pound.

Population 104,124,440 (July 2020 est.) Ethnic groups: 99.7% (2006 est). Religions: Muslim 90%, Christian 10% (2015 est). Internet users: 39,097,468 or 41.3% (2016 est.)

Currency Egyptian pound (EGP). Exchange rates: 1USD=15.80EGP; 1EUR=17.42EGP; 1GBP=20.73EGP; 1AUD=10.56EGP; 1SGD=11.56EGP

Language Arabic (official), English and French

Health & Safety The US State Department has issued an Egypt Travel Warning for US citizens due to threats from terrorist and violent political opposition groups. Please check with your country's state and health departments well in advance of your trip for updates on required vaccinations, health and safety advisories.

There is an intermediate degree of risk for food or waterborne diseases such as bacterial diarrhea, hepatitis A and typhoid fever; vectorborne disease such as Rift Valley fever; and water contact disease such as schistosomiasis. H5N1 avian influenza has been identified in the country but poses low risk to tourists.

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Web sites
Egypt Tourism
www.egypt.travel ■



Gran Canaria

— *Angelsharks & Huge Schools of Fish*

Text and photos by Christian Skauge



Diver with large school of sea bream (above); Arrow crab (right); Angelshark (top right); Fangtooth moray eel (far right); Common octopus (bottom right)

Text and photos by Christian Skauge

Gran Canaria is one of the most visited destinations by tourists, especially from Europe, but far too many leave their dive gear at home! You should definitely bring it, because the island offers great diving with huge schools of fish, angel sharks, stingrays and great volcanic seascapes.

Most divers, and especially underwater photographers, seem

to think it is necessary to fly halfway around the globe to get a good dive or some great underwater images. Not so! Great diving is much closer to home, at least if you are based in Europe, or plan a stopover in Madrid. The Canary Islands is a well-known holiday destination, but it seems most people are unaware of the great diving opportunities. Gran Canaria is located bang in the middle of the offshore island group, and offers perhaps the best combination of accessibility, value for money and great diving.

Gran Canaria receives approximately four million tourists every year, but only a fraction of them choose to dive. That's a pity, because Gran Canaria is surprisingly

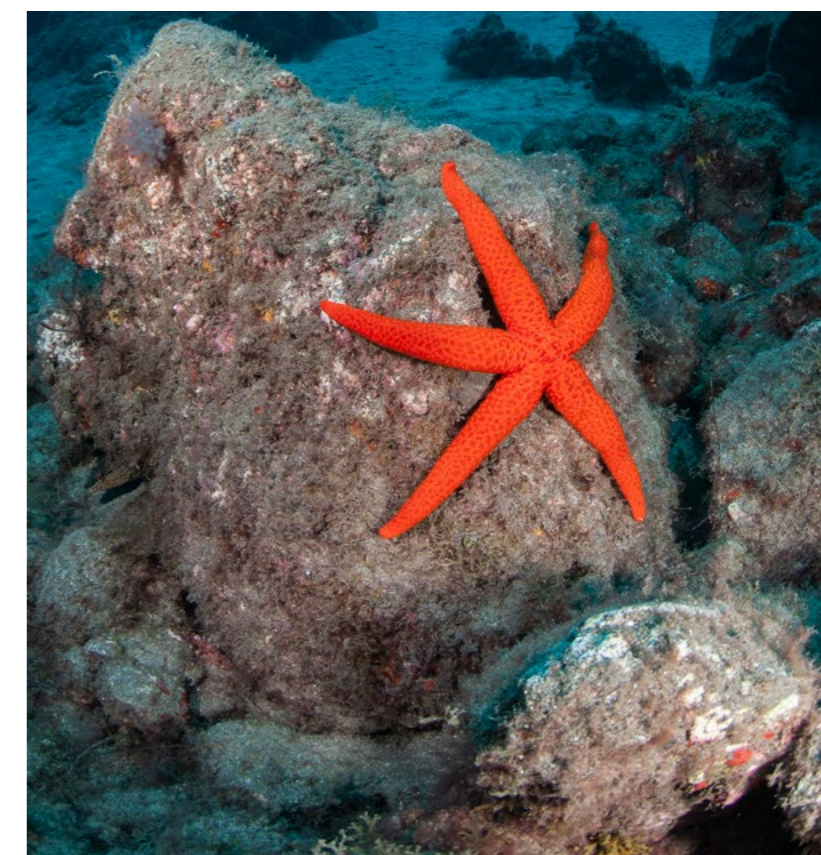
beautiful underwater, offering great visibility and an impressive range of marine life. I chose to go diving with Diving Center Nautico, the oldest operation on the island, which was established in 1972. Not only are they experienced, they are also very friendly and helpful, and will make sure your dive holiday lives up to expectations.

El Cabrón—the bastard

One of the top spots on Gran Canaria is found near the town of Arinaga in the marine reserve called El Cabrón, named after the pirate Pedro Hernández Cabrón who landed here with three ships in 1483. According to legend, he was not a



Cleaner shrimp and anemone



Club-tipped anemones on the rocky reef of Gran Canaria (above); Scorpionfish (top centre); Painted comber (right); Common octopus (top right)

very nice guy, but apparently, he got what he had coming. In the battle that followed the landing, he lost all his teeth and could not eat or speak for days.

The entry at El Cabrón is rocky, and the dive staff will help you get in and out of the water safely. After a short swim, you reach the drop-off, which offers spectacular walls and numerous swim-throughs—some of them so large, they made me think of Gozo's Azure Window. The sandy bottom at 20m depth below the volcanic formations is home to angel sharks, stingrays, butterfly rays, electric torpedo rays, stargazers, and schools of roncadores (or bastard grunts—but one should always try to learn some local lingo).

Bright red starfish and club-tipped anemones adorn the rocky outcrops and crevices. With the anemones,

you also find different species of cleaner shrimp tending to the moray eels living on the reef, and mysterious caves promise stingrays, bigeyes and huge feather duster worms.

The shallow reef, which runs along the rocky coastline, is covered in algae and yellow-green sponges, and is teeming with colorful wrasse, damselfish and parrotfish. If you look closely, you might find an octopus garden, with its curious but timid inhabitants showing off their amazing camouflage and shape-shifting abilities. Sometimes, they venture out to feed, but mostly they are busy arranging and re-arranging their personal collections of rocks and seashells to keep their hide-outs safe,

neat and tidy.

El Cabrón offers seven to eight different dives from the same starting point—no wonder this is a popular dive spot!

Angel in the sand

Visibility was generally good, and the



Common octopus hiding in a hole in the reef

Red sea star



THIS PAGE: The shy angelshark can be found camouflaging itself on the sandy sea floor. They are ambush predators that prey on fish, crustaceans and some mollusks. They have powerful jaws and sharp teeth, and can bite if divers get too close to their heads or pull their tails.

spectacular seascapes of El Cabrón were amazing. The best dive was when our group of divers decided not to return to the usual starting point, but instead continued on around Punta de la Monja and into the bay of Playa del Cabrón. This offered even more spectacular volcanic formations, some of which were shrouded with schools of fish, and had caves occupied by huge pufferfish and bigeyes.

Suddenly, the dive guide started pointing towards the bottom. She had spotted an angel shark! These magnificent animals can grow up to nearly two meters in length and look like a cross between a shark and a ray. How cool! This particular specimen was not buried in the sand, as angel sharks usually are, and had either been for a swim or had been spooked by divers earlier in the day. When they are not camouflaged, angel sharks tend to be

skittish, so we gently inched closer to get a better look. As soon as I fired the strobes, it took off and swam out on the sandy flat. Crikey, what to do?

Since I did not have too many dives left, I quickly decided not to let the opportunity pass me by. I swam as hard as I could after the shark and slowly gained on it, only to have it flick its tail and dart off when I was almost close enough. We continued this dance for four to five minutes, and I burned through my air like never before.

Finally, I was able to get close enough to get a handful of shots, and puffing and panting, I started to look for the reef. It was gone! I had no idea which way to head back until I saw the dive guide who wisely had stayed as an intermediary, so I could find my way back. The rest of the dive was spent in shallow water trying to breathe as little as










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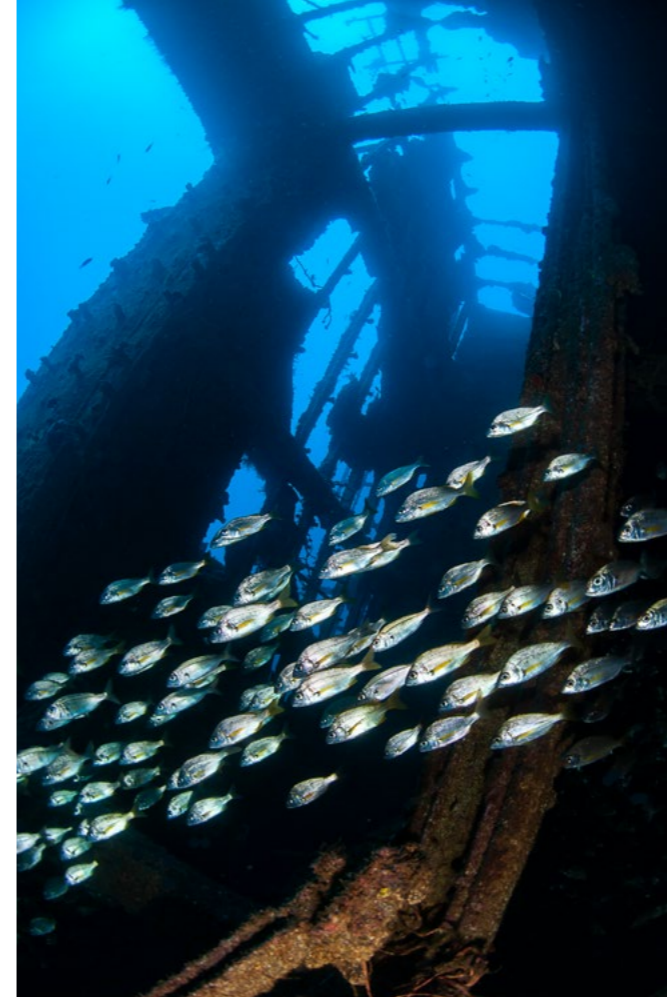


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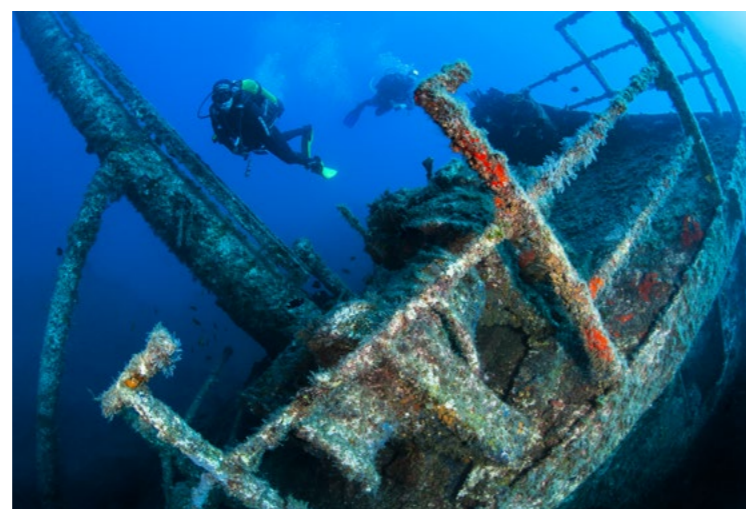
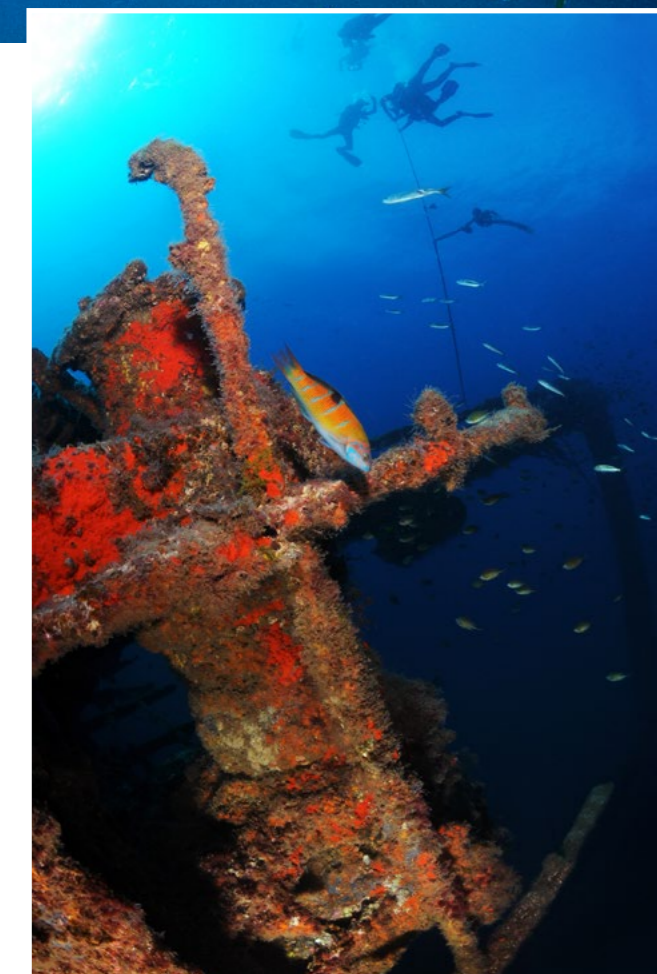
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Gran Canaria offers several opportunities. We chose the MV *Arona*, a 96m-long cargo ship that sank at anchor after a fire in 1976. The wreck lies off the coast of Jinámar, some six nautical miles south of the port of Las Palmas' Puerto de la Luz.

possible. (It is easy for underwater photographers to get caught up in capturing a shot, but always remember, safety first—for your own sake, and that of your fellow divers, as well as the marine life.)

MV Arona

A dive holiday is not complete without a proper wreck dive, and

The *Arona* is in excellent condition and offers large schools of fish both in the holds and above the hull, including barracudas, grunts and breams. The bow is especially beautiful and makes every underwater photographer try a little harder against the current (if there is any) to get the right angle. The wreck lies on its



THIS PAGE: Scenes from the *Arona* wreck, a 96m-long cargo ship, which sank in 1976 after it caught fire



Slipper lobster (left); Common cuttlefish (above); Detail of bearded fire-worm (right)



Felimare picta nudibranch (above); Red reef hermit crab (right)



keel with a 45-degree list to port at a 25 to 40m depth.

To get to the wreck, divers are first driven to Las Palmas, where a 15-minute ride in a RIB awaits them. Usually, there are two dives on each trip, with a surface interval at sea. Don't forget to take Dramamine if you are affected by sea sickness!

Tufia's macro heaven

The tiny, picturesque village of Tufia seems completely untouched by tourism that is so present in other areas of Gran Canaria. The steep hillside is covered

in white-washed tiny houses, stacked on top of each other above the small beach and anchorage. We trod down the narrow alleys to get to the water and found the beach to be a very easy entry and exit.

Tufia offers terrific macro dives in shallow water, but if one swims out a bit farther from

the shallows, there are also some great swim-throughs and caves at Punta de Silva. Being a macro fanatic, I never got that far. There was just too much to see and photograph along the way, and even a 90-minute dive was not time enough! Most people reach it within 20 minutes without any problems, but it is perhaps easier to do so without a camera.

Small overhangs revealed sea cucumbers, slipper lobsters, starfish and anemone shrimp, and colorful *Felimare* nudibranchs were crawling amongst the algae and sponges, upon which they feed. This large sea slug is associated with the Canary Islands, Cape Verde and the Azores, but is also found in the Mediterranean and even the Gulf of Mexico.



Tiny triplefins competed for attention with various moray eel species, scorpionfish and beautiful anemone hermit crabs. Towards the end of the dive, with the black sandy beach already in sight, we found two large cuttlefish doing their mating



Black-faced blenny



Squat shrimp, also known as sexy shrimp, in club tipped anemone (above); Canary scorpionfish (top right); Yellowline arrow crab (right); Divers with two large spotted sea hares in foreground (left)

ritual, barely noticing us passing by. A cold Coke and an ice cream in Luis' tiny dive-and-snack-bar at the beachfront rounded off a perfect day.

Sardina del Norte

After a long drive all the way to the northwestern corner of the island to the small town of Sardina del Norte (curiously, there is no Sardinas el Sur), we were hoping to find butterfly rays and perhaps more angel sharks on our next dive. Although visibility was good, we could not spot any of these oftentimes elusive elasmobranchs on the vast sandy plains. Instead, we

concentrated on the prolific fish life on the outside of the mole, which is covered with huge concrete blocks, acting both as wave-breakers and an artificial reef.

While trying to frame divers and a school of fish, I spotted something on a nearby outcrop—two giant sea hares! They had the same color and shape as Peter Pan's shoes, and I swear they were about a size 45. Nearby, some curious yellowline arrow crabs made their spidery presence felt, almost like they were auditioning for the role of Tinkerbell to make my underwater Disney fantasy come alive.



A Lembeh feeling in Taliarte

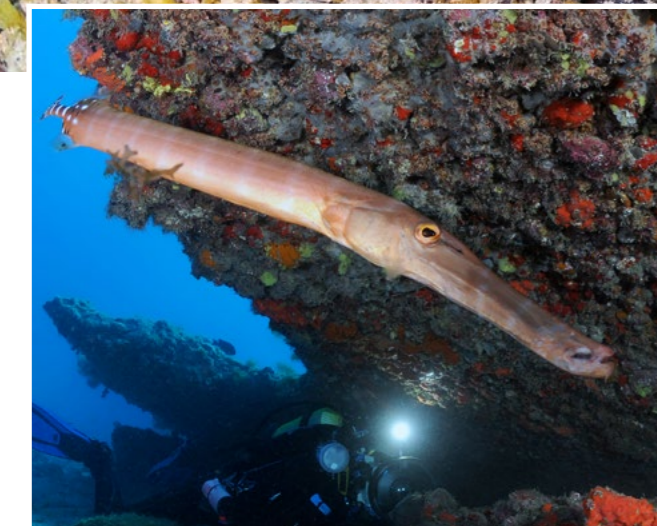
In the marine life identification book at the dive center, I had spotted something very interesting—a beautiful yellow-spotted bumblebee shrimp. I wondered: would it be possible

to find it? I really wanted to see this magnificent little creature, and the solution was to do a night dive.

Taliarte is, by far, the best spot for this on Gran Canaria, so off we went. A staircase with rails had been built for swimmers at



Yellow-spotted bumblebee shrimp



Trumpetfish (left), stingrays (above) and enormous school of roncadores, or bastard grunts (top right) at Pasito Blanco Reef

volcanic sand. I got the same feeling of excitement I had experienced muck diving in Lembeh Strait in Indonesia. This was similar! The tiny critter posed for a few images before it got spooked, inked and darted off. I found it about a foot away—I hoped its emergency-escape range would improve with time.

We started exploring the steep wall that runs along the entire shoreline at Taliarte, and within three minutes, we found our first bumblebee shrimp. These critters can be spotted at this dive site during the day, but at night, they are plentiful and very active.

The sandy bottom teemed with soles, razorfish, weavers and hermit crabs out feeding, while the walls were full

of sleeping pufferfish and scorpionfish. In tiny caves, we found slipper lobsters and well-camouflaged sponge crabs. The club-tipped anemones were in peak season, with tentacles emerging from every crack in the reef. A variety of cleaner shrimp were bustling about, and we even found tiny squat shrimp (also known as sexy shrimp)—a minute symbiotic shrimp, which has a pantropical distribution.

The schools of Pasito Blanco

The offshore reef of Pasito Blanco is another must-do dive when visiting Gran Canaria. We drove to the village of Arguineguin where a 24-foot RIB was waiting for us at the dock, engine idling.

After a short boat ride, we dropped down the anchor line to a marvelous sight—an enormous school of roncadores, just at the end of the reef! For more than half of the dive, we were surrounded by fish, completely encircled to the point where daylight started to disappear because of the density of the school. Curious, they slowly revolved around us, only to split up and slide by us on either side, when we dived into the fish soup.

The elongated, submerged reef offered a multitude of overhangs and small caves, revealing bigeyes and trumpetfish by the hundreds. Several large stingrays were resting under the ledges, sometimes letting us get really close, and sometimes



Location of Gran Canaria on regional map

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Divers explore the rocky reefscape of Gran Canaria

Close-up of club tipped anemone (top left); Forkweed (above); Greater weaver (left); Tube anemone (far left)



swimming off slowly into the distance.

the morning and brought to the dive center, where the gear was loaded onto the dive buses. These would then depart for the dive sites of the day, which had been carefully selected after reviewing wind and wave conditions. About half of the 20+ dive sites on the island were shore dives, the other half required a short boat trip—but you still have to get in the bus to go to the harbor.

Between dives, we were offered sandwiches and water to keep us hydrated, and dive briefings were always extensive and thorough. Diving was done at various

places all along the eastern coast of the island, from Mogan in the south to Sardina del Norte in the northwest—the western coast of the island being too inaccessible and prone to wind and huge waves.

Do more—don't just dive!

Gran Canaria has much more to offer than just diving, and this typical one-week holiday would be best enjoyed as a two-week adventure. The interior of the 65km-wide island has great mountains, with lush pine and eucalyptus forests, and the sand dunes at Playa del Ingles are well worth a visit. Being relatively small, the island is efficiently navigated by rental car, and staying in Maspalomas in the south like I did is no hindrance to reaching all corners of this otherwise relatively circular holiday paradise. ■

Christian Skauge is an award-winning underwater photographer based in Oslo, Norway, and is the owner and editor of the Norwegian dive magazine, Dykking. He is particularly interested in photographing macro life, but also enjoys wide-angle wreck photography. For more information, please visit: Scubapixel.com.

FACT FILE

TRAVEL

We flew Norwegian from Oslo via Copenhagen to Las Palmas, which can be reached from most major European airports.

ACCOMMODATION

We stayed at Apartamentos Las Camelias, close to Playa del Inglés. The spacious studios meet high standards of accommodation, with large bathrooms, kitchenettes and balconies. A supermarket, shops and restaurants are close by. The dive center will pick you up in the morning and take you back after diving.

DIVING

We went diving with Diving Center Nautico in Maspalomas, which was well organized, professional and made sure we had a great time. We did mostly shore dives, but also some boat dives. Good visibility, spectacular lava formations, huge schools of fish, great wrecks and surprisingly diverse and interesting macro life can be enjoyed. The diving is easy, with little or no current, but it may be challenging

to get in and out of the water if there are rough seas. The dive center's team will assist you and make sure you are safe.

SEASON

All year-round, the water temperature is 18-24°C. We had 20 to 30m visibility and 23°C in the water in late September, for which a 5mm suit was adequate; however, a 7mm suit should be considered for the rest of the year. Bring a hood for night dives and do not forget rugged booties for the land dives.

CURRENCY

Euros and credit cards can be used everywhere.

LODGING & TRANSFERS

Diving Center Nautico can book accommodations on your behalf. They will also pick you up at the airport or book you a rental car.

MEDICAL STATEMENTS

A recent medical statement saying you are fit for diving is required, but this can easily be obtained on the island. ■

Three of them ended up chasing one another around a big rock, becoming equally surprised to see me each time they made a lap. It was almost as if I could hear them squeal with terrified delight.

Well-organized diving

The diving was extremely well organized, and Nautico ran a tight operation. Divers would be picked up at their respective hotels in



Not Just a FAD

Text by Lucy Martin

Photos courtesy of Sam Balderson,
Christian Burger, Lucy Martin, Rose
Martin, Brandi Mueller and ICS

— *Saving the Reefs in the Seychelles Islands*





LUCY MARTIN

School of small fish shelter under a fish aggregating device or FAD (above)

Drifting fish aggregating devices (dFADs) are threatening endangered marine species and coral reefs in the Indian Ocean. Marine conservationist Lucy Martin worked with the Island Conservation Society (ICS), a non-governmental organization in the Seychelles, on a large survey in 2015 to find out how big an issue FADs actually were. The instruments littered the marine environment in the Outer Islands especially around Desroches, Poivre, Saint Joseph, Cosmolédo, Farquhar and the Alphonse Group, where Martin lived. As a trained marine biologist, she took a scientific approach to the survey and spent time in the water to see the damage for herself.

As I descended, I saw a mass of netting twisting around and down. The visibility was excellent, but all I could see was bright, disorientating violet, punctuated by the dark black mesh of nets—my only reference. The deeper I went, the clearer the picture became. I saw sheets of netting, splayed out and smothering the coral life on the seabed below. I looked further and saw that this was going to be a big job. The lines of rope and broken fishing net extended towards the drop-off of the second, deeper plateau.

As I approached, I checked my computer's no-deco limit and assessed the complexity of this particular case. I saw the main anchor point was wrapped around a large coral bommie, but it looked fairly fresh and uncomplicated. So, with eight minutes of bottom time left, I decided I could go a bit farther and try to remove the whole hunk of debris before me.

It was a fairly simple task until I had shallowed up. There, the netting was carefully woven around arms of branching coral. Some I patiently picked off, allowing the slight surge to swing me away and then



CHRISTIAN BURGER

back to my starting point to continue my mission. Other parts would take too long, and coral had already started to overgrow. So, I reached across my torso, releasing my knife from its holder, and sawed the net on either side.

Slowly but surely, my dive buddy and I—each working on our own complex puzzle of netting—got the whole monstrosity free from the reef. Once we started to roll up all the rope and net together, we realised that this was far too heavy for us to swim up to the surface. My buddy pulled out a 30kg lift bag, and we bound the bulk of rope together. After a couple of purges of the octopus into the lift bag, it sailed to the surface. Several minutes later, so did we, breaking the surface next to a wooden raft covered in goose barnacles.

As we waited for our pick-up, I noticed many small fish hanging in the dark beneath the shade cloth that was stretched across



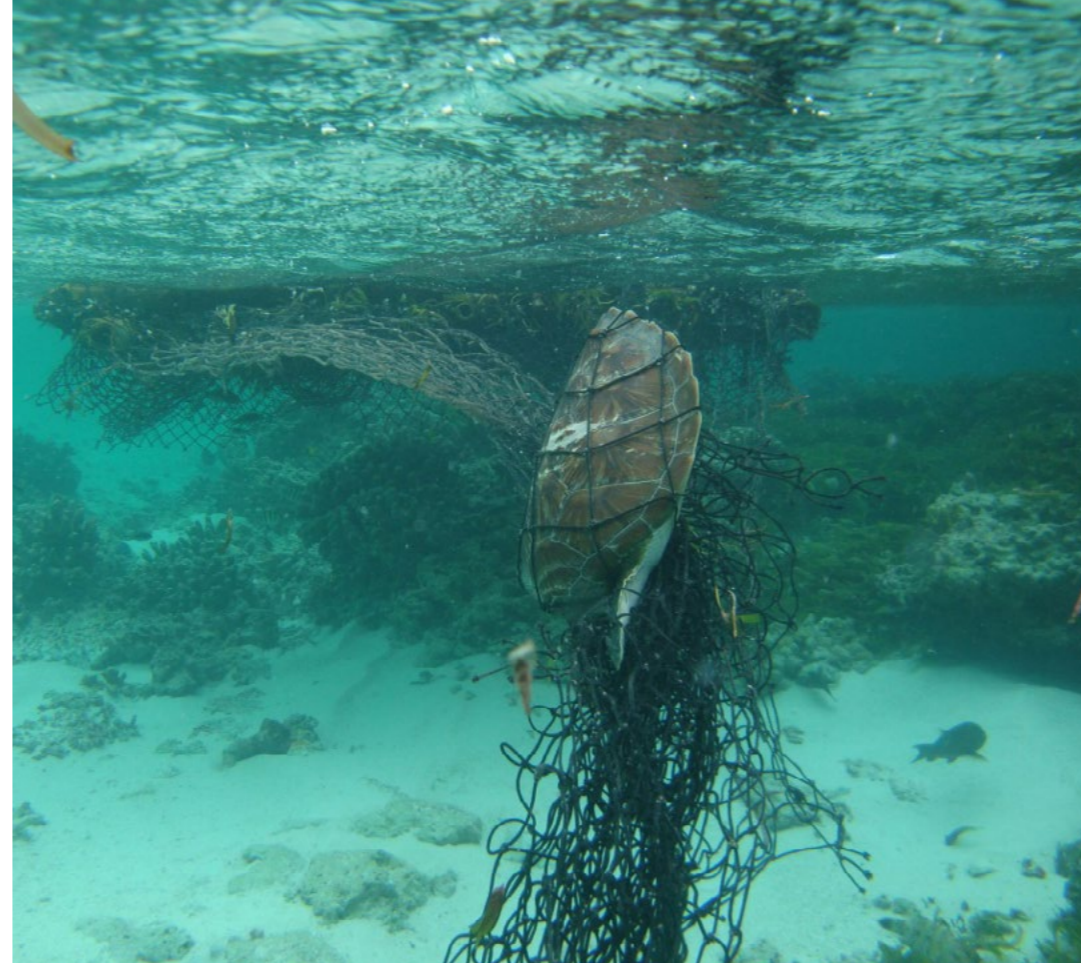
VIDEO STILL COURTESY OF LUCY MARTIN

Divers use a lift bag to bring heavy FAD materials to the surface for pick-up by a dive boat (above); A diver cuts lose a FAD tangled in the reef (top right and previous page)

Dead green sea turtle, which got entangled in a FAD and drowned just inches from the surface where it could have reached air to breathe



CHRISTIAN BURGER



ICS

Abandoned FADs will drag on reefs and seagrass, destroying critical habitat along the way

the raft—some juvenile triggerfish and needlefish. When the boat arrived, we heaved and hauled, trying to lift the heavy load aboard. Many shouted instructions and directions later, we finally retrieved the dFAD out of the water. We perched ourselves and our dive gear around it in our small boat, as the skipper accelerated towards the next removal mission of the day.

What are dFADs?

A typical dFAD is a two metre by two metre raft made of bamboo, polyvinyl chloride (PVC) pipes or even galvanised steel. The raft is typically tightly bound with layer upon layers of old fishing net or shade cloth. Within the binding, roughly six hard plastic or plastic foam buoys are attached to provide extra buoyancy to the raft. Underneath the raft, there is an aggregator of some sorts, typically hanging net or rope with woven plastic sacks tied at intervals.

The longest aggregator I ever pulled out of the water was 50m long. All of these dFADs were used in the industrial

purse seine (PS) tuna fishing industry. PS nets, which are long and trapezoidal, are dragged in a circle around schooling tuna. Once filled with tuna, they are closed at the bottom and everything is hauled aboard. The biggest PS vessels use nets that are 2km long and 300m deep, and quite frequently will capture non-target bycatch like whale sharks, silky sharks, sea turtles and manta rays.

Whilst this technique has been used on free schools of all types of fish for centuries, the use of dFADs really took off in the early 1990s when the yellowfin tuna fisheries in the Atlantic collapsed. Tuna fishing moved to the Indian Ocean, but the deep water posed a challenge to finding fish.

Natural FADs, such as tree logs or palm leaves, have long been known by local fishermen to have tuna aggregating around them. Any floating object in the open ocean provides shelter and refuge for small fish. Over time, small schools turn into bigger ones, and then, larger species arrive. After about five months, huge accumulations of tuna come to feed



CHRISTIAN BURGER

on the supply of food. The bigger the aggregator, the more fish. It was not long before businesses in the fishing industry started to manufacture their own (see Sidebar 1).

Environmental impact

Back in 2015, I drove around Alphonse

atoll, considering the impacts of this multi-billion-dollar industry. When a dFAD goes out of range, it is simply abandoned, at a high cost to both the marine environment and the non-profit organizations that try to clean them up. Through the baseline survey in 2015, we found 210 dFADs stuck fast to the reef, seagrass flats or

SIDBAR 1. A BOOMING TUNA INDUSTRY

Seeing huge potential, the purse seine (PS) tuna industries (Spanish, French, Seychellois, Mauritian and Korean) developed their own drifting fish aggregating devices (dFADs) with a floating buoy attached, which at first just housed a radio beacon. By the early 2000s, the beacon was replaced with real-time GPS units. Sophisticated acoustic fish finders on the buoys made it easy for vessels to know exactly what tonnage of fish were under the dFADs in specific locations. This made it easy to maximize their catch. Solar panels were then added to the buoy to extend the lifetime of a dFAD, allowing fishing grounds to expand, covering larger areas.

It was such a prosperous time that some nations even brought dedicated supply vessels into the fleet (the French banned the use of these boats) whose only job was to deploy and collect dFADs. Over the next ten years, dFAD use increased by 70 percent, with about 10,500 to 14,500 deployments of new buoys in 2013. This may seem exorbitant when one considers that each buoy costs around US\$1,500, but tuna fishing is a huge industry. In 2014, the global tuna industry was worth US\$33 billion. In 2017, PS vessels in the Western Indian Ocean caught more than 380,000 tonnes of tuna.

The majority of the tuna from the Outer Island of the Seychelles is landed in Port Victoria, the capital, and is destined for the island's cannery or transshipment. In 2015, the country exported over 30,000 metric tonnes of canned tuna, valued at more than US\$223 million and accounting for 50 percent of the country's exports. ■



Divers rescue endangered hawksbill sea turtles entangled in FAD netting (above and right), washed up on beaches where sea turtles go to nest (below); Dead olive ridley sea turtle drowned when it was ensnared in FAD netting (left)



SAM BALDERSON

mangroves, and an additional four that were still drifting in deeper water.

The range of affected species and habitats is vast. The worst damage is being done by curtain net aggregators—an early form of dFAD—which poses a significant entanglement threat to sharks.

In 2013, silky shark mortality in the fishing grounds was estimated as 480,000 to 960,000 sharks per year. Once a curtain net reaches our coastlines, it has left the habitat of pelagic sharks but not the habitat of sea turtles.

A cruel death for sea turtles

Fully aware of the threat of entanglement, I would jump into the water in snorkel gear every time I saw a new dFAD, with a sense of dread that I was going to see something terrible, and I usually did. I saw hawksbill and green sea turtles, and the only olive ridley sea turtle I had ever seen, suspended in the nets and no longer moving. Those usually graceful reptiles, with alert heads and bright eyes, were turned into lifeless

carcasses, with flippers limp at their sides and heads hanging down onto their carapaces in a timeless sleep.

On one particular dFAD dive, my mask filled with tears, when I came across another casualty. All that was left was a turtle's black skeleton, which was almost camouflaged among the masses of broken netting, just a metre below the surface—a metre from the air it so needed to breathe to stay alive.

Reef destruction

Following an outcry from conservation groups, dFAD designs were encouraged in 2012 to avoid entanglement of sea turtles, and curtains were bound to form sausage nets. During our survey, 62 percent of dFADs used sausage nets; but once they hit the coastal environment and wrapped around coral heads, the binding ropes were cut, and the nets began to unravel over the reef.

This scenario is the most difficult to approach. On scuba dives, I have unpicked sheets and sheets of netting to free coral, countless times.

The longer the dFAD is attached to the reef, the more points become anchored to the reef.

I have navigated these messes as if penetrating a shipwreck, pulling myself this way and that along the main ropes to find the end point. I have seen many smaller coral colonies, which are not

strong enough to withstand the drag of the raft above, wrenched from their base and suspended in netting like a sad, abandoned bouquet of flowers in a graveyard.



SAM BALDERSON

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A diver removes a FAD caught on the reef.



Divers remove a drifting FAD and tow it to the dive boat for collection.

Some dFADs make it through the shallow reef break and enter the lagoon. I remember going to retrieve one and seeing the destructive trail of the long, slow journey it had made over the reef flats where it lay completely dry on a low tide. As the water level rose, it had moved, bit by bit, closer to the deeper lagoon, and I could see the drag marks stretching for hundreds of metres, carving through the seagrass beds, leaving a bright white trail behind it. The dFAD itself was heaving from the amount of sediment being carried with it and took three people to load into the boat.

Danger for nesting endangered sea turtles

Occasionally, a dFAD gets across the flats into the deep lagoon where its journey to the beach is faster. One day, I was walking the beach and found a green sea turtle completely stuck in the netting. Alphonse is a haven for nesting turtles.

Many a time have I crouched in silence for hours, watching the miracle of life, as these enormous marine reptiles haul their bodies out of the water to lay eggs.

This particular turtle had just nested. In the act of trying to get back into water after all that labour, she had hauled her body into the net. Unable to move backwards, she had tried to turn to free herself, which had snared her further. Returning to the scene with a knife, I was able to cut her free and try to guide her exhausted and limp body back to the waters' edge.

Enduring synthetics

By 2015, both curtain and sausage nets were beginning to be phased out by upcoming bans and a non-entangling dFAD was defined as having no net material at all. Despite that, 70 percent of all dFADs we found, at the time, were made of synthetic materials. Many of them were abandoned, still floating around the ocean

from the early days of their invention. They will persist in the environment for hundreds of years if things do not change.

The ICS mantra is to envision a future in which island ecosystems and associated wildlife are robustly protected for the benefit of all, and its mission is to promote restoration and conservation. But was enough being done? It did not seem that way to me. We, at ICS, wrote news articles within the Seychelles and a technical report of our findings, but I doubted whether anybody across the rest of the world knew about these issues.

Tuna are a highly migratory species, and institutional bodies called Regional Fishing Managements Organisations (RFMOs) bring together nations to better manage their fisheries. For the Seychelles, this is the Indian Ocean Tuna Commission (IOTC), and we hoped they would be concerned about what was happening in the Alphonse Group. So, we presented our

SIDEBAR 2. FAD WATCH

Text by Gail Fordham, ICS Conservation Officer

As a result of previous studies and greater public interest, a multi-stakeholder initiative has been under way between the Spanish Tuna Purse Seiner fishing representatives (OPAGAC), Seychelles Fishing Authority (SFA), Island Development Company (IDC) and Island Conservation Society (ICS). It is called FAD Watch and is the first project of its kind. Its goal? To prevent and mitigate dFAD beaching through an automated alert system.

The project is only possible thanks to participating fishing associations, like OPAGAC, who agreed to provide real-time information from the GPS on their dFADs. The system reports to ICS whenever a dFAD penetrates a five-nautical-mile buffer zone around the atoll or island ecosystems, and provides GPS coordinates, trajectory and estimated time of beaching. This allows staff time to plan and intercept dFADs before beaching occurs on Seychelles' coastlines.

OPAGAC has also provided funding for ICS to cover the costs of fuel, labor, equipment and project coordination through the duration of the program, which is still on-going. IDC provided support to ICS on the islands where dFAD removal was taking place, including the use of boats, skippers and tractors.

FAD Watch continues with ICS teams quantifying and characterizing the negative impacts on habitats and wildlife across the Seychelles. This pilot project has raised awareness of the issue and aims to encourage other fishing associations to join.

Going forward, FAD Watch plans to improve real-time tracking, which will result in quicker effective action and to work with stakeholders in the development of BIOFADs. Through FAD Watch, IOTC reductions in quotas and increased general public awareness, beaching of dFADs may now have reduced from around 10 percent to less than one. ■

CHRISTIAN BURGER

CHRISTIAN BURGER





CHRISTIAN BURGER

Divers lift a dFAD onto a boat for proper disposal. Many are shocked to see the scale of the problem in the Indian Ocean.

findings to them at a conference later that year, in 2015.

Divers help remove FADs

In 2016, I left ICS to set-up a PADI scuba dive and nature activity centre for Blue Safari on my same island home and created a suite of hands-on conservation activities for guests. That year, the ICS recorded an additional 109 dFADs, which beached. With further investigation, the ICS identified the Alphonse Group as the worst affected atolls in the region. I put weekly beach clean-ups on the hotel guest's activity schedule, so that they would see, first-hand, the impact of dFADs and help remove them. Staff regularly joined in the educational initiative and learned to appreciate the problem even more. Together with ICS, we removed 1.3 tonnes of beach debris in 2018.

Beach clean-ups have become

hugely popular globally, with a very active community across the Seychelles, including some massive projects run by the Seychelles Island Foundation and The Ocean Project. Whilst we see lots of floating marine debris at the surface in the Alphonse Group, mostly coming from Indonesia, the only synthetic trash underneath the waves, on our otherwise unspoilt reefs, are those dFADs from the tuna fishing industry. In addition to damaging the environment and its wildlife, they also pose a navigational hazard to our dive boats and are eyesores for divers who often inquire as to what they are.

I encourage all guests to get involved with a dFAD removal on one of their dives during their dive holiday. It is a recommended adventure dive for PADI Advanced students and the AWARE Dive Against Debris (DAD) is our most

popular specialty course. Our dive staff view dFADs as graves upon the reef, but it is usually when they do the course and remove the dFAD that they are really shocked about the scale of the problem.

Employees of the Island Development Company (IDC) who lease the island and manage waste are also exposed to the problem of dFADs through disposal considerations. Together, we decide whether the materials can be recycled or incinerated on the island or sent to storage to await shipment to the mainland on the next available barge.

Our dive groups are exclusively small, with less than eight divers per week. Despite this, we engage enough divers to remove just under two tonnes of dFADs in each eight-month season. The story does not end with removal. Part of raising awareness is recording the information and placing it on the

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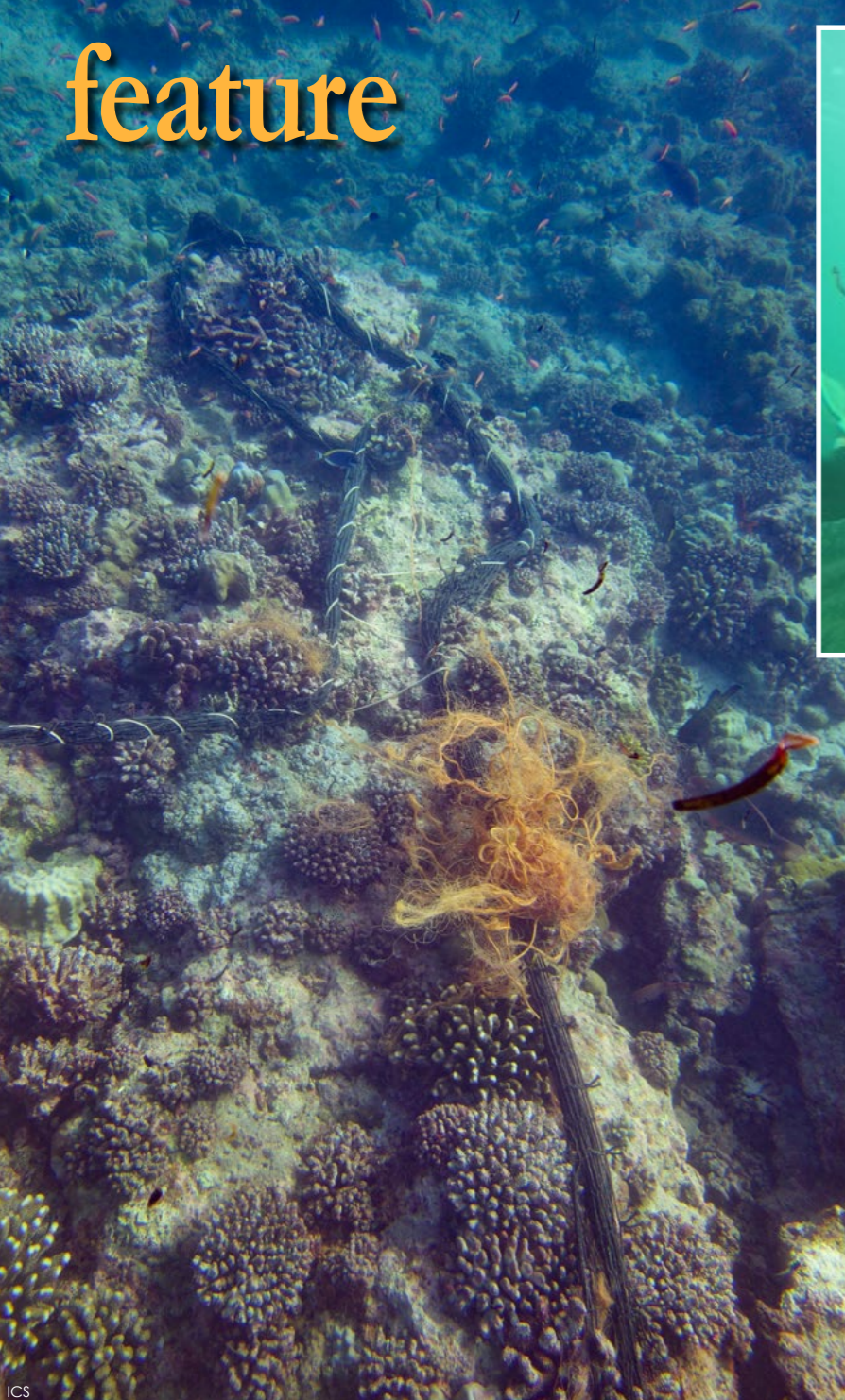
CONSERVE local research documenting the quality of marine ecosystems and aquatic life.

CREATE sustaining opportunities through fundraising contest and activities.

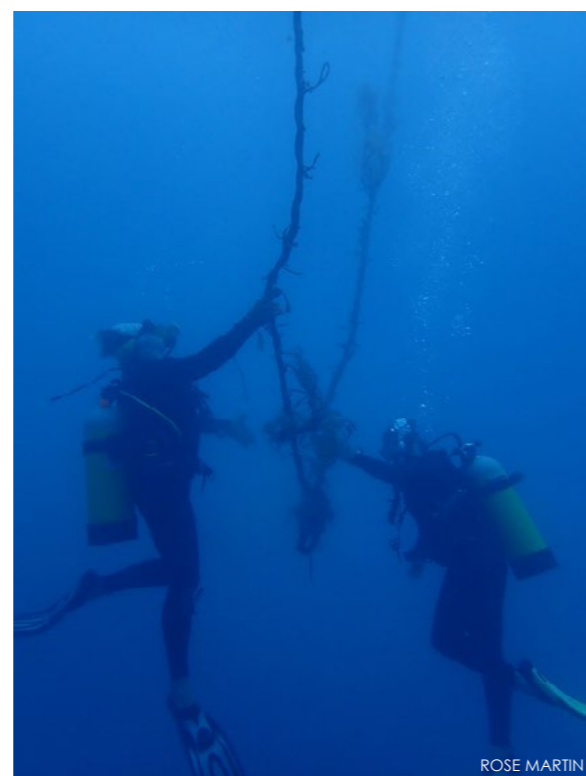


NAUIGreenDiver.org





VIDEO STILL COURTESY OF LUCY MARTIN



ROSE MARTIN

THIS PAGE: Divers (above and left) work to remove FADs stuck on the reefs in the Seychelles Islands; A raft loaded with recovered FADs and debris (right)

Recent FAD sightings

Last month, after strong winds blew new dFADs into the area, I headed out for a removal that was not one we had been alerted to by FAD Watch (see Sidebar 2). It likely belonged to a non-participating company. It was one of the newer non-entangling dFADs, with just a single long thick rope and ghostly white sacks tied to it

at intervals, flapping in the gentle current.

My heart sank when I saw a juvenile green sea turtle attempting to eat the sack, mistaking it for food, but at least the turtle was tangle-free and alive. This time, I had a whole entourage with me, because I was teaching an AWARE Dive Against Debris (DAD) course to hotel guests, willing to do their part in helping to protect the reef.

I have seen these new designs in deeper water lately, because the single ropes used by fishing fleets are very long. Luckily, several divers were on enriched-



air nitrox and able to dive beyond 25m, while others hung mid-depth, waiting to help coil the rope towards the surface.

The damage to the reef was minimal, but I noticed something I had been encountering more often of late. It was a smaller coral engulfed by the tiny ribbon-

like frays of plastic exposed from within the nylon rope. It was as though the coral had used its only defence and sacrificed its fleshy skin to cut the intruding rope with its limestone skeleton.

It took a long time to cut the frays free, but fortunately, there were enough of us

AWARE DAD website, putting the scale of our regional fishing-related pollution problem on the global map.

Move to biodegradable FADs

Meanwhile, whilst my main focus switched to eco-tourism, ICS and the IOTC made advances at the policy level. A year after the baseline study, the IOTC placed the first-ever limits on the number of active dFADs permitted per vessel—350 per vessel per season, at the time of writing. A reduction of 9 to 12 percent in the contributions of dFADs to overall tuna

catch had also been recorded.

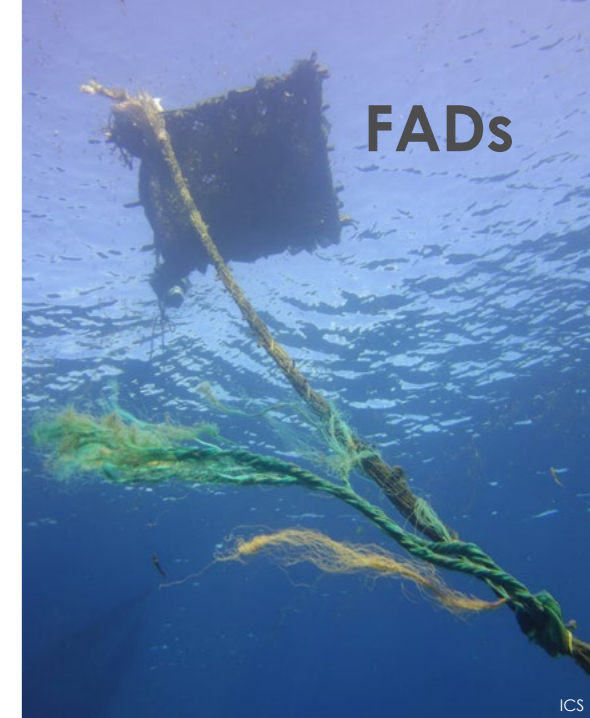
The IOTC has also recently called for further research into how the fishing industry can make the switch to using biodegradable material for dFADs (BIOFADs). To this end, the European Union is currently piloting a two-year project to assess the viability of the different materials and environmental damage by deploying 1,000 different BIOFADs. So far, the efficiency of these rafts is minimally less for the fisheries, and there is hope that we may soon see a move towards naturally-made dFADs.



BRANDI MUELLER



BRANDI MUELLER



FADs

ICS

Life under a FAD (left)—barnacles grow on the lines and dozens of golden trevallies shelter under the device; A beautiful beach on Alphonse Island in the Seychelles (above); One of the FADs found abandoned and drifting in the waters around the Seychelles (top right); Divers work to remove drifting FADs caught on the reef around Alphonse Island (right)



CHRISTIAN BURGER

to clear it before our air ran out. As the other divers climbed back aboard the dive boat, it occurred to me that coral reefs will still need the technical expertise and time of scuba divers to defend them from dFAD invasions for some time to come. I can only hope that less and less of these devices enter the ocean, that more companies join FAD Watch, and that BIOFADs finally do come into play.

I have always believed that throughout history, progressive changes in society have only been successful when humanity pulls together. It seems like this is happening in the Seychelles, although the oceans may need a louder voice. So, I will continue to tell the dFAD story and bring the scuba divers I encounter into action. ■

Lucy Martin, a passionate and experienced marine conservationist from England, is a PADI Master Scuba Diver Trainer and holds a graduate degree in marine biology. She has been living on Alphonse Island in the Seychelles for the past six years and manages the Blue Safari activity centre. Martin personally

thanks Greenpeace for initially supporting her work on dFAD removal.

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POINT & CLICK
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Edited by Peter Symes
& Rosemary E. Lunn

Equipment



Teric Limited Edition

Did you know that in China the colour red is thought to give protection and bring good luck and good fortune to all? With the start of a new decade and the Chinese New Year, perhaps that is why Shearwater Research has chosen to issue a limited edition version of their popular "Teric" watch-style computer in this significant colour combination. This is the first time that the award-winning Canadian company has released a limited edition, and the matte gold-coloured bezel and a vivid red strap does look quite special. However, you will need to move fast to get your paws on one because just 2,000 have been manufactured. Each Teric is uniquely numbered and comes with a metal gold-coloured certificate of authenticity signed by Shearwater Research founder, Bruce Partridge. ShearwaterResearch.com

Halo A°R

This is not the first time that Fourth Element has looked to space exploration for inspiration. The company's first foray was in the early noughties. Now, the British manufacturer has combined baffle technology with an extreme insulation product (A°RGON) favoured by the cryogenics and space sectors, and evolved the HALO. It is now the HALO A°R. At DEMA, Fourth Element stated the HALO A°R is "high performance low bulk" and its warmest undersuit to date. How can they make such a bold promise? The secret is the A°RGON material. During product development, Fourth Element conducted a series of tests in an environmentally-controlled "cold room" in temperatures of -17°C (1.4°F), using a thermal imaging camera. The test diver happily bounced around the room "as snug as a bug." The thermal camera imaging man? He gibbered, having completely forgotten to dress appropriately. Available in 16 women's and 16 men's sizes. FourthElement.com



Trshbg

Spotted at DEMA 2019 in Orlando: the hip model of *Trshbg*, an initiative for surfers and divers to catch plastic on every dive. The hip model, called the TBAG, is 3.8 litres. Also available is a smaller calf model of 1.2 litres called the Techbag, recommended for technical divers. The bags are handmade in Bali, from recycled banners and scooter tubes. Now, every dive you do can be a clean-up dive, according to inventor Trieu Huynh, who added: "Keep your hands free, enjoy your dive and help to save the ocean whenever you can." Trshbg.com

See *X-Ray Mag's* interview with the inventor at DEMA 2019 [here >>>](#)



ALFRED MINNAAR

Bauer Mariner 250

When is a grill not just a protection grill? When it is fitted to a Bauer. The German manufacturer proudly unveiled its new look Mariner 250 compressor at Boot 2020, stating its design engineers have made this compressor more effective and expanded the range of high-temperature applications. The engineers had a eureka moment after playing around with airflow and 3D printers. As a result, the BBQ looking protection grill is no more. Instead, the front housing now sports fixed directional fins, which optimise air intake. As a result of this change, cooling has dropped by 20%. The Mariner 250 comes in two models—(B) four-stroke petrol or (E) three-phase electric engine—and charges at 250 litres (9 cubic feet) per minute to 350 bar or 5,000 psi. Bauer-kompressoren.de



Coloured bezel for Petrel

Owners of a Shearwater Petrel can now physically personalise their computer. Narked at 90 has launched a custom coloured bezel, making it a handy visual "this is mine" identifier. The solid titanium bezel is coloured at Narked's Northampton workshop in England, using a laser to carefully manipulate the surface to change its colour. This is quite a long process and the result is a classy colour and more glossy look than an original titanium bezel. Although Narked states there are four colours—Gunmetal, Bronze, Rainbow and Shimmer—it is probably more accurate to say there are three colours and an "effect." The unique "Shimmer" result tends to display a rainbow of shades, varying from blues and purples to yellows and greens. Narkedat90.com





Technical diver in an O'Three Ri 2-100 drysuit

Text by Mike Ange

Exposure protection is second only to the dive mask in its importance to your dive experience. In my article in issue #92, we looked at wetsuits, their myths and design features. In this follow up, we will discuss the next level corollary—drysuits.

Literally for generations, neoprene rubber has been the chosen material for building most forms of exposure protection for divers and other water sports enthusiast. It has consistently been the primary, if not the only, material for wetsuits

since physicist Hugh Bradner at the University of California at Berkley invented the material in 1952.

Many divers are surprised to learn that prior to the 1990s, virtually all

drysuits were also made almost exclusively from neoprene rubber, and for good reason. Neoprene is form-fitting, has manageable buoyancy characteristics and provides a watertight or even an

airtight environment when properly configured. Most importantly, neoprene provides excellent thermal protection in the most extreme environments.

In the late 1980s and early 1990s, largely as a result of the efforts of Dick Long and his team at Divers Unlimited International (DUI), there was a trend towards membrane suits that were made from a

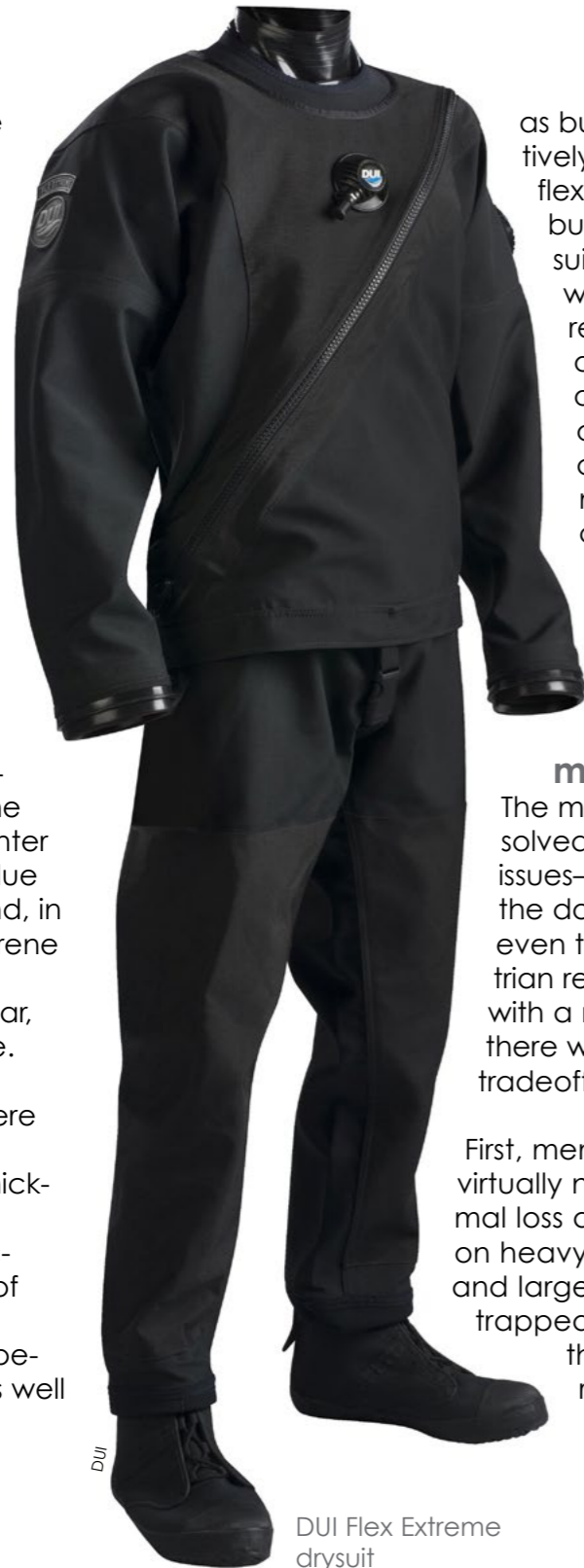
material with a very fragile (typically butyl) membrane laminated between two protective layers of a material like nylon or polyester to make it useable. These suits gained popularity because



Drysuit Technology *Comes Full Circle*

COURTESY OF O'THREE





DUI

DUI Flex Extreme drysuit

the neoprene suits of the era were very heavy and bulky to wear, and many people thought they required excessive weight to control buoyancy, although this was mostly a training issue. The new lightweight materials produced a suit that simply kept the diver dry, and if they were cut large enough, provided more freedom of movement.

Called bag suits by many divers of the day, the new technology produced many benefits. The membrane suits were lighter weight, easier to travel due to their reduced bulk, and, in comparison to the neoprene drysuits of the era, much more comfortable to wear, especially on the surface.

The neoprene drysuits were typically made of sturdy foams in 5mm or 7mm thicknesses, which provided excellent thermal protection but at the expense of added dry weight; they increased buoyancy, especially in shallow water, as well

as bulk, which effectively reduced diver flexibility. These attributes made these suits a challenge to wear, effectively restricting the use of these suits to only the hardest of recreational divers with a true need, and the commercial diving and public safety segments of the industry.

Pros and cons of membrane suits

The membrane suits solved many of these issues—literally, opening the door to dry diving for even the most pedestrian recreational diver with a need. However, there were significant tradeoffs.

First, membrane suits offer virtually no slowing of thermal loss and rely instead on heavy undergarments and large volumes of trapped air to insulate the diver. As a result, nearly all

divers are forced to add significant amounts of weight to submerge in a bag suit.

For example, I use a stainless backplate and twin LP 72 low pressure 13.5-liter cylinders, filled to 151 bar, for many dives in neoprene drysuits (Waterproof Antarctic suit, or my preferred O-Three R 2/100 suit) with a thin base layer and no added weight. This system is between 3 and 3.6kg (6.5 and 8lbs) negative, depending on salt or fresh water.

Switching the exact same configuration to a BARE XMission nylon trilaminate, with a medium weight thermal layer over the base layer to compensate for the loss of the thermal protection in the neoprene, requires approximately 20lbs (9kg) of total weight. The added buoyancy is the result of the trapped air, which is required to keep the “loft” in the undergarments so that they can provide insulation.

Trapped air safety issue

Incidentally, all this trapped air also creates the safety issues we train for in a drysuit diving course. The air can shift to the legs for example, causing the diver



BARE X-Mission Evolution drysuit for men and women—designed by Mike Ange, it won the Tauchen award in 2019.

transition to diving dry much simpler for the novice.

Lack of stretch

The other big trade-off for bag suits is the lack of stretch. While the materials are much more “flexible” than old-school neoprene,

they have virtually no stretch at all. So, the diver’s movements are quite literally restricted to the cut of the material, and in order to allow the diver to simply achieve a normal swimming attitude, with arms forward, a significant amount of loose material must be added to the suit. This added material traps additional air, and when it is not fully extended—which is most of the time—this cut produces folds and large wrinkles in the material. Those folds and wrinkles create a lot of drag when pushing the suit through the water, decreasing gas consumption and increasing diver fatigue.

Bias cut hype

Many manufacturers have touted “bias cut” to imply increased stretch in the suit. While this works with stretchy materials used in surface products, it is a bit of a fallacy for the laminated and more rigid materials used in membrane suits. It does improve stretch by 1 or 2% typically, but when you need 2.54cm (1in) of stretch and you only get 1mm, the 2% increase is not that effective. In short, bias cut bag suits suffer from the same market-

to invert and render him or her unable to vent air from the suit. This and does create a case safety issue for the diver, an inverted (feet-first) uncontrolled ascent to the surface. The smaller air volumes of neoprene suits tend to minimize this issue and will also make the



DUI CF200X drysuit with crushed neoprene

ing malady as omni red wetsuits and ground unicorn horn.

Difficult maintenance and repair

The final trade-off is that membranes are very hard to maintain and even harder to repair. In the interest of full disclosure, after 30 years as a technical and cave diver and 20 years selling, designing and producing drysuits for some fairly major companies, I am fairly biased against the bag suit. The reason for this bias is that they are hard to maintain, and they are also quite hard to build, as the quality rates from a number of manufacturers demonstrates.

The membrane is sandwiched between very porous materials (not even waterproof in many cases); hence, it is very difficult to exclude water

from traveling under a patch where it will seek out any flaw in the membrane. As a result, a flawed suit will leak or even flood. The internal membranes are extremely fragile, and over time, will break down, developing pin holes and leaks especially where the suit repetitively bends during activities like swimming.

Some materials used in membrane suits, like nylon, cannot be chemically bonded or glued in the field at all. This makes seemingly solid repairs fail quickly, but the reality is that it was never actually repaired at all, the hole was just temporarily plugged. All of this further complicates the fragile nature of the suit so that an active diver, or even a moderately active diver, can only expect to get about five or six years from a typical bag suit.

Waterproof D70 PRO ISS drysuit for men and women with 3.5mm special hi-dense neoprene and SD Toughtex lining



WATERPROOF

New developments

The good news is that the evolution of modern neoprene materials—that same evolution that has been beneficial to manufacturers of wetsuits but detrimental to divers—has had the opposite effect for drysuits. Thinner, more durable and more flexible materi-



als with more stretch, work in a drysuit because the suit is always dry. In a wetsuit, as the neoprene thins with compression, it will invariably allow the suit to flush water, effectively chilling the diver, but a drysuit does not have that issue. So, the technology has come full circle, as technology so frequently does.

Modern neoprene drysuits are made from materials as thin as 2.5mm and as

thick as 6mm. Some of the more rugged materials deliver abrasion resistance that is 80 times higher than older neoprene products and most membrane products. They are lighter and much more flexible than the neoprene suits of the 20th century, and because they all have both substantial stretch and inherent insulating capability, they can be cut to be more or less form-fitting.

This cut reduces drag through the water and reduces diver fatigue as well as gas consumption. Gas is saved not only from lower respiratory demand but also by the lower internal volume required to keep the diver warm. The lower internal volume also reduces the risk of gas trapping and loss of trim due to large volume gas shifts, which are always a hazard in membrane suits.



Ease of repair

Another advantage of neoprene is the ease of repair. There are several very effective, over-the-counter glues that can be used to close tears and seal punctures of varying sizes—even pin holes—quite easily. For small flaws, you do not even have to wait for the suit to dry. Carry a tube of aqua seal and a syringe, or similar device for pushing glue into pin holes, and you can deal with virtually any failure except a seal or zipper failure. This gives neoprene a huge leg up if you are doing expensive dive trips that would be ruined by a suit failure or dives that are mission-required for any reason.



Waterproof D70 SC drysuit with 3.5mm microcell CR neoprene

Superior thermal properties

The primary advantage of neoprene drysuits is without a doubt their thermal properties. As noted in my previous wetsuit article, actual lab testing shows that neoprene is the best insulating material of all those tested. With drysuits, you do not have to worry about the type of lining, because the suit is already sealed to stop water flushing. This means that the best protective materials can be used to cover and protect the rubber, and unlike wetsuits, there is no trade-off in thermal protection. In fact, the right materials may actually

add to the suit's capacity to slow thermal loss.

Climate control

On the climate control front, condensation is another major factor in comfort and once again neoprene suits are superior. Membrane suit wearers are forced to use wicking materials in expensive undergarments because of the immediate condensation that occurs in their suits when they submerge. Add a hot, humid day and the condensation can be quite significant when you drop even moderately into cool water. Because of the thermal properties of neoprene, this condensation effect is greatly reduced.

Finally, if your drysuit does leak during the dive, you are much better off with neoprene materials. Basically, a partially-flooded neoprene drysuit becomes a really high-speed wetsuit, while a bag suit just becomes frigid.

Designed by Mike Ange, the BARE Sentry Pro Dry is a drysuit made with high-density Yamamoto neoprene.



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Some divers may prefer a membrane suit for certain dives, especially divers who are diving in the temperate and tropical zones where the suit's integrity is not essential to being able to dive. For divers diving in more demanding environments or those who just demand consistent performance, there are many reasons to select a modern neoprene drysuit, especially when looking at the price tag.

A top-end neoprene suit will typically cost a lot less than a top-end membrane suit—by a thousand dollars or more. It is extremely rare in diving that the better-performing product is available at a lower cost. Even low-end neoprene drysuits deliver superior protection for not much more than a semi-dry or top-end 7mm wetsuit. For the drysuit novice, they

are by far the easiest suit to use for the transition to drysuit diving. ■

Mike Ange has worked in the dive industry for 29 years, 12 of those years in the senior management of exposure protection companies, including Huish, Waterproof, Harveys and Whites. His suit design modifications have won awards, and he designed the first commercially viable thermal testing process for wetsuits in conjunction with Simon Fraser University in Vancouver, Canada, in 2018. He has authored several books and manuals, including Diver Down: Real World SCUBA Accidents and How to Avoid Them published by McGraw Hill, Altitude Diving Manual published by SSI, TDI Advanced Wreck Diving Manual, and the SDI/TDI Diving Leadership Manual. For more information, visit: mikeange.net.





Text by Simon Pridmore
Photos by Peter Symes

— This *Scuba Confidential* column is taken from Simon's book *Scuba Exceptional: Become the Best Diver You Can Be*.

It was a beautiful day in Indonesia's Banda Sea. Richard rolled back into the warm waters and swam over to join his wife, Florence. After exchanging signals, they descended together, heading for a patch of bright yellow sea fans on the reef wall at 30m, where their guide had promised to show them pygmy seahorses. The guide was already there below, searching for the elusive little creatures. But, as Richard gradually went deeper, he began to find it harder to breathe and he was soon having to expend significant effort to suck air from his regulator.

Three or four breaths later, it stopped giving him any air at all. He reached for his contents gauge and saw the needle pointing to zero. Impossibly, only a few minutes into his dive, he was out of air. He felt the desperate urge to breathe

and, with his lungs empty, he could feel himself starting to lose buoyancy.

He kicked hard and swam up towards Florence, slashing his hand across his throat urgently as he approached her

and pointing to her octopus. She immediately deployed it and handed it to him when he arrived. She held on to him and inflated her BCD a little to help them both stay neutral, as she could feel him pulling her down. Richard took a couple

of quick breaths from the regulator to fill his lungs, then exhaled fully. He was well aware that he had been on the verge of panic and knew that he had to get his anxiety under control.



Out of Air

With Plenty to Breathe



As he breathed deeply in and out, his mind cleared, and a habit formed during his technical diving training kicked in. With his left hand, he reached back and pushed the bottom of his cylinder up, bringing the valve handle within touching distance of his right hand. His

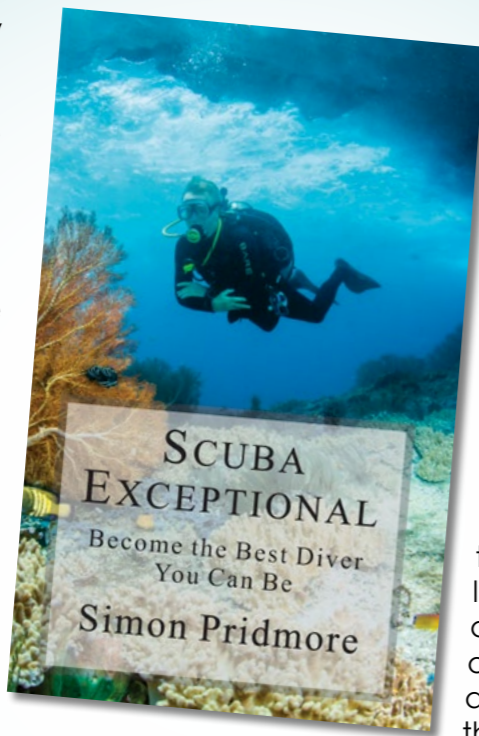
first instinct was to turn the valve handle away from him—that is, to try and open it—in spite of the fact that he expected it already to be fully open. To his surprise, not only did the valve handle move when he twisted it, it kept moving for quite a while before it locked. He

A New Book for Scuba Divers!

Scuba Exceptional may be the fifth in Simon Pridmore's *Scuba* series, but it is actually the true follow-up to his first book, the best-selling *Scuba Confidential*.

The philosophy of safer diving through the acquisition of knowledge and skills is the same, although this time the themes are different. As before, Pridmore provides us with a whole host of extremely useful advice and techniques, illustrated by real-life experiences and cautionary tales.

The focus this time, though, is more on issues that experienced divers face. There is more technical diving content, and Pridmore covers some relatively complex issues in his usual clear and easy-to-read style. In many cases, the issues that concern technical divers reflect those that affect scuba divers at every level. After all, as Pridmore writes, technical diving is on the same spectrum as conventional sport diving:



It is just a different frequency.

Scuba Exceptional also deals in more detail with the psychological approach to scuba diving, broaching familiar topics from new angles and borrowing techniques and procedures from other areas of human activity.

While most of *Scuba Exceptional* focuses on the diver, it also takes a look at the wider picture and highlights a number of areas where scuba diving professionals and the "industry" as a whole are letting divers down.

As always, Pridmore is realistic in his assessments. He may shine a little light on the dark side of the scuba diving world, but he does this in order to illuminate bad practices and encourage change, while offering solutions.

Scuba Exceptional: Become the Best Diver You Can Be by Simon Pridmore is available on: [Amazon.com](https://www.amazon.com).



glanced at his contents gauge. It was showing 160 bar.

He switched back to his own regulator and took a tentative breath. The air flowed easily. He thought about abandoning the dive but there now seemed to be no reason to do that, so he and Florence carried on down to look at the seahorses. The emergency was over, but Richard was left with plenty to think about.

How could this have happened?

He was bewildered. Surely, his valve must have been open when he started the dive, otherwise, he would not have had air to breathe during the first few minutes. He dismissed the possibility that Florence

might have crept up behind him and closed his valve as a prank. She would never do that. He then thought that perhaps there was something wrong with his regulator. But it had been working perfectly throughout the trip up to the point when it stopped giving him air, and it had continued to work perfectly after he had re-opened his cylinder valve. It was only much later that he deduced what must have taken place.

When he had put his gear together on the boat, he was sure he had fully opened his cylinder valve, as was his usual practice. However, on this particular day, there was a temporary and relatively inexperienced crew member on board. This person had helped Richard,

Florence and the other divers into their gear, and Richard had noticed him turning other divers' air on.

What must have happened, thought Richard, was that the helpful crew member had mistakenly closed Richard's valve, thinking he was opening it. He had then twisted it back a quarter of a turn. During the first part of his dive, Richard was able to breathe from the cylinder, as the valve was slightly open. It was only when he went deeper that he began to have a problem, as the only-slightly-open valve could not supply the quantity of air (usually 9 bar or so above ambient pressure) required to keep the regulator working at depth.



opinion



Who is the last person to check your air is turned on?

to share air with. Then, reach back and check that your cylinder valve is open, just in case some well-meaning person has left you out of air with plenty to breathe. ■

Simon Pridmore is the author of the international bestsellers Scuba Confidential: An Insider's Guide to Becoming a Better Diver, Scuba Professional: Insights into Sport Diver Training & Operations and Scuba Fundamental: Start Diving the Right Way. He is also the co-author of Diving & Snorkeling Guide to Bali and Diving & Snorkeling Guide to Raja Ampat & Northeast Indonesia, and a new adventure travelogue called Under the Flight Path. His recently published books include Scuba Exceptional: Become the Best Diver You Can Be, Scuba Physiological: Think You Know All About Scuba Medicine? Think Again! and Dining with Divers: Tales from the Kitchen Table. For more information, see his website at: SimonPridmore.com.

Had the crew member closed the valve completely and not turned the handle back a little, Richard would have discovered the problem while he was still in the boat or on the surface waiting to descend, as he used up the small quantity of air left in his regulator hoses. So, here we have another argument for abandoning the antiquated practice of routinely closing a cylinder valve by a quarter- or half-turn after opening it, something new divers are still taught to do, entirely unnecessarily, as I have pointed out before.

Useful techniques

Two factors turned what could have been a tragedy into simply a useful story. The first was Richard's controlled response to the emergency, borne out of good diver training. Although this was not a technical dive, the instinctive skills he had learnt during his technical diver courses came in very handy. The

second factor was Florence's commendable readiness to assist. She was a new diver at the time but responded like a veteran. She and Richard practised sharing air frequently, so she was used to it.

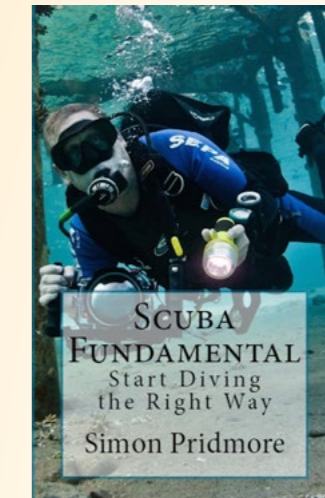
Messages to take away:

1. Take responsibility for opening your own cylinder valve before a dive. If someone else wants to do it for you or touches it to check it is open, politely refuse. Then, show them that it is fully open by double-checking it yourself and taking a few breaths from it while looking at your contents gauge to make sure the needle does not move when you breathe in and out. (If it moves, that means you have an air supply problem).
2. If, nevertheless, you ever find yourself out of air early on in a dive, do what Richard did. First, find someone

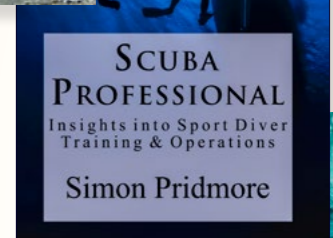


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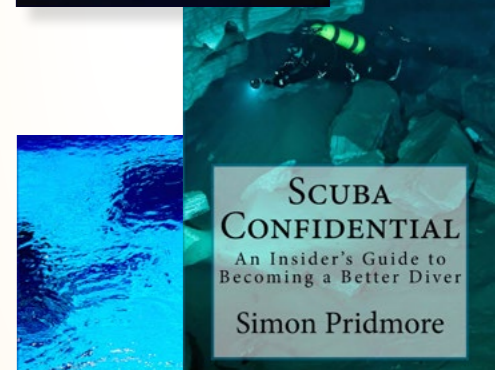
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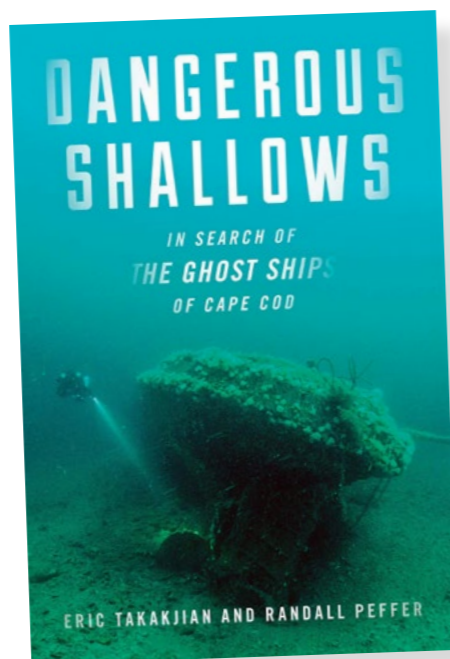
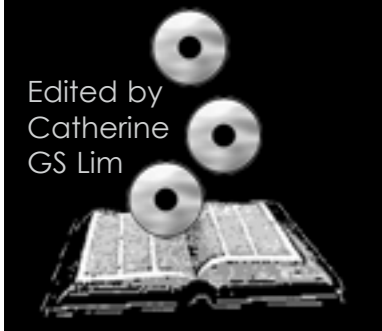


Learn more! Visit the author's website at:

SimonPridmore.com



Edited by
Catherine
GS Lim



Ghost Ships

Dangerous Shallows: In Search of the Ghost Ships of Cape Cod, by Eric Takakjian and Randall Pepper

Hundreds of wrecks—men o' war, square rigs, merchant ships, light ships, ocean liners, submarines, etc—can be found in the waters of Nantucket Shoals. The book brings to light the background behind some of these wrecks. The stories have been reconstructed from extensive first-hand interviews and observations of the people and families involved, as well as military records and extensive research.

Paperback: 272 pages
Publisher: Lyons Press
Date: 24 January 2020
ISBN-10: 1493042300
ISBN-13: 978-1493042302



Queensland

Queensland & The Great Barrier Reef, by Anthony Ham

Located at the northeastern corner of the Australian continent, Queensland presents to visitors diverse natural landscapes, from rainforest-covered mountains and undeveloped deserts in the outback, to unique islands like the Whitsunday Islands and Fraser Island. Below the waves, the Great Barrier Reef, the world's largest contiguous coral reef, teems with irrepressible beauty and charm. In this book, author Anthony Ham uses more than 340 photographs to showcase the unique character of Queensland.

Hardcover: 348 pages
Publisher: Koenemann; None edition
Date: 1 January 2020
ISBN-10: 3741923095
ISBN-13: 978-3741923098

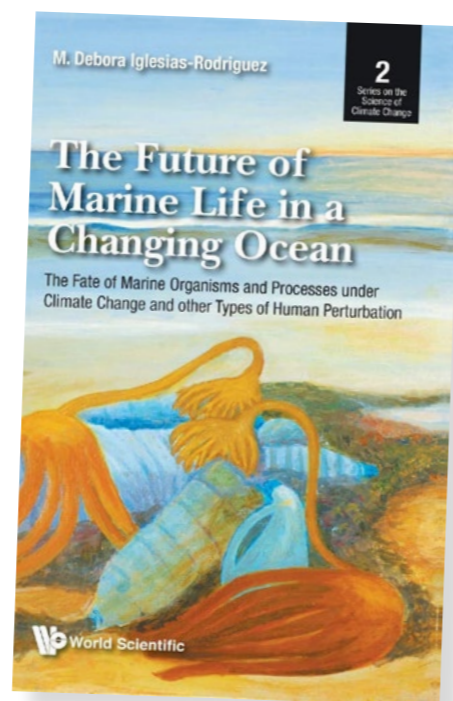
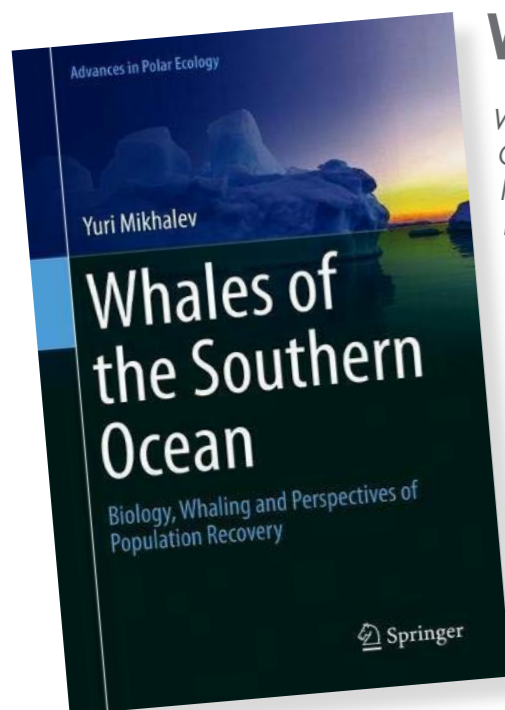
Whales

Whales of the Southern Ocean: Biology, Whaling and Perspectives of Population Recovery, by Yuri Mikhalev

Whale-lovers will find a plethora of information in this book which focuses on whales of the Southern Ocean, including a new species of killer whale, *Orcinus nana*. Distribution and migration patterns of whales in this region is covered as well as their distinct populations based on genetic traits, breeding zones, pregnancy, offspring, sexual and physical

maturity and life expectancy. Scientific findings based on actual data of Soviet whaling and methodologies of the time are described. In addition, impacts of whaling and how whale populations may recover are addressed. The book aims to be a reference for ecologists, biologist-cytologists, biology students and researchers specializing in cetaceans.

Hardcover: 368 pages
Publisher: Springer
Date: 29 February 2020
ISBN-10: 3030292517
ISBN-13: 978-3030292515



Marine Life

The Future of Marine Life in a Changing Ocean: The Fate of Marine Organisms and Processes Under Climate Change and Other Types of Human Perturbation, by M Debora Iglesias-Rodriguez

This book focusses on the interactions between climate change and marine biota. It starts by explaining fundamental concepts in ocean science and climate, then moves on to recent changes in marine chemistry like ocean acidification, declining oxygen levels in the oceans, ocean warming and marine pollution. These topics are discussed in the context of how a changing ocean impacts ecosystem health, the biological carbon pump, the sequestration of carbon dioxide from the surface ocean into the deep sea and the perceived notion of the ocean's unlimited capability as a "carbon reservoir". The book concludes with an analysis of the impact of climate change on food security.

Series: Series on the Science of Climate Change (Book 2)
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Publisher: World Scientific Publishing Europe Ltd
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ISBN-10: 1786347423
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Edited by Peter Symes

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Rorqual whales include the largest predators of all time, yet some species capture forage fish at speeds that barely exceed their prey, suggesting that highly manoeuvrable fish should easily escape.

Hungry whales are sneaky

Lunge-feeding whales need dense concentrations of prey to forage effectively, yet fish schools could easily disperse and render lunge-feeding ineffective if they sensed a threat. So, how come the whales do not go hungry?

The answer, it seems, is simply that the fish do not recognise the whale's shape as a threat—not until it is much too late.

During field observations, modelling and lab experiments with anchovies, whale biologist David Cade and his team discovered that as a whale approaches a school of fish, it keeps its mouth closed. It is only when the whale opens its mouth that the fish realise the danger and swim—or at-

tempts to swim—away. Using this strategy, the whales can consume as much as 30 to 60 percent of the school of fish.

The reason the fish do not recognise the whale's shape as a threat is because they have been conditioned for over 100 million years to view certain shapes as predators. In contrast, the whales developed their lunge-feeding hunting tactic only five million years ago—in evolutionary terms, quite recently.

This suggests that escape responses of these schooling fish, are not tuned sufficiently to respond to predators that can engulf entire schools, allowing humpback whales flexibility in prey choice.

The researchers also discovered that the longer the whale can delay opening its mouth, the more successful its "catch" would be. ■ SOURCE: PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCE



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Stings & Scrapes — Part I

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The ocean's flora and fauna are why many of us dive, but they are also responsible for thousands of injuries every year. The good news is that while common, these injuries are rarely serious and can usually be avoided with a little planning and forethought.

While the most exotic of these potentially dangerous organisms are fairly well known, the more mundane sometimes cause uncertainty. Know what is most likely to cause an injury on your next dive so you can relax and enjoy making bubbles. In part one of this two-part series, we will refresh your knowledge of wound care and treating common marine stings; next time, we will cover injuries that involve scrapes, bites and penetrating wounds.

Wound care

Caring for wounds of all types requires the same foundational knowledge. Once the source of the injury has been removed and the injured diver has been evaluated for life-threatening conditions, it is time to start thinking about infection control and general wound care. Any break in the skin can cause an infection, and exposure to a marine or freshwater environment can significantly increase the risk of infection. Some diving locations are also home to some uncommon pathogens, and even minor wounds in these areas can become infected quick-

ly and should be taken seriously.

Proper wound cleaning immediately after injury is crucial to preventing a serious infection, but performing that cleaning with dirty hands or instruments will likely do more harm than good. To avoid contaminating a wound site, wash your hands immediately before providing any care, and wear gloves and other personal protective equipment if available. The specifics of how to clean a wound will vary based on its location and type, but in general, a thorough rinse, a gentle cleaning with a mild soap and a second rinse will help remove debris and bacteria and promote healing. Larger wounds may require more cleaning and involve more pain during cleaning. Sometimes allowing the injured person to clean their

own wound can make it more tolerable. Other wounds may require cleaning by a medical professional. After providing basic wound care, keep an eye on the person to watch for signs of shock, allergic reaction or anaphylaxis.

Stings

Apart from a few exotic species and reactions, marine stings are mostly easy to treat, easier to avoid and rarely fatal. Despite this, they are common and can be extremely painful. With all types of marine stings, it is important to monitor a diver for a delayed allergic reaction or hypersensitivity. Reactions to stings and envenomations are not always immediate—symptoms may appear over the course of minutes or hours after the injury.



Should an injury cause an allergic reaction (i.e., symptoms such as shortness of breath, chest pain or difficulty breathing), it is important to seek medical help immediately. If available, Benadryl can be used to slow the onset of symptoms, and an Epi-Pen can be used if the diver has a known allergy and a prescription for the medication.

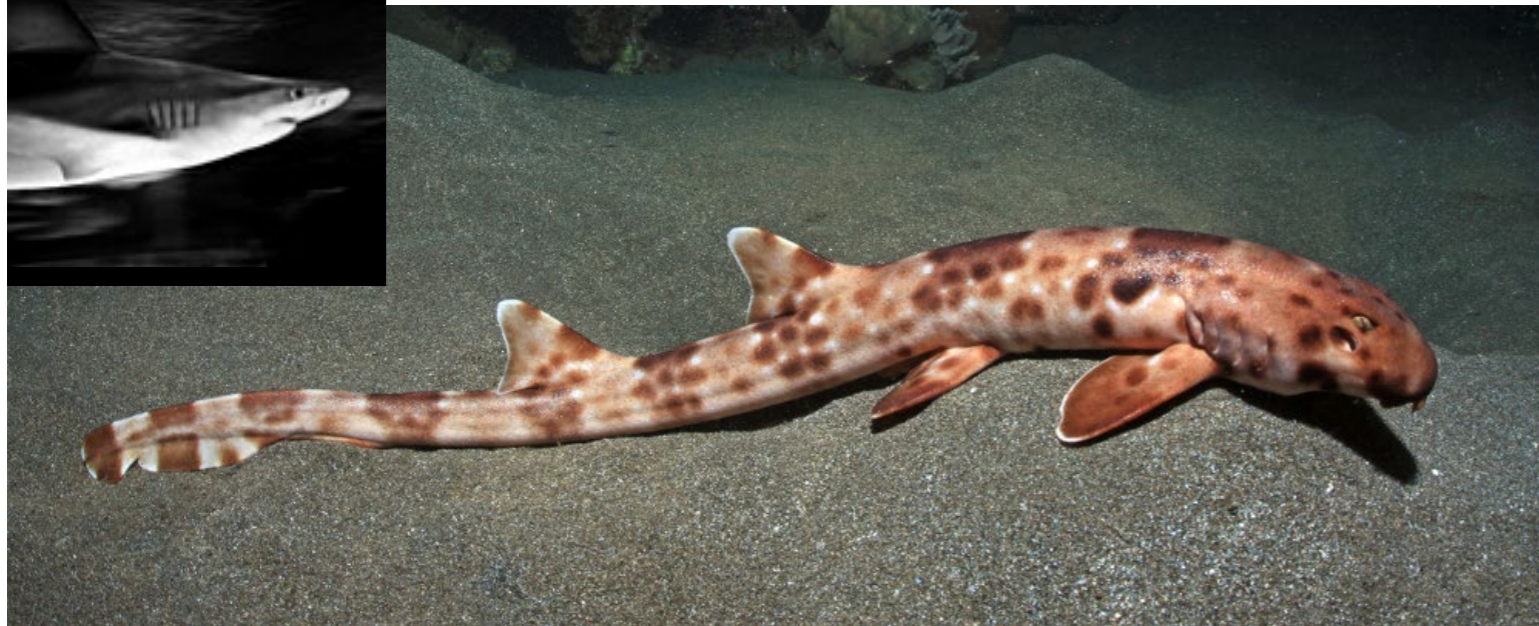
For stings from fire coral and hydroids, the focus of wound care is to first neutralize the nematocysts, or stinging cells, that caused the initial injury. These can be removed by flushing the injury site with sea water or vinegar. Flushing with fresh water can exacerbate an injury by causing unfired nematocysts to activate, leading to further envenomation. Large pieces of hydroid or fire coral should then be removed while taking care not to let them contact the skin of either the injured diver

or the person providing care.

These and most stinging injuries, are easier to avoid than to treat. Once nematocysts have been removed from the skin, there is little that can be done to reverse the damage or discomfort caused by their venom. Focusing on buoyancy control and identification is the best way to avoid contact with these organisms. In areas where jellyfish are common and contact cannot always be avoided, a thin lycra dive skin may be enough to protect the skin from envenomation, although care should be taken not to let loose jellyfish or tendrils float up toward the face or hands. ■

For more information on treating stings and general wound care, please visit: [DAN.org/Training](https://www.dan.org/training).

MARK ERDMANN, CALIFORNIA ACADEMY OF SCIENCES



A related species, the Halmahera epaulette shark (*Hemiscyllium halmahera*), was described in 2013.

Four new walking shark species discovered

Four new species of shark, which use their fins to walk along the seabed, have been discovered off the coast of Australia.

The walking sharks were discovered during a 12-year study with Conservation International, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Florida Museum of Natural History, Indonesian Institute of Sciences and Indonesian Ministry of Marine Affairs and Fisheries.

How they “walk”

Walking sharks—also called “epaulette sharks” for their spots that resemble the military decoration—“walk” on their muscular fins to forage for small fish in shallow reefs and areas of sea grass. Scientists have known for some time that five such shark species exist, but

new research nearly doubles that number to nine.

The walking sharks all belong to the genus *Hemiscyllium*, according to ScienceAlert. The new members of the group were linked to five existing kinds of shark through genetic analyses, using tissue samples from live-caught specimens found during the study. The sharks have evolved to succeed in their unique coral reef environment and hunt during low tides.

100 million years

The results confirmed the new animals' DNA was consistent with existing *Hemiscyllium* species, which can be traced back to the Late Cretaceous period, extending from roughly 66 to 100 million years ago.

Given the immense time scales involved, and the broad scope of international waters, it can be difficult to know exactly how these

walking shark species came to be, and why they evolved their separate adaptations.

The youngest species might have evolved less than 2 million years ago. By evolutionary standards, that is relatively recent—as well as a major contradiction to the widely held belief that sharks are slow to evolve.

“The discovery proves that modern sharks have remarkable evolutionary staying power and the ability to adapt to environmental changes,” said Mark Erdmann, the paper's co-author and Conservation International's vice president of Asia-Pacific marine programmes.

This genus is confined to tropical waters off Australia, Papua New Guinea and Indonesia, but an individual from this genus, possibly representing an undescribed species, has been photographed at the Seychelles. ■

SOURCES: CSIRO, CONSERVATION INTERNATIONAL, SCIENCEALERT

Now open for voting: The EU Stop Finning Initiative

The “Stop Finning—Stop the Trade” European Citizens' Initiative has begun collecting signatures. EU citizens have one year to support the requested change by collecting one million votes demanding the end of the shark fin trade in the European Union.

A group of citizens from across Europe have united, demanding the end of the shark fin trade in the European Union (EU), so as to increase the protection of this fragile but key species. This trade relies on the wasteful and unethical practice of cutting the fins off sharks and discarding the animal back into the ocean while it is often still alive.

Because of their high commercial value and use in a traditional soup in Asian culture, the practice of shark finning still occurs, and Europe is one of the major players in the global fin trade.

Sharks are crucial to a healthy ocean

Every year, between 63 and 273 million sharks are killed, and many species are being increasingly threatened worldwide. Globally, sharks are targeted for their meat and liver oil, but the biggest threat is still shark finning. The steep erosion of shark populations across the globe has severe impacts, as many sharks are “apex predators” and play an active role in maintaining healthy and productive marine ecosystems.

EU laws must be strengthened

By demanding to “end the trade of fins in the EU including the import, export and transit of fins other than if naturally attached to the animal's body,” these citizens aim to strengthen the European Union's legal framework. Should their endeavour succeed, the European Commission can then decide to propose a new regulation to achieve this goal.

Such a new regulation would go one big step further than the current EU legal framework, which requires—since 2013 and for all EU vessels—that fins remain attached to the carcass of the shark until unloading at port. However, fins can then be separated and traded across the world. While a steep improvement from the EU's former regulation, this requirement thus still allows fins to be traded across Europe and EU fishers to feed Asia's strong demand for shark fin soup.

Other countries are ahead

In June 2019, Canada became the first country of the G7 group to ban shark fin imports in its territory, and people around the world are increasingly calling for the end of such cruel and useless practices. Europe must follow suit.

European citizens have the power to demand stronger wildlife protection from the EU's decision-makers. At a time when the scientific community regularly rings the alarm bell regarding the steep erosion of biodiversity and the risks associated with climate change, we have no choice but to change our production and consumption patterns. It is high time to end the shark fin trade in Europe! ■

To vote, please **CLICK HERE >>>**



(File photo) NOAA agent counting confiscated shark fins

NOAA





GRAEME KRUGER / FLICKR (CC BY-NC-SA 2.0)



The puffadder shyshark (*Haploblepharus edwardsii*) is a species of catshark. Laboratory experiments suggest the tooth-like scales of the skin can be degraded by acidifying oceans.

Acidifying oceans could corrode scales on sharks' skin

The ongoing changes in the ocean's carbonate chemistry caused by anthropogenic CO₂ emissions are thought to have profound effects on the biology, distribution, morphology, behaviour and physiology of marine organisms. The increased dissolution of CO₂ in seawater results in a lowered pH—a process known as ocean acidification—by the year 2300, a global pH of about 7.3 is expected as a result of an increased absorption of carbon dioxide from the atmosphere.

Researchers have already shown that ocean acidification,

which particularly affects compounds based in calcium, can take a big toll on the shells of bivalves like clams and the skeletons of coral, Jonathan Lambert reported in *Science News*. But the effects of these changes on sharks, which lack both shells and bony skeletons (shark skeletons are made of cartilage), have been less clear.

To test how acidity affects sharks' skin, scientists housed 80 puffadder shysharks in tanks full of pH 7.3 water, simulating projected future conditions, or pH 8 water.

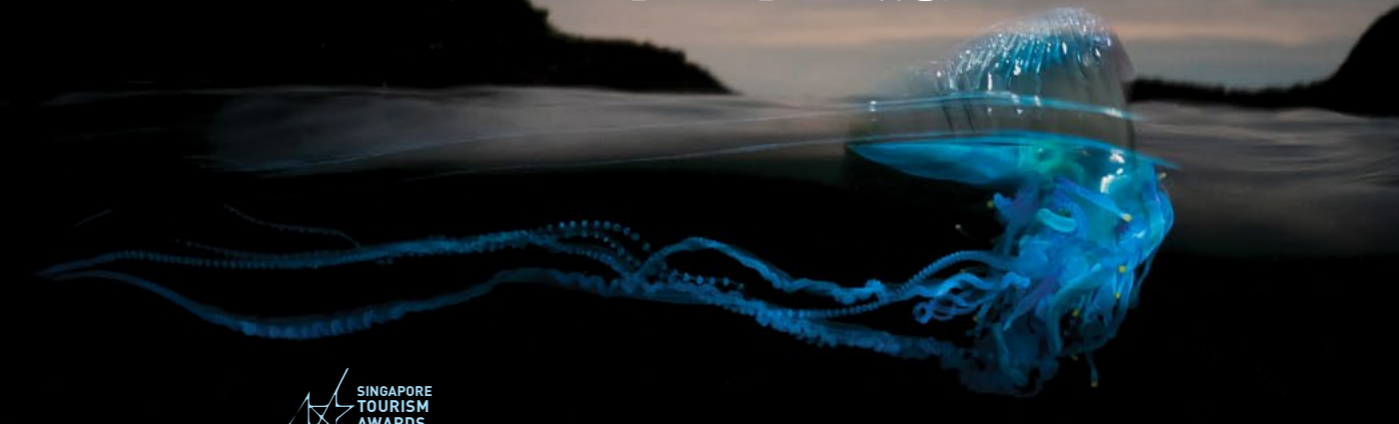
Exposed to acidified water,

sharks' bodies quickly began to pump bicarbonate, a base, into their blood to counteract the acid. But the longer the sharks spent bathing in the harsh liquid, the worse off their denticles were. When the researchers examined three specimens that spent nine weeks in the acidic tank, they found damage on 25 percent of the sharks' denticles under a microscope, compared to just 9.2 percent in a group that had remained in more neutral water.

■ SOURCE: NATURE

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Erikos
Kranidiotis
exploring
Mine 145 in
the Hilarion
mine com-
plex, Lavrio,
Lavreotiki,
Greece

Text by Maria Fotiadi, Erikos Kranidiotis and Stelios Stamatakis. Photos by Trifonas Egglezos, Maria Fotiadi and Erikos Kranidiotis

In May 2019, a group of dry cavers visited the famous silver mines of Lavrion in the south-eastern area of Attica, Greece. The main objective of the visit was to inspect and document the flooded chambers.

An unexpected discovery

On a beautiful Sunday morning, a few friends and I visited the famous silver mines of Attica in the municipality of Lavreotiki. Driving nearly 50km from Athens to Lavrion on the southeastern coast of Attica, we went to visit a central mining complex called Hilarion. My friends, who were also dry cavers, told me about the fifth level of this mine, which was filled with water.

Water inside a mine? I did not know much about mining, and it was only my second visit to this area, so I was intrigued. We made our way through the entrance of the mine complex and left daylight behind us, descending into the dark corridors of a tunnel that was over 100 years old.



Hilarion

— *Exploring the Greek Silver Mines of Lavreotiki*

TRIFONAS EGGLEZOS

Historically, the mines in this area are famous for silver and lead. Extraction of ore has taken place here since 3000 B.C., during the Neolithic Period. Early humans

took copper to construct tools.

Later, during the 5th century B.C., mining activities here funded the construction of the Acropolis of Athens. But after

a millennia of exploitation, the mines fell into oblivion until the 19th century when the ancient mines were rediscovered. The Industrial Revolution fostered a rebirth

in the area, and Lavrion became an important pillar of the Greek economy during the 19th and 20th centuries. Walking through the mine tunnels with





ERIKOS KRANIDIOTIS

A passage deep within the Hilarion mine complex (above); Expedition team members Vasilis Stergioy, Maria Fotiadi, Apostolis Tzamalís and Akis Palis walking through the forest to reach the entrance at the Hilarion mine complex (right). One of the difficulties of the mission was to transport dive gear to the entrance of the mine and then over half a kilometer into the mine itself to reach the sump; Kranidiotis and Stamatakis preparing to dive Mine 23, with Tzamalís assisting and Thodoris Manousakis recording activities for a two-part documentary on Time Machine to be aired on the Cosmote History channel early to mid-2020 (far right)



ERIKOS KRANIDIOTIS



MARIA FOTIADI

my friends, my thoughts went to the miners of old. These people spent hours in the dark, working in poor conditions, with just the light from a head lamp for company. Semi-collapsed chambers, wooden beams supporting the ceilings and

rusty rail tracks were a common sight. Out of the 5,470 unique mineral specimens found worldwide, almost 700 come from Lavrion mines. And in the Lavreotiki municipality specifically, there are also unique specimens, some of which are of

exceptional quality. The end of mining activity in the 1980s and the subsequent abandonment of the mines have led to extensive damage in the passages. Evidence of this can be found in the form of trash left in some

parts of the mine by disrespectful visitors. Walking on slippery terrain, we saw an increase of water in the mine's passages and humidity became more intense after the fourth level. After more than an hour, we finally reached a large chamber filled

with water. It was an extraordinary sight to see this subterranean lagoon. It was obvious that the chamber continued underwater. But this was the end of the line for me.



ERIKOS KRANIDIOTIS

Taking the plunge

When I got home, I could not stop thinking about this unique site for the next few days. What was down there and how far did it go? I had to find out somehow. However, it was difficult to find willing and experienced cave divers in Greece. But I had something in mind. I knew two divers who were experienced both in cave diving and deep wreck diving—the Addicted2H2O team. I contacted them immediately, sharing my photos and videos with one inquiry: “Are you interested in exploring this site?”

They got back to me, excitedly writing: “Mine diving in Greece? That would be something different for sure!” We started conversing over e-mail, had endless phone calls and set up a meeting on-site in order to evaluate the difficulties of this project.

The most difficult aspect of the endeavor was to safely navigate inside the dry

parts of the mine tunnels to reach the flooded chambers. Another major difficulty would be to get the equipment down to the sump. An hour-long walk on muddy and rocky terrain was a difficult task on its own. But Erikos and Stelios were willing to pull through it. We all met again at Lavrion: the dive team of Stelios and Erikos, and the surface support team of Konstantinos (a PADI Instructor and fellow diver) and me.

Carrying the heavy equipment was a hell of a thing. But the team managed it well. After resting, Erikos and Stelios started their dive, descending into the water for the first time.

First expedition

Underwater, the dive team found that the mine continued its course in a complex section of chambers formed of natural rock. At least two of the chambers had entrances with wooden support columns,

while remnants of rail tracks leading to the heart of the mine were found in situ.

During the first exploration, which took place on 20 July 2019, the dive team found three main corridors. They followed the main central corridor, which led to another chamber comprising three different intersections. Continuing straight ahead, they found the main corridor, supported with four rows of wooden beams.

At this point, Erikos and Stelios returned to the support team, because the first and main objective of this dive was to check and evaluate the conditions of the underwater part of the mine and to see if the mine extended farther.

The water was freshwater coming out of the aquifer at 20°C. Previously, it had been thought that the water in the mine would be seawater, due to the proximity of the Lavrion region to the sea (Saronic Gulf). This turned out not to be true.

Stamatakis pushes farther into the Hilarion mine complex as Kranidiotis follows behind, capturing the first underwater video of the mine on 20 July 2019

Hilarion

During the mine's active period, water had been pumped out so the ore could be extracted. So, when mining works ceased, the tunnels filled with groundwater, which sealed the mine completely.

According to the dive team, the visibility was amazing. The only difficulty underwater occurred on the way back. Scuba bubbles and fin movements during entry stirred up silt and decreased the clarity of the water, causing loss of visibility—an expected phenomenon in cave diving.

Second expedition

On 19 November 2019, our

team returned to the site and continued underwater filming. The support team had more members this time, and we transported the dive equipment again 500m inside the mine to a depth of 120m.

This time, the dive team penetrated the sixth level of the mine and managed to explore and confirm that all three sections found on the first expedition were linked together and interconnected. Passages were found directly below the flooded area that resembled a subterranean “lagoon.” But there was also a fourth corridor, which was located in another section nearby, that could be accessed both underwater and by foot from the dry part of the mine. From this area, there was a narrow entrance point, with a downward slope, leading to a flooded section with rail tracks, dating to at least the 1930s.



MARIA FOTIADI

Smiling faces after completion of a successful dive in Mine 80 (below) with Tzamalīs (right) at the surface in support of exploration divers Kranidiotis (left) and Stamatakis (center)





tech talk

Surveying the rail tracks found underwater (right). These tracks led to a new entry and exit point to the water in the Hilarion mine complex discovered by the dive team during the second dive on 19 November 2019; Kranidiotis does final checks on the camera while Stamatakis (in yellow helmet) has already begun the dive in the first chamber of Mine 80 (below).

Our belief was that these various parts were linked, and the dive team also confirmed it underwater. The railway connected the dry fourth level of the mine with the underwater sixth level, and it was used to extract ore via wagons. Furthermore, this led the divers to discover a new connecting underwater section, thus providing the divers with an alternative exit nearby in case something went wrong. Now, the team can focus on exploring the main passage farther.

A Greek mine quest

The first underwater images from

the Lavrion mines made a great impression on the diving community in Greece. Mine diving and exploration are not developed in Greece at all. Starting from the Hilarion Mine, the team, assisted by local explorer Vassilis Stergiou, visited other parts of this vast complex, which covers over 120 sq km.

So far, five different underwater sections, with more than one intersection in some cases, have been rediscovered and explored. Every one of these tunnels has unique characteristics and different levels of difficulties for the dive team to



Hilarion

ERIKOS KRANIDIOTIS



MARIA FOTIADI

overcome.

Members of the dive team believe they have only begun to scratch the surface of perhaps one of the oldest and most iconic mine sites in the world. The team members, however, do agree on one thing: It is the element of water that has protected and preserved the mine as it was when the miners of old ceased their works.

Divers experienced a sense of awe in the flooded mine. It was like going back in time; you could almost see faint images of the

people who worked under such adverse conditions.

One thing is for sure: Mine diving in Greece is now a fact, thanks to the Addicted2H2O Greek diving team, and there will be more to report in the future. ■

The Addicted2H2O exploration team will be at TekDive USA 2020 in Orlando, Florida, USA, from 24 to 26 April 2020 (tekdiveusa.com). For more information about the expeditions to the Hilarion mine complex, please visit the official site at: addicted2h2o.com.

Maria Fotiadi is an archaeologist and recreational diver. Erikos Kranidiotis and Stelios Stamatakis are cave and technical divers.



TRIFONAS EGGLEZOS

Left to right: Erikos Kranidiotis, Vasilis Stergiou, Stelios Stamatakis, Maria Fotiadi





photo & video

Photograph taken in the domed cylindrical pool at MChS near Moscow.

Text and photos by Anatoly Beloshchin

It used to be that when one talked about underwater photography, one primarily meant photographing sea animals in their natural surroundings; however, it can also be interesting to shoot underwater images in swimming pools. Firstly, a pool can be turned into an underwater photo studio. Secondly, there are pools that are unique in themselves. I present some examples in this article.

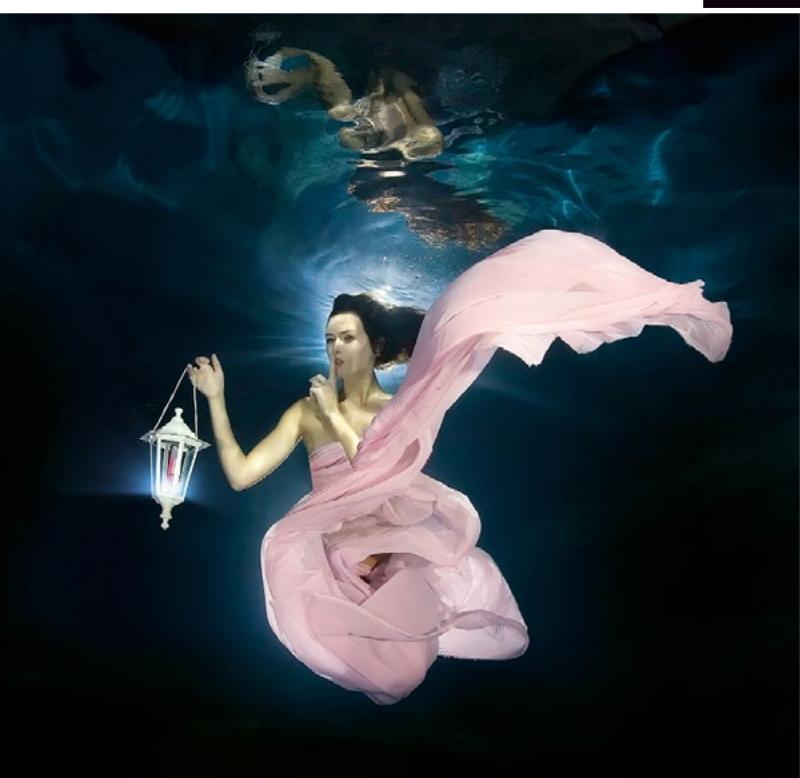


Photo taken in swimming pool with black backdrop



Swimming Pools & Underwater Photography

When doing underwater photography in pools, I have always been irritated by the inherent "feeling of a pool" in the resultant images. What does one shoot in a pool?

People! However, if it is not to chronicle dive training or swimming competitions, why do we have to include the pool's tiles in the shot?

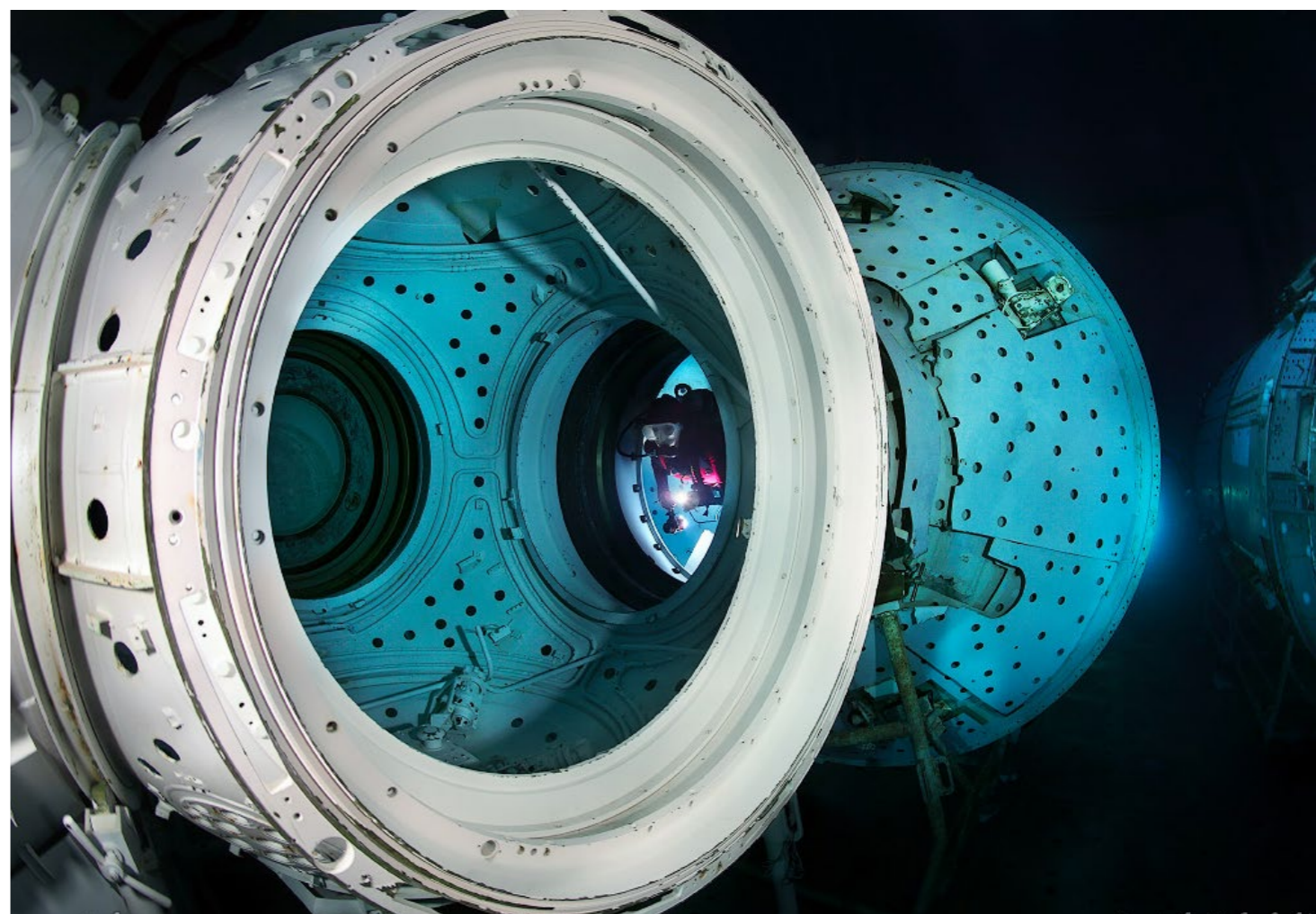
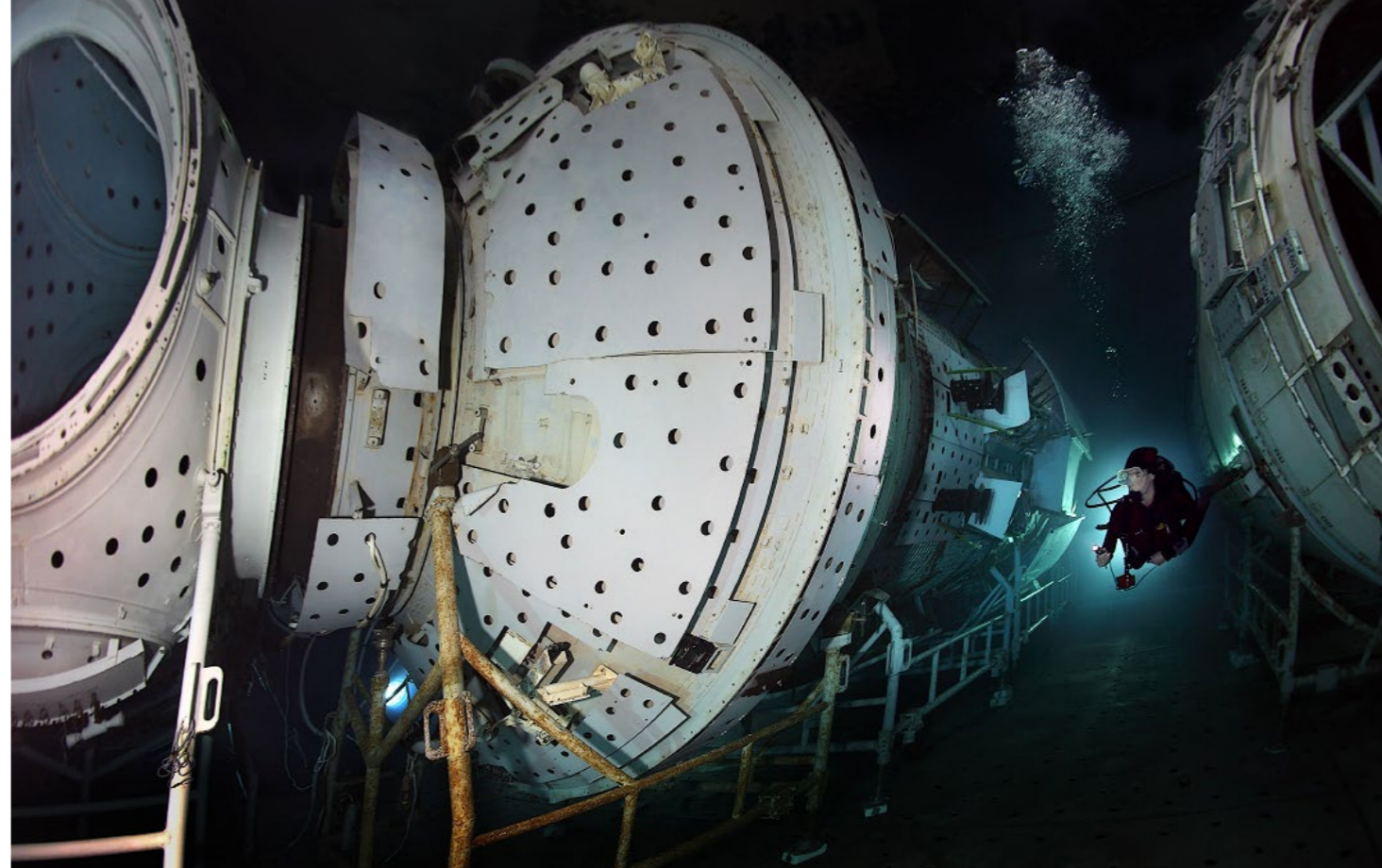
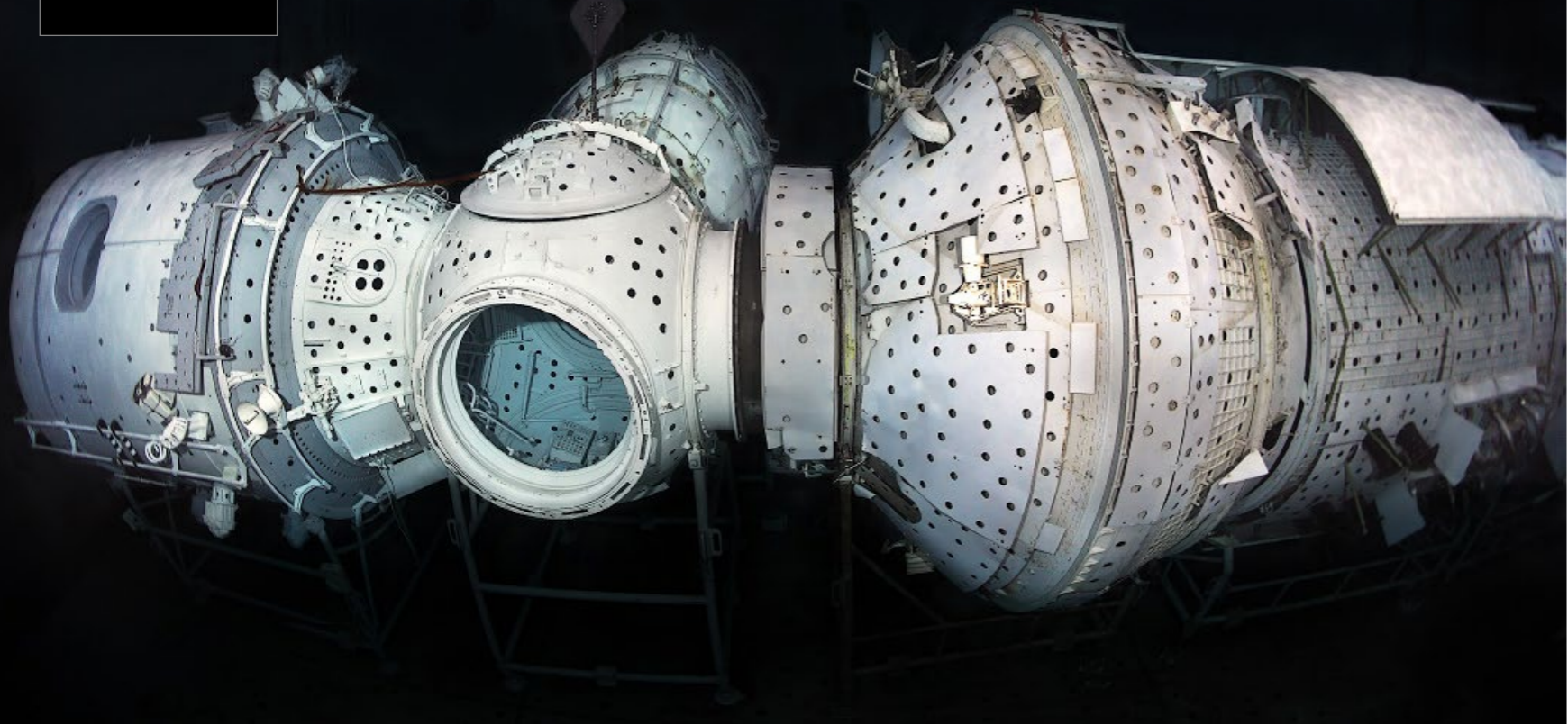
So, I decided to create a photo studio out of a pool. I bought a big piece of

black material, made it a "backdrop" for a photo and installed an underwater light. As a result, I got a photo of a model that seemed to be hanging in weightlessness.

I think that the main problem with such a photo is the lack of a feeling of

the water. There are two ways to solve this: Firstly, include in the shot the illuminated surface of the water, catching the reflection of the model; and secondly, blow bubbles into the water. Catching the model's reflection is quite





THIS PAGE: Photographs taken in the GCTC pool at Star City. The pool has replica segments of the International Space Station and Soyuz space craft.

to connect a hose lined with holes to an air-filled balloon, or, if depth permits, put a diver nearby, exhaling bubbles from scuba equipment. If there is a possibility to turn off or dim the light in the pool, then the resulting image can be very interesting!

Such an underwater studio can be made quickly from almost any pool. However, there are pools that are unique in themselves. I had a chance to shoot in three such pools.

GCTC

The pool at the Yuri Gagarin Research and Test Cosmonaut Training Center (GCTC) is located near Moscow in the Zvyozdny gorodok, or urban settlement, of Star City in Russia. It is a cylindrical pool with a diameter of 23m and a depth of 12m. Replica segments of the International Space Station (ISS) and the Soyuz spacecraft are immersed in the pool for use in training astronauts in weightless conditions.

Here, one may ask the pool staff to turn off the lights. By the way, the lights turn off quite spectacularly; they do not go out instantly but slowly dim, imitating a sunset. Being without light in the water at the space station in the pool feels like being in outer space—with only one difference: You can go home by car the same day. Plus, the temperature of the surrounding water is a comfortable 30°C (86°F).

easy by tipping the camera angle upward. So then, you just need to tinker with the bubbles. To create bubbles, one option is

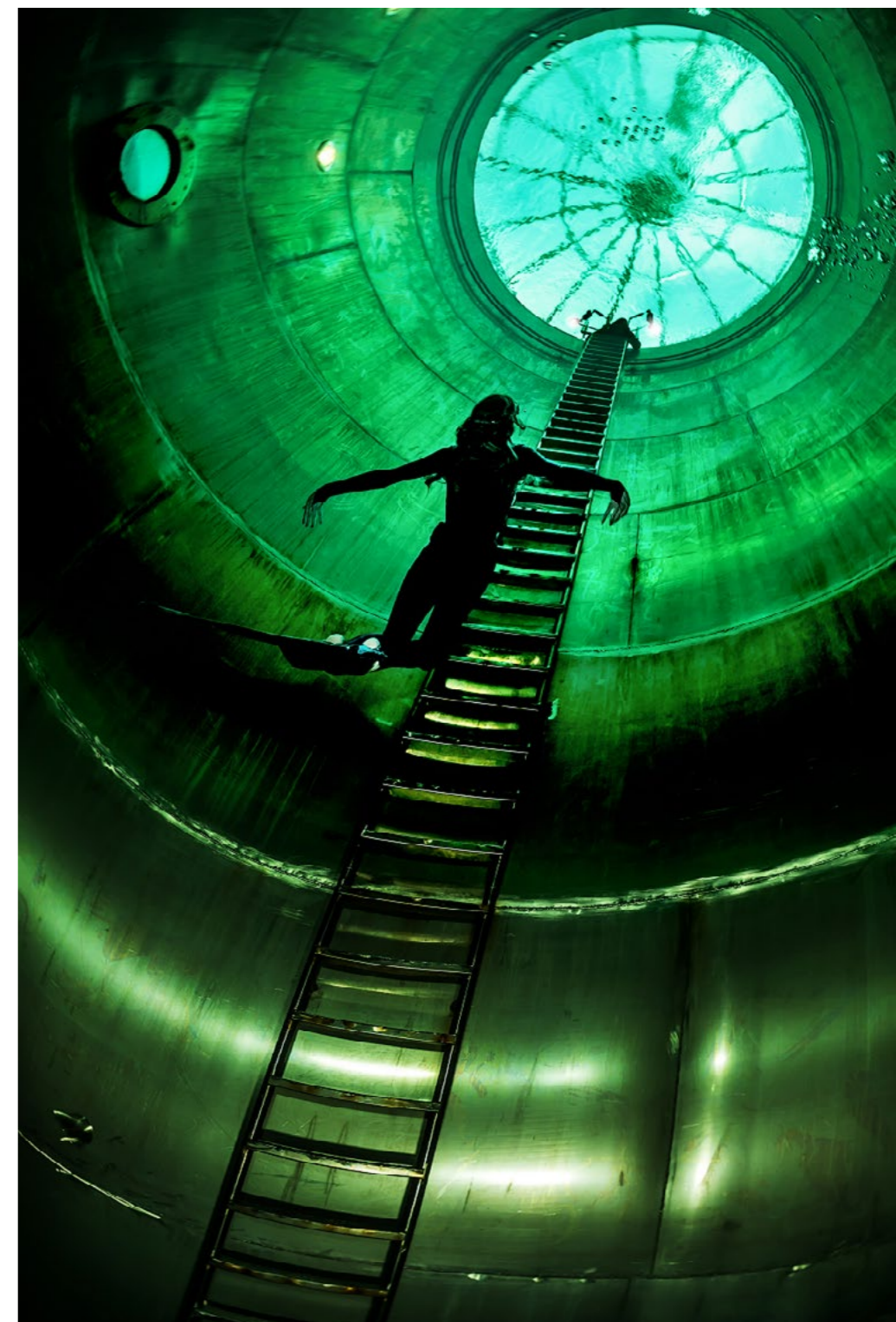
The pool lights can be switched off, giving one the sensation of being in outer space!



THIS PAGE: Photographs taken in the MChS pool facility located near Moscow. It has two pools lined with stainless steel, which offers curious reflections and lighting effects.



One of the MChS pools is cylindrical and is covered with a glass dome cover, giving photographers a chance to stretch their imaginations (below)



MChS

Another even more unique pool—which, more precisely, comprises two pools—is also located near Moscow in the Academy of Civil Defense of the Russian Ministry of Civil Defence, Emergencies and Disaster Relief (MChS). One pool measures 25m by 17.5m, with a depth of 2m to 5m. The other is cylindrical, with a diameter of 5m and a depth of 12m.

What is unusual about this facility is that both pools hold water from a well located 190m underground, and the pools are made of

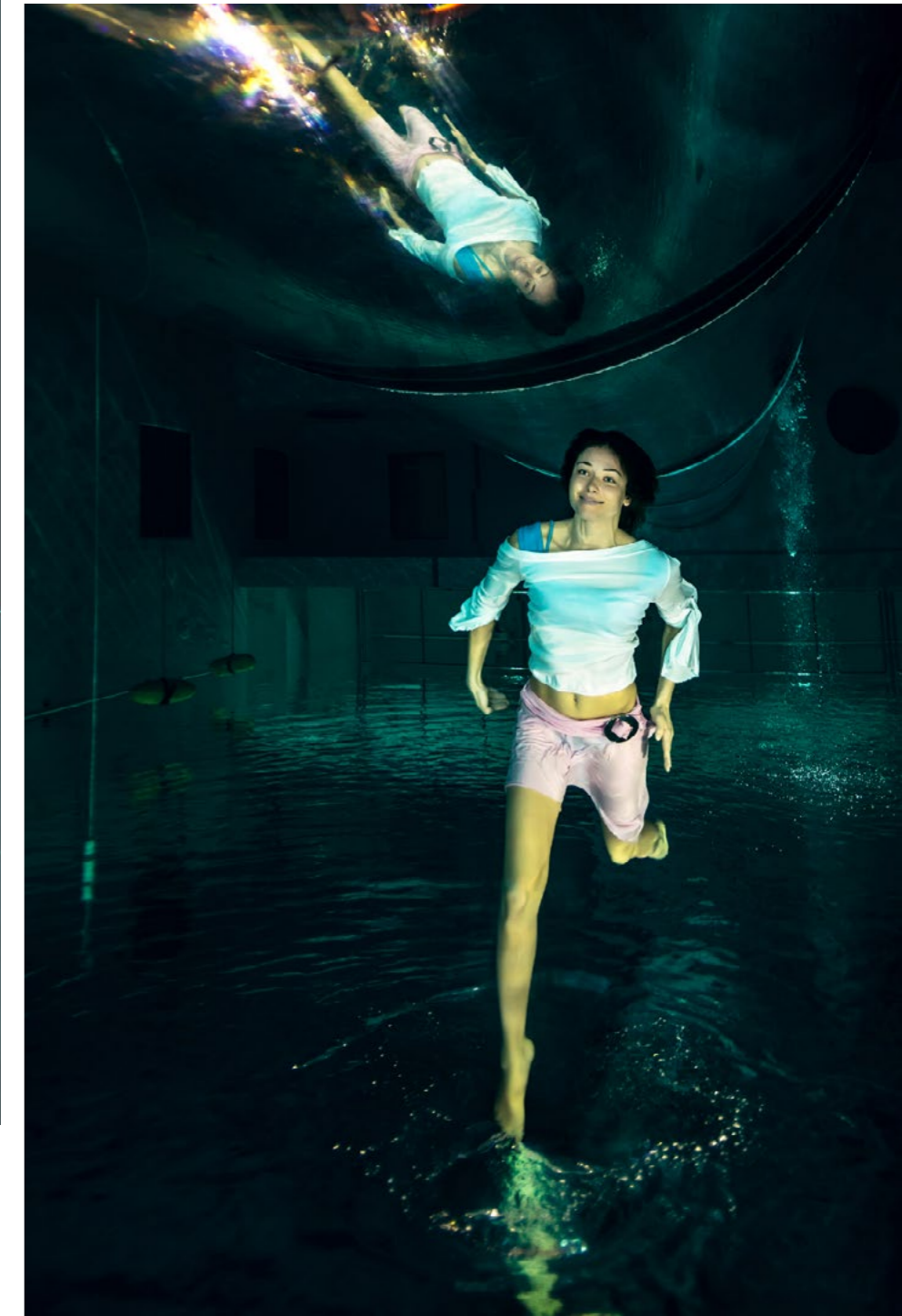
stainless steel. In addition, a glass dome covers the deep cylindrical pool.

This pool facility attracts not only divers and freedivers but also underwater photographers. The metal walls of the pools create very unusual reflections of light streaming down from the surface, which can result in very interesting photos. Additionally, the cylindrical pool with the glass dome can widen the scope of a photographer's imagination.

Y-40 "The Deep Joy"

One more unusual pool is located in Italy in the small city of Montegrotto Terme, which is 12km from Padua. This pool, called Y-40 "The Deep Joy," is the deepest pool in the world. It is even listed in the Guinness Book of World Records, as its depth is 42m!

Before traveling to this location, I was



slightly skeptical about the idea of shooting underwater images in Y-40. Above all, I was interested in an interesting photo session, and it was not clear to me what else there was, besides the pool's 42m depth, that was worth the visit.

But when I got there, I discovered more features. Briefly:

- Y-40 has an unusual shape. It is not a rectangular basin like a typical pool, but rather, it has a layered form. At the shallow end, the depth is only 1.5m. Then, there are several "terraces" at a depth of 5m, one of which gives you a feeling of being in a theatrical scene, underwater. The pool then descends deeper to 10m and 15m. The deepest

part is in the "pipe," which has a depth of 15 to 42m.

- On one of the pool's terraces, there is a big mirror, which offers a lot of options for shooting images.
- There are stylized caves or grottoes of various kinds.
- There is a glass tunnel, which crosses through the pool, and large windows.
- The pool's surfaces are finished with large plates. Moreover, some parts of the pool have different colors. There is no feeling of "tiles" in Y-40, the surface texture that bothers me

the most in typical pools.

In addition, the pool is filled with very clear mineral water at a toasty temperature of 34°C (93°F)!

The above three locations are probably the most interesting pools where I have had a chance to shoot in. But there is yet another pool I know of that is unique in concept, located in Houston, Texas, USA, on the 40th floor of the Market Square Tower. Part of this pool is suspended outside the building, hanging out over the city, at a height of 152m (500ft)! Furthermore, the suspended part of this

"sky pool" has a transparent bottom and walls. Unfortunately, I have not yet visited this pool, as it is built in a private apartment complex. But I hope to go there one day and share my photographs from this unique place. ■

Anatoly Beloshchin is a widely published Russian underwater photographer and IANTD trimix instructor-trainer based in Moscow. For more information, please visit: anatoly.pro.



photo & video

Edited by Rico Besserlich

ALL PHOTOS COURTESY OF THE MANUFACTURERS

Chasing Gladius Mini Underwater Drone

This small 15.2 x 8.9 x 5.4in (38.5 x 22.6 x 13.8cm) underwater remotely operated vehicle (ROV) is capable of shooting 4K UHD video and 12 MP stills (jpeg and DNG formats supported) up to a depth of 328ft (100m). The built-in 5000 mAh rechargeable battery supports a run-time of two hours. Two built-in LED lights of 1200 lumens each add a little light to underwater scenes. The ROV is connected to its surface base station by a tether cable; all operations of the vehicle can then be controlled by a smartphone or tablet, which connects to the base station via WiFi (with a maximum range of 10m). The built-in camera supports a 95-degree field of vision. The 1in CMOS sensor supports an ISO range of 100-3200. The ROV is powered by five thrusters, allowing a maximum cruising speed of 4 knots (2m per second). A depth sensor tells you the depth of the ROV. All signals and data are transmitted in real-time. chasing.com



Easydive DivePad

This underwater housing for IOS and Android tablet devices (up to 10-inch screen size) allows you to shoot underwater images or videos up to a depth of 60m. The housing communicates with the tablet via a Bluetooth connection. For IOS devices, a downloadable app allows you to trigger all camera functions; for Android devices, no extra app is required. A "selfie button" allows one to switch between front and rear camera views. The built-in electronic unit has its own battery, which is fully charged within two hours and provides 14 hours of operation. A built-in 6Ah power bank provides the tablet with extra energy. The housing is made of anodized aluminium. Waterproof sealing is guaranteed by a double O-ring on the back and eight stainless steel lever latches. Two standard balls allow users to attach additional devices such as underwater lights. easydive.it



INON UW Tripod System

The INON underwater tripod is a modular, highly customizable system that allows one to mount underwater housings of any dimension, weight and size to a tripod during underwater photo or video dives. The main modules consist of a tripod hub, different tripod heads (ball, 2-way, and 3-way) and telescopic arms and legs of many different lengths. The operation height of the tripod is 14cm to 127cm, depending on the legs and tripod-head chosen. inon.co.jp

Kraken Sports Solar Flare Mini

The new underwater video light from Kraken Sports has a light output of 12,000 lumens. A COB LED gives it a warm colour temperature and a smooth, even beam with no hot spots. With its dimensions of 8 x 6 x 4in and a weight of 3lb, it is designed for professionals who need powerful yet compact lighting systems. The Solar Flare Mini is flood-resistant with a vacuum-sealed battery compartment, head/lamp and battery compartments are completely isolated from each other. The video light is prepared for remote controls, which are available as additional accessories. krakensports.ca



Paralenz Vaquita

This new dive camera from Paralenz features include a True Color OLED display and an improved image processor, which auto-corrects white balance while measuring the depth of the dive. It also has 4K video with 60 frames per second or 1080p with 240 frames per second. It can shoot 12 MP RAW or JPG stills and has a built-in image stabilization. In addition, Vaquita now automatically tracks conductivity, temperature, depth and location (GPS) during a dive. The LCD display has a dive profile overlay, providing dive data on screen. The Paralenz app (for IOS and Android) serves as an intelligent dive log and media library, which automatically organizes all recorded footage neatly. The camera features a 1-inch IMX577 sensor by Sony. It is made out of aluminium and has a weight of 240g and dimensions of 128 x 40 x 43mm (5 x 1.5 x 1.7in). It supports microSD memory cards of up to 128 GB in capacity and its LiPo 2000 mAh battery can be recharged by a USB Type C cable (fast charger). The Vaquita is shock-proofed and depth-rated to 350m (1,150ft). paralenz.com





Guardian in Lacy Palace, by Chong Wan Yong of Malaysia, First Place, Compact Camera category, Lens Beyond Ocean 2019

Call for entries: Lens Beyond Ocean photo competition

This year marks the tenth year of the annual international underwater photography competition held by the Malaysia International Dive Expo (MIDE) in Kuala Lumpur. Since its humble beginnings in 2011, the contest has grown each year, with over 850 underwater photographers from all around the world competing for a chance to win attractive prizes.

Indeed, this year's prizes worth US\$25,000 do not disappoint, comprising dive travel packages to some of the best locations in Asia as well as top-of-the-line dive equipment and underwater camera gear. Judges of this year's competition include renowned underwater photographers Tobias Friedrich of Germany, Jason Isley of the United Kingdom and Nurul Yazid of Malaysia.

Entry deadline

The deadline to enter is **15 May 2020**.

Categories and winners

First and second place winners will be chosen in each of seven cat-

egories, including Macro, Wide-Angle, Compact Camera, Creative, Freediving, 3-Minute Video, and Portfolio. Additional images will be awarded honorable mention as "Memorable Pictures" by the panel of judges. Winners will be announced on 5 June 2020 and awarded prizes on the main stage at the MIDE 2020 on Saturday, 13 June 2020. All winning photos will be on display during MIDE 2020 in the foyer from 12-14 June 2020 at Hall 1, Putra World Trade Centre, Kuala Lumpur. Winning videos will be showcased on the big screen of the main stage at MIDE.

For more information, please visit: **Lensbeyondocean.com**. ■



MALAYSIA'S ANNUAL UNDERWATER PHOTOGRAPHY COMPETITION

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PARTICIPATE NOW!

Register at **www.lensbeyondocean.com**

CLOSING DATE: 15TH MAY 2020



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12 - 14 JUNE 2020
PUTRA WORLD TRADE CENTRE
KUALA LUMPUR • Malaysia

Kelly Quinn



P O R T F O L I O

portfolio

American artist and educator Kelly Quinn creates vivid, dynamic paintings of marine life and reefs with brilliant color in detailed compositions. She is currently the artist-in-residence at The Florida Aquarium in Tampa, where she gives younger generations insights into the planet's fragile marine ecosystems. *X-Ray Mag* interviewed the artist to find out more about her artwork and her mission to connect audiences to conservation through the power of art.

Kaleidoscope, 30 x 40 inches, acrylic on canvas by Kelly Quinn (right); The artist as a guest speaker, giving a presentation about art and conservation to children at a public school



BLAKE WHEELER

Kelly Quinn



Cradle, 30 x 40 inches, acrylic on canvas (above) and *Goliath*, 30 x 40 inches, acrylic on canvas (previous page) by Kelly Quinn

Text edited by Gunild Symes. All artwork by and photos courtesy of Kelly Quinn. Additional photos by Blake Wheeler.

X-RAY MAG: Tell us about yourself, your background and how you became an artist.

KQ: I grew up in central Florida, and my curiosity was molded by the wild land that surrounded me. From mystical cypress wetlands to the highest ridges in Florida, I had the opportunity to find inspiration from nature, explore its vast secrets, and explore the world through paper and pencil.

After attending Harrison School for the Arts, I found watercolor and color theory to be a fulfilling avenue of expression for the stories of mythical wildlife. After graduating from the University of Florida, I made my way to Tampa Bay to be with my boyfriend, Blake, who played a huge role in helping me take my first steps as



BLAKE WHEELER

The artist working with children, families and park staff on a 25 x 18ft outdoor chalk mural at Biscayne National Park in Florida





Biscayne Heritage, 18 x 36 inches, digital painting by Kelly Quinn

an artist! I would have never made it this far without the love and support of so many people, including my family, who were my first patrons, and our passionate community.

In the years since, Blake and I founded Paint for the Wild (PFTW), which teaches art classes in wild locations to raise funds for conservation. Currently, I am an art instructor with PFTW, teaching classes at six locations in Tampa Bay, with every class supporting local conservation initiatives.

I am also the artist-in-residence at The Florida Aquarium, where I live-paint with guests, teach art classes and collaborate with educators to create illustrations for research and teaching. Most recently, I collaborated with Biscayne National Park to host a weekend of artistic and inspiring events for their local community. Every day, I find myself compelled to protect what we are so lucky to have, and to do this through the power of education and art.

X-RAY MAG: Why marine life and underwater themes? How did you come to these themes and how did you develop your style of painting?

KQ: I have always loved the sea, having been born and raised in Florida. I tasted salt for the first time when I was two years old, and always found the abundance of life and the colors mesmerizing.

While I am currently focused on the sea, my original love was actually born from

freshwater ecosystems. I grew up on Lake Hatchineha, an area regarded as the beginning watershed for the Everglades and considered one of Florida's most endangered habitats. Here, I found a love for things both seen and unseen, and patience taught me perspective on the habits and personalities of wildlife and ecosystems, all of which inspired a passion for shedding light onto other realms of perspective. I found myself drawn to the critters which we saw the least, those

living below the water line, whose lives we knew so little about, and sought to tell their stories visually.

I have always used color theory to accentuate reality, because I find the expression of color allows me to show the intensity of emotion in a piece more effectively. In the end, my work is a mix of contemporary, realism and a touch of romanticism, to highlight the way I view the natural world in a whimsical manner.

portfolio

Bold, 30 x 40 inches
acrylic on canvas
by Kelly Quinn

X-RAY MAG: Who or what has inspired you and your artwork and why?

KQ: I was completely self-taught until I went to high school, where I attended Harrison School for the Arts, and met my first mentors to guide me in the ways of many different art forms, so I could experience what medium would be best for me. I owe a lot of my early exploration in high school to my teachers Karen DeMichael and Rocky Bridges.

In terms of artists I admire, I have always been inspired by all art forms from music to poetry. Thomas Moran was an artist who created massive landscape artworks, which captured the wildness of the Yellowstone region, and created work that convinced the American public to fall in love with nature, and to be moved to protect it. Alongside pho-

tographer William Henry Jackson, Moran and the team of explorers convinced Congress to form the first national park—Yellowstone.

John Muir was another integral part in the formation of the national parks system and the continued protection and appreciation of the land we are so lucky to call home. He was a wild soul who wrote romantic prose about nature, which inspired the imagination of a nation.

Robert Bateman is another artist I admire—a traditional oil painter born in Canada and inspired by her fiercely wild landscape. He was a naturalist from a young age, keeping sketches and musing on why nature was the way it was, asking questions, and drawing inspiration from nature... something I have found myself doing throughout my own life. I find his thought processes and tech-



Eye of Miami, 30 x 40 inches, acrylic on canvas by Kelly Quinn



niques to be a great lens with which to view my own work.

In general, my greatest inspiration is nature itself—the pure reality that so much precious life exists on our planet in astonishing and exciting ways is unbelievable, and I think it is worth protecting for the next generation.

X-RAY MAG: What is your artistic method or creative process?

KQ: I start with a theme, an environmental issue, a recent story in the news, a location that has a story to tell, or an ani-

mal facing a threat, and then develop a set of “pages” (i.e. artwork), each of which focus on one aspect of the main subject. I will try to find points of personality and comparison between humans and other animals, to break down the wall of differences, so we may care more empathetically and logically for every form of life by seeing similarities.

After themes and base musings are down, I move on to sketches. By this time, I have already been thinking up possible compositions and imagery in the back of my mind, but now I put it all on an idea board (or file). I will spend a of couple

weeks sketching on a given concept while working on other projects. Then, from these, I pick the most favorable for what story I am trying to tell.

Once picked, the artwork is painted in daily painting form—an 8 by 10-inch canvas painting I use to throw down initial colors, depth and movement in preparation for the final piece. Once I have found the right mix, I finally move to the full-sized canvas, which ranges in dimensions from 30 x 40in to 132 x 48in.

X-RAY MAG: What is your relationship to the underwater world and coral reefs?



Are you a scuba diver or a snorkeler and how have your experiences underwater influenced your art? In your relationship with reefs and the sea, where have you had your favorite experiences?

KQ: I am a scuba diver and general nature enthusiast, but I finally had the opportunity to dive for the first time four years ago, and immediately fell in love with the whimsical world just below the surface of our oceans. I found a special place in my heart for coral reefs for many reasons, but one prominent inspiration is because of my relationship with The Florida Aquarium, which has been dedicated to coral conservation for years, creating arks of coral gardens for the preservation of genetic diversity, working exclusively on the United States' only barrier reef system in the Keys, which is quickly disappearing before our eyes.

Blake and I had the opportunity to join The Florida Aquarium Center for Conservation team on their annual trip to the Florida Keys to monitor the coral spawn, which happens for only a handful of minutes once a year by the light of a full moon. There, we witnessed dozens of pillar coral spawn at the Keys Marine Laboratory, and celebrated the successful collection of over 3,000 wild coral spawn that the Center for Conservation later grew into adult corals for outplanting on the wild reefs to restore this endangered ecosystem.

Blake and I also went on a trip to Southeast Asia where we got to dive the Gulf of Thailand and meet whale sharks, cuttle-



King of the Castle, 30 x 24 inches acrylic on canvas by Kelly Quinn



Queen of Hearts, 30 x 24 inches acrylic on canvas by Kelly Quinn

fish and baby blacktips. All this abundance of life only existed because of the precious reef system that exists amongst the karst

islands in this warm region.

My favorite dive experience was with Blake. While diving in Phuket, Thailand, we came across

this lovely little cuttlefish, which seemed both so intrigued and so offended by my presence. It first displayed a pale sandy color,

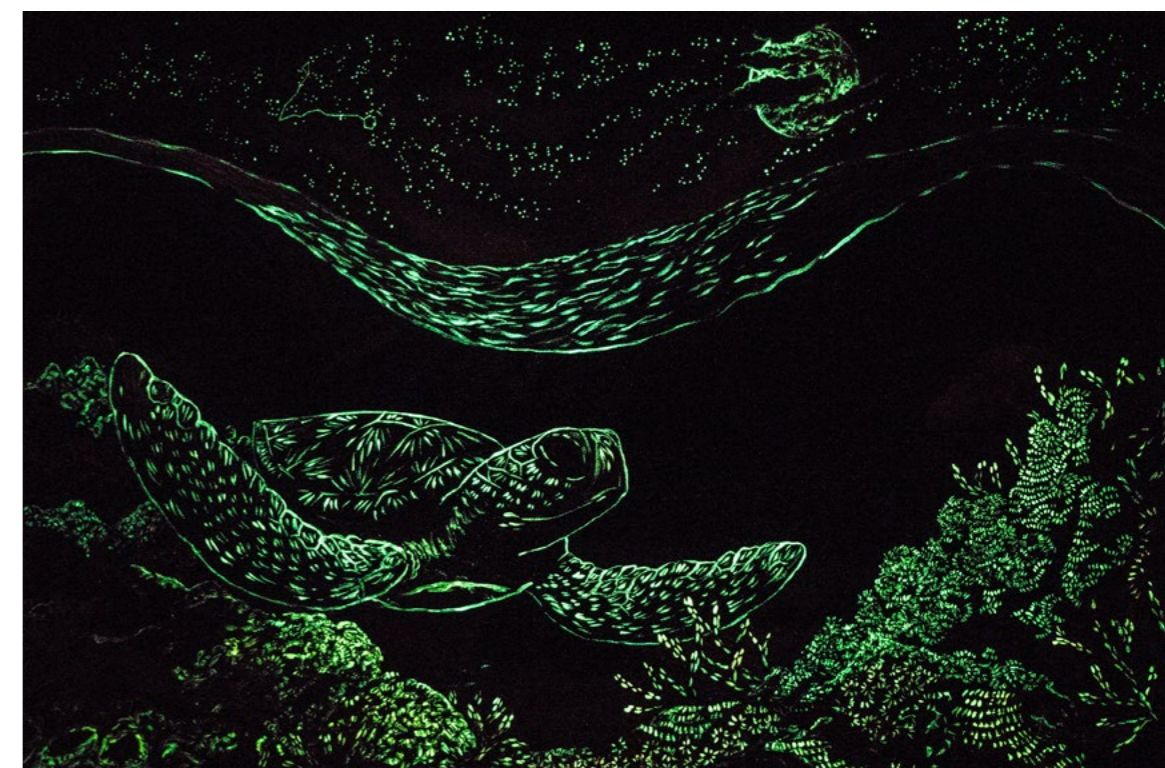
calmly scooting along the seafloor, but then as it slowed and looked at me, it turned a kaleidoscope of patterns before my

eyes, abruptly decided I was not worth its time and sped off! It was such a comical moment.



Pisces, 24 x 36 inches, acrylic on canvas (left), fluorescing phase (below) and glowing phase (lower right) by Kelly Quinn. Inspired by a coral spawning event at night, the painting captures the fluorescing nature of marine life.

Kelly Quinn



X-RAY MAG: *What are your thoughts on ocean conservation and coral reef management and how does your artwork relate to these issues?*

KQ: I believe the protection of our oceans and lands needs to be one of the most important topics on the minds of humanity from every walk of life. Without the ethical and logical protection of our planet's resources and the very life that gives it vitality, we are slowly destroying everything we have worked to achieve.

A wise soul once said: "We

do not inherit the Earth from our ancestors; we borrow it from our children." It is a notion that sums up why I care so deeply for what is currently facing coral reefs.

I believe funding and efforts to both protect and restore reefs has really picked up steam, with an excellent set of organizations leading the charge, from the Coral Restoration Foundation (CRF) to The Florida Aquarium. Alongside other organizations like Mote Marine Lab, Keys Marine Lab, Georgia Aquarium, NOAA, Florida Fish and Wildlife Conservation Commission (FWC)

and many more, the collective effort has led to a \$100 million project to restore the Florida Keys reef tract over an 18-year period.

With their coral nursery system, CRF is helping to restore and provide corals for outplanting, while The Florida Aquarium is leading the charge with new spawning techniques, enabling them to lab spawn multiple times a year to grow genetically distinct Florida corals in their arcs.

I believe my artwork facilitates the dissemination of science, connecting people not just with facts or statistics, but also with

individual characters, their stories and the similarities between ourselves and other life on this planet.

X-RAY MAG: *What is the message or experience you want viewers of your artwork to have or understand?*

KQ: I want viewers to feel compelled to know more, to wonder and puzzle over the reality of this colorful and lively realm we call Earth. I hope people feel a sense of wonder when viewing my work and take a moment to marvel at

the precious existence of life as we know it, since it exists nowhere else in the universe in the way it does here. My goal is to help facilitate science through art, so we may better educate our communities,

take action to protect land, water and wildlife, and seek a happier balance with our planet.

X-RAY MAG: *What are the challenges or benefits of being an*

portfolio

The artist with her triptic,
Wonders, 4 x 11 feet,
acrylic on canvas

Kelly Quinn

artist in the world today? Any thoughts or advice for aspiring artists in ocean arts?

KQ: It is a long-term commitment. It does not happen over a year, two years, or even three or four. But I have found a lot of traction by aligning myself with other organizations and/or people who are passionate about the same things as myself. For me, that is nature and its continued protection. I just happen to use art to express that story and to uplift the stories of science and conservation.

Each artist's niche will be different, but you find it more quickly through social media, where you can tag regionally, and by subject matter. I find tagging under the typical tags like #art #artist does not help that much. Instead, use more focused hashtags that are local.

Don't be afraid to join a non-profit

team to learn more about grants, project planning, branding and how you can impact a mission through your own talents! It is good for an artist to gain experience in branding, marketing, grant writing and project planning to give you guidelines for approaching your own business or personal brand.

X-RAY MAG: How do people—adults and children—respond to your works?

KQ: I love sharing the creative process with others, from children to adults. I find most people are fascinated by the act of art-making and even more interested to learn about the subject of said piece when we are bonding over the art.

One time, while I was live-painting at The Florida Aquarium as their artist-in-residence, I was approached by a four-year-



The Guide, 30 x 40 inches, acrylic on canvas by Kelly Quinn



BLAKE WHEELER

old girl, curious as to what I was doing. The art I was creating was based off of Cleatus, the aquarium's goliath grouper—a fan-favorite due to his massive size and inquisitive eyes. And this little girl was no exception. I saw the joy in her eyes as her curiosity was sparked, after which I could not help but ask her if she wanted to paint with me. Her eyes lit up, and she grabbed a brush and attentively listened to my instruction for color and location.

It was such a joy getting to share this moment of creativity with one so young, and it was made even more memorable when she started asking about Cleatus, after which I got to share with her all the reasons why goliath groupers are awesome! I have instances like this happen often in these live-painting events, and they are some of my favorite moments from my work.

X-RAY MAG: What are your upcoming projects, art courses or events?

KQ: My current project just finished up with Biscayne National Park, where we held an art reception coupled with educational speakers and local cuisine for a night of "immersion" into the marine world of Biscayne Bay. During the weekend, I connected local community members with the park through a fun art class at the visitor center followed by the creation of a massive 20 by 14 in chalk mural with the help of over 250 kids at the park's Family Fun Fest!

My next projects include a new collection inspired by another aspect of wild Florida, the continuation of my scientific illustrations for researchers and educators to use in the communication of science, and finally, I want to bring on new artists

and locations for the business my boyfriend and I run called Paint for the Wild, which brings our community to wild spaces to learn how to paint.

Every individual scientist, storyteller, researcher, artist, influencer, animal caretaker, adult and child matters so much in making lasting change. With your help, your voice and your natural talents, we can protect the home that was gifted to us, so our children may also enjoy the opportunity to thrive in life. ■

For more information or to order artwork and prints, please visit the artist's website at: kellyoffthewild.com. You can follow the artist on Instagram @Kellyoffthewild or @PaintfortheWild, or email her at: kellyquinnartist@gmail.com.

