AquaCorps :: Dive Volunteerism :: UWPhoto Flash Photography

X-ray mag

GLOBAL EDITION
July 2011
Number 43

British Columbia
Port Hardy

Sweden
Tech Wreck Park

Caribbean
Southern Belize

Ecology
Mangroves

China
Qian Dao Lake

Sharks
Broadnose Sevengill

PACIFIC
Yap

COVER PHOTO BY BARB ROY

DIRECTORY

X-RAY MAG is published by AquaScope Media ApS
Frederiksberg, Denmark
www.xray-mag.com

SUBSCRIPTION
X-RAY MAG International Edition in English is FREE
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COVER PHOTO: *King Crab on Kelp, Lucan Chute, Port Hardy, British Columbia, Canada,* by Barb Roy

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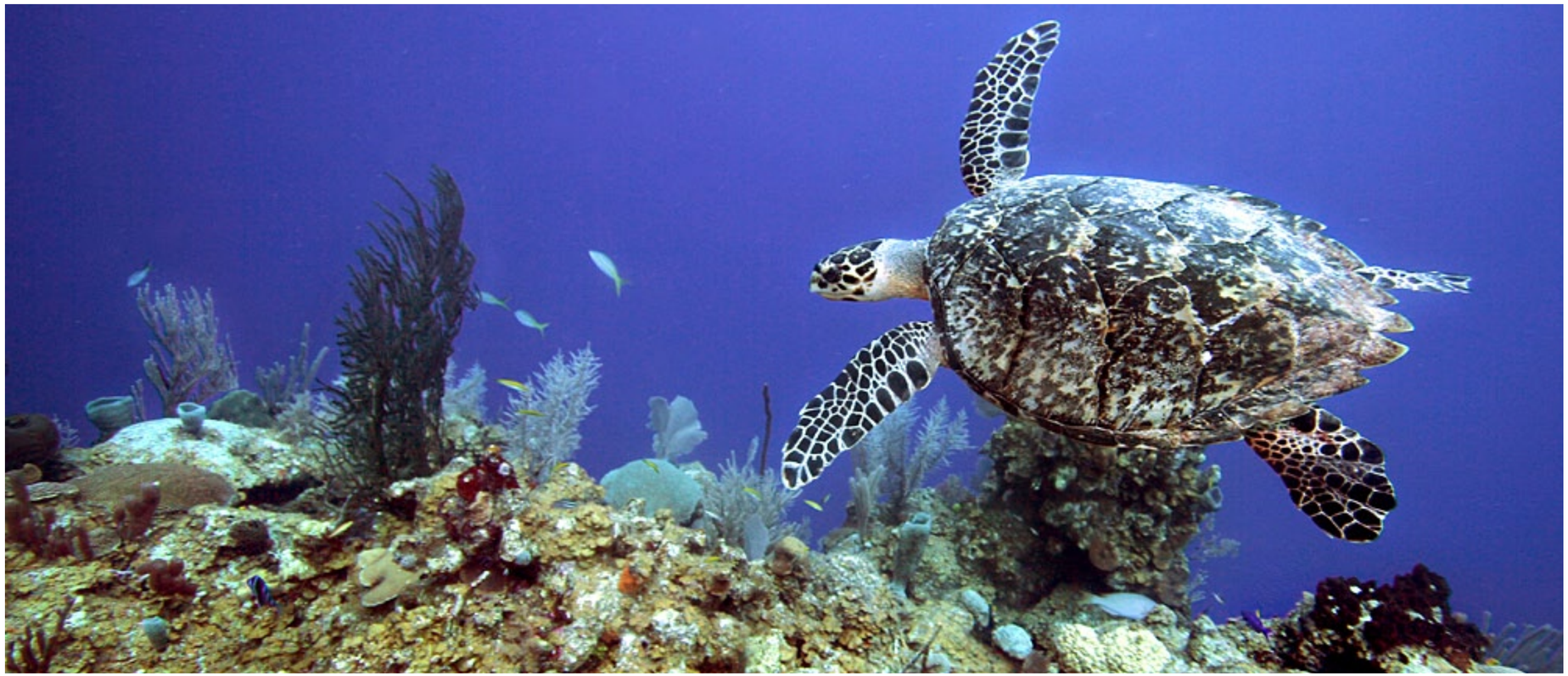
Hawksbill sea turtle, Southern Belize. Photo by Kate Clark



columns...

plus...

Death Porn, no thanks

A middle-aged gentleman on his annual two-week vacation at a resort plays a game of tennis and drops dead on the court from a heart attack. Would that qualify as a 'tennis accident'? Would we see tennis magazines or websites make a mention of another 'tennis death'?

A lady in her 40's suffers a stroke and collapses during her Saturday shopping in the mall. Is that a *shopping fatality*?

It's ridiculous, right?

These people all died from common maladies resulting from modern unhealthy lives. Too many French Fries or cookies and a sedentary life style is what killed them.

Yet, if any of these persons had suffered their heart attack or strokes in the water during a dive or swimming back to the dive boat, it would immediately be labelled as a dive accident, and everybody would be up in arms, somber editorials would be written and admonitions given.

It's gotta stop.

Traffic accidents kill and injure a lot of people every year, but could you imagine a car show, such as BBC's very popular *Top Gear*, make statements as to the weekly number of fatalities or injuries? Or how about travel magazines interspersing their articles about vineyards in France, cruises on the Nile and museums in New York with reports of tourists being abducted by terrorists or mugged in a dark alley?

That would come across as rather odd.

So, why is it that the diving press seems to have this morbid propensity for revelling in fatalities?

Diving is a wonderful past time giving many of us joy and adventure. Diving is also by any reasonable yardstick quite safe—even the insurance companies have to appreciate that.

Sure, there are some high-profile incidents, such as known personalities meeting their untimely demise, but many of these most unfortunate events are often associated with exploratory or deep dives with high levels of complexity. Yet, comparing cave divers pushing the envelope in pursuit of the unknown with the average diver who mostly dives on holidays or perhaps on weekends is like making inferences from Formula One racing to commuting to work, or comparing the climbing of Mount Everest to hiking in the national forest. Technical divers are aware of the added risk; they're trained to handle it, and they accept it. And that is a completely different matter than going on a leisurely shallow dive to watch the clown fish and corals with friends or family on a vacation.

Like the general car industry benefits from research and developments in F1 and much of the outdoor wear we use today have mountaineering to thank for its existence, we can and indeed should learn from accidents and use the insights gained to make the sport even more safe. But that is a separate issue.

Nothing in life is totally risk free, and people die every day from a wide variety of causes including disease and starvation. Diving is all about living life and not about losing it.

Let's keep that in mind. ■

X-ray mag

News edited
by Peter Symes
& Scott Bennett

out of the deep

NEWS

A two-week marine survey conducted by scientists with Conservation International (CI) in Indonesia, along with local partners, led to the discovery of eight potentially new species of fish and a potentially new species of coral in the waters surrounding the island of Bali.

Text by Arnold Weisz. Photos courtesy of Conservation International / Gerald Allen

CLOCKWISE FROM RIGHT:
Euphyllia new bubble coral;
Siphamia new cardinalfish;
Heteroconger new garden eel

A two-week marine survey conducted by scientists with Conservation International (CI) in Indonesia, along with local partners, led to the discovery of eight potentially new species of fish and a potentially new species of coral in the waters surrounding Bali island.

Among the potentially new species documented were two types of cardinalfish, two varieties of dottybacks, a garden eel, a sand perch, a fang blenny, a new species of goby and a previously unknown Euphyllia bubble coral. Further study will need to be done to confirm the taxonomy of each species.

Coral reefs recovering

This Rapid Assessment Program (RAP) survey, along with a previous survey conducted by CI and partners for the Bali government in November of 2008, documented 953 species of reef fish and 397 species of coral in the waters off the coast of Bali.

"We carried out this present survey in 33 sites around Bali, nearly completing a circle around it, and were impressed by much of what we saw," said Dr Mark Erdmann, senior advisor for the CI Indonesia marine program.

"There was a tremendous variety of habitats, surprisingly high levels of diversity and the coral reefs appeared to be in an active stage of recovery from bleaching, destructive fishing and crown-of-thorns starfish outbreaks in the 1990's."

Acting Executive Director for CI-Indonesia Ketut Sarjana Putra added, "Compared to 12 years ago, we observed an increase in healthy coral reef cover in the area surveyed, indicating a recovery phase. That is why it needs serious protection and management, to complete the revitalization."

Though the survey found the reefs to be recovering well, with a seven-to-one ratio of live to dead coral, the RAP survey team observed that commercially important reef fish were severely depleted. In over 350 man-hours of diving, the team only observed a total of three reef sharks and three Napoleon wrasse—a stark contrast to a healthy reef system where a diver would readily encounter this number of large reef predators in a single dive.

The team also saw that plastic pollution was omnipresent and noted the encroachment of fishers on no-take areas in the West Bali National Park.

Improving sustainability

"This RAP survey highlights how important these Marine Protected Areas are to improving economic returns from marine tourism while also providing food security and ensuring the sustainability of small-scale artisanal fisheries," Erdmann said.

Among the recommendations made by the CI team are a prioritization of which

New Marine Species Discovered on Bali Reefs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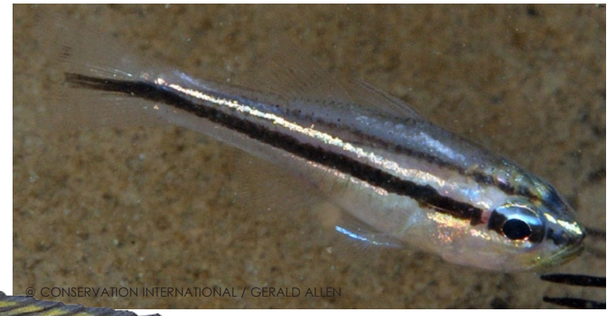
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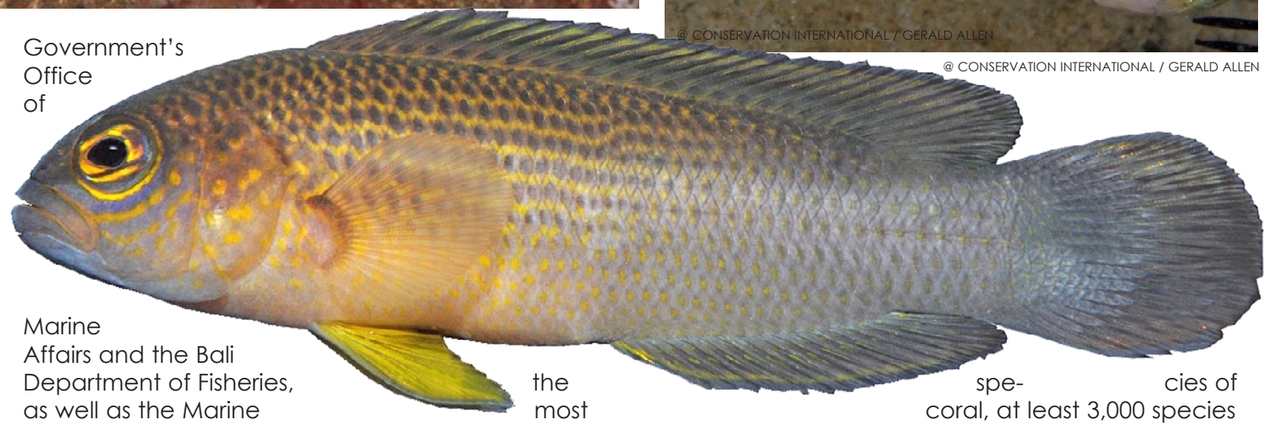
CLOCKWISE FROM RIGHT: Parapercis new sandperch; Grallenia new goby; Apogon new cardinalfish; Pseudochromis new dottyback

areas need immediate protection, the need for spatial planning to reduce the clash between marine tourism and many unsustainable fishing practices, the need to commit to enforcement and public funding to manage the MPAs and the need for strict measures to be put in place to manage pollution from plastics, sewage and agricultural runoff. The survey, part of CI's 20-year long Rapid Assessment Program (RAP), was undertaken by CI at the request of the Bali provincial government and the Department of Fisheries and Marine Affairs to assess reef health and provide management recommendations for 25 areas proposed to be developed into a network of Marine Protected Areas (MPA) in Bali, which will be designed to be ecologically-connected and resilient.

CI's partners in the Marine RAP survey include the Bali Government's Office of Marine Affairs and the Bali Department of Fisheries, as well as the Marine Research and Observation Office and Warmadewa University. Funding for the scientific survey was provided by USAID Indonesia as part of Coral Triangle Support Partnership (CTSP). The Coral Triangle Support Partnership-Indonesia (CTSP-I) is a collaborative five-year project to bring about the protection of marine systems and their myriad habitats for the benefit and sustainable livelihoods of communities across the Coral Triangle Region of Indonesia, which is the global center of marine biodiversity—with the most diverse marine ecosystems in the world, and more than 500 species of coral, at least 3,000 species of fish and the greatest remaining mangrove forests on Earth. ■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Manonichthys new dottyback (left); Meiacanthus new fangblenny (right)


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THE MOST EXCITING EVENT OF OUR OCEAN

10TH CELEBRATE THE SEA FESTIVAL • 23-25 SEP 2011 • MANADO, NORTH SULAWESI

FORUM, PRESENTATION & UNDERWATER PHOTOGRAPHY SEMINARS

THE SPECIAL OF GUESTS OF 2011
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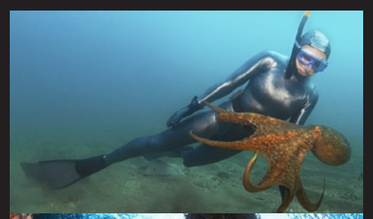
THE "MOST INFLUENTIAL UNDERWATER SHOOT OUT PHOTOGRAPHER COMPETITION"

Staged at 10 supporting resorts, the shootout competition 19-23 Sept; competitor stand to win the coveted title for the 'Most Influential Underwater ShootOut Photographer with cash and holiday prize of USD 5000. Join the panel of speakers & judges, to discover the splendour of underwater North Sulawesi - situated in the apex of the coral triangle. Oceanic walls, soft coral canyons, extensive coral meadows, and intriguing muck dive locations offer unparalleled photographic opportunities found nowhere else in the world.

INTERNATIONAL UNDERWATER FILM FESTIVAL

The current Best of the Best – award winners of documentaries and music videos from the World Underwater Pictures Festival will be screen over the weekend.



CALL FOR ENTRIES

– THE CTS INTERNATIONAL UNDERWATER PICTURES COMPETITION

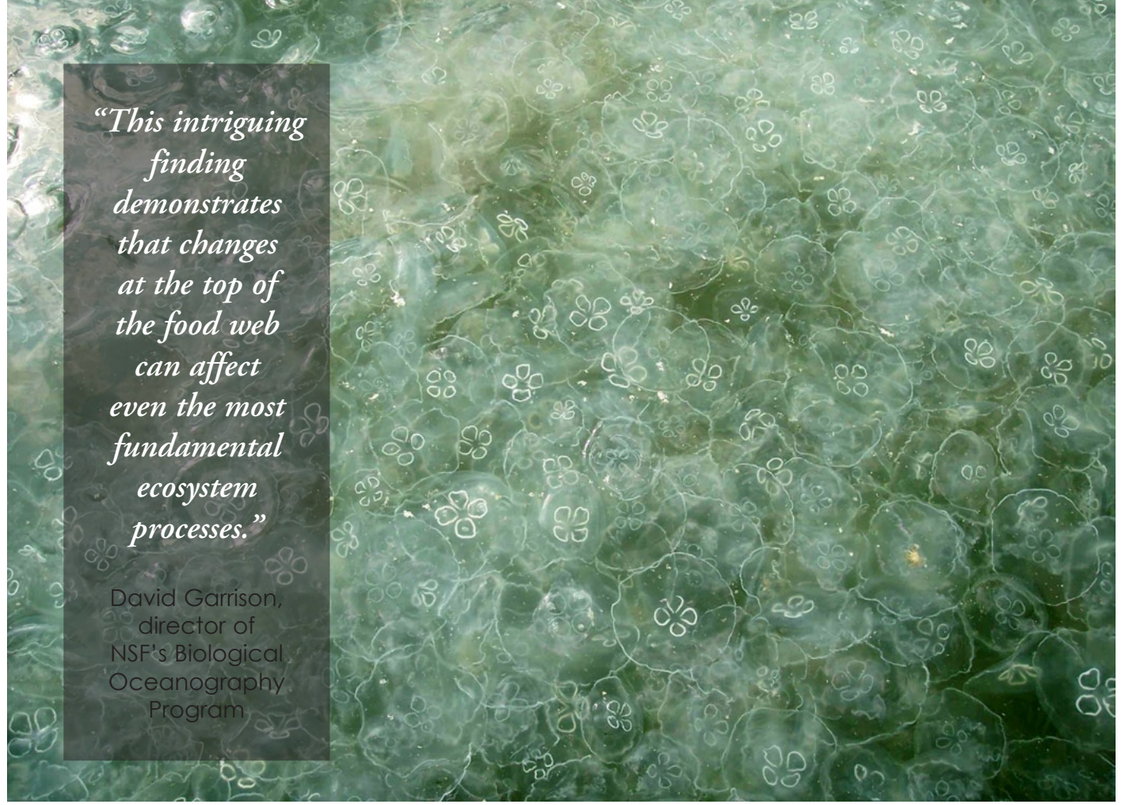
Compete in the International Underwater Pictures Competition – the most prestigious and richest underwater imagery competition in the Asia Pacific. Over $50 000 in cash and holiday prizes; Win the OUTSTANDING ACHIEVEMENT: MERIT OF EXCELLENCE: HONOR OF DISTINCTION: High Commendation for each category plus the most coveted 'Award for Highest Achievement – Photographer of Festival 2011' title with cash and holiday prize of USD 5000. Finalists will be displayed in special galleries for the duration of the show and with more than 10000 focus audience. **Compete in 7 categories; Black and White print, Colour Print, Portfolio of Festival, Digital Trio, Slide Shows, short video and feature length documentary.**

CHILDREN ART COMPETITION

The theme this year is 'My Ocean' finalists will be invited to compete in the final round in Manado for the Ocean Ambassador award. Register to participate now.

CTS festival Weekend Package with Masterpass to seminars, forum, film festival, award ceremony at Sintesa Peninsula Hotel available. Find out more at cts@oneocean.com : CelebratetheSea.com. Official Venue and Hotel: Sintesa Peninsula Hotel Manado. Organiser: Ocean Geographic Society – OceanNEnvironment Ltd

Supporting Publications



"This intriguing finding demonstrates that changes at the top of the food web can affect even the most fundamental ecosystem processes."

David Garrison, director of NSF's Biological Oceanography Program

Jellyfish Blooms Transfer Energy from Fish to Bacteria

A new study by researchers at the Virginia Institute of Marine Science shows that jellyfish have a more significant impact, drastically altering marine food webs by shunting food energy toward bacteria. An apparent increase in the size and frequency of jellyfish blooms in coastal and estuarine waters around the world during the last few decades means that jellies' impact on marine food webs is likely to increase in the future.

"Jellyfish are voracious predators," said Rob Condon—a scientist at the Dauphin Island Sea Lab (DISL) in Alabama. "They affect food webs by capturing plankton that would otherwise be eaten by fish, and converting that food energy into gelatinous biomass. This restricts the transfer of energy up the food chain, because jellyfish are not readily consumed by other predators." Jellyfish also shunt food energy away from fish and shellfish that humans like to eat through their effects on the bacterial community.

"Marine bacteria typically play a key role in recycling carbon, nitrogen, phosphorus and other by-products of organic decay back into the food web," said Condon. "But in our study, we found that when bacteria consumed dissolved organic matter from jellyfish they shunted it toward respiration rather than growth."

The upshot of this "jelly carbon shunt" is that bacteria in jelly-laden waters end up converting carbon back to carbon dioxide, rather than using it to grow larger or reproduce. This means the carbon is lost as a direct source of organic energy for transfer up the food web.

The researchers think the shift toward bacterial respiration happens because jellyfish produce organic matter that is extra-rich in carbon. ■

SOURCE: PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES

First species of mushroom found to be growing *underwater*

The International Institute for Species Exploration has named its top new species discovered in 2010, and an Oregon mushroom, *Psathyrella aquatica*, is on the list. Aquatica is the first species of mushroom with gills that scientists have observed fruiting underwater.

The mushroom appears to be quite strong and can stand up to fast-moving river currents. It was found in 2005 in the Rogue River in the U.S. state of Oregon by Southern Oregon University professor Robert Coffan and described in the journal Mycologia in 2010. Gilled mushrooms usually reproduce using spores that travel through the air. He said that it raised the question of whether other species of gilled mushroom could be found in streams. Biologists at Southern Oregon University studied the mushroom and decided last year that it was a genetically unique species that grew in river gravels and on submerged logs, and wasn't accidentally washed into the river.

Psathyrella aquatica is a new species of Basidiomycota with true gills that has been observed fruiting underwater in the clear, cold, flowing waters of the upper Rogue River in Oregon. Fruiting bodies develop and mature in the main channel, constantly submerged, near aquatic vegetation, and where observed fruiting over 11 weeks. Its sequence data place this fungus in the genus *Psathyrella*. These appear to be truly underwater mushrooms and not mushrooms fruiting on wood recently washed into the river.

Substrates include water-logged wood, gravel, and silty river bed. Water constrains spore dispersal. Spores were observed as wedge-shaped rafts released into a gas pocket under the cap. Underwater gills and ballistospores indicate a recent adaptation to the stream environment.

This particular river habitat combines the characteristics of spring-fed flows, clear, cold, aerated water with woody debris in shallow depths on a fine volcanic substrate. The presence of nitrogen-fixing cyanobacteria near fruiting body attachment sites suggests a source of nitrogen in an otherwise clear stream. This observations adds to the biodiversity of stream fungi that degrade woody substrates. ■


EUO © OCEANA CARLOS MINGUELL

Nudibranch (*Coryphella verrucosa*) on hydrozoans (*Eudendrium sp.*). Fladen, Kattegat, Denmark

Oceana: Baltic Sea is heading towards collapse

Photos courtesy of Oceana

Oceana concluded one of its most comprehensive expeditions to date to document species and habitats in the region around the Baltic Sea. The international marine conservation organization completed over 100 dives with an underwater robot (ROV) and a team of divers in the coastal countries.

The Baltic covers an area of 415,266 square kilometres in Northern Europe, almost entirely surrounded by nine different countries. Baltic Sea is a very unique brackish water environment. But, at the same time, it's one of the most polluted seas in the world. In addition, destructive fishing practices like bottom trawling, high levels of by-catch and illegal, unregulated and unreported fishing all lead to the degradation of its marine habitats.

The objective of the expedition, which covered 7,000 nautical miles in two months, was to collect data on the state of conservation of the Baltic to prepare proposals to improve the network of Marine Protected Areas and their management.

"There is no precedent of any other international expedition that has covered all the Baltic countries and filmed depths ranging from three to 450 meters —the deepest area being Landsort Deep, Sweden," explained Xavier Pastor, executive director of Oceana Europe and the leader of the expedition. "Oceana's expedition is valuable because it proves that there are areas still rich in biodiversity in this devastated sea—areas that show how the Baltic Sea can look like if adequately protected. We've also seen areas that have been completely destroyed or are heavily polluted, proof of the lack of adequate conservation measures."

Seventy percent of the dives were

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The Oceana *Hanse Explorer* in the Baltic Sea


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ABOVE: Chamelion prawn (*Hippolyte varians*). Hirsholmene Marine Reserve, Kattegat, Denmark; Oceana diver (top right) watching a fourhorn sculpin (*Triglopsis quadricornis*) on the seabed. Långron, Bothnian Sea, Sweden


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EUO © OCEANA CARLOS MINGUELL

Nudibranch (*Dendronotus frondosus*). Fladen, Kattegat


EUO © OCEANA CARLOS MINGUELL

Dead man's fingers. Kattegat, Sweden


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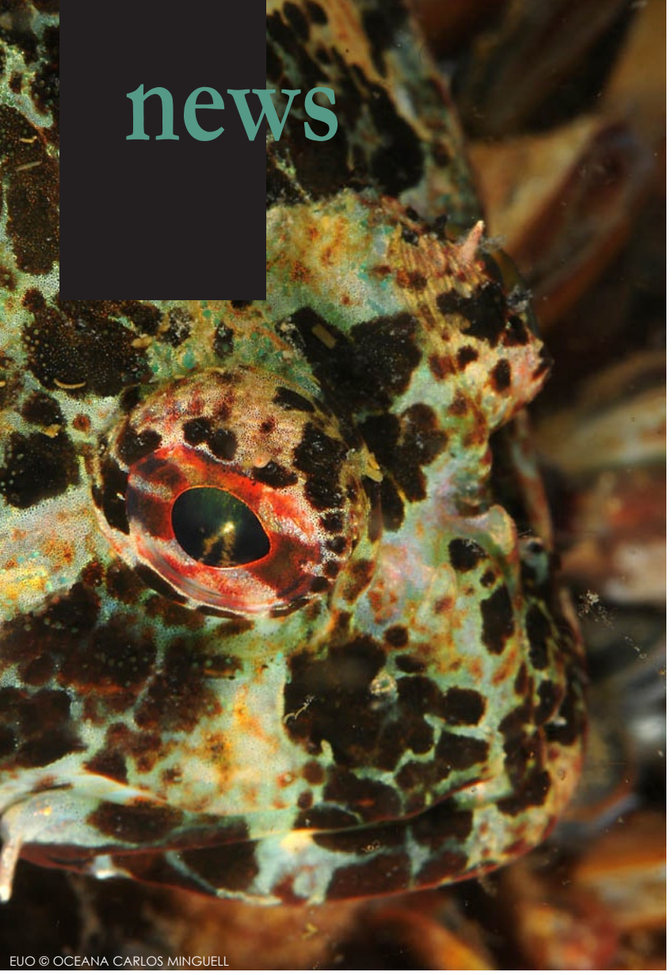
Fourhorn sculpin (*Triglopsis quadricornis*) on the seabed. Älgön, Bothnian Sea, Sweden; Diver in the seabed. Kopparstenarna, Northern Baltic Proper, Sweden

completed with an ROV capable of filming marine life in high resolution. The divers took photographs and video footage of the shallow areas, in some cases at temperatures below zero. This graphic documentation was completed with samples of sediments and macroorganisms taken with a Van Veen dredge and a CTD—a device which measures hydrographical data such as salinity, temperature, oxygen, chlorophyll.

In the coming months, marine scientists from different countries will study this data, including experts specialized in visually identifying species filmed with the ROV. Oceana will publish proposals with specific conservation measures based on the results of this analysis.

Oceana's team on board the *Hanse Explorer* also documented fishing activities in the Baltic, filming dozens of vessels from different countries using a variety of fishing gear. These observations will be combined with the data obtained from official sources and other analyses of the fishing sector in the Baltic Sea countries compiled by the organization.

"One of Oceana's characteristics is that our campaigns are not only based on analyzing scientific research, facts and figures, but on doing our own field work as well. This expedition will be a tool to promote the creation of an effective network of Marine Protected Areas that includes all types of habitats and species, while also promoting more responsible fisheries management in the Baltic," stated Anne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ABOVE: Blue jellyfish (*Cyanea lamarckii*). Kattegat, Sweden; Shorthorn sculpin (*Myoxocephalus scorpius*). Kalmarsund, Western Gotland Basin, Sweden (left)

Schroeer, Oceana's Project Manager in the Baltic.

ICES, the International Council for the Exploration of the Seas, published their advice on recommended catch amounts for Baltic fish stocks in 2012. Based on this advice, the European Commission will propose a Total Allowable Catch (TAC) per fish stock. While around 60 different fish species are caught in the Baltic Sea for consumption, ICES has only given advice for ten of them. The rest of species remain largely unmanaged despite the fact that many are overfished, and some like the European Whitefish are threatened species according to the Helcom redlist.

However, after a decade during which countries ignored their obligations to report scientific data, this is the first time that ICES scientists applied the precautionary approach and advised a TAC for brill, dab and plaice that is not higher than catches in 2010 and a reduction of catches for flounder and turbot, all of which are currently unmanaged.

The species for which ICES gives advice, cod, herring, sprat, salmon and sea trout are overfished and most of the stocks are far from making sustainable fisheries possible. The situation is particularly bad for western Baltic cod, which is only very slowly recovering from an almost depleted state, and for the central Baltic herring, which is still severely overfished. In fact, ICES scientists recommended a 2012 catch limit for western Baltic cod that is much too high given member states' requirement to reach Maximum Sustainable Yield by 2015. Meanwhile, after the 2011 ICES recommendations on herring stocks were ignored, scientists now advise a further reduction of catches as the current catch level is unsustainable.

Oceana Baltic Sea project manager Schroeer commented, "This is the first time that scientists have followed the legal obligation to apply the precautionary approach and propose catch limits for stocks that are currently unmanaged as Oceana requested. That is a big step forward." ■


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European flounder (*Platichthys flesus*). Kopparstenarna, Northern Baltic Proper, Sweden


EUO © OCEANA CARLOS MINGUELL

Painted goby (*Pomatoschistus pictus*), Örskar, Bothnian Sea, Sweden

Edited
by Arnold Weisz

Asteroid Research Begins Under the Sea

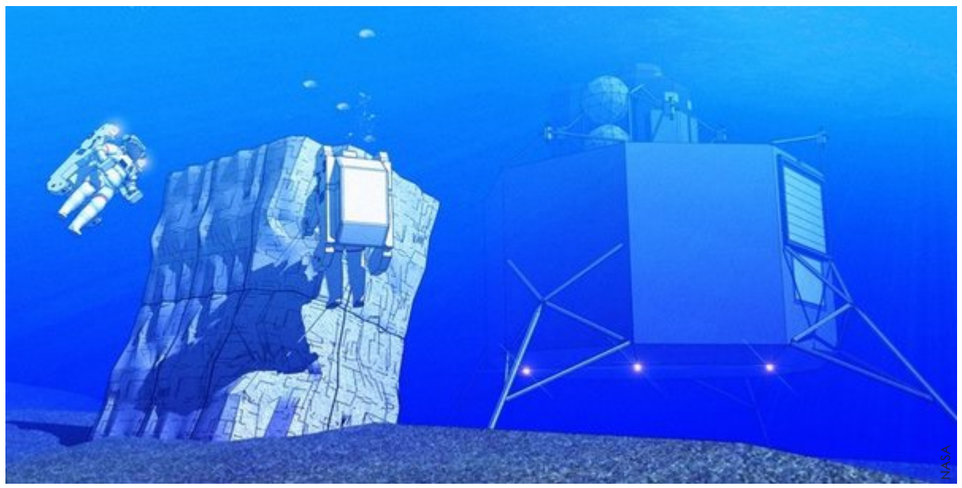
A NASA team is going underwater in the U.S. Florida Keys to lay the groundwork for the space agency's first simulated journey to an asteroid.

To determine how best to explore asteroids in the future, U.S. National Aeronautics and Space Administration (NASA) scientists and engineers are taking their experiments underwater in the 15th expedition of NASA Extreme Environment Mission Operations, or NEEMO. This year's NEEMO expedition, which will include the usual compliment of astronauts and engineers, is slated for October. Since this is the first mission to simulate a trip to an asteroid, there's a lot of work to do before the mission can start. To prepare, engineers have journeyed to the National Oceanic and Atmospheric Administration's Aquarius Underwater Laboratory near Key Largo, Florida, to work through some of the concepts that will be tested in the fall.

"Even experts don't know what the surface of an asteroid is going to be like," said NEEMO project manager, Bill Todd. "There may be asteroids that we don't even know about yet that we'll be visiting. So, we're figuring out the best way to do that."

The aim is to determine which tools and techniques work best for asteroid exploration. NASA has gotten quite familiar with microgravity operations on the International Space Station, and traveling around the moon or Mars doesn't pose all that much of a challenge, gravity-wise. In a sense, making your way around an asteroid combines the worst of both worlds: Most asteroids are so small, it's virtually like working in zero-G. But unlike the space station, there are no built-in handholds or railings. "We have no control over what this asteroid looks like," NASA astronaut Mike Gernhardt said. ■

NEEMO engineering crew diver simulates anchoring to an asteroid surface



An artist's conception shows astronauts practicing for asteroid exploration on an underwater rock wall

Ocean warming detrimental to inshore fish species

To assess the impacts of this temperature increase on a marine species, the research team analysed long-term changes in the growth rates of the banded morwong (*Cheilodactylus spectabilis*)

WIKIPEDIA

Australian scientists have reported the first known detrimental impact of southern hemisphere ocean warming on a fish species.

Surface water temperatures in the Tasman Sea have risen by nearly 2°C over the past 60 years. This warming, one of the most rapid in the southern hemisphere oceans, is due to globally increasing sea-surface temperatures and local effects caused by southward extension of the East Australian Current.

"Generally, cold-blooded animals respond to warming conditions by increasing growth rates as temperatures rise," CSIRO marine ecologist Dr Ron Thresher said. "But theory and laboratory studies show that this has a limit. As temperatures get too high, we begin to see increased signs of stress, possibly eventually leading to death. We are looking at whether climate change is beginning to push fish past their physiological limits.

"By examining growth across a range that species inhabit, we found evidence of both slowing growth and increased physiological stress as higher temperatures impose a higher metabolic cost on fish at the warm edge of the range. In this case, off northern New Zealand, ocean warming has pushed the banded morwong—which inhabits temperate reefs in waters 10-50m deep—past the point where increasing temperatures are beneficial to growth."

Influence on body function

Climate change can affect species directly by influencing how their bodies function, their growth and behaviour and indirectly through environmental effects on ecosystems. To assess the impacts of this temperature increase on a marine species, the research team analysed long-term changes in the growth rates of the banded morwong (*Cheilodactylus spectabilis*). These fish can live for almost 100 years and, as adults, they stay in essentially the same area even if the water temperature shifts.

The bony structures fish use for orientation and detection of movement—called otoliths—have annual growth rings which were measured for changes. Similar to growth rings in trees, they can be counted to indicate a fish's age and annual growth rate, estimated by measuring distances between each new ring.

Dr Jeremy Lyle from the University of Tasmania said the study showed that growth performance in banded morwong began to suffer above average annual water temperatures of about 17°C. ■

Seagrasses are disappearing

Across the globe, seagrass species are disappearing at an alarming rate, with some species now threatened with extinction. The first global survey of individual seagrass species has discovered that 14 percent are at risk of becoming extinct. Common species are also in decline, indicating a loss of habitat.

Heading up the survey was Professor Frederick Short of the University of Hampshire in Durham, North Carolina, USA, and director of SeagrassNet, an international seagrass monitoring program with 114 sites around the world.

Along with an international team of experts, Short convened three workshops to gather all the knowledge about individual seagrasses, utilizing the findings to evaluate how each species is at risk. The workshops were hosted by Conservation International, the Global Marine Species Assessment programme and SeagrassNet.

Forming vast meadows that flower and seed underwater, seagrasses form important marine habitats, providing food and habitat for a plethora of ocean species. As well as being nurseries for young fish, they are also the primary food for large marine mammals such as manatees and dugongs. They also contribute to the health of a variety of marine habitats ranging from coral reefs to mangroves, salt marshes and oyster reefs. Seagrasses have vanished from the most developed coastlines due to a mixture of sedimentation and runoff from impacted watersheds and deforestation.

See grass bed. If you look closely you will see a school of razor fish

"Many widespread, common seagrass species, which are not presently threatened, are nonetheless in decline, so we have both an overall loss of habitat and a loss of bio-diversity," stated Short. "Seagrasses are both direct food for important species, and as they break down within the coastal ecosystem, they are part of a vast food web that provides food to many organisms within the coastal ocean, including many commercially and recreationally important species."

The team discovered that 15 of the 72 seagrass species should be considered Endangered, Vulnerable or Near Threatened, under criteria laid down by the International Union for Conservation of Nature (IUCN) Red List. Of those, ten face a significant extinction risk. Results of the study have been published in the journal *Biological Conservation*. ■

South Georgia is the most biodiverse island in Southern Ocean

South Georgia is richer in biodiversity than even many tropical sites, such as the Galapagos Islands.

Photos courtesy of
the British Antarctic Survey

The first comprehensive study of sea creatures around the sub-Antarctic island of South Georgia has revealed a region richer in biodiversity than even the fabled Galapagos Islands. Made famous by great polar explorer Sir Ernest Shackleton's expedition, the sub-Antarctic island of South Georgia is one of the remotest outposts of Great Britain's overseas territories.

Reporting recently in the online journal *PLoS ONE*, a team from British Antarctic Survey (BAS), funded by the British Government's Darwin Initiative and the South Georgia Heritage Trust analyzed over 130 years of polar records, discovering a biodiversity that exceeds that of Galapagos and Equador in terms of the number of species inhabiting its shores. According to lead author Oliver Hogg from BAS, the

island is home to the densest mass of marine mammals on Earth, making it the the richest area for marine life in the Southern Ocean. Highly diverse, poorly studied and uniquely threatened by climate change: an assessment of marine biodiversity on South Georgia's continental shelf by Oliver T Hogg, David K. A Barnes and Huw J. Griffiths is published online in *PLoS ONE*.

Specimens were obtained via scientific cruises, fisheries vessels and by scuba divers from the seas encircling the islands resulting in approximately 1,500 species being recorded from 17,000 specimens. Species identified include sea urchins, free-swimming worms, fish, sea spiders and crustaceans, with many rare and occurring nowhere else on Earth. "This is the first time anybody has mapped out the biodiversity of a small polar archipelago in

the Southern Ocean. If we are to understand how these animals will respond to future change, a starting point like this is really important," added Hogg.

The near-surface waters around South Georgia are some of the fastest warming on Earth, so this study provides a framework to identify ecologically sensitive areas and species, identify conservation priorities and monitor future changes. Over an 81-year period from 1925-2006, researchers observed significant warming, with a mean increase of 0.9°C in January and 2.3°C in August in the top 100m of the water column.

A significant decrease in warming was observed at depths of 200m. However, these warming levels are much greater than reported elsewhere in the Southern Hemisphere.
The temperature of the ocean around Antarctica has increased by an average of 1°C in the last 50 years. The atmospheric temperature on the Antarctica Peninsula has increased by 2.5°C over the same period and is one of the most rapidly warming areas on the planet. ■

In Bahama Deep

Successful expedition places humans at lower limits of Mesophotic Zone.

Text and photos by Michael Lombardi

Ocean Opportunity announced that is has successfully conducted an expedition to explore and document the natural history of the mesophotic, or 'middle light', zone from 200 (61m) to 500 (152m) feet in the Exumas, Bahamas.

The not-for-profit organization, based in Rhode Island, USA, conducted the expedition from April 28 to May 8 and was hosted in the Bahamas by the John H. Perry, Jr. Caribbean Research Center—a facility with a long history of advancements in marine technology and innovations in ocean exploration.

The mesophotic zone expedition built upon the Ocean Opportunity team's previous success in November 2010 with a project at Andros in the Bahamas when they worked down to 430 feet—more than three times the depth of conventional scuba diving.

The expeditions are being led by explorer, Michael Lombardi, who has been funded by the National Geographic Society to carry out the work. Collaborators on this latest expedition included individuals from the American Museum of Natural History, the City University of New York, the University of Connecticut, and the University of Kansas.

The deep diving team conducted several mixed-gas closed circuit rebreather dives in excess of 300 feet, with one to 400 feet, and another reaching 446 feet. These explorations allowed the team to observe, first hand, below the presumed sea level at the end of the Pleistocene ice age, some 370 to 420 feet below today's sea level. Numerous images, samples, and specimens were gathered, which are being evaluated by project collaborators.

Lombardi commented, "Working to the lower limits of this newly accessible realm is wrought with challenges from a technical and psychological perspective. We are working with the best and brightest in the industry to improve human accessibility to this alien environment, and bring back data and knowledge from each dive that will advance the necessary life support technologies to improve in-water efficiency, and catalyze scientific discoveries."

When asked, "Why work to the frontier limits of manned exploration?" Lombardi stated, "The reaction time, real-time decision making, and personal interaction offered by wet diving at these depths, as opposed to robotics use, brings the raw and intimate experience of human exploration back into the game. Nearly 70 years of marine science has been fuelled by the ability to routinely access the shallow coral reef ecosystems—that excitement, and creativity made possible by a researcher actually being there catalyzed the marine science field that we know today. We are on the verge of creating an opportunity for the next 70 years. This is a very exciting time for benthic marine scientists." ■

Dive Caching

Everyone loves a great treasure hunt, and the Diving Equipment Marketing Association (DEMA) has officially launched their new real life, in-water game called DiveCaching. DiveCaching—an underwater variation of "Geocaching"—is all about adventure and fun.

The basic idea behind DiveCaching is to locate containers called, *caches*, which have been hidden underwater by divers using a GPS-enabled device and a compass. When the cache is found, the finder logs their visit to the cache online, and puts the cache back where they found it. The cache, itself, is usually composed of a container holding a log book or log sheet, something with which to write, and various items that might be of interest to the dive cacher, such as collectible coins, lapel pins, key chains, beads, money, stones, or other treasures. These items, known as, SWAG (Stuff We All Get), can include handmade items, stuff from the dollar store and anything else the DiveCacher can imagine. Items don't need to be expensive but should be a reflection of the cacher's personality.

There are many rewards for DiveCaching, and everyone has their own favorite reason for participating. Some will thrive on the fun and adventure of discovery. Others enjoy exploring a new dive site or returning to one that they have not visited in a while. Still others enjoy practicing their diving skills or using new skills in navigation or search and recovery, or just simply being with friends and family. Some, especially the younger DiveCachers will love the treasure!

The cache container is hidden underwater and out of sight of non-caching divers or swimmers. The surface coordinates of the item are recorded using a Global Position System (GPS) and are posted online so that other divers can find the cache. DiveCaching is a form of "Geocaching", a decade-old land-based activity with more than five million participants worldwide who are looking for (mostly land-based) caches hidden by others and posted on the internet. To view the introduction video of DiveCaching visit: **www.DiveCaching.org** ■

GEOCACHING

Grown-up men and women are searching planet Earth, on land and in lakes and seas, all looking to swap worthless objects. They are Geocaching, a fun, international game that spread like a bush fire more than a decade ago, thanks to the Internet. Anyone with access to a computer, the Internet, a handheld GPS and, of course, a bit of that childhood sense of adventure can play can partake of the game. GPS positions along with a few clues to the caches can be found on the Internet. Small trinkets, sometimes not even that, are found in durable containers, well-hidden but not buried. So, it's really not the treasure they are looking for, it's the hunt itself that makes the game interesting. **Geocaching.com.**

Swimmers, a fun experience for sea lovers

A new original and fun idea has been born, so that water sport enthusiasts enjoy the sea by treasure hunting. Any swimmer, snorkel or scuba diver can hide underwater ceramic figures called, Swims, in a ceramic amphora, then fill in information online about the road map with photos, videos, coordinates and all the clues you want to indicate so that another swimmer, snorkel- or scuba diver can find the treasure, hide another figure in the amphora and take one in exchange to be hidden in another corner of the world. With Swimmers, you will discover beautiful underwater places you have never been, and you will live an underwater adventure. The swims are a great way to attract other swimmers to great free- or scuba diving enthusiasts, by placing the hidden treasures in the sea you consider attractive because of the marine species, any pleasant sea experience you have had, or simply because of its originality, it could be the perfect location for a swim. And remember the environment. Therefore, the amphoras and swims used should only be made of clay, without lacquer finish. The use of non-self-degradable materials are not allowed.

Swimmers is a new activity that needs your support to be successful! Diving centers, activity centers and individuals interested in participating are encouraged to help us to hide more amphorae and swims. There are already hidden swims in Spain, Italy and Egypt. Are there any swims in your country? Swimmers is organizing contests and competitions for you in order to make this game fun and enjoyable, so check out ***www.swimmersexperience.com/en*** become a pirate and start to live the Swimmers experience. ■

Human Factors in Sport Diving Incidents

For the last two years, Gareth Lock has been working on a paper which takes the Human Factors Analysis and Classification System (HFACS) devised to investigate the root cause of incidents and accidents in aviation and applies it to sport diving, covering both recreational and technical diving. The application of the HFACS to U.S. Navy and U.S. Marine Corps accident analysis reduced accidents whose root cause was violations of rules or regulations from approximately 44 percent to approximately 12 percent over a nine-year period ending in 2000.

The paper looks at how incidents develop, and whilst it includes the individual's actions to 'create' the event, it also looks at the influence of the supervisor or organisation on how the incident develops. By identifying those influences, future incidents may be prevented. This work has been the baseline for his presentations on Human Factors and Diving Incidents, which he has presented at DiverSE '10, Eurotek 2010, LIDS and TEK 2011. (More presentations are planned for this year, too, including the Global Diving Conference in Germany in November 2011).

Some reviewers have commented that such a system will not be adopted within a recreational sport because it costs money, and therefore drawing comparisons with an activity (aviation or medicine) which is well funded, is not a valid comparison. He leaves that to the readers to decide, but the drivers must come from the top down, rather than the bottom up.

*The full paper can be found on the **Cognitas website**.* ■

wreck rap

News edited
by Brian and Millis Keegan

Tech Wreck Park in Sweden

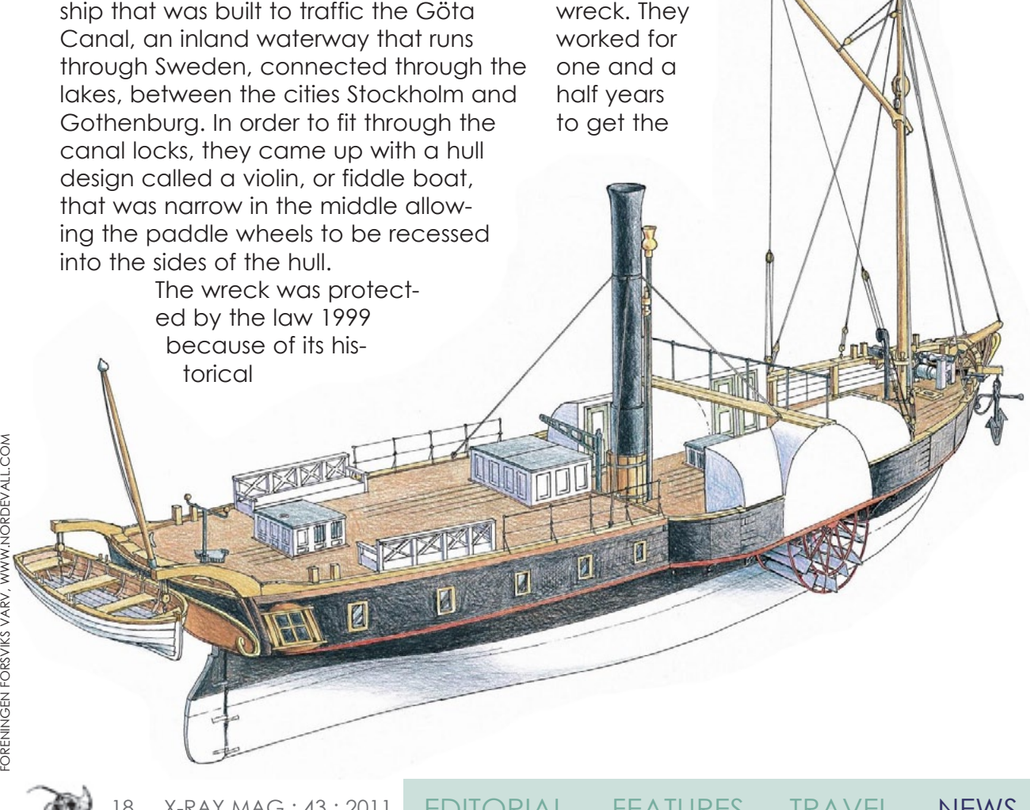
A group of Swedish divers is working on creating a wreck park in Lake Vättern. Vättern is Sweden's second largest lake and is located in the center of the country.

Text by Brian Keegan
Photos by Anders Engman
Illustration by Föreningen Forsviks Varv

ANDERS ENGMAN

The centerpiece of the park will be the wreck of the *Eric Nordevall*. She was built in 1837 and is a rare type of side wheeler steam powered paddle wheel ship that was built to traffic the Göta Canal, an inland waterway that runs through Sweden, connected through the lakes, between the cities Stockholm and Gothenburg. In order to fit through the canal locks, they came up with a hull design called a violin, or fiddle boat, that was narrow in the middle allowing the paddle wheels to be recessed into the sides of the hull.

The wreck was protected by the law 1999 because of its historical value, and as such prohibited to dive on. After reading about other efforts to create a historical wreck park for divers in Sweden, the group became interested in doing the same. The process of applying for the wreck park includes carefully documenting the condition of the wreck. They worked for one and a half years to get the permit to do the dives as research for the park, and got it. If they succeed, and the park is established, another survey of the condition of the wreck will have to be done in one year, regarding how diving has affected the wreck.



FÖRENINGEN FORSVIKS VARV. WWW.NORDEVALL.COM

The extraordinarily well-preserved wreck of the *Eric Nordevall* sits upright on the bottom of the lake at a depth of 45 meters. That means it's out of sport divers reach, so the park itself will be aimed at tech divers. A number of other well-preserved wrecks in the lake will also be included in the park; some wrecks will be within sport diving depth, but it will be advanced diving.

I had a talk with Erik Rådström, who started the project. I was interested in what inspired him to try to create a park like this. It is not exactly an easy task! Erik told me that he'd wanted to dive *Eric Nordevall* ever since his uncles dove her in 2001. They showed him some fantastic videos of her, and after seeing the amazing footage, he set a personal goal of diving her some day.

In the beginning of 2009, he read about how the Swedish maritime museum planned to develop a dive wreck park at Dalarö in Sweden.

Fulfilling the dream

Eric then realized that this could be the solution—to create a wreck park with a possibility to dive historical wrecks but under supervision to protect them from damage. "I could dive *Eric Nordevall,* and I would have the chance to make her available for others, to fulfill their dream dives."

This is not a one-man job. I asked: "Who else is involved in creating this dive park? Between your day jobs and your other regular activities, how do you and the others manage to find the time and resources you need for the work on establishing the park?"

He started the project alone with some advice from one of his uncles, who is now a part of the project as one of two project leaders. "We are at the moment

ANDERS ENGMAN

between seven to ten guys that are involved in the documentation of the wreck and all the work around the dives. Everyone helps as much as they can, and some do much more work now, and others will do their part later."

Erik is dedicated. He has a vision, a dream. But all the hard work is getting to him, especially since the paperwork for the park is taking time from the dives and the documentation of the wreck. "I just realized that I need to slow down a bit, I don't want to get burned out. We just had a very time consuming period getting the permits, sponsors, website updates and PR. I hope it will calm in a couple of weeks and we can focus more on the diving and documentation."

It turned out that much of the work that needed to be done he needed to do on his own, resulting in late hours and few hours of sleep. As soon as he came home from his day job, he started working with the dive park project.

He feels it is all worth it, though. Sure, it is hard work, but in the end, something good will come out of it. The work he and his team are doing will open the area up for other divers and give them a great experience by visiting a one of a kind, a truly unique wreck site!

It's great that one person's dream may result in a dive park that gives everyone a chance to dive on such and interesting wreck while preserving it for future divers. We wish Erik and his project the best of luck and will finish off with just a few more questions:

BK: Given the 45-meter depth of the main attraction, how will tech diving figure into the operation? Will you allow sport divers to dive on depth-appropriate wrecks, or will the park's management only cater to tech divers?

ER: *Eric Nordevall* will never be available for sport divers. You can't do safe dives at that depth when you are at that level. There will be other suitable wrecks at shallow depths, so there will be a wreck for everyone at any level.

BK: What do you think is the most important aspect of establishing a tech wreck park like the one you are working on?

ER: The hardest thing with the entire project is the work we have ahead of us when we are going to discuss who is suited to guide and arrange trips to the *Eric Nordevall*. One person's right is another person's wrong, so it will be a difficult discussion.

I don't put down all this time, so a shipper can go and do as he wants, and it results in damages to the wreck. We have examples of shippers anchoring in wrecks from the 19th century and dragging it until it hits the wrecks. We need a way to keep them away from the start.

BK: Any clever names in mind?

The name is Dykpark Vättern. It's a brand that will include several companies in the future, just like Dalarö Dykpark.

BK: Are there any dive centers involved to run the logistics and if so which one(s)?

ER: No centers at the moment, it is too early in the process to start talking to dive centers about these things.

BK: I read a little on the system you came up with to anchor the boat at the wreck site. Can you tell us a little about that? Are there any other major tasks you are currently working with to make this work?

ER: The anchor system is a combination of several different systems I read about on the Internet. We think it will be a good solution at the wreck site. The bottom at the wreck site is sand, and we decided to use used brake drums from a large truck; they weigh 50kg each and look like a piece of pipe. They sink themselves into the bottom, and by putting a chain in one side of the drum, it will dig down in the bottom if you pull on one end.

We chose to put a buoy at 6m, because if the buoy at the surface gets cut, we won't need to go down 45m to pick up the line. It's also a good thing to keep as a reference on deco.

On our next dive, we are going to dig them down a bit in the bottom so they stay in place. We are also going to place a line between the wreck and the anchor line. Nothing can be attached to the wreck, so we will be putting a weight near the side of the wreck and attaching the line to that and a small float to hold it up at the same level as the upper deck.

BK: What do you envision as the end result?

ER: I picture a wreck diving park with wrecks at all depths for all types of divers and the *Eric Nordevall* as a main attraction for tech divers. Many of the wrecks are dived regularly by the local diving clubs. They are great wrecks that are worth visiting even for divers from other parts. We just need to advertise them for the public.

BK: Anything else you would like to share with us that you feel is of importance?

ER: I would like to encourage all of you out there with an idea to go for it. If it is a good idea, you will succeed, but it will take more time than you ever could plan for! It will never be fun all the time, but the good moments will carry you through the rough parts if you set your mind to it. If everyone does one thing for the diving community, we will have fantastic options in the future!

LINKS
The wreck park's web site is:
www.dykparkvattern.se
T*he Facebook page is:*
www.facebook.com

At the time of this writing, there are plans to translate them to English. ■

The Lion Wreck
Lejonvraket

A couple of years ago, Johan Rönnby, professor at the Marine Archeology Institute of Södertörn University in Sweden, got a call from two divers saying they wanted to show him something, and they wanted to do it right that minute. He didn't know what to think, but said, "Sure." He did not regret that decision.

The divers had images of a pretty well intact ship with details telling him it had to be around 400 years old. He identified it as most likely a Dutch Flute, one of the more popular trading sail ship models during the 17th hundred, because it could be manned by fewer sailors than other sail ships of that size.

The Flute looked astonishing, as if it had gone down within the past year or so, the masts still standing tall.

Amazing woodwork

The images showed some amazing woodwork. A carving of a lion on the rudder naturally led to naming the ship the "Lion wreck". Rönnby found the whole thing hard to believe. Just a few years earlier a ship was found from the very same era, so eerily well-preserved, it was named the Ghost ship. That wreck was a remarkable find for the entire world of marine archeology, a one of a kind, one thought. The research gave a lot of insight into the past. Now, he was looking at yet another well-preserved wreck from the 17th century found near Stockholm. The Lion wreck appears to be untouched, so there are some hopes to find a cargo in the cargo hold.

Luck

The find was by pure luck. The divers—Markus Hårde, Anders Backström and Jonas Rydin—were looking to dive a steel wreck from the 20th century, outside the island of Värmdö. When the sonar picture of the site showed up on the screen, the divers went down. Rather surprised, they found a wooden wreck instead, richly decorated with wooden sculptures and canon ports. The bottom depth read close to 50 meters (150 feet).

The future for the Lion wreck is an international research project together with the Netherlands, England and the USA. There have been talks about salvaging the Lion wreck, the know-how exists. The Maritime Museums of Sweden have already salvaged an historical wreck—the well-known Vasa ship. Still, it is a huge undertaking and is nowhere in the near future. ■ **► Watch video**

You never know...

As Markus Hårde and Jonas Rydin's group and a few other dive teams were looking for four steamships that went down in the outer archipelago of Stockholm when they made a another intriguing find.

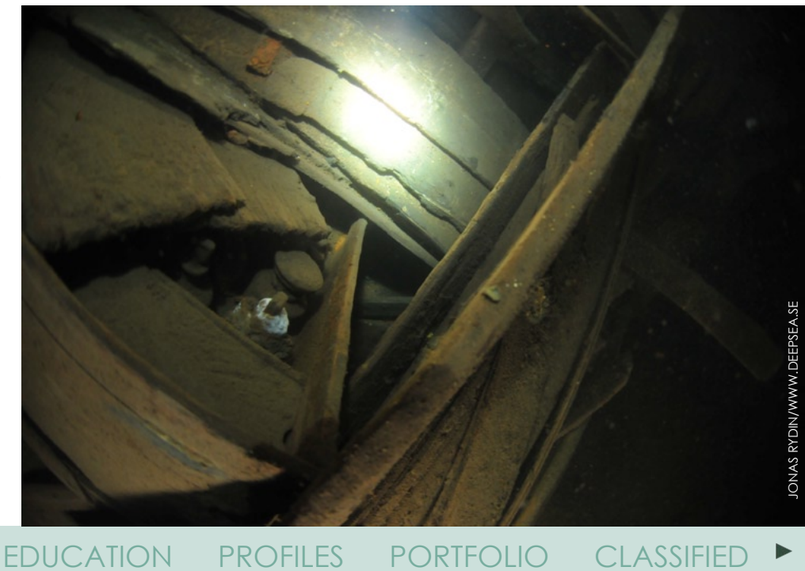
Underwater cliffs at all depths makes the area a challenging place to search even with modern technology, but all four steamers were eventually located. They were in excellent condition, basically untouched, and the team would like to keep it that way so the positions have not been disclosed. One steam ship in particular caught the team's interest. They knew the name of the ship and an approximate location. What they did not know, was the extraordinary shape she was in. Five years have now gone by, and only ten dives have been conducted on her.

A diver sheds light on a wood carving on the Lion Wreck

She might not be as historically important as their other finds, but every dive on her has revealed something new. On the latest dive, the team penetrated the wreck and found a small room with a complete set of 20 pharmaceutical bottles. They were all in great condition; many of them are still sealed and with liquid inside.

Morphine

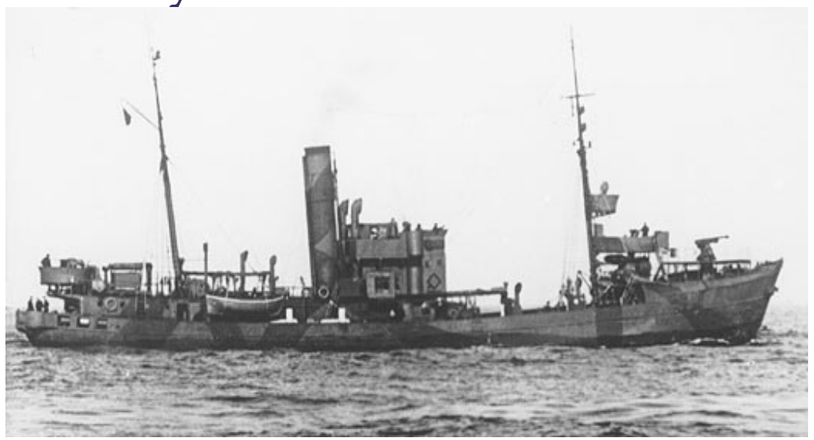
"I lifted a bottle out of the set," Jonas said, "and to my amazement, the label was still on the bottle. It read Morphine, and a date and a year. I can't quite remember the year, but it was sometime around World War I." That information is a time stamp. He put the bottle back in the set and left it as they found it. "Many groups are still looking for the wrecks, and we want it to be as pristine for them as it was for us. We just hope they have the same code of honor as we do and the other few [folk] that know its location." ■



JONAS RYDIN/WWW.DEEPSEA.SE

wreck rap

Armored WWII trawler found in Norway



The *Jan Hubert*

The 50-meter-long M-1104, *Jan Hubert,* was a German armed trawler and minesweeper that collided with another vessel on 8 July 1941 and sank not far from the city of Kristiansand in Southern Norway. The wreck was located by side scan sonar last fall at a depth of 50m by divers Arne Wathne and Steinar Monsen, who first visited the wreck on January 3.

"It was a fantastic sight that greeted us as we came down the bottom line. In the incredibly good viz, we could see most of the vessel, which stood there as if it was neatly parked along the side of the cliff. Objects were still in place as well as cannons in both ends," Arne Wathne told *Dykking,* the Norwegian dive magazine.

M-1104 *Jan Hubert* is very similar to the *Mosel,* which was found near the town of Lillesand in 2001 and has become a very popular wreck. The excellent state of preservation of the two wrecks are also reported to be similar. ■

► **Watch video**

Steamship *Dix*: Puget Sound's worst maritime disaster discovered after 104 years

The steamboat *Dix* operated from 1904 to 1906 as part of the Puget Sound Mosquito Fleet. She was sunk in a collision, which remains one of the most serious transportation accidents in the U.S. state of Washington to this day.

Using a five passenger submarine and a remotely operated vehicle (ROV), Scott Boyd—wreck diver and co-author of *Northwest Wreck Dives*—and underwater videographer, Laura James, discovered an historic Mosquito Fleet Steamer in Elliott Bay near Alki Point (the westernmost point in Seattle) that they believe is the *SS Dix,* which sank in 1906 and has not been seen since. OceanGate then provided an ROV with an experienced crew on *Dive Bum*, and on 19 March 2011, the first video images of the wreck were recorded along with high-definition sonar. "The deep wreck is clearly a wood-hulled passenger steamer from the Mosquito Fleet era and is in a location consistent with the last sighting of the *Dix*," said James.

Dix was purpose-built for one route only—the run across Elliot Bay from Seattle to Alki Point, then the main recreation area for Seattle.

On 18 November 1906, *Dix* was not on her customary Alki route, but was acting as a relief boat for the *Monticello* on the Seattle-Port Blakeley run. She left Seattle with about 77 passengers. Her captain, Percy Lermond, tasked with collecting fares, was absent from the pilot house, leaving the mate Charles Dennison in charge.

Disaster

Off Duwamish Head, *Dix* approached near the Alaska Coast Company steamer *Jeanie,* and then mate Dennison (who, it turns out, was unlicensed) inexplicably turned the vessel directly into *Jeanie's* path. *Jeanie* was ten times the size of *Dix* and loaded with iron ore. Even though *Jeanie* had already reversed her engines, and was barely under steerage way, the impact was sufficient, given the much greater weight of the *Jeanie*, to cause *Dix* to heel sharply over on her port side. She quickly filled with water, rolled over, and sank in 103 fathoms (188m). ■

On 18 November 1906, the *Dix* was underway from Seattle to Port Blakely on Bainbridge Island with 77 passengers and crew when she struck the three-masted schooner *Jeanie* one mile west of Duwamish Head. The *Dix* sank within minutes with a loss of 39 lives

wreck rap

What sank the Soviet destroyer *Moscow*?

Text by Julia Golosiy
and Philip 'Gisborn' Yakimov

Moskva (Moscow) was commissioned in 1938 and twice made port visits in Turkey before Operation Barbarossa began on 22 June 1941. Both ships bombarded the Romania port of Constanța with a total of 350 rounds on June 26, but *Moskva* either struck a mine or was torpedoed

Nearly 70 years ago, on the night of 22 June 1941, German troops crossed the Soviet border, and opened up the East Front. It is a common belief that the Soviets were taken by surprise and the command was passive and slow to respond during the first days of fighting. This may be the case in other places but not in the Black Sea. Already the same morning the city of Sebastopol was blacked out, and the Black Sea Fleet put on the highest alert. And by 3:15 the same morning anti-aircraft batteries shot down the first German aircraft.

About 13 hours later, at 4:40 pm, three submarines—*Щ-205, Щ-206* and *Щ-209* (*Щ* is short for Щука or *shuka*, which means pike in Russian)—received approval from the Kremlin to move towards the eastern shores of the Black Sea, while the *M-33* and *M-34* left for long-range patrol near the main base. It was the first day of the war in the Black Sea.

On the night of June 26, Soviet warships attacked the Romanian port of Constanta. The artillery fire from the Soviet vessels, which were led by the Kiev and Moscow, completely destroyed the port's oil reserves and also took out several trains with arms and ammunition destined for Romanian troops and the invasion of Ukraine.

These events were reported to the Soviet government, but it was through the Soviet Information Bureau that the whole world learned about the successful raid. But, as often happens, the full story was not told. It was left out that the otherwise successful operation had cost the Soviet Navy one of its finest ships—the destroyer, *Moscow*.

Even after so many years, it is quite difficult to determine the course of events and what actually caused the loss of the ship. According to the testimonies on both sides, the explosion was so monstrous that a column of white flame and smoke shot more than 30 meters into the air. The ship broke midships, and the bow almost immediately sank while the stern, with the still rotating propellers now sticking up in the air, remained afloat for several minutes. Until it too slipped under the waves, the aft bridge was continuously strafing enemy aircraft with anti-aircraft fire.

Surprisingly, during all these years the story of the ship and its sailors has been shrouded in an information vacuum. Perhaps in the depths of the (Russian – ed.) Central Naval Archives answers to all these questions can be found, but researchers have never been able to reconcile any of the official versions with where the wreck was actually located.

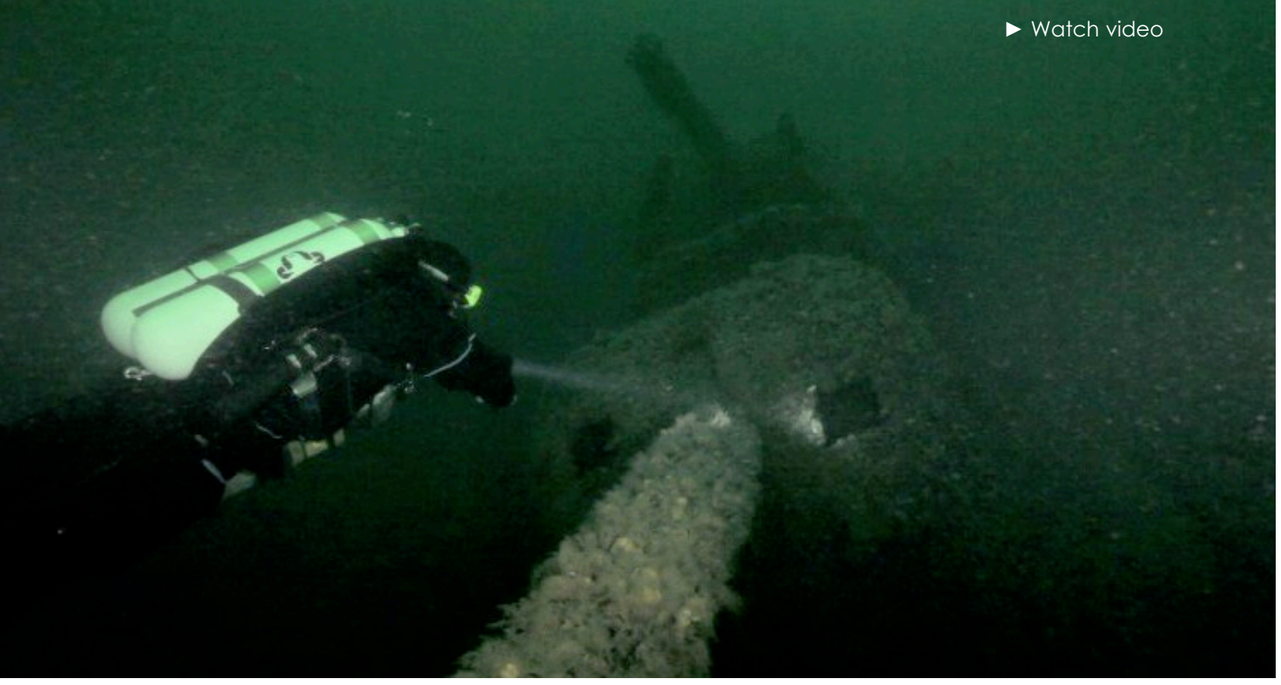
The prevailing official theories as to what sank the *Moscow* come in four varieties: she was hit by a large-caliber grenade from coastal artillery; fire from enemy ships hit her; she hit a mine; or she was attacked by a submarine. As regards to the location of the sinking, scans were made of the sea floor at the alleged position, which was marked on sea charts but no remains of the ship were detected.

Dive team

On 1 May 2011, a Romanian-Russian-Ukrainian team of divers arrived in the city of Constanta, following an invitation by the leader of the Respiro Diving Society, Mircea Popa, who has been searching the *Moscow* for more than two years.

The first day, the team scanned the seabed in a sector that archival Romanian sketches showed was the battlefield, but it produced no results. During the debriefing the same evening, the team once more went over the various information discarding the scenarios that they considered improbable.

First, the team discarded the theory that artillery from enemy ships sunk the *Moscow*. The armament of the Romanian Royal Navy's destroyers, *Regina Maria* and *Marasti,* were probably too light for such a devastating hit, and combined with the fact that the Soviet vessels were taking evasive manoeuvres and were hidden under a smoke screen and already at the maximum range of their 120mm Bofors cannons, this



Diving the Mosvka.

scenario struck the team as quite unlikely.

Also the team considered it unlikely that the *Moscow* were hit by heavy artillery from the Tirpiz coastal artillery battery. According to German sources, as well as the report of the flotilla's flagship, *Kharkov,* the battery's first salvo only came quite late in the battle. It landed dangerously close to the *Kharkov,* but only after the *Moscow* had already exploded. The team was then left with the options of hitting a mine or being struck by a torpedo.

The team did not really believe in the latter option either. According to available archival documents the only Romanian submarine, the *Delfinul*, was much further north at that time. The only submarine in any meaningful proximity was the Soviet *U-206* under command of Lieutenant-SA Karakaya. However, this vessel was not involved in the raid, and in fact, he most likely knew nothing about it. It should be noted, however, that the northern position of the boat was only seven to eight miles from the alleged location of these events, and only a small error in navigation could have put this submarine within the battlefield. However, the *Kharkov* made an observation of wakes from two torpedoes just a few seconds before the explosion. Nonetheless, the team felt that this scenario was the least likely of the two and turned their attention to the minefield theory.

After analyzing all available information, the team pinpointed what was the most likely position for the sinking—the first quadrant (south-western part) of the S-10 mine barrier. Unfortunately, all sources differ in regards to the accounting of the movement of the Soviet vessels before the explosion, but by comparing the information, the team estimated the most logical course of the ship, taking all circumstances into account.

The next day produced some interesting moments. Firstly, the team managed to meet with the historian, Prof. John Damaschin, who has spent more than a decade trying to understand the events of 26 June 1941. The meeting took place in the offices of the Marea Noastra magazine and was attended by Rear Admiral Petre I. Zamfir, who served on the destroyer, *Regina Maria,* remembered the battle. This meeting opened with an interesting piece of information, which was not mentioned in any of the Soviet sources.

According to this information, the Soviet vessels which were beyond the range of the German heavy (280mm) Tirpiz coastal batteries attracted the fire from the Romanian (105mm) battery, Elisabeth, which, unlike the German batteries, opened fire three minutes after the Sovient vessels entered the battle at 5:05. At that time the Soviet ships were moving at 26-28 knots, heading 221°, which took them, directly towards the Elisabeth battery. The light calibre of the battery was insufficient to defeat the ships at the beginning of the operation, but it's probable that the fire from the Elisabeth battery made the Soviet ships change their course and withdraw along a bearing of 123°.

Constanta today

Diving the site

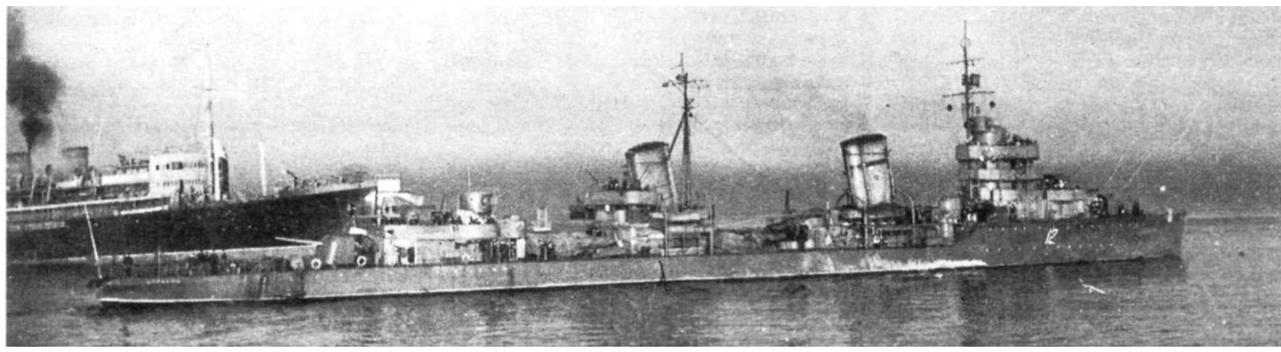
While part of the team was at the meeting, the other part of the team was busy searching the area that was selected the previous evening. The first part of the day was devoted to the complete search of the area north of the S-10 mine field in order to exclude this region from further search. During the second part, after about ten hours of searching with sonar at a depth of 45 meters, they first located an indefinable object with the dimensions of eight by six meters, later affectionately nicknamed the "box", and a few seconds later, the sonar pictured the hull of a vessel about 90 feet long.

On May 5, divers went down to examine the wreck, and they were able to confirm beyond a doubt that the *Moscow* was finally found! The ship had rolled onto its left side and was resting at a degree of 35° rising about ten meters above the seabed. The divers inspected the intact rudder and propeller. The whole aft part appeared to be in a good state of preservation up to the first boiler compartment—aft gun turrets, anti-aircraft cannons, stern fire post and filled torpedo tubes. But further ahead, it was just a tangle of collapsed metal, and it is impossible to comprehend the magnitude of the destruction. The team did two dives with a bottom time of 40 minutes, which allowed for a preliminary inspection of the ship, but obviously was not enough for detailed study.

Satellite image of Constanta and its port

From the condition of the "box"—which in size was very similar to the main superstructure, which was located at the edge of the S-10 minefield—the team concluded that the ship exploded as a result of striking a mine. But it is difficult to understand how a 200-kilo mine could cause such severe destruction of the bow by itself. This could be explained by accounts that during the beginning of the war, spare torpedoes were kept directly on the deck near the explosion. Perhaps then, it was a detonation of the torpedoes on the port side that caused the terrible explosion.

Indirectly, this theory is substantiated by the fact that after the operation in Constanta, such torpedos were removed across the entire fleet. Furthermore, upon examining of the wreck, the divers did not find any spare torpedoes except one detached from the main part of the crew compartment, which was on the right side of the ship.



The *Kharkov*

Unfortunately, neither the weather nor the time allowed the team to dive to the cherished "box", and it will await exploration by future researchers.

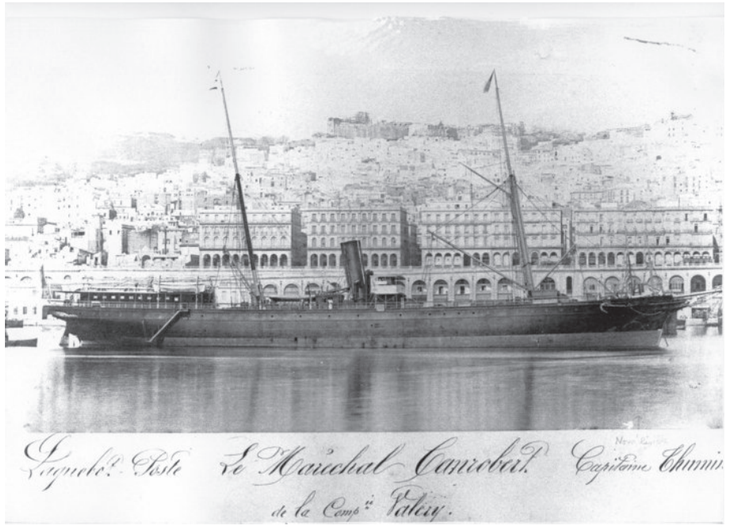
On 26 June 2011, on the 70th anniversary of the loss of the *Moscow*, the Respiro Diving Society is planning to drop a memorial plate on the deck of the *Moscow* and a wreath in memory of the dead sailors and the first Soviet warship, which perished during the Great Patriotic War.

As a result of the expedition, all the data and project materials, as well as information about the location of the wreck will be sent to the archives of Romania and Russia, and various web-resources. Everyone in any way interested in further information on the project, should contact pgscuba@gmail.com

Thanks

The members of the expedition would like to thank Colonel Banshatsu Boris Shoylovichu and Lubyanovu Kolmogorov for the great job they have done compiling a large number of documents and versions in the book, *The leader of the destroyers*—Moscow. Thanks goes also to Professor John Damascene who assisted and provided valuable information not previously studied. The team is also grateful to all those who directly or indirectly helped in the search and believed in the success of the expedition.

Note: Submarine *U-206* did not return to base and is considered "missing in action". It is difficult to say how credible the reports are about the torpedo track at the Battle of Konstanz before the sinking of the *Moscow*, and several hours later, the sinking of the *Kharkov*. There are documents about the successful attack of the destroyer, *Soobrazitelnyi* (the quick-witted)—the vessel, that protected *Kharkov*—directed towards an unknown submarine in the square 3953. On the other hand, there is no confirmation of the sinking of a U-boat from *Kharkov*, which, in fact, hailed the *Soobrazitelnui* to protect and attack submarines. This is another dark page in history to be investigated further. ■



In 1892, off Marseilles, the steamer Maréchal Canrobert collided with the Ironclad Hoche and sank with the loss of 107 lives.

French divers locate steamer sunk in 1892

After a two-year-long search, French divers—Florent M. Locatelli, Lerome Espla and Romain Lhost—reach and identify the wreck of the steamer *Maréchal Canrobert* resting at a depth of 108m.

In 1892, off Marseilles, the steamer *Maréchal Canrobert* collided with the Ironclad *Hoche* and sank with the loss of 107 lives.

On 7 July 1892, at the end of a crossing between Bône and Marseilles in the Gulf of Lyons, the ship sank in eight minutes, close to the Island of Planier, following a collision with the armoured battleship *Hoche* during manoeuvres with its squadron off Marseilles.

According to an article in *New York Times* dated 8 July 1892, 107 lives were lost. It is supposed that some of the people were killed by being struck by the ram of the *Hoche* when she crashed into the side of the steamer. There were 85 passengers on the deck of the *Maréchal Canrobert* watching the maneuvres when the collision happened.

The *Maréchal Canrobert* was literally cut in two by the ram of the man-of-war, and eight minutes later the two portions sank, all lives, with the exception of two soldiers and three children, being saved by the *Hoche's* boats.

The disaster occurred 18 miles outside Marseilles, and was due to an error of judgment on the part of the steamer's captain.

Well-preserved

According to the divers, the 75-meter-long vessel, which was launched in 1881, is still in an astonishing state of conservation. The dive, which took four hours and 20 minutes, was conducted with trimix and CCR rebreathers, which permitted a bottom time of 30 minutes at 110m of depth. ■

Former British flagship, *HMS Ark Royal*, could become the largest artificial reef in Europe

A group of divers in the United Kingdom is bidding to turn the decommissioned aircraft carrier in to a dive wreck.

Michael Byfield and James Doddrell, from Torbay, believe turning the former Portsmouth-based ship into a reef could bring GB£40m into the Devon economy, creating the largest artificial shipwreck reef in Europe. It would mean towing the vessel to a port to be stripped and made clean enough to be sunk.

The idea could repeat the success of *HMS Scylla*, which, since being sunk, has attracted thousands of divers to Plymouth, generating millions of pounds for the local economy.

The divers have formed a team called Ark Royal Reef, which was one of a number of interested buyers to tour the vessel last week.

"We would love to get it ready in time for the closing ceremony of the 2012 Olympics when we could sink it, with a fireworks display, to coincide with that and get worldwide coverage.

"It should bring us worldwide attention because *Ark Royal* is the flagship of the Royal Navy, and it would be the third largest artificial shipwreck reef in the world and the largest in Europe." ■

We would love to get it ready in time for the closing ceremony of the 2012 Olympics when we could sink it, with a fireworks display, to coincide with that and get worldwide coverage. It should bring us worldwide attention because Ark Royal is the flagship of the Royal Navy.

travel news

Edited by
Scott Bennett

One price for one flight

Budget airline add-on charges set for EU-wide ban

Most air passengers are all too familiar with this scenario: after discovering a so-called 'bargain' fare online, the final cost is much higher due to fees and taxes. A growing trend among budget airlines to advertise a low price for fares before hitting the customer with a series of charges could be a thing of the past if a proposed ruling comes into effect.

European Commission transport chief Siim Kallas is considering a European-wide ban on hidden add-ons to ensure airlines must offer the final price for flights on their websites. The ruling would combat levies made by airlines, such as Ryanair's £1.75 charge on all flights which is set to earn it £150m extra a year. The justification for the levy is to pay compensation for delays and cancellations.

However, British Labour MEP Brian Simpson, chairman of the European Parliament Transport Committee isn't buying it. "Flyers are being ripped off by an endless list of charges that airlines add to the prices they advertise. I am calling for the European Commission to look at how passengers are being misled and how it can force airlines to be more transparent in showing holidaymakers exactly what they're buying."

To all those divers returning to the Red Sea with an excess of luggage, take note:

In a bid to woo tourists back to Egypt, Egyptair has doubled its baggage allowance for both international and domestic passengers. With this latest development, the airline has become one of the few airlines in the world allowing two free checked bags. The announcement was made by Mr Medhat Nabil, General Manager Egyptair and Mr Adel EL Masry, Director Egyptian Tourism Office in India.

"Because of the recent political movement, the airline had lost its business considerably. This move will help Egyptair attract more and more tourists from all over the world, as people, when they travel abroad, like to travel in their comfort zone with all their personal articles on them. This will be one incentive to travel to Egypt as not many airlines allow such baggage allowance", said Mr. Nabil.

The effects of the democratic movement in January, 2011 has dealt a severe blow to Egyptian tourism. More than twelve percent of the country's GDP is derived from tourism.

SCOTT BENNETT

Evidence mounts that electronic interference impacts airplane safety

We've all heard the those pre-flight announcements about turning off personal electronic devices (PED's) such as cell phones, blackberries and iPods. They are flat-out ignored by many passengers, who seriously doubt such devices pose any threat to airplane safety. However, a confidential industry study indicates that the reality may prove to be quite the opposite.

According to a report by the International Air Transport Association(IATA), 75 separate incidents have been documented that may link mobile phones and other electronic devices to electronic interference hampering aircraft operation. Spanning the years 2003 to 2009, the report is based on survey responses from 125 airlines accounting for a quarter of the world's air traffic. Reported incidents affected a range of airline operations, from affected flight controls including the autopilot, autothrust and landing gear, to navigation and communication systems. The culprit most often suspected in the incidents was cell phones, linked to four out of ten. The report, which stresses that it is not verifying that the incidents were caused by PEDs, includes a sampling of the narratives provided by pilots and crew-members who believed they were experiencing electronic interference.

SCANDINAVIAN AIRLINES

Text and photos by Daniel Brinckmann

Yap

Home of the Big Stuff

Yellow, white, black and purple paper fishes inhabit a bommie in Mi'l Channel (left); Lovestoned eagle ray the second before it hits the dome port (above). PREVIOUS PAGE: Valerie the manta ray with the tell-tale v-shaped marking on her belly greets a diver

You name it and you know it—the itching and scratching in the morning, those five minutes of mini breakfast, the coffee swallowed so quickly it burns your throat—all for the anticipation of the adventure to come. The Big Game. Every experienced diver knows that feeling, but hardly anybody is able to describe the notion just why one feels a certain day is gonna be *the* very special one.

Probably the most intriguing thing about my "day of days" is that none of the above happened. Actually, it started out worse... much worse. The evening before, dive center manager, Jan Sledsens, and Bill Acker, the owner of Manta Ray Bay Resort in Yap, assembled in front of the weather forecast on the internet. The worried looks on their faces said it all: one typhoon was coming in from Guam in the North, one from that coral patchwork in the East they call the Outer Islands of Micronesia, and finally the last one from the Philippines just after it left Manila flooded and devastated. "This could be too much for the 56 square kilometers that Yap is," said Bill after taking a deep sip from his beer mug. "The day after tomorrow, we need to tug in the jetty and get the resort storm-proof."

The next morning, the tropical paradise greeted us with its grim face, it was raining cats and dogs, and instead of rushing off to dive boats, everybody seemed to be glued to their coffee cups. Shrugging his shoulders, Jan said: "Okay guys, let's go. The other guests are waiting for their mantas."

The giant rays, one has to know, are Yap's pleasure and pain, at the same time, since many guests are just keen on their flying carpets and ignore even the sharks, the reef and everything in between. Adding insult to injury, no

There to feed the cliché: spinner dolphin family riding the dive boat's bow wave; Two reef sharks on patrol (right); Manta Ray Bay Resort and Yap Divers (top right)

mantas had been seen in the last two days, and everybody was pushed to the limit to get the guests "their" mantas.

Green water engulfed us as we navigated through Goofnuw Channel, in the middle of the Valley of Rays. We could hardly find the cleaning station. Even though the water was blooming with plancton, there were no mantas around. "Why didn't I just stay in bed," I thought, but in the next moment, the tables turned.

Driven by an invisible force, a strong current came in from the open ocean, clearing up the water by more than 20 meters. And with the clear blue water—surprise, surprise—came the mantas. One, two, three, four—one by one, they glided over the rocky channel bottom and rose up to the cleaning station next to our heads.

From the V-shaped blotches on her belly, I recognized Valerie, one of the "friendliest" mantas in Yap, that has a very special habit. Swimming a long curve, she passed me and hovered on top of my buddy's head, going deeper and deeper until she basically sat on top of his head. Valerie just loves the tiny air bubbles from the regulators. No doubt, if she was human, Valerie would spend her days in a jacuzzi. Mission accomplished! I could almost hear dive center manager Jan sighing in relief.

Pretty much to our surprise, the other mantas also remained motionless. As if they hung on transparent wires, they did not even bother to move a single tip of their black wings. Maybe they saw them coming earlier than we did: a bunch of

MANTA ETHICS

Manta Ray Bay Resort and Yap Divers is the only locality in the world where divers are able to do a PADI "Manta Awareness" specialty. Bill Acker, who basically founded tourism on Yap, and his crew celebrate their 25th anniversary this year—not too bad for a privately owned dive resort in the middle of the Pacific. This is exactly how long the guys have been diving with those elusive flying carpets.

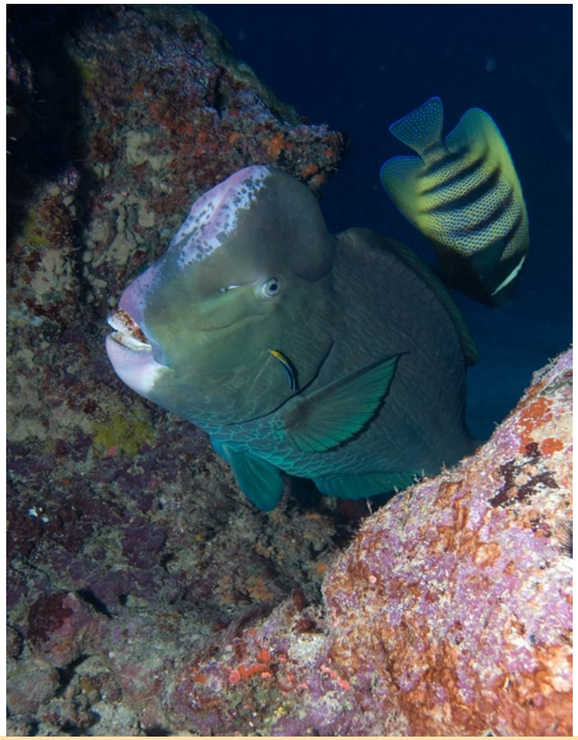
Around 100 different individuals have been recorded and named in the dive center's data base over the years. If you should be one of the happy ones that find a new one, which after all these years still happens, you can gladly give it a name. With six cleaning stations in Mi'l and Goofuw Channel located between 33 and 78 feet, Yap is an all year round destination for manta ray encounters, even though they can often be absent for a few days.

Only last January saw the discovery of a new cleaning station in just 21 feet of depth. "This is a sensible environment," dive center manager Jan Sledsens said, "and that's the reason why we do have a code of conduct for diving at the channel's cleaning stations." First, to sit still on the sandy bottom and swim after the mantas are as much no-no's as touching them. How they get the mantas to hover over your head and make them fill the frame of your fisheye lens is a different issue you best explore on the spot.

The reef mantas (*Manta alfredi*) inhabiting Yap's waters usually do not exceed a wingspan of 15ft, however there are some special features about the local animals, for instance, with the presence of two white specimens—one aptly named Snowhite. Judging from the photos, renowned ichtyologist, Helmut Debelius, claims these two animals are "rather unlikely real albinos, but suffering from a lack of pigments". On the other hand, this color variant is much rarer than the black ones ("melanism") that can often be found off Komodo, for example.

Between December and April, divers that are in the right spot at the right time may witness mating dances in Mi'l Channel. Generally speaking, it is less the numbers but more the quality of the encounters that make Yap an enchanted place to go for the giant rays. But don't let the mantas fool you, diving Yap is so much more, with the steep walls off the west coast, 120 feet plus of viz on the outer reef, the healthy shark population (these days "Vertigo" hosts less divers and more teeth than Palau's famous "Blue Corner"), the pelagics, the critters on the inner reef and the surprise encounters that the open waters off the southern tip may hold for you. See: **www.mantaray.com** ■

THIS PAGE: Mandarin fishes, gobies and cuttlefish are typical critters; The cleaning stations not only attract mantas, but huge humphead parrot fishes



grey reef sharks made their way up the channel, of course, not without taking a closer look at the foreign intruders.

As cool and as bold as they appeared to be, their lively eyes were rolling and revealed that they were not about to miss the slightest movements on our part. For some people, the sharks ventured closer than they had ever wished.

Orca time

Ninety minutes after we jumped in, we finally breached the surface with nearly empty tanks. The second boat which had just arrived, brought news: "Guys, we've seen a couple of orcas just in front of the main channel," said Captain John with a calm smile, as if to suggest that the movie he'd just watched wasn't too bad.

Initially, everybody started cracking jokes: "Sure, orcas, here in the tropics, we call 'em spinner dolphins, my friend! Let's go for them, and after that, you get us a school of tiger sharks feeding on floating coconuts." However, jaws dropped when John showed us a video on his mobile phone with an orca looking curiously up to the dive boat's bow.

Five minutes later, the plans for any further dives were put to rest for the day, and we were going out with roaring engines. Orca time! "This is like looking for a needle in the hay," I thought to myself, hoping for the best and expecting nothing at all. And there they were—three dorsal fins sticking high out of the water like swords in the air.

"Could I? Would I? Should I?" Before I started thinking too much about the risky part of sharing the water with wild orcas, I grabbed mask, snorkel and fins and slid into the water as calmly as possible. "If they take me for an alternative to Hawaiian monk seals or whatever else, then so be it."

But just like it is most often with so-called dangerous animals, the orcas immediately fled as soon as we saw a glimpse of them. However, the first five attempts proved to be not fruitful at all. All the way we saw nothing but wonderful transparent blue water... up to the moment when a huge black body of at least six meters appeared as if it came out of nowhere.

Resembling a big black torpedo, one of the adult orcas came on a straight head-on course towards me. I think my heart stopped beating for a second! A heartbeat later, it approached me for a quick sonar scan and quickly passed below my fins. There are hardly words to explain how it felt to be in the water with such a big animal, without a reef at your back, a tank on your back, or even a buddy close to you.

Let's say, it is less frightening than just overwhelming, because you are so much struck by the fact that there is no space for fear in your brain! Needless to say, once we climbed the ladder back onto the boat, we all enthuastically started shouting, probably so loud even the seagulls were scared away.

In this happy mess, it turned out that the others counted four animals, including a small calf. What a day. From then on, we saw them only a few times, even though our approach got a little more professional—jumping into the water and going after the whales at full fin power obviously did not

Sunfishes are rare visitors, but make a good example for special encounters off the island's southern tip

do the job.

You could fin forever, as some red faces indicated, but the animals were always faster even though they did not seem to move at all. We found ourselves in a much better position when we stopped the boat 20 meters in front of them, got into the water, just hoping they would not change their direction. Quite often, we would see them swimming past us 10 to 15 meters away. In fact, they tended to keep this distance, which did not make things easy for me, as I was equipped with a strong wideangle lens.

Looking through the viewfinder, the orcas reminded me more of sardines than of proper sized whales. The case seemed to be clear—taking into account that the bull and the cow had a semi-adult and a calf of not more than two meters with them, it was obvious that they were looking for shelter in relatively shallow and safe water just off the outer reef wall in order to protect their young one from predators like tiger sharks. This said, everybody knew that orcas normally tend to stay and feed in cooler water with only a few exceptions off the Great Barrier Reef and Papua Newguinea.

The next resident population from Yap lives around Okinawa in south of Japan. Still a good share of miles to swim. So, could it get any better at that point? Yes, indeed it did! Not only were we able to track the orcas for the next two hours and spend a few minutes with them swimming in the distance, we saw another high dorsal fin in between the whales when we followed them around the southernmost point of Yap to the west side. "A fifth orca?," somebody thought out loud.

Sunfish fun

Sliding into the water once again, we immediately saw the orcas playing with a massive sunfish before they noticed us and changed directions. And while all of the snorkelers were going after the whales, I rushed after the sunfish with the camera housing in increasingly aching arms.

Running out of air and cursing the cigarettes from last night, I noticed a small boat approaching. "Hey, wanna ride?" a familiar face shouted. It turned out to be a local marine biologist I briefly met. He threw a line over board, towed and dropped me just in front of the sunfish.

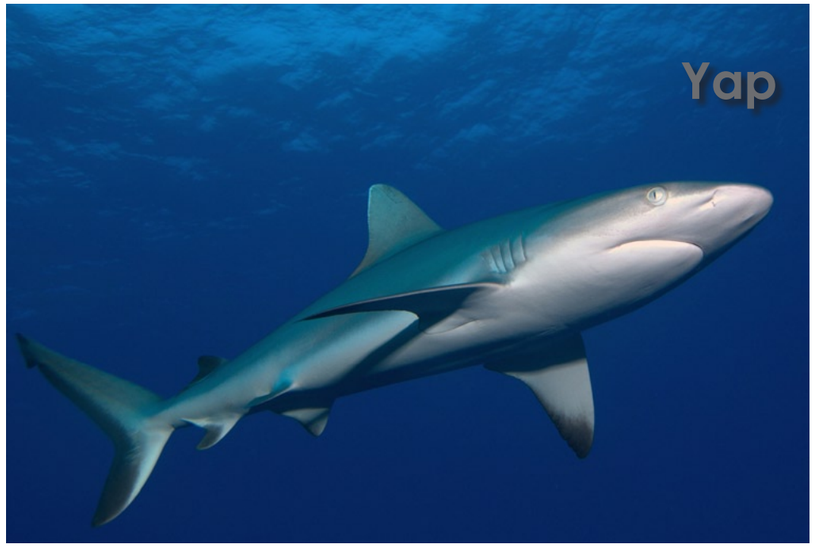
This was my moment—for the next ten minutes, nobody disturbed my tête-à-tête with the beautiful spotted giant. Having seen a number of sunfishes off Estartit

Mangrove whiptail rays can often be seen resting

Yap

SHOOTING MANTAS

Obviously, with the exception of shots of the eye or other details, crisp manta photos demand either fisheye or super wide lenses, with an angle between between 8.5 to 18mm. Timing and control of your strobe power is everything. Mantas are highly indivual in behavior. Marine biologist and renowned manta specialist Dr Andrea Marshall pointed out recently that "mantas are the only fishes that probably, get "the concept of playing due to their intelligence". Still, not every one of these flying carpets might be in the right mood. With respect to both their future behavior in presence of divers and your very own results, it is recommended to wait for the right moment to pull the trigger rather than to go for rapid fire, which might scare the animals off. This goes especially for cleaning stations, which are sensible environments and crucial to the mantas. At the same time, cleaning stations give photographers extensive shooting opportunities as the mantas will often circle the corals where the cleaner wrasses live and come over to the divers before getting back to body hygiene. Their snow-white bellies will often require low strobe power. However, one is better off if the equipment allows TTL-corrections. With manual settings you will need to be quick, as it can be difficult to trace the manta's next movement. Let the animal come close, wait for your shot and never ever chase it. ■



One in roughly 20 curious grey reef sharks (above) resident in the shallows at Vertigo Reef; Hawksbill turtles (left) frequent Mi'I Channel, next to a patch of purple spiny soft corals; Wanyaan Beach can be reached within 20 minutes (right)

and the Azores islands, I can say that this animal had the greatest coloration of all. Certainly it was not the brightest of them. He really did justice to the reputation of a fish with a walnut-sized brain and ran me over with flapping fins more than once.

Once the other seven snorkelers arrived with the boat, the sunfish quickly became more shy, went horizontal and started spinning. One could tell the animal started to feel stressed, so I decided to leave it alone just to be approached by two bottlenose dolphins for a quick hello.

On board, photo buddy Andy Sallmon gave me a big thumbs up: "You lucky bastard," he yelled while hugging me. "Congratulations on this excellent sunfish footage." Not the worst compliment from a veteran underwater photographer, who took his first pictures by the time I learned how to walk.

With increasingly rough sea and clouded skies it took us more than half an hour to find the orcas again and decide to head for the coast before we run out of fuel.

Back in the dive center, happy insults are flying. "Now, I hate you even more than I did before—I haven't seen an orca in Yap for ten years," joked Bill, Manta Ray Bay Resort's owner. "I should send you back to f*****g Germany!"

Needless to say, the evening went by much too fast with beer from the house brewery flowing like a waterfall, and the best footage surfacing on the restaurant ship's five-meter outdoor screen.

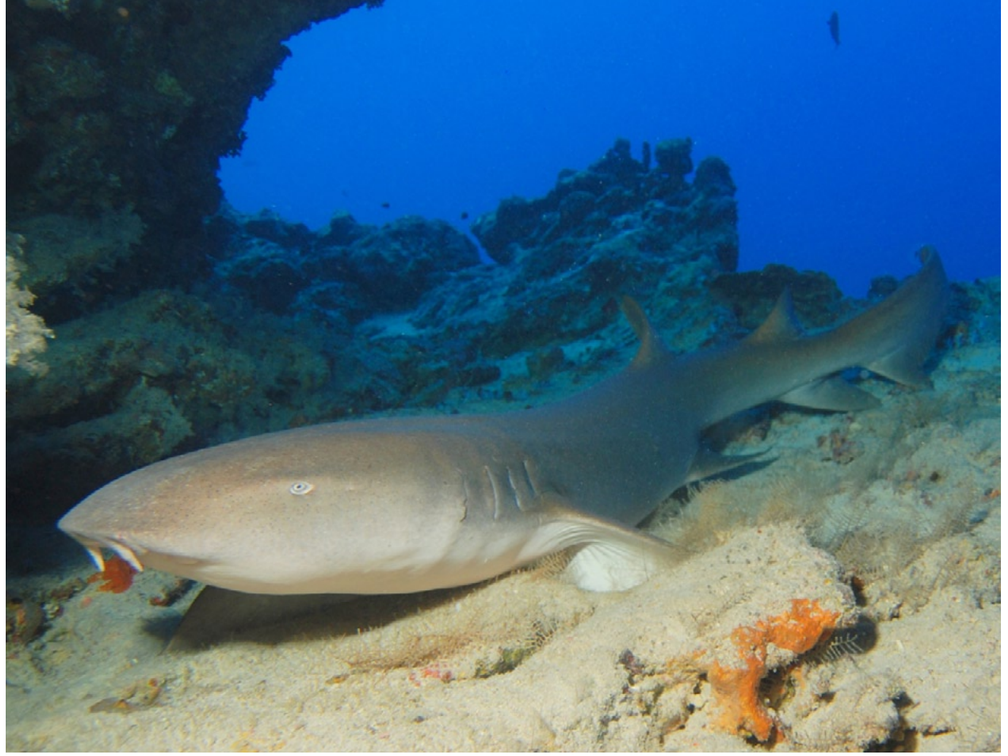
"Two mantas, whitetips, at least five grey reef sharks, four orcas, a sunfish and two bottlenose dolphins," I thought to myself with a beer in my hand, "This is what I call a good quota!" Cheers!

Take two

Of course, by that time, the seed was planted into the mind of all those who did not have the chance to the see the whales. So, against all odds and the weather, we went out again the next morning.

After roaming the southernmost point for a while, we found them. To our surprise, one of the adults was missing, but they did not turn away like before—they just ignored us, if we did not get too close. Being the smart animals they were, they really seemed to become more familiar with the boat and those strange humans in rubber suits watching them from every angle possible. Unfortunately, the cloudy weather and the waves swallowed the last beams of light below the surface, leaving me with low contrast and dark blue water like ink.

While the conditions did not improve a bit the next morning, we could see the whales really



Adult nurse sharks prefer deep overhangs in the channel entrances (left); Dressed for success—Yapese siblings ready for a traditional chamorro dance (far left)

Yap

showing off their playfulness. Instead of us approaching them, it was them approaching us, with splashing black and white fins so close to the boat we all got a shower.

The group of Swiss guests on board could hardly believe their eyes and decided to leave the close encounter underwater to me. As it started raining heavily, I was surprised to even see the orcas coming, thanks to their white bellies. Surprise again—they all came towards me upside down and clearly communicating with each other. It really seemed as if the parents decided to show their calf the strange beings that we must be to them. As if to say: "Look, these little humans are not dangerous, they produce bubbles just like us."

Evidently, at this point, the four whales were not uncomfortable with our presence anymore. Maybe it should have rather been me who feel uncomfortable sharing the water with predators that outgrow a great white shark? Anyway, the Swiss guys slowly dared to go into the water. In the best cartoon style, one by one—with every jump into the water—there was yet one more snorkeler.

Whales, whales, whales...

Leaving the orcas aside for a moment, the true miracle was maybe not even them, but the three typhoons. They could have devastated the island and the surrounding reef, but they all changed directions less than a hundred kilometers off the island. Still the wind and two-meter waves forced us back to the shore, where we decided to go on an island trip.

During our visit in Kaday Village we were surprised to learn that "our" orcas were old news. Stan Fillamed, a 69-year-old fisherman from the village really made our day. "You mean, these black and white whales? Yes, of course we know about them," he said and left us with mouths wide open. "They have been around for almost one month now and always try to steal our hooked tuna."

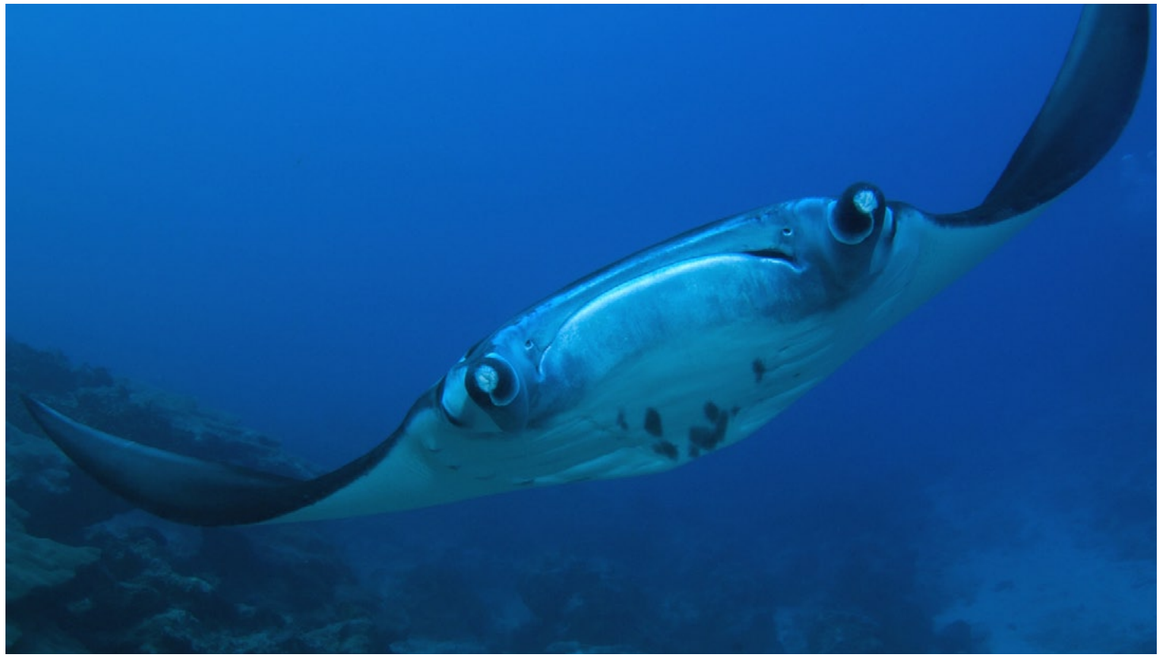
With stars in his eyes he recounted how one of them jumped out of the water with a shark in his mouth. "Having a really great head-on shot of this would be a good reason to sell all of my equipment and quit diving," I thought. Actually, Stan wondered that we did not hear about the "small whales with the round fins" as he names them.

Back at the hotel, we asked Bill about it and earned shrugging shoulders: "Yes, there is a group of pilot whales living around the island, but you never asked for them, and I thought you'd rather go diving than spending the day on the sea searching them." If we could only speak "whale" and invite them on a few fishing trips...

Manta Visions

The pioneering dive center of the island, Yap Divers, harbors the photo and video center, Manta Visions, and plenty of dry storage room for housings and other equipment. Or, to put it in a nutshell—16 booths, each equipped with electric looking glasses, charging station with three 220V European style sockets, as well as three 110V US-style sockets and a spacious locker unit. Over the years, pros like Eric Cheng, Marty Snyderman, Andy Sallmon and Bob Halstead rubbed shoulders at Manta Ray Bay Resort, as well as many TV crews up to National

Orcas roam the seas around Yap (left and right)



The walls of the Western side offers enough subjects to make a good movie as seen on the big outdoor screen of the resort's restaurant schoner Mnuw, *Seahawk* (below); Underwater photographers with their gear (bottom center)

Yap

Geographic.

Apart from the decent infrastructure for us lens geeks, the resident videographer and manager of Manta Vision is another good reason to pick Manta Ray Bay Resort in Yap. Peter Schneider, originally a cameraman for German public TV in Berlin, worked with the likes of Christian Petron (Luc Besson's film, *The Big Blue*) and won an award for his film, *Sharks of Rangiroa, from Legend to Reality*— an uncompromising manifesto against shark fishing, which effectively triggered a federal ban on finning in the Southern Pacific in 2006.

Schneider was also the first to capture not only the mating of manta rays, but their actual copulation in the wild. Not only were his frames used by National Geographic and Discovery Channel, nine years in French Polynesia made him also an expert of marine life in the tropical Pacific. In short, ask him what subject you need and how to get it, and he will very likely bring it to the table—not only the big classics, such as sharks and mantas, but also mating mandarin fishes, white mantis shrimps and a colorful array of leaf fishes just to name a few.

Next August, Schneider will also host the MantaFest shoot-out along with fellow pros Tim Rock, Frank Schneider and—once again—Marty Snyderman.

While there are no docking stations at Manta Visions to catch an immediate glimpse of one's photographs, Yap's reputation for "big stuff" extends to the screening of images—the restaurant ship beamer screen measures no less than 18 feet and is used for the display of the day's best images and frames virtually every evening at dinner time—a perfect opportunity to sneak in and connect your notebook while you're waiting for your blackened sashimi. ■

Daniel Brinckmann, 31, started diving at age 11 and published his first travel story in a German scuba diving magazine prior to his final exams at school. He then went for journalism and media studies and English at Düsseldorf University. Throughout this period, he worked as a freelancer for the county capital's daily newspaper as well as for other scuba diving magazines. Following his university career, he decided to focus on travel reporting full-time and now works for 11 magazines throughout Europe. His motto: "There are no boring dive spots. SOMETHING can even be found in a dirty little pond, even if it is only a withered lighter with small shells on top!" Photo equipment used by the author includes 2x D90 with 2x Ikelite DS-160/161, Tokina 12-24mm, Sigma 50mm, Sigma 105mm.

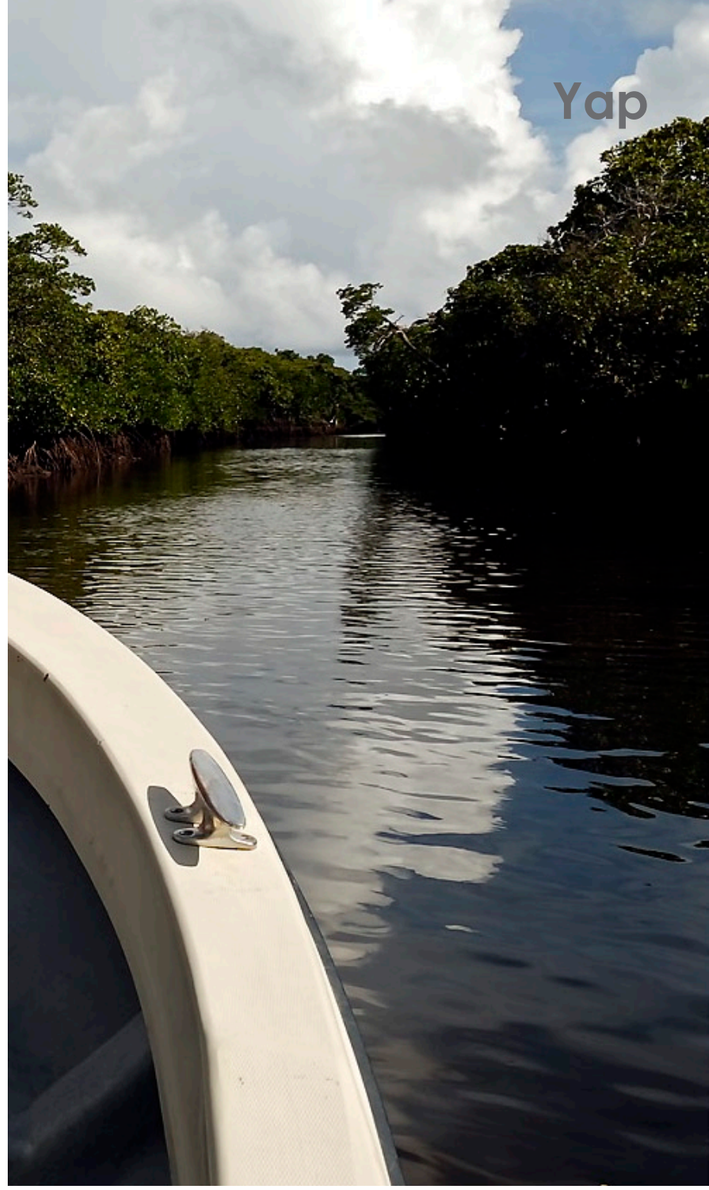
The Islands of Yap

Exploring the Garden of Eden

Text and photos by Scott Johnson

A Yapese girl (above) weaving a basket at Kaday village

In the beginning, God created the heavens and the earth. When He reflected on His handiwork, God thought, "Is there anything I can add to crown my glorious creation?" His answer, of course, was "Yap!" So, He added the lovely island chain, and then, "God saw all that He had made, and it was very good." (Genesis, chapter one — journalist translation)



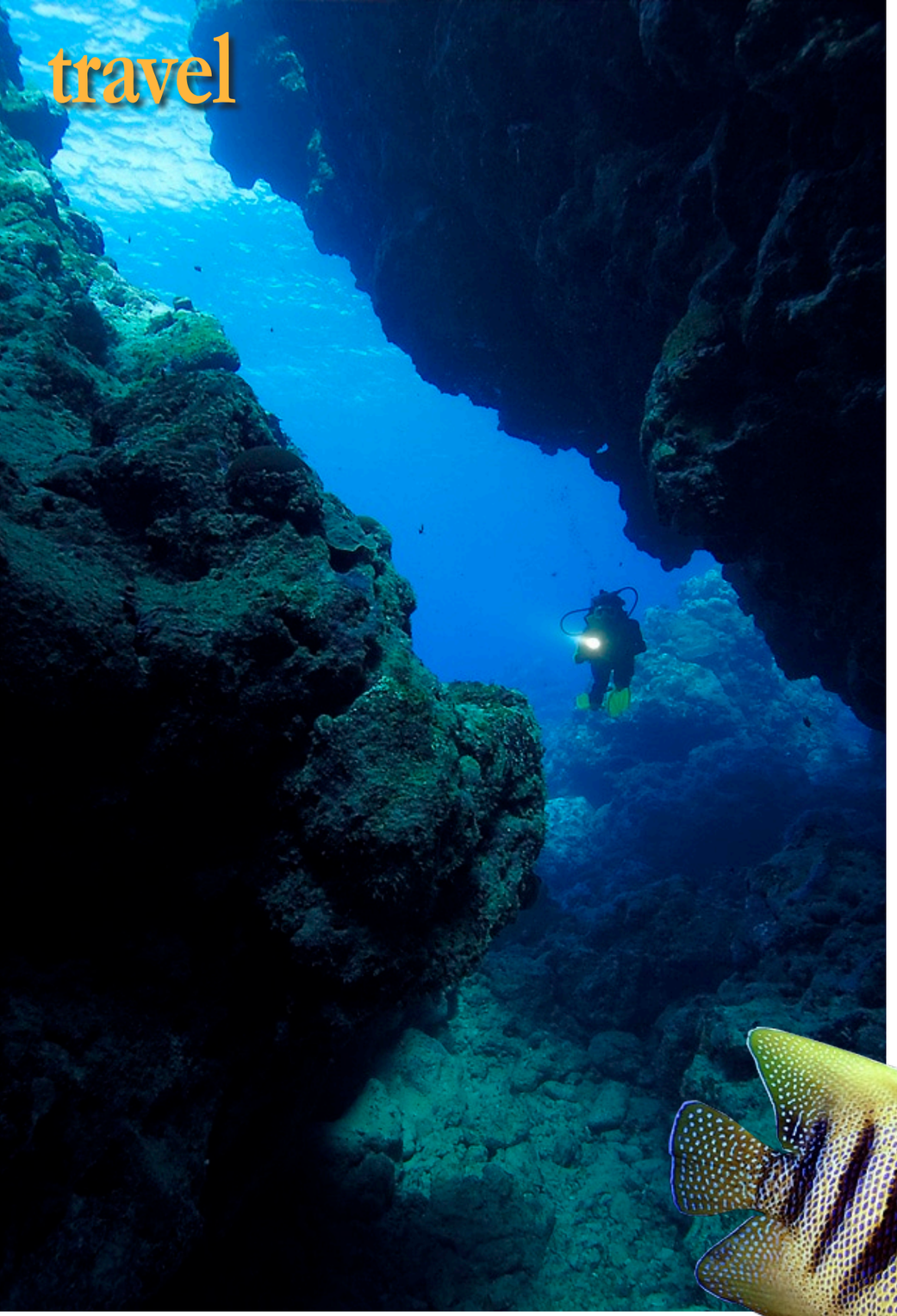
Schooling Pacific barracuda in Goofnuw channel (left); Mangrove-lined German channel (above).
PREVIOUS PAGE: Leaf scorpionfish on Lionfish Wall

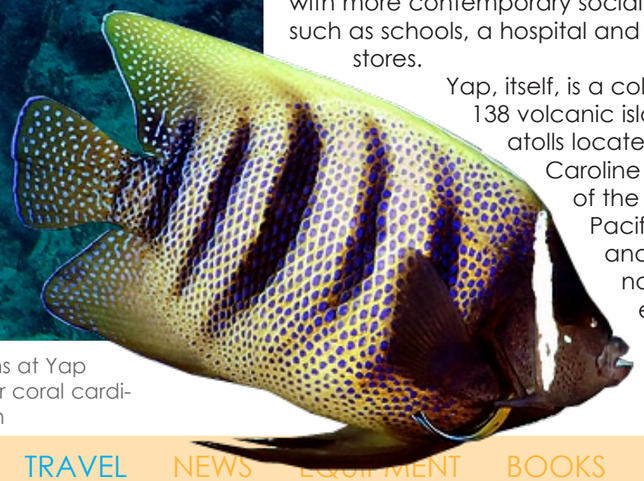
Of course, in the Garden of Eden, "Adam and his wife were both naked, and they felt no shame." (Genesis 2:25). The naiveté and simple pace of the people in this island paradise were certainly refreshing, once one got used to the bared flesh, of course.

The Yapese are known to be a friendly, but traditional and shy people. Their shyness apparently does not include their entire wardrobe (although, woman's thighs must be covered at all times, including visitors).

Confused. I admit it. I feel confused and yes, a little bit embarrassed. I am used to seeing canned foods, packaged goods, fresh vegetables and luscious fruit in a grocery store. But the situation here was challenging, as half of the women were fully dressed in shirts and knee-length skirts, while the others were only covered from their waste down. I did not want to be rude by avoiding eye contact, but I also did not want to stare. Lauren Johnson, my wife, was obviously enjoying my discomfort, though I am sure she was perplexed as well.

Yap is not the land that time forgot, but more like the islands where





CLOCKWISE FROM ABOVE: Diver explores one of the many formations at Yap Caverns; Yellowfin goatfish in the shallows of Mi'I Channel; Pajama or coral cardinalfish and mandarinfish; Beautiful six-banded angelfish are common

the past and present mix in intoxicating ways. We sensed no true clashing of times, where a digitally and mechanically driven world view was trying to forever cover the old, or where ancient ways were attempting to keep out any modernization. Instead, there seemed to be a tranquil blend of traditional village life with more contemporary social elements, such as schools, a hospital and grocery stores.

Yap, itself, is a collection of 138 volcanic islands and atolls located in the Caroline Islands of the western Pacific Ocean and slightly north of the equator. If you mark a diagonal, straight-line between Guam and Palau on map, you will find Yap. It is 853km (530mi) miles southwest of Guam and 452km (281mi) northeast of Palau. Yap Proper may seem like one continuous island when pictured on a brochure or the web, but it actually consists of four different islands (Yap Island, Tomil-Gagil, Maap and Rumung) that loosely fit together like puzzle pieces within a barrier reef.

Pohnpei, Kosrae, Chuuk (formerly Truk) and Yap, are members of The Federated States of Micronesia (FSM), which is a constitutional democracy. It is closely aligned with the United States as evidenced by the Compact of Free Association the two entities signed in 1986. Ultimately, the agreement provides the FSM with security and economic benefits, including regular coverage by the U.S. Postal Service, and the United States maintains a valuable presence in the region.

Lost in translation

The Yapese absolutely cherish their roots and heritage, yet embrace "sensible" advances in education, medicine, communications and even name changes. The islands of Wa'ab became the islands of Yap due to a miscommunication. According to the Yap Visitors Bureau, "When the first ship to anchor at the central islands arrived. A canoe of local warriors from the remaining islands went out to greet the ship, and through sign language, communicated their desire

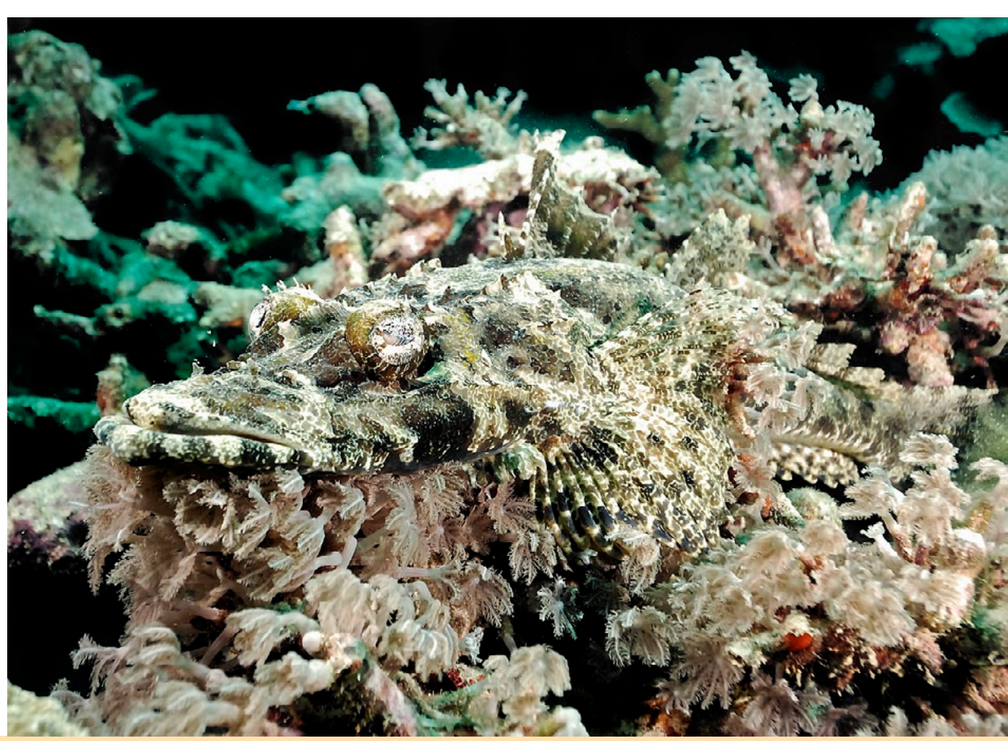
CLOCKWISE FROM LEFT: Kaday village scene; Nudibranch at Slow & Easy; Living wall of big-eye jacks at Manta Ridge; Resting crocodilefish in Goofnuw Channel

to have the captain come ashore for discussions. As they boarded the warrior's canoe, the ship's captain pointed towards the shore and asked the name of the nearby landmasses. Thinking that the captain was pointing at a canoe paddle held by a navigator in the bow, the warriors responded proudly, "Yap." The name was duly recorded by the captain, and it stuck, so to this day the islands of Wa'ab are known to the outside world as Yap, which translated is *canoe paddle!*

Pocket change

If non-divers outside of Micronesia are aware of Yap, they probably think of it as the Island(s) of Stone Money. The Stone Money, or Rai, are doughnut-shaped disks that were primarily quarried from Babelthaob, Palau. Ranging in size from 4m (12ft) to .3m (1ft) in diameter, the Rai are easily the largest coins in the world.

The ancient Yapese admired the shinny properties of the Palau calcite, so they sent warriors with rudimentary tools in outrigger canoes to hew and transport the Rai over hundreds of kilometers (miles) of potentially treacherous water. Many Rai and the bones of even more warriors ended up on the sea floor between the two states. The difficulty of the journey, including the loss of life and property, that brought a piece of stone money to Yap is one of the most important aspects that determine its overall worth. Other key features that impact a coin's value are its size, shape and texture. The U.S. dollar is now the accepted currency in Yap, but Rai are still used for ceremonial and traditional exchanges, such as marriages and land transfers. Most Rai are never moved and stored in Stone Money Banks in the villages.



LEFT TO RIGHT: Reef octopus at Yap Corner; Male mandarinfish ready for a night on the town; "Just" another nudibranch at Slow & Easy

David Dean O'Keefe, an Irish-American sailor, was shipwrecked on Yap in 1871. His rescue by and subsequent stay with the Yapese endeared the people and location to him. O'Keefe left Yap only to return with a new ship and a grand business proposition. He offered to transport the Rai from Palau in exchange for copra (the dried coconut meat) and beche-de-mer (sea cucumbers). The Yapese not only accepted his proposal, but granted him a 30-year monopoly on the business. While "O'Keefe-money" was valued much lower than the Rai brought by canoe, it allowed more villagers to achieve the status of owning stone money without having to risk their warriors to obtain it. O'Keefe's life even inspired the 1954 movie, *His Majesty O'Keefe*.

On wings of mantas

Let's face it, manta rays put Yap on the radar of the scuba diving world. Mexico's Revillagigedos Islands, the Maldives (Hanifaru Bay, in particular) and Yap are widely lauded as the hottest of the hot spots for these massive filter-feeders. Lauren and I have been to all three places and can validate the manta mania reputation of each.

What separates Yap from the other two is the same timelessness that permeates the rest of the island state. The Revillagigedos Islands and Maldives encounters are seasonal events, which means divers have a limited access window each year. In addition, liveaboards and a 28-hour crossing are the only way to visit The Boiler, the Revillagigedos renowned manta site. Yap, on the other hand, is open for business year-round and requires only a short boat ride each day. By all means, visit all three destinations and become the envy of manta aficionados everywhere. This will also help you best appreciate the simplicity and consistency of Yap's manta dives.

There are two types of mantas, worldwide: giant (*Manta birostris*) and reef (*Manta alfredi*). Giant mantas are pelagics that roam vast areas of open ocean, while the reef mantas tend to take up residence in one area and stay put, though definitely not on the same sedentary scale as the Rai. The mantas seen around Yap are predominantly the resident reef mantas.

If the mantas get credit for putting a marine face on Yap, then Bill and Pat Acker—the owners of the Manta Ray Bay Resort and Yap Divers—deserve to be recognized as their chief publicity agents. In particular, Bill, a Texan from the United States who found Yap and then his lovely wife, Pat, via a tour in the Peace Corps in the late 70's, is credited as being the person most responsible for bringing recreational diving to the state. I have never met a better

ambassador for a destination.

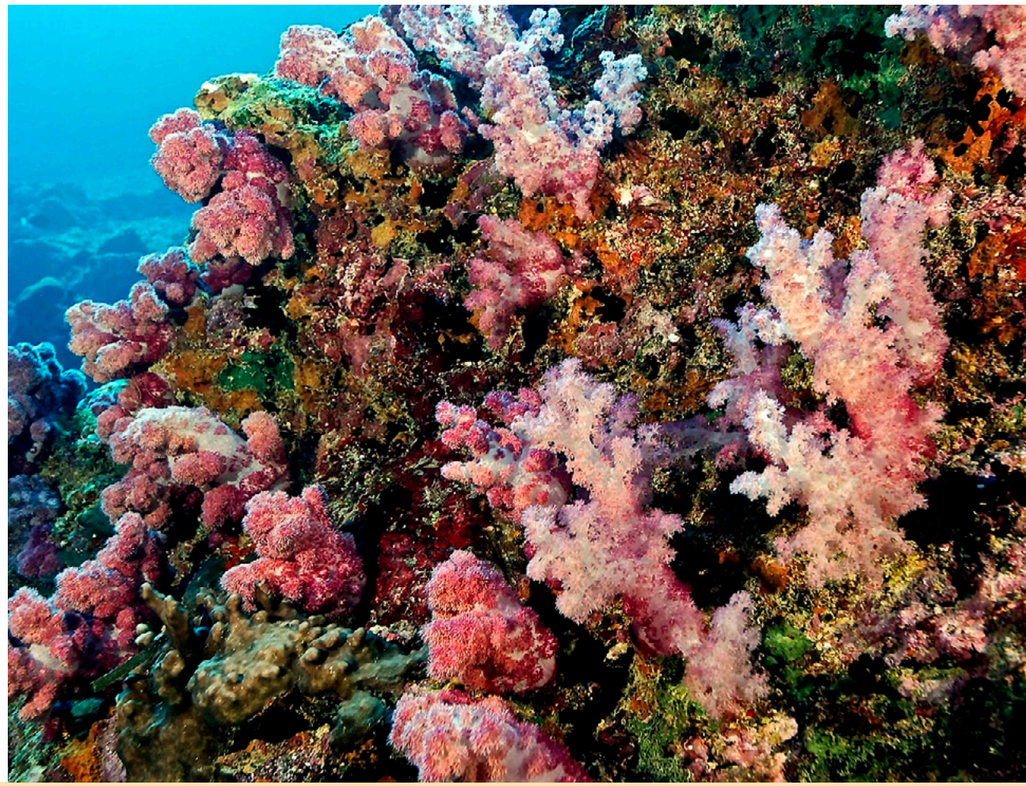
Jan Sledsens, a transplanted dive junkie from Butare, Rwanda, is Yap Divers' dive operations manager. He warmly greets us on our opening day of diving, asks if we need anything to get started and then introduces Alex Raimon, Gordon Keiji and Nico Erhieisap, our dive guides and captains for the day. There is nothing perfunctory about the process, though Jan has clearly performed the same ritual thousands of times before.

Nico's big smile displays gums and teeth stained bright red from chewing betel nut. The Yapese believe you should always carry a bag during the day (empty hands indicate pending mischief) and a light at night (only trouble makers walk in the dark). Areca nuts, betel leafs and lime, the essential ingredients in a good betel nut chew, are in the bags of most. You learn to watch where you step in the Garden of Eden or you will become a part of the chewing experience, one way or another.

Our three escorts put our gear, including my two Aquatica housings equipped with a pair of Sea&Sea YS-250 strobes each, in the boat and then we were off. We slowly made our way through the mangrove-bordered German Channel until the boat stopped. The tide was still so low that Nico and Gordon jumped out

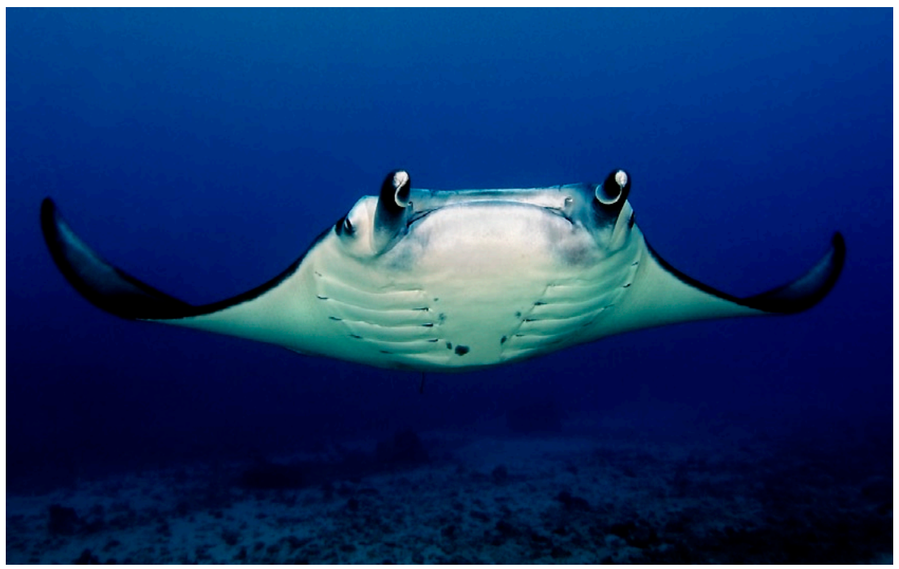
Yap

CLOCKWISE FROM FAR LEFT: Lionfish are plentiful at Slow & Easy; Brilliant leaf scorpionfish at Magic Kingdom; Soft corals in Mi'l Channel; Fire dartfish hovering above the sand at Yap Caverns; Princess damselfish at Yap Caverns



THIS PAGE: Some of the majestic manta rays that frequent Goofnuw and Mi'l Channel

Yap



and pushed us until it was safe to use the engines once again. The Germans who originally carved out the channel, and the Japanese who the then refined it before and during World War II, apparently could not do anything more to improve navigating the low tide conditions.

The best time to dive for mantas is on an incoming tide. This floods the channels with clear water from the open ocean, gives rays and other animals a jet stream to ride inside the barrier reef and carries divers in to the safety of the islands instead of out towards the unprotected sea. By the time we reached our drop point in Mi'l Channel, it was apparent that the tide had started to turn.

In the winter months, which is usually from December to April, mantas congregate in great numbers in Mi'l Channel to mate. During the summer, they tend to prefer Goofnuw Channel. When not mating or feeding, the mantas flock to cleaning stations in the respective channels so industrious Bluestreak Cleaner wrasse (*Labroides dimidiatus*) and other small fish can rid them of parasites in their mouths, around their gills and on the their skin. It is basically the manta version of a manicure.

Yap Divers focuses on putting their guests on rocks and dead coral around the cleaning stations, so the largest rays can glide over the divers' heads and at times, around them, during the alternating circling and cleaning process. Since the cleaning stations are relatively shallow and the divers are given IMAX-like seats, the only thing preventing extended bottom times is the amount of air the excited divers waste while acting like children being presented with a parade of gifts on Christmas morning.

We suited-up, hit the water and followed Nico and Gordon to a site called Manta Ridge. We literally had to swim through a veritable wall of big-eye jacks, or trevally (*Caranx sexfasciatus*), in order to reach the coral formation at 16.8m (55ft), which is home to all the eager beauticians that keep the

rays coming back for more. A three-meter (10ft) manta was already circling when we arrived.

Over the next hour, we observed and photographed rays gracefully gliding around us and taking turns being cleaned. This unique form of aquatic ballet was quite peaceful and certainly not the adrenaline rush one feels during a death defying stunt, like child rearing, or white-knuckling a roller-coaster. In fact, the mantas own apprehension appeared to be linked to our breathing rate and general state of calm. The more we relaxed, the closer they came.

Getting sharky with it

Hi. My name is Scott. I am a sharka-holic. I have hit most of the planet's celebrated shark dives at least once. If you want to dive with bull sharks (*Carcharhinus leucas*), look-up Beqa Adventure Divers in Fiji. For tiger sharks (*Galeocerdo cuvier*), lemon sharks (*Negaprion brevirostris*) and Caribbean reef sharks (*Carcharhinus perezi*), you should try a Little Bahamas Bank charter from the U.S. Cocos Island. Costa Rica and Ecuador's Darwin Island in the Galapagos Islands are your best bets for schooling scalloped hammerhead sharks (*Sphyrna lewini*). Great whites (*Carcharodon carcharias*) are the featured attractions at Guadalupe Island, Mexico. And, the Southern Red Sea and Cat Island, Bahamas, are the last reliable footholds for oceanics (*Carcharhinus longimanus*).

My recommendation for grey reef sharks (*Carcharhinus amblyrhynchos*) is right here in Yap. Where Bill Acker has succeeded in marketing the mantas, he has done a poor to average job of letting us know about his sharks. Maybe Bill was trying to keep it a secret, but the proverbial cat is out of the bag now. I have never enjoyed watching or photographing grey reef sharks more than at Vertigo Reef.

Vertigo, located on the eastern side of Yap Proper, features a reef that

THIS PAGE: Grey reef sharks at Vertigo

starts as shallow coral gardens and then plunges to more than 100m (300ft). The blue water drop-off is captivating and the perfect backdrop for the shark feed. Frozen bait is placed in impact resistant crates that permit water to flow-through, but keep the bait relatively intact as sharks try to get it. The crates are then secured mid-water by ropes attached to both a buoy and rock on the bottom. The result is an irresistible enticement for the sharks to come calling and to stick around as happy divers observe them in water that is not fouled by free-for-all feeding. Once the dives are over, the divers return to the boat and the sharks are finally rewarded for their patience. It is a win-win, all-around.

Forty or more grey reefs and a hand full of blacktip reef sharks (*Carcharhinus limbatus*) and whitetip reef sharks (*Triaenodon obesusarrive*) greeted our arrival. Lauren knows I rarely need her services when I am dancing with sharks, so she found a nice comfortable piece of dead coral from which to watch the action. Meanwhile, I positioned my back to the crates, faced the blue and waited for the sharks to approach. Though there was a greater sense of urgency displayed by the sharks than the graceful mantas in the channels, the sharks clearly responded to human anxiety in a similar fashion. The slower my respirations and beating heart, the more the animals focused on the bait and less on me. This meant I could take shots at point black range without my flashing strobes causing the hungry creatures undue stress.

Sex, sex, sex

As the days of our two-week stay continued to melt away, Bill and his crew entertained us with sun dappled swim-throughs at Yap Caverns, macro-gone-amuck at Slow & Easy and thrilling drift dives through the channels. And yet, these daytime adventures simply could not scratch the itch that was only satisfied when watching the passionate sex of the locals in the light of the moon.

Night after glorious night, we politely declined Bill's generous invitation to join him in the *Mnuw's* Crow's Nest for a round, or ten, of beer. He brews the libation in his own 600-liter micro-brewery in the hotel's lobby. Bill is proud of his beer and a firm believer in its "Drink, Pee, Repeat!" slogan, so it is hard to turn

THIS PAGE: Glimpses of the Manta Ray Bay Resort

CLOCKWISE FROM LEFT: Giant feather duster worm at Lionfish Wall; Yapese dance during a Kaday village tour; Hawksbill turtle resting in Mi'l Channel

him down. Additionally, the *Mnuw*—the South Seas schooner that doubles as the hotel's restaurant and bar—offers a great view of the sunset over Tomil Harbor, so, it, too, is tough to pass-up. Still, the unbridled flirting and rampant sex that was soon to engage just a short boat ride away was too alluring for such seasoned voyeurs to stand.

Rainbow Reef was the scene of the unbridled debauchery. At dusk, we descended to the great depth of 6m (18ft) and waited for the players to show themselves. We used red filters in our Princeton Tec flashlights because our subjects, mandarinfish (*Synchiropus splendidus*)—the most exquisite fish in the sea—are leery of bright lights. In addition to the red filters, we have learned to arrive early, so we and the life around us can adjust to our presence. It took time for our eyes to get used to the dim light and even longer to finally notice the apprehensive little fish weaving through the coral, as its desire to mate started to consume it. We were learning to build patience during these dives just like a weight-lifter slowly added muscle.

When the sun finally bled into the horizon, the mandarinfish prepared for another early night on the town. Mandarins maintain complex social structures, as evidenced by these nightly mating rituals. Community members look for action in the same locations each 24 hours, which simply means mandarinfish have their own version of a local street corner. Males are generally larger than females and occasionally extend an elongated, pointed dorsal fin in a regal display. I suppose any male this pretty needs to do something, anything, to advertise its prowess.

Mandarins throw caution to the wind as the courtship nears its climax. Once the female acquiesces to the male's passionate pleas for sex, these bashful, gentle creatures rise, side by side, from the top of the coral, shimmy against one another, release their respective cargos of eggs and semen, then flip their tails to scatter the combined offering before rushing back to safety. This unusual, frenetic boogie may be repeated multiple times. Each occurrence increases the possibility of offspring, but also places the fish at their most vulnerable position to predators.

Paradise Found

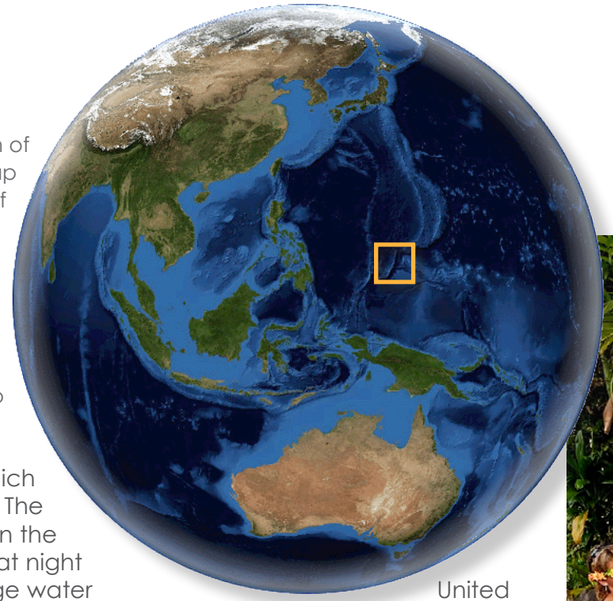
In the beginning—before we had met Bill or even researched the destination—Yap was not on our bucket list of places to visit. In fact, we knew very little about the islands. While wrapping up a project for a client, my client shared details of his recent trip to Yap with me. His spontaneous testimonial on Yap started us on a path that ultimately led to underwater mandarin sex, will-work-for-food sharks, hygiene-conscious mantas and burn-your-bra shopping. Yap is not the "hand me down" offspring of Palau or the place to waste a few days at the end of a long holiday. It is an idyllic tropical paradise that is fortunately well off the beaten path. If one day you make your own pilgrimage to Yap, please remember to tell Bill we said, "Mogethin!" (hello) and be sure to look the locals in the eye when you go shopping. ■

fact file

Yap

SOURCE: CIA.GOV WORLD FACTBOOK

RIGHT: Location of Yap on global map
BELOW: Location of Yap on map of the Caroline Islands in the North Pacific
BOTTOM LEFT: Children perform traditional dances for guests of Yap



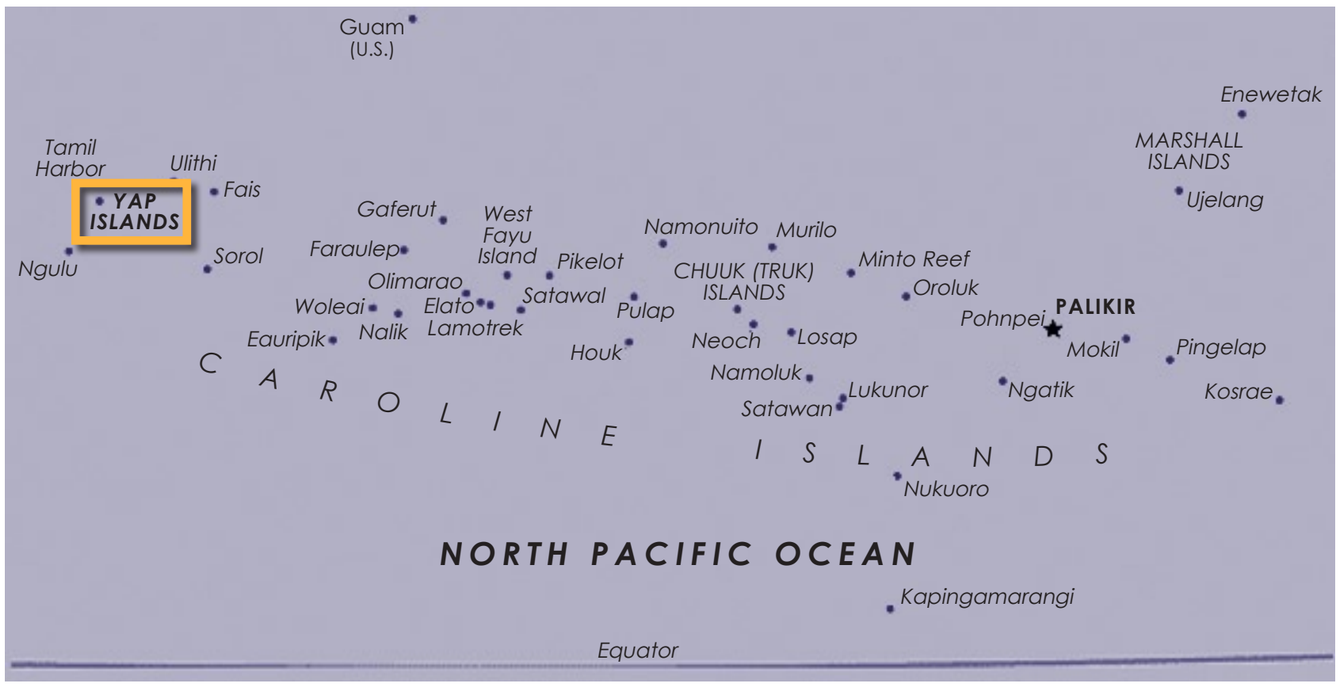
Guest stands next to one of the largest coins in the world. Stone money, or Rai, is still used in traditional weddings and land transfers on Yap

History Both Germany and Spain claimed Yap in the mid-1870s. In 1886, Pope Leo XII settled the feud by awarding Yap and the other Caroline Islands to Spain, but granted Germany commercial rights. Spain made a tidy profit on the deal when it turned around and sold Yap and the remainder of Spanish Micronesia to Germany for US$4.5 million 13 years later. As a result of World War I, Japan was awarded all the Pacific islands north of the Equator via the Treaty of Versailles. Japan then surrendered Yap to the United States after a World War II battle in 1945. The creation of the Federated States of Micronesia (FSM) was ratified in 1978. The Compact of Free Association between the United Sates and FSM went into effect in 1986, which formalized the relationship between the two entities.

Geography Yap is a collection of 138 volcanic islands and atolls located in the Caroline Islands of the western Pacific Ocean and slightly north of the equator. If you mark a diagonal, straight-line between Guam and Palau on map, you will find Yap. It is 853km (530mi) miles southwest of Guam and 452km (281mi) northeast of Palau. Yap Proper may seem like one continuous island when pictured on a brochure or the Web, but it actually consists of four different islands (Yap Island, Tomil-Gagil, Maap and Rumung) that loosely fit together like puzzle pieces within a barrier reef.

Climate Tropical, which means hot and humid. The average temperature in the day is 27°C (80°F) and at night 21°C (70°F). The average water temperature is 28°C (81°F). Northeast trade-winds typically blow from November to April, which results in slightly less rain and humidity.

Economy According to the U.S. State Department (www.state.gov), under the terms of the Compact of Free Association, the United States provided the FSM with about US$2 billion in grants and services between 1986 and 2001. The Compact's financial terms were renegotiated for the 20-year period 2004 through 2023, with the aim of encouraging sustainable development. The United States will provide almost $100 million in direct assistance every year until 2023, which includes the systematic reallocation of a portion of the direct aid to a jointly managed Trust Fund. Additional federal grants to the FSM total approximately $35 million annually. Tourism and fishing play key roles in the economy.



Currency U.S. dollar

Population
Approximately 11,500

Language English is the official language of Yap State, but these four other languages are also spoken: Yapese, Ulithian, Woleaian and Satawalese.

Hyperbaric Chambers The Yap State Health Department manages a recompression facility in Colonia Hospital. Volunteers from both the hospital and the diving community run it.

Websites
Manta Ray Bay Resort
http://www.mantaray.com
Yap's Visitor Bureau
http://www.visityap.com

Edited by
Rosemary 'Roz' Lunn
& Arnold Weisz

POINT & CLICK ON BOLD LINKS

Equipment

rockin' and a rollin'

Beuchat MaxLux

Beuchat MaxLux has 'the winning mask design combination' of a very wide field of vision coupled with ultra low volume. (We actually tried this lightweight mask on as a prototype and were impressed to discover just how much we could see)! Whilst all divers will find this pleasant to don and dive because the skirt is made from hypoallergenic silicone, we believe it's particularly well suited for photographers who struggle to get their eye close to the view finder. **beuchat.fr**

Wave Fin

This open heel / boat fin has a 39 cm / 15.4 inch long blade, with big soft rubber inserts. They're perfect for ensuring the ideal Superchannel water flow. The upper part of the foot pocket is especially molded in soft rubber to guarantee the maximum comfort whilst a double button release prevents accidental opening of the buckles. The Wave comes in five different colours and sizes from small to x-large **Mares.com**

Scubapro Tek line

Scubapro has been developing and manufacturing their TEK-line equipment since 1994 with this year seeing the launch of the X-TEK range. This modular BC Collection covers every diving ethos; whilst ensuring quality, durability, handling and overall diving comfort is not compromised. (Choose between five standard configurations or combine individual components to configure your own personal TEK system). Authorised Scubapro Dealers will be stocking TEK gear, plus Scubapro also has dedicated Scubapro TEK Stores carrying the entire line of TEK gear. Look for the Scubapro sign to get further details and specific advice. **Scubapro.com**

Hollis LED

Available in three models (LED Mini3, LED3 and LED5) these lights are machined from solid aluminium and hard anodized for a rugged finish. Each unit is depth tested to 200 mt / 650 ft. and includes a bulb life of 50,000 hours. (210 – 260 Lumens). Each light includes a heavy duty lanyard, spare o-rings, manual and an overbuilt rear tie point for boltsnap attachment if desired. Burntimes; LED Mini3, 4 hours. LED3, 6 hours. LED5, 8 hours. **Hollisgear.com**

Suunto D-Series upgraded

The revamped Suunto D-Series family - D4i, D6i and D9tx - benefits from mouth-watering new looks, superior specs and additional new features. This includes more memory, faster processors, intuitive sophisticated software and gas integration across the board. The D4i (illustrated here) now comes with an in-water stop watch for timing skills and stops. If you want Freediving Mode, D6i is the one for you. Finally the D9tx is Trimix compatible (Suunto Wienke Technical RGBM algorithm). This algorithm was previously only available on the Suunto HelO2. Therefore this natty baby gives you 8 gas switches including Helium and Oxygen, three dive modes and mandatory deep stops. **Suunto.com**

Abyss Navy

The new Abyss 22 Navy regulator has been designed and built to be dived in extreme conditions and temperatures, including under ice. Features include good heat exchange capability, a Moisture Retention System to reduce dry mouth problems and a mesh grid on the fluoropolymer resin finished 2nd stage. This mesh grid apparently optimises the flow of water around the diaphragm, thus minimising the likelihood of freeflows. **Mares.com**

Atom 3.0

The Atom 3.0 has a easy to read display and intuitive user interface. Plus you can choose the decompression algorithm that best suits your diving needs. In addition the Atom 3.0 has Four Operating Modes: Watch (Alternate Time, Chronograph, Daily Alarm, Countdown Timer), Normal (Air and Nitrox), Gauge (with run timer) and Free Diving. You can switch between 3 independent transmitters, with up to 3 different Nitrox mixes up to 100% O2. Finally the Buddy Pressure Check allows you to receive and monitor up to two remote transmitters, keeping track of your dive buddy's gas reserve.
Oceanicworldwide.com

Xen bottom timer

This compact Bottom Timer features a full colour OLED screen. The angled display and large fonts optimise readability when mounted on a wrist and / or DPV. However the true beauty of the Xen is that you can individually customise the display layout and colours for key information such as depth or time. The Xen menus are easy to navigate to and Liquivision's patented tap-interface allows you to interact with the computer quickly and easily.
Liquivision.com

Light Monkey

Light Monkey HID primary lights are available in 4 power levels: 10W, 21W, 35W and 50W. All lights are machined from solid Delrin and are warranted to withstand depths up to 500' (150m). With the exception of the 10W, their HIDs utilize a split ballast system (in which the ballast is located in the lid of the canister and the igniter is located at the light head). This design allows for a much smaller volume when combined with the Goodman head. A focusable reflector comes standard, and video reflectors are available as accessory items. All Light Monkey lights fall below the threshold mandated by TSA regarding Equivalent Lithium Content (ELC) and are both safe and allowed for air travel.
Lightmonkey.us

Mate Flight

Designed specifically for air travel, the Mate Flight weights in at 3.5kg. Manufactured from heavy duty polyester, this promises to a useful bag as it can take up to 100 litres of equipment.
Seacsub.com

Text and photos by Christian Skauge

Periphylla

—Aliens of the Deep

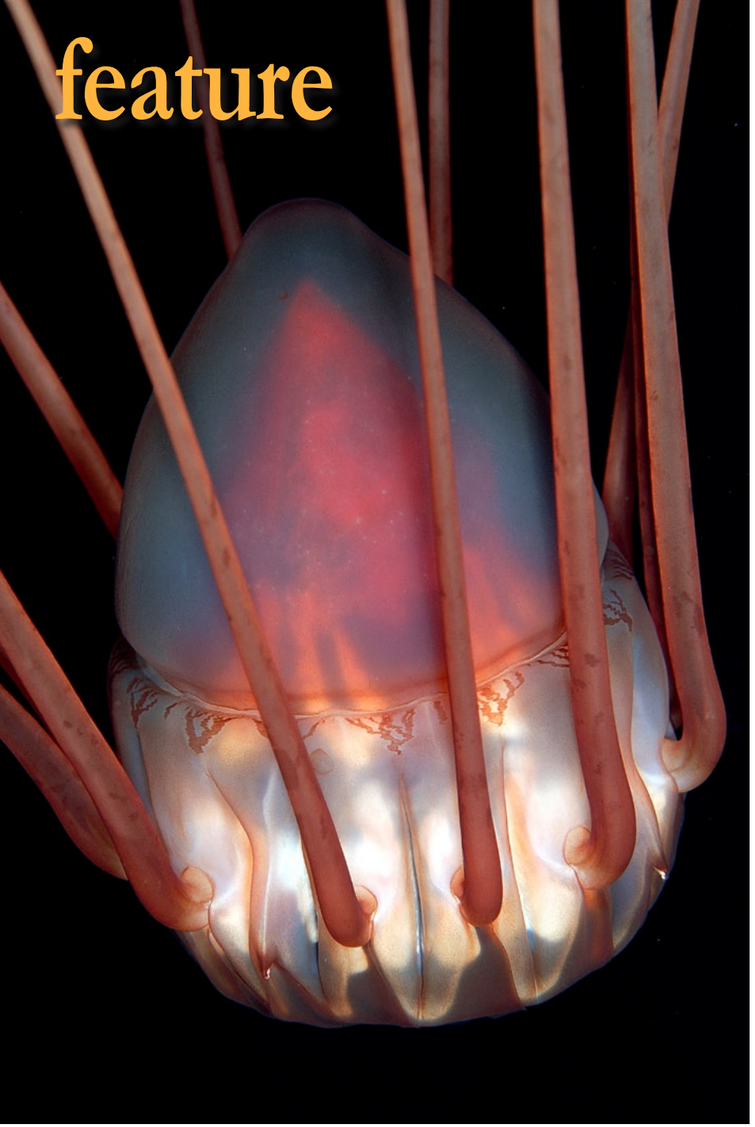
The jet-black rubber RIB was running flat out in the February night. We were sweeping past the Mongstad oil refinery at the Norwegian west-coast, just south of Gulen Dive Resort, and the clock was approaching midnight. Apart from the lights in the distance, the visibility was zero, and we were navigating solely on GPS, chart plotter and radar. The speed of 35 knots produced a howling wind, although the sea was completely calm. There was no moon, which was perfect for what we had in mind—an encounter with the alien of the deep, the crown jelly, *Periphylla periphylla*.

The crown jellies, *Coronatae*, belong to the *Scyphozoans*, a class of jellyfish counting some 200 species, many of them stunningly beautiful. Mainly known by its very descriptive Latin name, the *Periphylla* (*peri* = around, about; and *phylla* = leaved) has a bell that may reach a height of 35cm, although they are rarely seen larger than 20cm in the north Atlantic. Their 12 tentacles, which are often held in an upward position may be up to half a meter long. With their tentacles spread out, this strange and menacing looking animal reaches over a meter in diameter.

Life in the abyss

The Periphylla is a true deep-water creature. It is found in all the world's oceans, except the Black Sea, and typically live below 900 meters and as deep as 7,000 meters in certain areas. In the Antarctic, they grow bigger than anywhere else, and

Although jellyfish have eyes, they have no brain. The prtiphylla reportedly hav to separate nervous systems, and scientists believe one of them may be acting instead of a brain in the normal sense of the word. Their body consists of over 90 percent water



American scientists report having trawled for periphylla at 2000 meters depth for two hours outside Monterey Bay, catching only about 10 specimens. One haul in Lurefjor-den landed several tonnes of jellyfish

the Periphylla may be the most abundant and widely distributed deep-water jellyfish in the world.

Life in the abyss is one of eternal darkness, scarce food supplies, trouble finding mates—and voracious predators. Many of the deep-water animals have developed bioluminescence in order to overcome some of these challenges, and so too with the Periphylla. Sometimes it can be observed changing colour and almost pulsating with light. It is not known exactly why the Periphylla does this, but many scientists believe the jellies use light to communicate and signal such things as readiness to mate—after all, they have four eyes called rhopalia at the rim of the bell, surely capable of detecting the light. The dark red colour of the bell is said to be masking the light of ingested bioluminescent pray, which might otherwise attract predators.

Like vampires and trolls

So, how deep do we need to venture to catch a glimpse of this stunning deep-water creature? Luckily, the Periphylla has a trait that enables scuba divers to observe and photograph them at dive-able depths—even close to the surface. After the hatching of the eggs, which floats motionless for months in mid-water at a depth determined by a combination of temperature, salinity and water density, the Periphylla develops 12 powerful tentacles and starts a life-long cycle of swimming several hundred meters to shallower water to feed at night, then sinking back into the abyss as soon as day breaks. In that respect, they are like the vampires and trolls of ancient tales—if they see the sun rise, they will die. But this time, it's true.

Despite being able to produce its own light, the Periphylla is photo-sensitive and will not survive being exposed to sunlight. Even strong moonlight makes them turn around and head for deeper waters, and so do powerful dive torches. Light will break down the brilliant red pigment in the bell and the tentacles, and the jellyfish will perish. The destruction spreads along the two nervous systems the jellyfish possess, also destroying its capability to move properly. In order to observe them during a dive, absolute darkness (apart from dive lights) is a necessity. And you have to be at the right place at the right time.

A rare treat

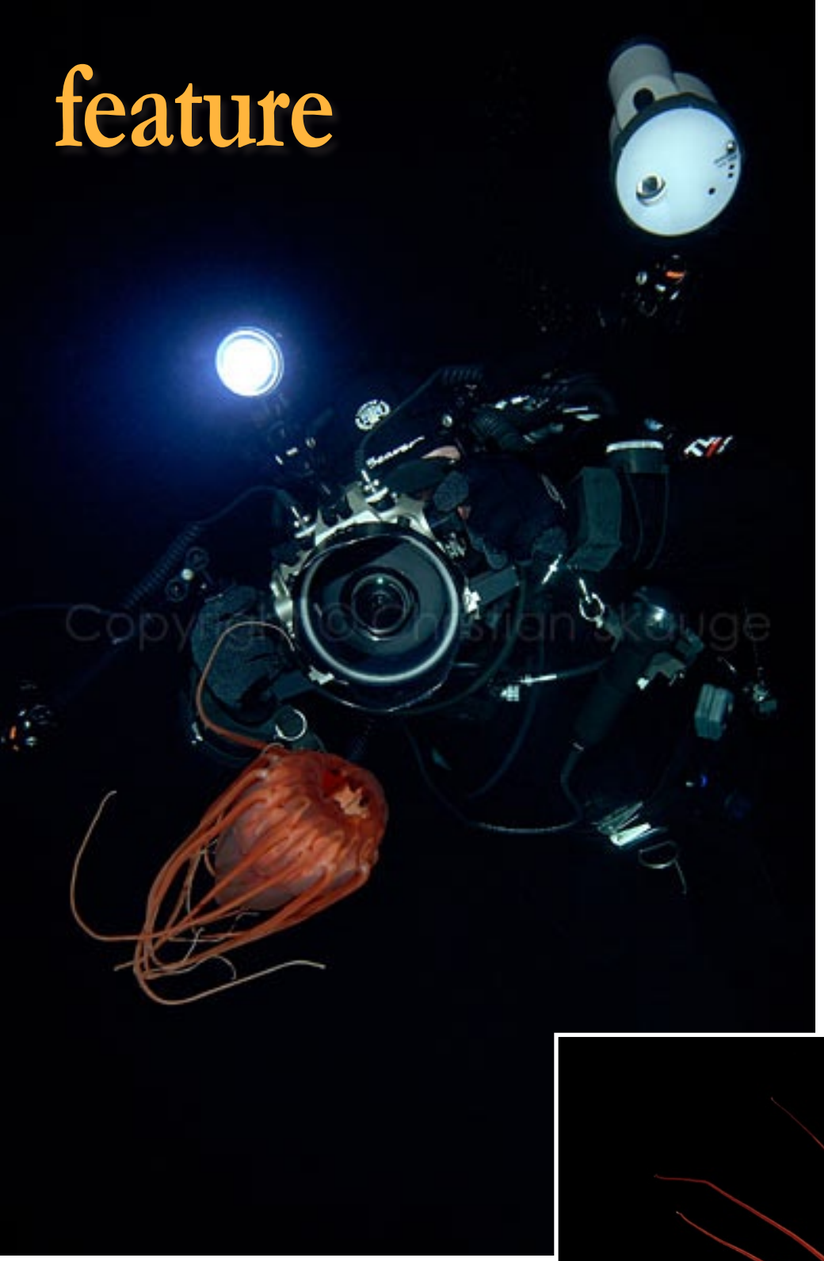
Although the Periphylla is abundant in the depths of most oceans, there are some special places where they congregate in the millions because the conditions are particularly favourable. One of very few such places on the planet is a fjord called Lurefjorden, just north of Bergen, and this is where we were heading at full throttle through the night. In the winter, the feeding cycle of the Periphylla coincides with mating season, which occurs from November until April. February, being right in the middle, usually offers the highest density of jellyfish—if you dive on a moonless night such as we were.

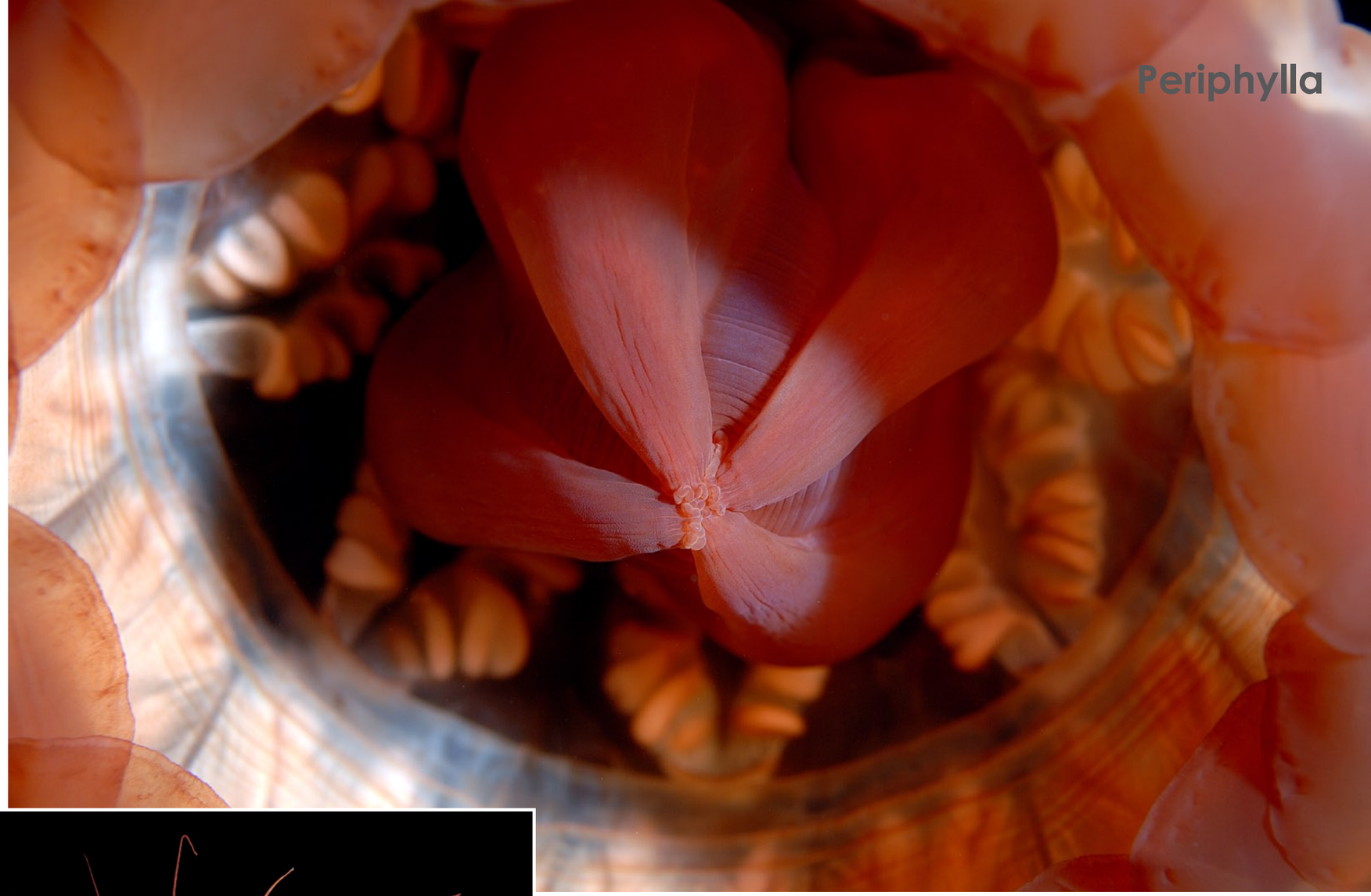
Lurefjorden is a 400-meter-deep,

Periphylla

The periphylla can be seen in a few fjords on the Norwegian west coasts during nighttime in the winter. Lurefjorden is the best place to experience large concentrations, but the jellyfish can also be found in Halsafjorden, Sognefjorden, Trondheimsfjorden and Vefsnfjorden

Gulen Dive Resort just south of Sognefjorden is the only dive resort in the world to offer regular periphylla-safaris. This happens once a year in february, permitting 8 divers to experience the alien of the deep



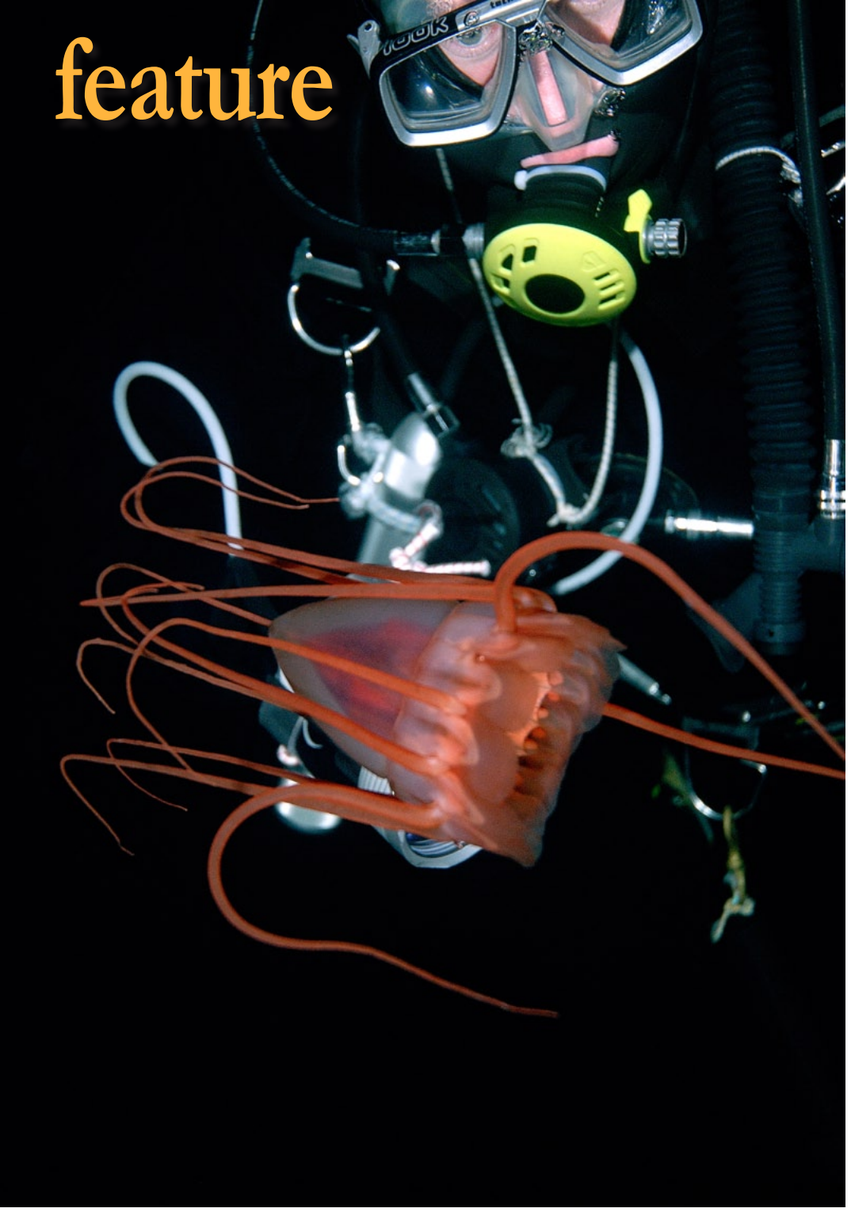


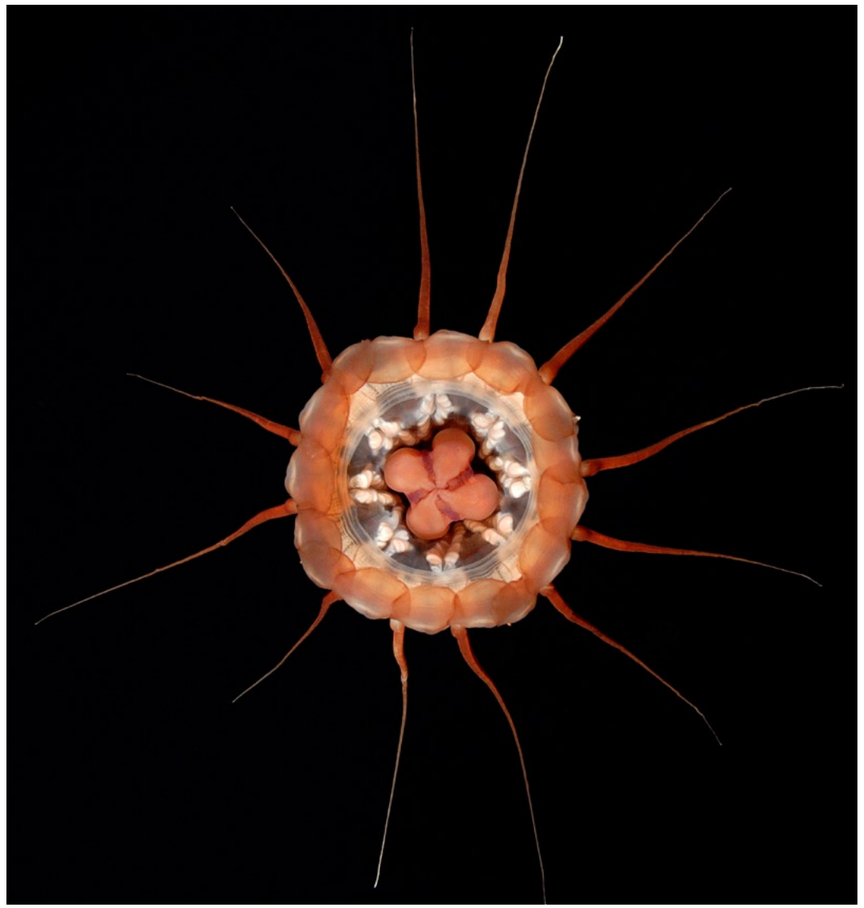
The nematocysts (stinging cells) of the periphylla are bigger than on any other jellyfish – in fact, they may be up to 10 times as big. The fact that the stinging cells continue to grow during the lifespan of the jellyfish is also unique; normally they only grow to a certain size

enclosed fjord with four openings to the ocean. All the openings are nearly closed by thresholds as shallow as 20 meters, permitting very little oceanic water to enter and exit with the tides. In addition, arrow worms, copepods and krill—which make up the bulk of the diet—are abundant in the fjord. The jellyfish also feeds on fish eggs and larvae, and have almost eradicated the once rich population of cod that used to inhabit the fjord back in the 70's. Today, the Periphylla reigns on top of the food chain with very few predators threatening its existence.

The RIB finally slowed down, and the biting cold and howling wind came to a halt. The night closed in on us, quietly, as we drifted slowly across the surface, several hundred meters from land. The echo sounder showed that we had almost 300 meters of water beneath the keel—a perfect place to scout for the Alien of the Deep.

We geared up in the darkness and checked the cameras, torches, backups and extra backups. The dive was planned to a maximum of 30 meters, without surface markers or lines. We needed to be free in the water, and didn't want lines tangled up in stinging tentacles. Needless to say, buoyancy was crucial in the pitch-black waters we were about to enter. If





Periphylla

Not only does Lurefjorden offer the periphylla particularly good conditions in terms of food; the water in the fjord have been proved to absorb up to four times as much light as normal sea-water, giving the impression of being much deeper than it actually is

Due to the large amount of jellyfish in Lurefjorden, attemtps to trawl the jellyfish commercially have been made. The japanese consider dried jellyfish something of a delicacy, and in tradition-al chinese medicine jellyfish is thought to have a positive effect on the skin and the circulation of blood. Jellyfish are also rich in proteins and minerals such as calcium, iron and iodine.

one gets too caught up in a particular specimen, one might suddenly find him of herself at a depth of 50 meters or more.

Diving 300 meters above the seafloor

We splashed in, and the slight current immediately grabbed us and pushed us away from the boat. We signalled OK with the torches and slipped beneath the dark surface with a few stars and a keen-eyed dive leader as our only witnesses. It was the moment of truth. Were they here tonight? Would we see many, or just a few?

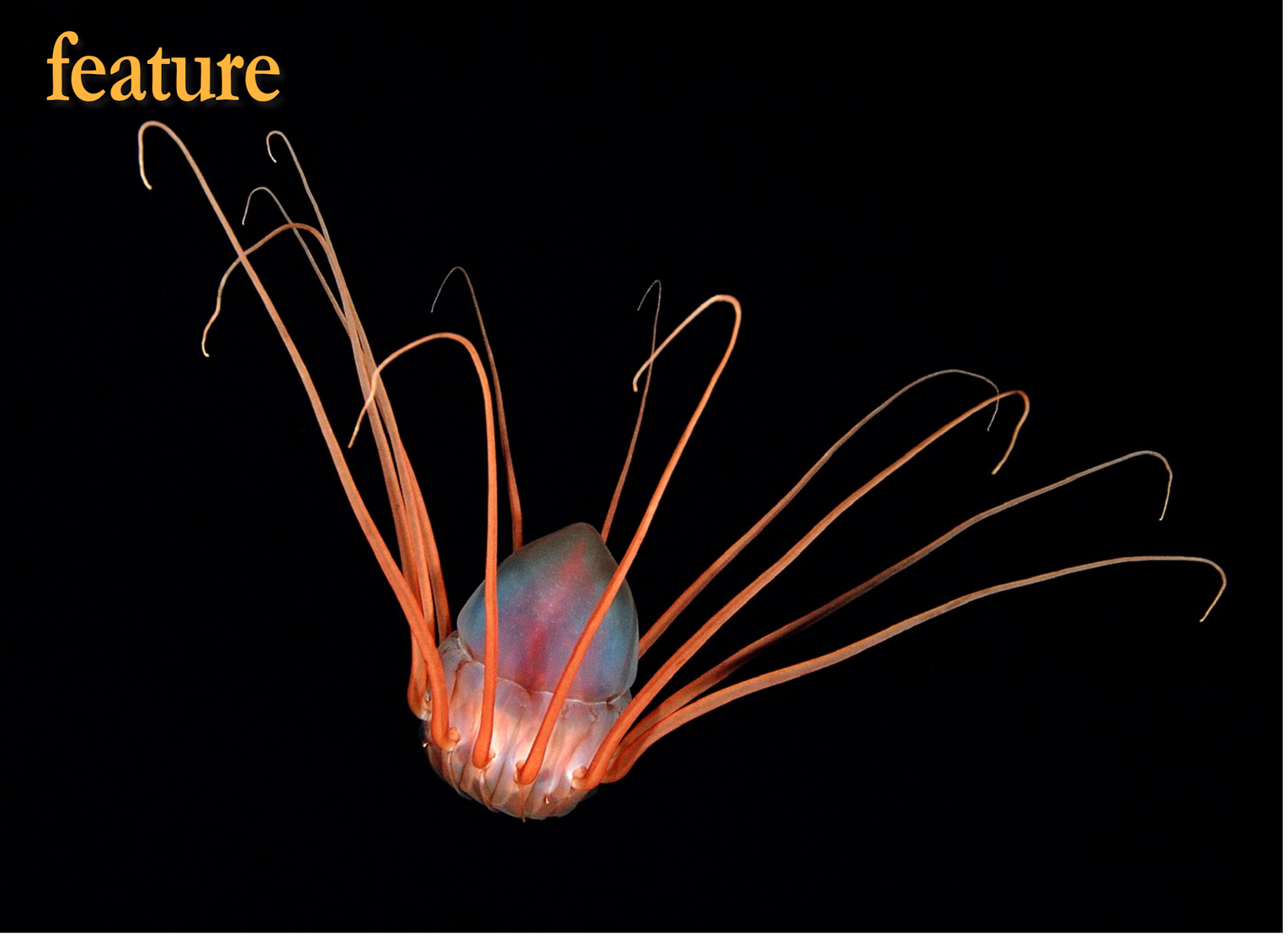
As we slowly descended through the water, our eyes tried to adjust to the immense blackness. Torches painted luminescent arches, as we swiped them back and forth through the water to catch signs of life. The first few meters all we saw was krill, but that was a good sign. Food. At about 12 meters, I spotted the first shapes below us. They were here—and my god, there were lots of them! A few more meters, and suddenly they were everywhere. Most of them were just hanging still with their tentacles spread out, eagerly awaiting their prey. Some of them turned nose down to escape our beams of light, and headed into the abyss below us.

The Periphylla don't have thin tentacles like normal jellyfish. The appendages are thick and stiff, and more anemone-like than anything else. When you touch them (and with these great numbers you can't help it) they attach to your gloves or suit just like the tentacles of a large anemone—sticky. Their burn is that of the familiar lions mane jellyfish or worse, but doesn't last that long.

Because of their relatively small number of tentacles, the Periphylla seemed to be avoiding contact with other individuals, to avoid getting tangled up and losing their precious cutlery. They neatly spread out and occupied about a cubic meter of water each. There they hung, almost motionless, ominously awaiting the arrival of their prey—which, because of the current, was bound to happen sooner rather than later.

Intelligent—or just very adept?

The Periphylla have a highly perfected and almost intelligent way of catching food. Their sensory organs are able to pick up minute vibrations—just like those made when a krill is "running" through the water with all its tiny



Close-up detail of the bell of the periphylla jellyfish (below)

Periphylla

Studying the periphylla in laboratories has proved very difficult. For some unknown reason, it does not take well to being captured and will digest itself in a matter of days, leaving a big hole in the bell. This behaviour has baffled scientists and adds to the mystery and already existing difficulties caused by the jellyfishes sensitivity to light

legs. When the jellyfish senses food is approaching, they sometimes fling their tentacles in the direction of the prey, actively hunting, not just waiting for stuff to drift into their arms. Once contact has been made, the powerful nematocysts (stinging cells) covering their arms will attempt to paralyze the unlucky crustacean—if it's a big strong one, the Periphylla will send in one or more arms in addition and produce a corkscrew-like motion to aid in capturing dinner. The bigger the contact surface, the more nematocysts will fire. In seconds, the arms holding the prey will swing underneath the jellyfish and into the mouth cavity, only to reappear empty a few moments later. Efficient and deadly, the Periphylla is a fierce predator.

Jellyfish glided by us as we slowly drifted at about 25 meters. At this depth, they seemed to be the most abundant. I looked at the other divers; they often had two or three jellyfish attached to various parts of their gear without even knowing it. In any direction you looked, there were just jellyfish after jellyfish after jellyfish—and it was such a thrill! Eventually, the presence of my camera in my hands dawned on me, and I started taking pictures. The camera struggled to focus in the difficult conditions, but a subtle focus light helped. Manoeuvring close enough to the jellyfish without startling them was a challenge, but we soon got the hang of it. The night water was constantly penetrated by the sharp flashes of underwater strobes going off.

Secrets revealed

Suddenly, I got too close to a jellyfish, and inadvertently touched it with the camera. Its colour immediately changed from deep red to bright white and back again, and then the Periphylla revealed yet another of its secrets: Almost like a squid, the jellyfish spit out a bright blue cloud of slime, turned around and headed for deeper water with powerful contractions of its bell, the arms trailing. Baffled, it took me a few seconds to realize what had just happened, and had I been a predator with no torch, the jelly would have escaped to safety thanks to this defence mechanism.

Although it seemed that we were in a different dimension, time passed just as quickly with the jellyfish as on the surface—in fact, even more quickly. After an hour, I slowly made my way back to the surface. My computer turned off the depth meter when I got close to the surface, but I could not yet see it or sense it at all. The darkness was just so impenetrable that I was not sure if I had actually surfaced before I took my regulator out of my mouth and breathed fresh air. The boat was nowhere to be seen, probably picking up other divers elsewhere. We lied on our backs gazing at the faint stars above us, knowing we had seen something very few people have ever witnessed. When they boat crew finally saw our strobes and picked us up, it turned out that we had drifted about a kilometre.

Unforgettable

The encounter with the Periphylla is one of those dives people never forget. Just like seeing a manta or whale shark for the first time, the Periphylla is an awe-inspiring, out-of-this-world experience.

The jellyfish are true aliens to our world, even though they have been on this planet far longer than we have. Some scientists believe the Scyphozoa to be about 600 million years old. Even though the Periphylla can live to be 30 years old, that's a lot of generations.

When we headed back to the resort, the freezing cold and howling winds again got the better of us. But this time, it didn't matter—for the jellyfish had warmed our hearts.

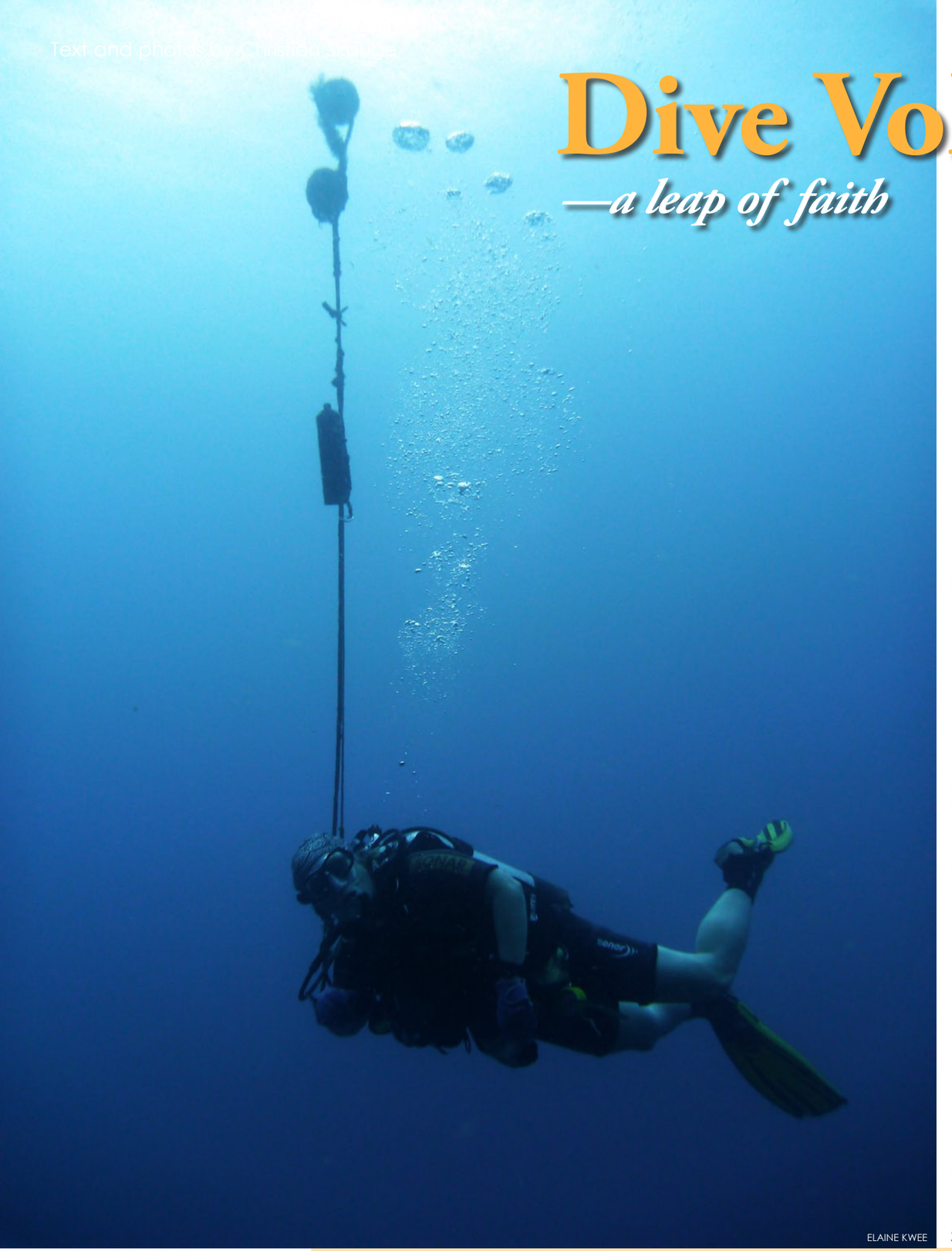
Christian Skauge is an award-winning underwater photographer and dive writer based in Oslo, Norway. For more information or to order prints, visit: ***www.scubapixel.com*** ■

Text and photos by Christian Skauge

Dive Voluntourism

—a leap of faith

Text by Elaine Kwee,
DiVo Dive Voluntourism
Photos by Elaine Kwee,
Liz Harlin, Jemina Stuart-Smith, Rick Stewart Smith


ELAINE KWEE

DiVo is based in Australia. Its aim is to bring more recreational divers to active marine conservation and research participation. DiVo also collaborates with marine conservation and research groups to originate projects where divers can participate hands-on in marine conservation and studies and have a dive with a difference to make a difference.

Dreaming the dream…

Recognise this? You're back from a beautiful dive trip, wistfully recalling the simple life of thatched huts, bare feet and just diving. You know you should be clicking down the tottering email inbox. Instead, the mouse hovers over Google.

In my case, I searched "dive+volunteer". Part of it was Robinson Crusoe escapism—life after the corporate world where I could pursue my passion for diving, saving the oceans of the world in the process. But part of it was also that I was looking for a different type of dive from the usual recreational dive, short of becoming a marine biologist or commercial diver.

Google didn't throw up anyone in Asia or Australia doing this sort of thing, so I thought, I'd just start one. So, what does a corporate warrior do to turn into an eco-warrior?

Living the dream…

First, set your own expectations and targets. If it is a passion, don't expect to make money. But you can't keep throwing money at it either, so I keep an eye on a stop-loss dollar threshold.

Not many understand why I do this if I don't make money. When potential collaborators ask me—what do I get out of this—I know exactly where they are coming from. They don't want entrepreneurial sharks latching onto their non-profit cause and making money out of it. Yet, answering this question involves going into personal detail about where I am financially, which I don't usually explain to friends let alone strangers! Getting DiVo's registration as a non-profit environmental organisation is an important step in establishing DiVo's credibility.

Second, buy a camper-van. If you are on the road 120 days out of 365 traversing the Australian coastline looking up conservation groups and causes, multiply that by $80 per motel night, and you get the economics of buying a camper-van. I spent A$3,888 (lucky

LIZ HARLIN

Reef Check Australia volunteers having fun with a serious message

SURG President Bob Edgar at work maintaining plinths in an underwater trail at Solitary Islands


JEMINA STUART-SMITH

COUNTER-CLOCKWISE FROM LEFT: Reef Life Surveyor conducting a fish bioinventory survey; Elaine Kwee of DiVo; and her home away from home, Ivana the Tramp

Chinese number) buying one from a nice Canadian couple, gave *Ivan the Van* a sex change to *Ivana the Tramp*, and since last August, notched up 22,000km with *Ivana*. In order to contextualise 22,000km: Sydney to London is around 17,000km. I sleep in *Ivana* while on the road, and every morning, I run and swim on a different beach.

Third, look up strangers and say, hello, I want to do this, will you work with me? I started from scratch looking up individuals who were involved in the pioneering early days of dive voluntourism. I was surprised by the kindness of strangers.

Pete Faulkner, the current chairman of Coral Cay Conservation (a UK-based organisation pioneering reef research by volunteers for 20 years), happened to live in Queensland, so I went up to see him. He also turned out to be my Reef Check Australia trainer. Through Pete, I got to learn about Tony Fontes, a PADI instructor trainer who also co-founded the Order of the Underwater Heroes or OUCH, a dive volunteer group in Queensland, and as a result I am a graduate of Tony's instructor boot camp.

A nice dive agent in Cairns, Dirk Werner-Lutrop of Diversion Travel, introduced me to John and Linda Rumney who are pioneers in marine research tourism through the famous liveaboard, *Undersea Explorer*. Through them, I learnt a lot about operating in the eco-diving world of funding science and documentary-making through tourism.

The young manager of a marine research station on Orpheus Island, Haley Burgess, put me in touch with her PhD supervisor, Pete Woods, an authority on marine research tourism who fortuitously turned out to be a good friend of the Rumneys.

When I looked up SURG in Coffs Harbour, the president, Bob Edgar, was embarking on a project on the standardisation of volunteer data collection protocols in New South Wales (NSW), and through Bob, I got to learn about community watch groups in NSW.

But the best way to get to know people in dive volunteering is to be a dive volunteer. I am involved in many dive volunteer groups: Reef Check Australia based in Queensland, URG Sydney, SURG in Coffs Harbour NSW, Reef Life Survey a pan-national network, BURG in Byron Bay NSW, PURG in Port MacQuarie NSW—URG, by the way, stands for underwater research group, a moniker unique to New South Wales dive clubs who also do research and conservation. This is only way to build up contacts and trust. You cannot desktop these things.

By the way, just trawling the net—like I did in the beginning—will be an inefficient exercise. A dive volunteer group may not have a website, or if it does have one, it probably would have been set up for its members in-the-know and not be search engine-optimised. Still, search engine-optimisation (or SEO, for those who have been there and done it) is an art, not a science.

Just when you thought it all sussed by capturing keywords relating to "dive", "Australia", "Great Barrier Reef", "marine conservation" and whatever else that the SEO mining experts tell you, you start to learn that maybe, your target audience responds better to "eco".

There were a fair number of no-email replies, too. Generally, environmental and community groups were responsive. But bigger institutions operating within more formal parameters probably could not engage on volunteer initiatives for various reasons.

The reality of dive volunteering

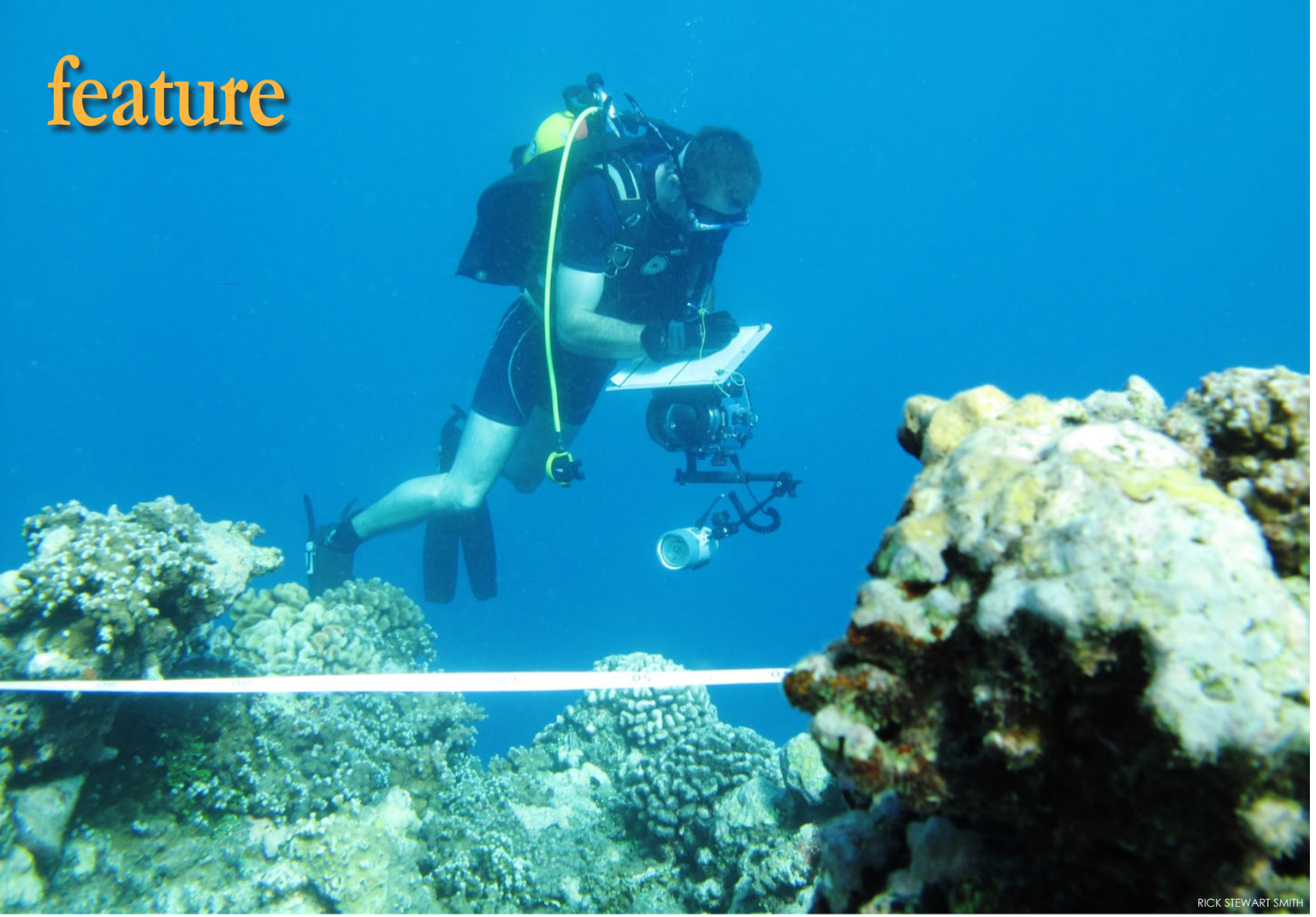
When I started DiVo, I hadn't done any dive volunteering before. I just thought I would be pretty good at it. Good buoyancy, able to multi-task, frog kicker with reef friendly dive technique, PADI pro. What else would be needed? Actually, the reality is this—*the actual diving*.

My first impression of volunteer diving was that you spent a lot of time hovering upside down. My initiation into the world of volunteer diving was at a Reef Check Australia training camp at the James Cook University Research Station at Orpheus Island off Townsville. There, we first learnt reef-friendly diving practices.

The classic underwater posture was fins up to avoid contact with the coral, while writing on a slate upside down. Given that surveys can be in the shallows of five meters or less, try doing this while combatting a surge.

Reef Check Australia usually does two transects. One buddy team would do a substrate survey, where a diver would move a plumbline along the transect while the other diver notes the type of substrate underneath. The other buddy pair would do a count of specific invertebrates (such as sea cucumbers, banded coral shrimp, lobster, urchins, starfish, giant clams, triton and trochus shells) swimming along the transect in an S-curve.

Some dive volunteer groups—such as


RICK STEWART SMITH


ELAINE KWEE

THIS PAGE: Reef Life Surveyors conducting a fish bioinventory survey

some of the URG groups and Reef Life Survey—do fish and invertebrates bioinventory surveys. The simpler surveys entail learning, such as the top 50 species typically found in the local dive waters.

The more demanding surveys—Reef Life Surveys are very detailed in taxonomy—may require familiarity with the entire fish identification book. The actual survey itself involves a swim along the transect line noting fish and estimating abundance, sometimes even size—easier said than done.

This takes practice, experience and a mentor-buddy relationship with a more experienced survey buddy. After the first few surveys, one would generally recognise the majority of fish and inverts species underwater, and one also gets the knack of estimating size and abundance.

It helps to perma-ink your underwater slate with length markings (2.5cm, 5cm, 10cm, etc). If one cannot identify a fish immediately, one notes characteristics and tries to get a photo.

The reality is a lot of multi-tasking. While identifying fish, counting, sizing, one also juggles a slate, grabs a camera, chases a fish, tries not to lose the transect line (easy when vis is under 5m), then looks for one's positively buoyant pencil floating behind one's neck, making sure the pencil string or camera bungee hasn't tangled around coral or remnant fishing line. I have actually lost a wide-angled lens in one survey, where, with all that multi-tasking, I didn't notice the missing lens until I was out of the water.

Some surveys also involve photo and video quadrats. Good quality quadrats entail no shadow or overexposure, getting a clear shot of the substrate with no backscatter. In challenging surge conditions with poor vis, not easy!

In a variant of photo surveys, Project Manta, a University of Queensland project started in 2007 to look into the movement and habits of manta rays on the east coast of Australia, runs volunteer expeditions with Earthwatch Institute where the volunteers take belly shots of manta rays. Manta rays have a distinct pattern on their bellies, and the Project Manta scientists have built up a photo ID database of about 600 individual manta rays. This has enabled them to track the movement of mantas over the east coast from the Great Barrier Reef down to New South Wales. The volunteers on Project Manta expeditions also help with plankton sampling. For more, see: **ww.divevoluntourism.com/project-manta-co-opting-passion-science** and **www.divevoluntourism.com/blogs/project-manta-real-scoop-behind-scenes**.

Volunteer dives are not recreational dives. The dives often take place in recreational dives spots, and happily, most volunteer dives are enjoyable, and one does get time to take in the surrounds. However, some survey dives are at sites that are identified as priority sites regardless of underwater scenery, and one may have to contend with more challenging than normal entry or exit points clambering in and out of rocks and beaches. And if the wind conditions aren't favourable, one may have to cancel the dive rather than merely diverting to a different spot that is dive-able but doesn't need surveying.

Aprés survey

For the Reef Check Australia training module, we were picked up from shore by the James Cook University research vessel and delivered onto Orpheus Island 45 minutes later. Half day was in classroom learning about coral substrate ID, and then, we were in the water doing a check out dive.

The JCU Research Station on Orpheus Island, by the way, is not usually accessible to divers. Usually, one can only dive on it if one is registered on the JCU dive register, which has to satisfy various occupational health and safety criteria, namely rescue diver or higher, a commercial dive medical, current O_2 certificate and current Emergency First Aid. Reef Check Australia managed to get an exemption for its training modules, with a minimum PADI advanced diver certification.

The research station has exceptional facilities. It is well designed with well thought out eco-friendly features, such as natural rainwater showers, clean composting toilets, renewable energy sourc-

ELAINE KWEE

Project Manta volunteers collecting plankton samples and ocean data

es. In addition, participants get professional kitchen facilities worthy of a hotel and generous dorm facilities—not to mention the camaraderie of barbeques by the waves lapping on the beach, star watching on wraparound verandas of the research station.

It was a nice thought that a few hundred meters away on the other side of Orpheus Island, well-heeled tourists were paying a lot more to stay in an exclusive resort but nonetheless experiencing no more than what we were while enjoying what Orpheus Island had to offer.

Project Manta had comfortable eco-tent dorm style sharing and food provided under the generous auspices of Lady Elliot Eco-Resort.

Not all volunteer surveys are resort style, of course. With the local survey dives, one may spend half a day diving off a local dive site with a survey buddy and then going home. Or, the local dive group may be limited in funding and can only put up their volunteers in caravan park cabins. But you get great camaraderie amongst advanced divers with a shared interest, and lots of learning during the mentor-buddy data entering/verification process.

With Reef Life Survey for instance, we would spend the afternoon after the dive comparing data sheets and looking up fish ID pictures, before adjourning for dinner as a team. At the end of a weekend survey, one has made a new bunch of friends who will informally band together for surveys every now and then.

Who are the volunteer divers?

Generally, volunteer divers are pretty advanced in diving skills. This is not because volunteer dive groups require minimum diving certification—most do not unless there is university involvement, in which case certain occupational health and safety requirements apply. More pertinently, divers tend to gravitate towards volunteer diving because they want to go beyond the usual recreational diving to test their skills or improve their marine knowledge.

Divers usually get to this point after they have dived many dives in many environments. For instance, Living Seas in Singapore leads its club of Global Underwater Explorer divers in thresher shark survey trips to the Philippines, so as to have an outlet for its members to utilise their special buoyancy training.

Usually, volunteer divers are conservation-minded. In Australia, many are drawn from the local community, and they want to do something for their environment. However, some (myself included) will take the time and expense to travel out to these dives because it involves a higher skill of diving for a good cause.

Sometimes they are avid photographers who want to do something constructive with their images such as archiving them in a publicly accessible database.

Is the data collected by volunteers being applied to a useful end?

All volunteer groups apply the data to either a database or a study that will be publicly accessible. It is not data for the sake of data. Some databases seek to establish a baseline for comparing the state of the oceans either geographically (what we call spatial) or over time (temporally).

Some data is for specific projects (such as Project Manta). For instance, Reef Check Australia's data goes to its Reef Health Database, freely accessible to anyone via Reef Check Australia's website. The data is also shared with Reef Check International for global comparisons of reef health. Reef Life Survey's data is also publicly accessible in a national database of fishes and invertebrates.

Reef Life Survey's data has already been used, amongst other things, to assess the effectiveness of management policies in marine protected areas, impact of fish farms and urban pollution on coastal ecological communities, and contribute to the zoning and management planning for reserves such as Lord Howe Island and the Cod Grounds Commonwealth Marine Reserve.

In recent years, the National Marine Science Centre of Southern Cross University in NSW did a study on whether data collected by voluntary organisations could be used by marine parks and other government agencies. The study concluded that volunteer groups could provide important information to marine managers if specific projects were designed in consultation with the managers and professional scientists.

But the volunteers should be trained in certain protocols if they are to provide reliable data. Coral Cay Conservation, for instance, runs their camps with a minimum time commitment because they recognise that the training alone can take weeks. Reef Check Australia runs four-day training modules before volun-

ELAINE KWEE

Pete Faulkner, Reef Check Australia trainer and current chairmen of Coral Cay Conservation, at Orpheus Island Research Station

Project Manta had comfortable eco-tent dorm style sharing and food provided under the generous auspices of Lady Elliot Eco-Resort

teers can start surveying. Reef Life Survey's training in fish bioinventory is recognised to be very rigorous and uses an ongoing mentorship model of training.

Bob Edgar, President of SURG, is also project manager of a program commissioned by a NSW government agency to build capacity in volunteer underwater divers and develop standardised data collection and training protocols for underwater research groups in NSW.

The more sophisticated the study or survey, the more training you need. Scientists from universities and research organisations understandably can be reluctant to take on untrained volunteers. If scientists are serious about publishing, they have to be careful of the integrity of data collection. The universities are also wary about occupational health and safety regulations which require scientists who dive as part of their job to satisfy commercial diver criteria.

Nonetheless, there are scientists willing to involve volunteers such as Project Manta, based out of University of Queensland. Most of the activities are suited to untrained volunteers such as taking belly shots of mantas for the ID database, trawling for plankton.

So, what do we get out of volunteer diving?

First, a new dimension in diving. Sometimes, buddies kid me that I missed seeing a big pelagic because I was too busy looking at a bit of coral or smaller fish. It is like visiting a country before and after you've learnt its native language. Suddenly, a whole different dimension opens up and enhances your awareness and enjoyment of what you are experiencing in that place.

Second, we know our marine life more. It's like walking into a museum where everything is "nice" and "pretty", versus being armed with knowledge and history of what you are looking at. It adds a whole meaningfulness to the experience.

Third, we get involved in a community of divers that really do care about the oceans that we take so much out of. The grassroots community that make up the Coastcare culture in Australia—has to be experienced to be understood. The emphasis of Coastcare groups is to foster education and action.

Fourth, we get to experience adventure diving. We become better divers able to multi-task underwater with an enhanced awareness of reef-friendly diving practices, able to operate in less than ideal dive conditions of poor vis, surge and current. These skills will develop with practice, but those interested in a taster of what's involved can also sign up for the two day PADI Scientific Diver course, which will teach dive techniques such as setting up underwater transects and grid, safe diving practices and operating in poor visibility.

Call to Action

Ready for a dive with a difference? I have given enough information and contacts for you to get started right away. You can also check out the DiVo website, which posts updates of new activities and blogs on volunteer diving. You don't have to be time- or money-rich to get involved in volunteer diving.

DiVo organises trips and gives information on volunteer diving activities, specifically targeted at the recreational diver who simply wants a dive with a difference without having to commit to a sabbatical or career switch. Remember, your dive with a difference can also make a difference supporting conservation and ocean-watch efforts.

Elaine Kwee is an ex-corporate lawyer who established the non-profit environmental organisation, DiVo Dive Voluntourism. DiVo has a website www.diovodive.com which gives information on the activities of marine conservation and research groups who work with volunteers.

Kwee was trained as a lawyer and worked in England, Hong Kong, Australia and Singapore. In her last role between 2003 and 2010, Kwee was General Counsel at PSA International, one of the world's two largest global port operators with 28 ports in 16 countries.

While Kwee was headquartered in Singapore, she had a portfolio, transaction negotiations and a global team that entailed frequent international travel. Fortuitously, this often brought her near the sea at exotic locales such as Panama Canal, Tangier, Gujerat and Turkey.

Elaine is now pursuing a second career in promoting hands-on dive volunteer activities amongst recreational divers through DiVo. She became a PADI instructor in February 2011 and is now a full-time social entrepreneur with DiVo.

■

Reef Life volunteer processing samples in the lab

"Parlez-vous Whalic?"

When sperm whales dive together, they make patterns of clicks to each other known as "codas". Recent findings suggest that, not only do different codas mean different things, but that whales can also tell which member of their community is speaking based on the codas' sound properties.

Through the Dominica Sperm Whale Project, scientists from the University of St. Andrews in the United Kingdom have recently confirmed that a sperm whale's origin will influence the sound properties of its clicks. Just like humans with regional dialects, Caribbean and Pacific whale populations possess distinctly different repertoires of codas. However, the "Five Regular" call, a pattern of five evenly spaced clicks, is believed to have the universal function of individual identity as sperm whales worldwide utilize it.

These discoveries were recently published in the journal *Animal Behaviour*, in an article authored by University of St. Andrews PhD student Ricardo Antunes, Dal alumnus Tyler Schulz, Mr. Gero, Dal professor Dr Hal Whitehead, and St. Andrews faculty members Dr Jonathan Gordon and Dr Luke Rendell.

Sound pollution

Gero and Whitehead explained that the sperm whale's biggest threat is human pollution. In addition to introducing toxins into the ocean, humans generate harmful sound pollution. Ever-increasing global shipping, military sonar and the search for undersea oil fields all add up to noise in the water that can inhibit communications between whales. "No one wants to live in a rock concert," said Gero. Noise pollution is especially troublesome in the ocean because "it is a totally different sensory world". Diving to depths of over 1,000 metres, sperm whales depend on sound for communication and navigation in the blackness of deep water.

No one wants to live in a rock concert

Sperm whale society

The Dominica Sperm Whale Project hopes to understand more about sperm whale society. "It is infuriating that we know more about the moon than the oceans," stated Gero. He hopes to communicate a better understanding of life in the oceans to people by using whales as examples, emphasizing "how similar their lives actually are to ours".

Matriarchs

Whales live in matriarchal social units composed of mothers, daughters and grandmothers. Upon reaching adolescence, males become ostracized from the group and travel towards the poles until they are ready to breed. Although little is known about the males, the roles of females in relation to their young have been extensively studied. Female whales will baby-sit each other's offspring while mothers are diving, forming a strong community that revolves around the upbringing of calves. "They are nomadic," explains Dr Whitehead, "so the most important things in their lives are each other." He hopes the Dominica Sperm Whale Project will be able to trace how whale communities change through time.

How similar their lives actually are to ours.

Dialects

Part of Gero's PhD includes the study as to how calves acquire their dialect. Just like humans, baby sperm whales babble at first and Gero is intent to discover how this evolves into to the family repertoire. "One of the most exciting parts [of returning to Dominica] is to go down and see who's around," said Gero, admitting that he has "become attached to the individual whales." For the first time, sperm whales are being studied as individuals within families, with one family in Dominican waters recognized as "the best studied social unit of sperm whales in the world".

Gero wishes to continue working with the same whale groups, as a long-term project will provide a better understanding of their social developments. He "feels a responsibility to speak on [the whales'] behalf" and hopes to move toward conservation, while still remaining in the field of biology.

Talking with dolphins

In additional cetacean communication breakthroughs, Florida scientists have developed new underwater translation software that could soon allow humans and dolphins to communicate with one another.

Denise Herzing, founder of the Wild Dolphin Project in Jupiter, Florida, USA, and Thad Starner, an artificial intelligence researcher at Georgia Tech, have developed the Cetacean Hearing and Telemetry (CHAT), project, aiming to record and interpret dolphin sounds by building a prototype device featuring a smartphone-sized computer and two hydrophones. Divers will use this underwater system to record dolphin sounds that are made in response to human interaction. These recordings will then be analyzed using software to find distinct clicks and whistles that represent the "fundamental units" of dolphin communication. The prototype is hoped to be tested over the coming summer months.

Considered to be the world's second most intelligent creatures after humans, dolphins can keep track of over 100 different words. Once these units are identified, Herzing hopes to combine them to make dolphin-like signals, teaching the cetaceans to associate behaviours and objects with these sounds. If the project is successful, dolphins could make requests, ranging from the desire to play with a piece of seaweed to riding the bow wave of a boat. ■

It's long been known that killer whales, or orcas, get around, but the study is the first to document such a rapid, long-distance swim.

Orca swam from Arctic to Azores in a month

Whale tagged with satellite transmitter completes 5,400-kilometre trip in a month. In a remarkable month-long journey, the whale swam 5,400 kilometres from northern Baffin Island, down past Greenland, Labrador and Newfoundland heading for the Azores in the mid-Atlantic.

Biologist Cory Matthews working with scientists from Fisheries and Oceans Canada said the "remarkable" swim suggests killer whales have a large range in the Atlantic. He is lead author of their report on the whale's travels published in the current issue of *Polar Biology*.

It could be that killer whales that spend summer in Canada's north and along the east coast congregate in the mid-Atlantic between the Azores and Bermuda in the winter, said Matthews, noting that whalers reported seeing concentrations of killer whales in the southern waters in the 1800s.

Hunters, scientists and other northern travellers are spotting more killer whales in the Arctic waters, especially in Hudson Bay. Narwhals, belugas and bowhead whales, which are known to take refuge under the ice, seem to be favoured prey. Matthews said the whales may also be eating fish, but added more work is needed to understand the changing wildlife dynamic in Canada's north.

Researchers say the increase in killer whale sightings appear to be related to the way the Arctic ice has been retreating in recent years, because killer whales tend to steer clear of thick ice. ■

The Arctic-to-Azores trip is believed to be the first documented case of an orca travelling so far in such a short period of time

"Some whales are happy enough kind of jogging around behind you as you're moving up your string and slurping up the discards. Those are the nice whales."

Jay Skordahl, Alaska commercial fisherman to Seattle Times

Researchers try beads to thwart pilfering whales

Sperm whales stealing black cod from fishing lines off Alaska a growing problem for local fishermen.

Sperm whales, the world's largest toothed cetaceans, for more than a decade have bedeviled fishermen catching sablefish, also known as black cod or butterfish, a deep-water fish that tastes like butter and sells for more dollars per pound than any other Alaska finned fish.

Researchers this year are using a US$353,000 federal grant to continue assessing how much thievery sperm whales, an endangered species, conduct in the black cod fishery. They plan to continue using acoustic recorders to refine their estimates of how many fish are taken. They also will experiment with a cheap deterrent: acrylic beads attached to longlines that are designed to confuse a sperm whale's built-in sonar, echoing back a signal that resembles a tasty sablefish. The latest research will be to determine whether 28mm beads attached to each ganion will throw the whales off their game. The beads, slightly smaller than a golf ball, were picked because they bounce back a signal similar to a sablefish. Researchers hope the whales will not be able to distinguish the signal returned by a fish from the signal from the beads.

Estimates that whales can pluck five to ten percent of the fish off a line may be low, said Jan Straley, a whale biologist at the University of Alaska Southeast. Before a camera captured a sperm whale gently taking a black cod from a line in shallow water, the only visual evidence of plundering was bent hooks or fish lips left on lines. Fishermen sometimes even caught more fish when whales were present, Straley said, which may prove only that both whales and fishermen know where the fishing hot spots are. Researchers have determined that sperm whales apparently can distinguish longliners from salmon trollers or other boats by how they shift gears. Laying down a string, requires pacing: moving forward, shifting to neutral or reverse, finding the best speed to pay out a line. It's been a dinner bell for sperm whales. ■ **Video: thieving whales**

PETER SYMES

Seal whiskers sense fattest fish

Harbour seals have the ability to detect the size of fish using only their whiskers, research has shown.

Hunting in the North Sea, harbour seals often encounter murky water that impedes their vision, but it doesn't affect their ability to chase prey. Extending their vibration-sensitive whiskers, the mammals are almost as efficient at pursuing their quarry as they would be if guided by sight.

Dr Wolf Hanke and scientists from the Marine Science Centre at the University of Rostock, Germany, first showed how sensitive seals' whiskers were last year. They reported that a trained seal, Henry, was able to sense an artificial fish up to 100m (328ft) away using just his whiskers.

The researchers then focused their investigation on whether seals used their whiskers to discern size and shape. Knowing that a fish's size and shape can dramatically affect its wake structure, researchers then decided to find out how well seals can distinguish between the wakes of objects with different shapes and sizes. Teaming up with Henry the harbour seal at the Marine Science Centre, Germany, scientists began testing Henry's ability to distinguish between the wakes of differently sized paddles.

Experiment

In an open-air pool in Cologne zoo, the team set up a box with a series of rotating paddles inside. These paddles created trails similar to those made by swimming fish. The researchers blindfolded Henry and covered his ears, then they swept a paddle through a large box in Henry's enclosure and allowed him to enter it three seconds later. Wearing a mask and headphones to restrict his other senses, Henry swam through the box to hit one of two targets on the other side and get a fish reward.

Comparing a control paddle and one that varied in thickness or shape, scientists found that the seal could tell the difference between the trails left in the water. For trails made by the control paddle, Henry selected a target to the right, and for anything thicker, thinner or of a different shape, he touched the target above the exit gate. ■

Alone At Last

Southern Belize

Text by Kelly LaClaire and photos by Kate Clark

A diver investigates a cup coral that has attracted a lion fish, a species not native to the waters of Belize (left); Sharp-nosed puffer fish; Loggerhead sea turtle heads to the surface for a breath. PREVIOUS PAGE: Divers explore the coral around Glovers Atoll

Belize

Hello. My name is Kelly and I'm a dive-aholic. I freely admit it. I'm unabashedly, totally and completely addicted to travelling the world scuba diving. I love soaking up foreign cultures and engaging in lively conversations with friendly locals. I love sampling exotic foods that make your mouth sing and your stomach angry. I love taking that first giant stride into turquoise waters and discovering what new and fascinating critters await in the depths below. Heck, I even love the long and cramped, often overbooked and under-serviced flights one has to endure to reach these remote destinations.

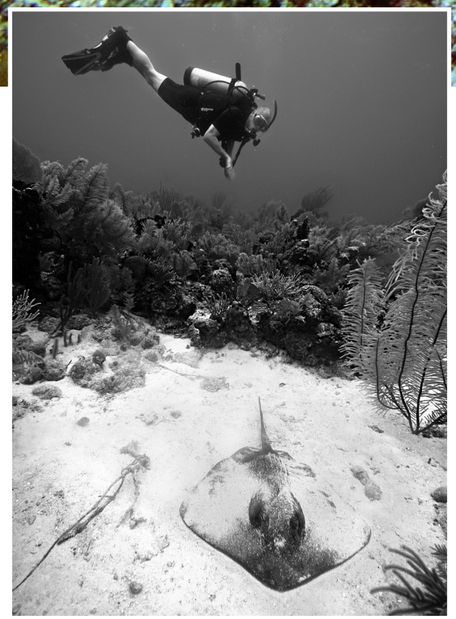
But there is one thing I am not a fan of—and I'm pretty sure I'm not alone here—and that is the sagging, bitter disappointment I always feel when having to share my vacation with packs of people crowding every dive site and swarming each sight-seeing destination. It's not that I'm selfish—well, okay, maybe I am just a little—and it's not that I don't want fellow travellers to have great vacations and wonderful excursions for themselves, because I really do. They deserve it just as much as anyone else.

But let's face it. Don't we all yearn to show up at a world-class dive spot hardly anyone knows exists and get to explore it all by ourselves? Haven't we all fantasized about laying a towel under a swaying palm along some deserted stretch of white sand beach and feel that blissful contentment of knowing you've got the whole place to yourself? Haven't each one of us stood in line with scores of other tourists waiting to see some natural wonder the guide-book promised was a "three-star, sight-seeing must" wondering, "What's with all these people?"

You may be suffering under the delusion that all the great vacation destinations have already been discovered—that crowded dive sites, clogged beaches and endless lines are just a fact of life. Well, let me disabuse you of that idea here and now, loyal readers, because I have been to a place that defies even your grandest holiday wishes—Southern Belize.

Hopkins Village

Glover's Reef Atoll. As I watched the gleaming white sands of the Hopkins shoreline grow fainter, my cousin and photographer, Kate Clark, said out loud what I was already thinking, "No one's out on the beach yet—I guess they're all still in bed." She turned back around and stretched out on the large bow of our dive boat, soaking up the morning sun. It takes about an hour and 20 minutes to reach Glover's Atoll, an



Diver and caribbean whiptail stingray at Glover's Atollt

Not native to Belizian waters, the lionfish is a beautiful pest rising uncontrollably in population (far left); Divers with hawksbill sea turtle on reef (left); Diver at ledge of coral with red sponges along Glover's Atoll (below)

Belize

unspoiled ring of lush islands on the world's second largest barrier reef, but we both considered this a plus. It gives you time to wake up and shake off the cobwebs of jet-lag (or the foggy-headed remains of too many drinks the night before) while getting to enjoy the gentle swells and soft breeze of the Caribbean.

When we arrived at the southwest wall—the first of three dives that day—our small group began stepping off the stern. As I awaited my turn, I scanned the flat sea, and I was surprised that we were the only boat in the area. C-Dog, one of our dive masters, had told me earlier that Glover's was a popular site due to the pristine waters. So, I was expecting other dive operators to be bringing groups out that morning. I thought briefly that our early start was the answer, and when we popped up, I would see several boats close by.

I took a giant step off the boat relishing the warm water and remarkable visibility. We dropped swiftly, levelling off and letting the mild current push us over the giant forest of purple sea fans, elkhorn, tube sponges and wire corals. Our dive master was right; Glover's is absolutely teeming with life. A large school of black durgeons stopped circling a giant tube sponge to get a quick look at us but quickly realized we were no threat and went back to their never ending game of chase.

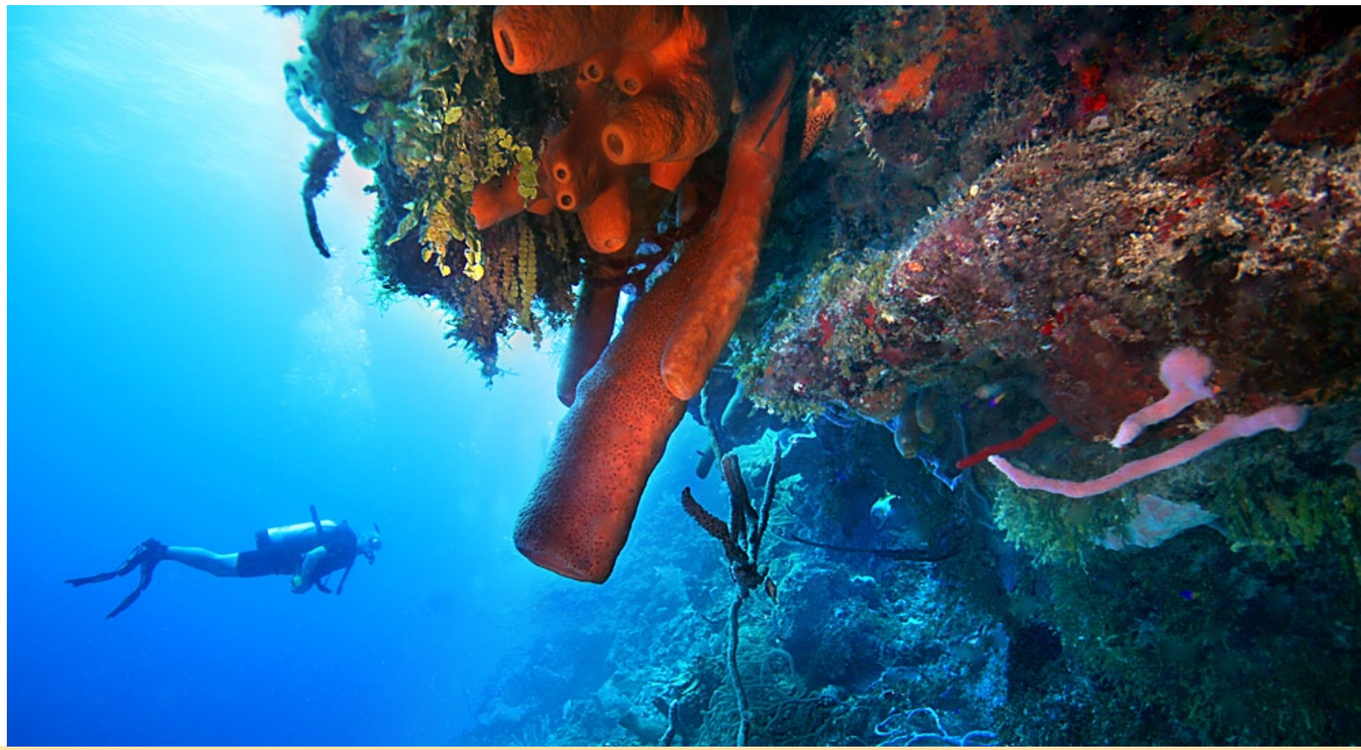
A pair of spiny lobsters twitched their tentacles nervously, trying to shove themselves further back into their hiding place as Kate moved closer for a picture or two. When she got the one she wanted, she took her reg out and flashed me a big smile, shaking her thumb and pinky at me, "This is so awesome!"

Rocky shelves and overhangs covered with red and green tube clusters dominated the seascape, and we immediately began searching for nurse sharks and morays. Neither showed themselves, but a curious hawksbill turtle came to greet us and inspected the glass on Kate's housing before finding a spot to rest next to a glowing azure vase.

We slowly finned up a few meters and watched a pair of gray angelfish swimming in lazy, twisting loops around a group of star coral. They disturbed a sizable grouper that had his mouth open for a few tiny fish busily cleaning his teeth.

The current pushed us gently along the coral cliff for the next 20 minutes. Stoplight and butterfly fish darted in and out of craggy alcoves and a small school of barracuda eyed us with resentful suspicion.

I checked my air pressure and signalled to Kate that I needed to start ascending. She looked at her own gauge, still showing plenty of air left, and I could see no sign that she was exasperated by her time



Belize

Beautiful red fan corals branch out of the reef along Glover's Atoll (left); A small school of blue tangs graze along the coral mounds of Glover's Atoll (above)

Large hermit crabs can be found in sandy patches between reefs at Glover's Atoll

being cut short. In fact, Kate has been forever patient with my apparent lack of lung capacity, and I owe her a debt of gratitude that she never seems to hold it against me.

We surfaced after our safety stop and I immediately looked to see if any other boats had appeared. I was pleasantly surprised to find we were still alone on the water.

Long Caye Wall. Jacque Cousteau once said that the Long Caye site at Glover's was one of his top-ten favorite dives. I would have to agree. It's an easy dive with almost no current and shallow depths, so the colors are brilliant and vivid. As with all the waters of Belize, the visibility easily extends beyond 40 meters (120 ft) so keep an eye on your depth gauge.

At the top of the great wall, dozens of sandy cut-throughs leading in and out of towering coral heads can be explored and the site abounds with brightly colored fish, stingrays, eels, green turtles and nurse sharks.

At only 15 meters, we reached the brilliant white sand bottom and headed for the massive coral mounds marking the lip of the wall. A few divers swam through the tunnels in the rocky outcroppings while our dive master pointed out two adult spotted drums being swarmed by seven or eight tiny juveniles—their long, wispy fins fluttering. Two more hawksbill sea turtles made an appearance, and a lone hermit crab heading towards a sprawling field of sea grass was carving long, distinct, double tracks in the sand.

After 50 minutes, it was Kate that was pointing her thumb towards the surface, and I was stunned to find I had as much air left as she did. Back on the boat, sucking on Jolly Ranchers to get the salt out of our mouths, I couldn't help myself. "You're slipping in your old age, Miss Clark. Seems as if you may not be the breathing machine I always thought you were!" I went on this way for five minutes, grinning widely and feeling horribly proud of myself.

Finally, she could stand no more. "You know, I was trying to let you feel good about yourself," she said. "But now, you're just being completely obnoxious, so I'll let you in on a little secret. My computer hose was leaking like crazy the whole time, and my tank was only filled to 2600 psi. Yours was at 3300, and you still came up with the same amount of air as I did." She was standing over me at this point, and I was beginning to shrink under the onslaught. "So shut your trap, LaClaire, you're still an air hog!"

Blue chromis and silt-pore sea rods at South Water Caye

Hamanasi Dive & Adventure Resort

It was mid-afternoon as we approached the long, sparkling beach of Hopkin's village on our return from Glover's, and I was amazed to see that the white sands were still empty. I turned to Kate, "This is spring break, right? I mean, I don't have

Aaaaah... cold Belikin beer

my dates wrong, do I?" She shook her head and smiled. "I love it here!"

We unloaded our gear provided by the operator—all of it high-end and in perfect condition—onto Hamanasi's long dock and walked through the scattered palms lining the beach of the carefully tended property. If you're unfamiliar with the resort, let me give you a brief introduction.

Named Belizean Hotel of the Year in 2009 and rated as one of the top ten hotels in the world by Trip Advisor, Hamanasi—meaning *almond* in traditional West African parlance—is a five-star, eco-friendly adventure lodge that has everything you could ask for. The quiet, secluded grounds are lush with native plant species, the rustic and charming tree-houses are replete with every imaginable amenity, and service takes on a whole new meaning here. Hamanasi's motto is, "Bring the guests into our home and treat them like family. Deliver the vacation of a lifetime—no less!" It's obvious they take that credo to heart, because the staff will do absolutely anything to make you happy.

We once tested this by asking Chef Sheridan Polanco for what is arguably the world's best key-lime pie at 11pm—long after the kitchen was closed. We were brought out two plates and coffee within seconds. But it's not just the visitors who are important, the resort takes it commitment to the local population seriously, hiring exclusively native Belizeans, donating supplies to local grammar schools and providing higher education scholarships. They are fiercely protective of the environment and dedicated to responsible, sustainable tourism.

Katrina, the concierge, had our guest house made up, and after we made ourselves comfortable, she took our dinner reservations and gave us a brief tour around the grounds. I asked her about the apparent lack of visitors and the empty beach. "It's always like that here," she replied. "It may not seem like it, but in fact the hotel is fully booked right now. Hopkins is a slow, quiet place, and that's what we love about it."

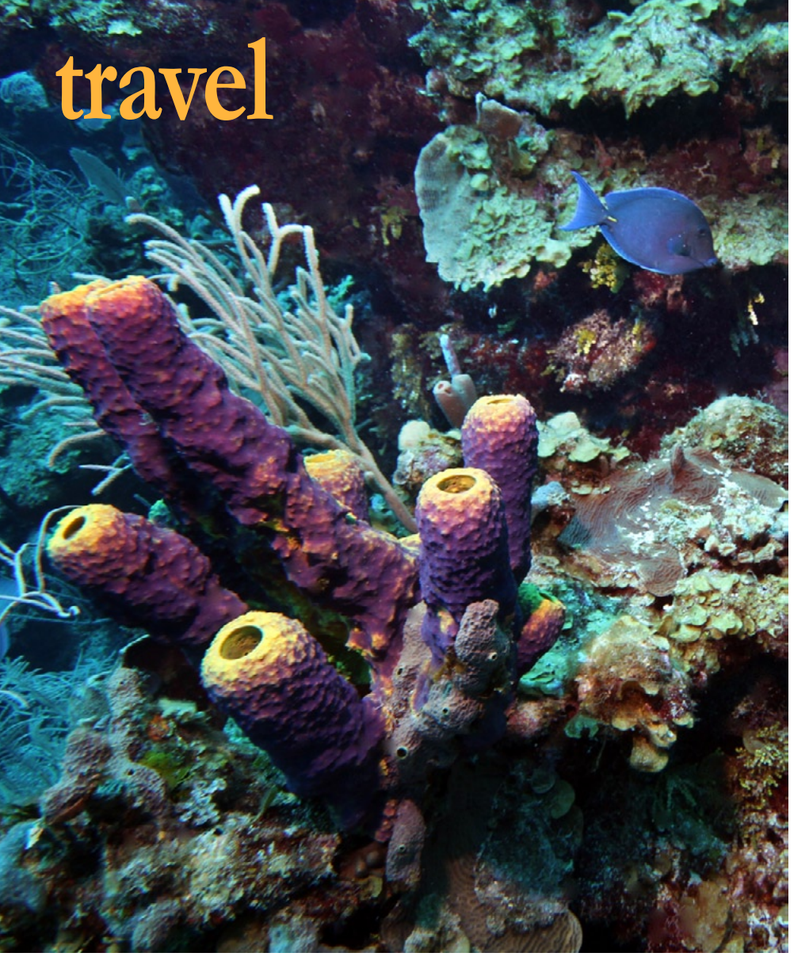
We spent the rest of the afternoon sitting by the pool, sipping cold Belikin beer and napping in the hammocks hung between the palms lining the empty beach. We had the place all to ourselves, and the only sound was the gentle surf breaking a few meters away.

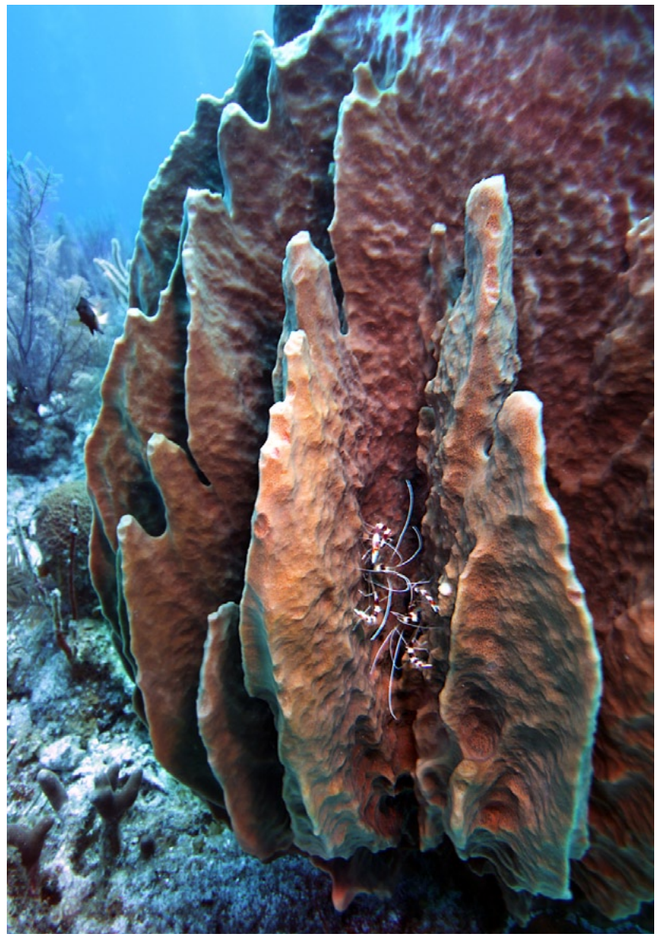
South Water Caye

The next morning, before leaving for South Water, we were treated to a tasty variety of fresh fruits, newly baked pastries and Hamanasi's breakfast buffet of eggs, potatoes, bacon, coffee and juice.

The ride out to the reef was much

CLOCKWISE FROM LEFT: The national beer of Belize, Belikin can be enjoyed at any cool spot along the Hummingbird Highway; Brightly colored and extremely inviting, the exterior of Hamanasi Resort completes the tropical relaxation of Southern Belize; Clean and comfortable beds greet travelers; Along with stellar service and impeccable accommodations, Hamanasi Resort also offers five star dining; For guests looking for a bit more privacy, Hamanasi offers several secluded Tree Houses that sit amidst the shade; Hamanasi's tree house rooms offer a shady porch for lazy afternoon naps. See: **www.hamanasi.com**





CLOCKWISE FROM ABOVE: Two French angelfish at Jason's Wall; Blue tang and branching tube sponge at Fourth Cut where life is tucked into every crevasse, such as banded coral shrimp found in the folds of a large sponge (center); Nassau grouper and azure vase at Jason's Wall

shorter than the previous day, but we had plenty of time for sunbathing and a few conversations with several of the people who were joining us. This is one of my favorite parts about the scuba experience—meeting interesting people who have travelled the globe in search of blue water adventure. It's always a pleasure to connect with someone from halfway across the world and compare notes on gear, dive locations, shark sightings and the fascinating similarities and differences of foreign customs.

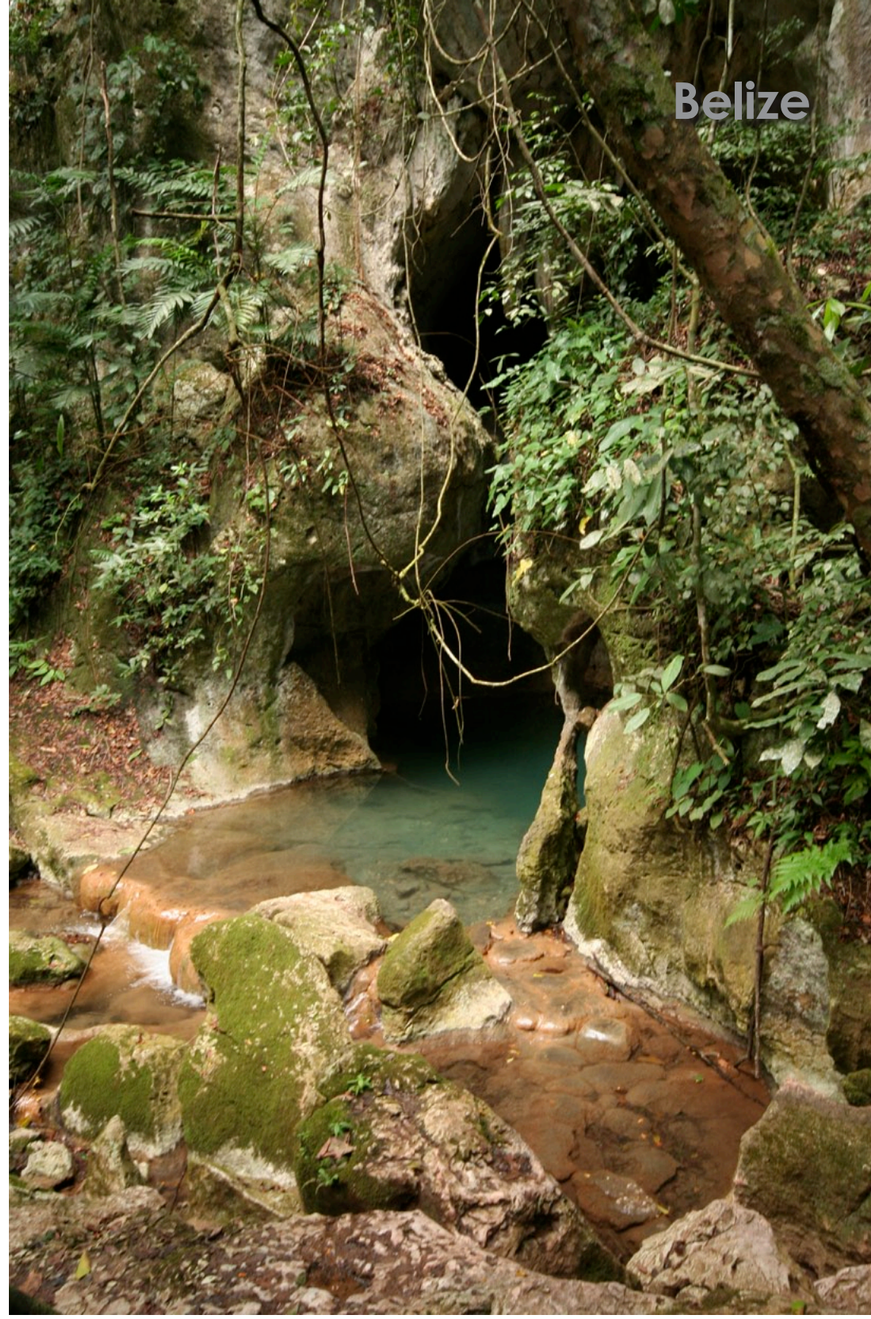
Sam-I-am, another of our dive masters, called out the five minute warning, and we all began slipping into our wetsuits. Watching fellow divers ready themselves for upcoming dives is wonderfully exciting for me. You get to see adults suddenly become childlike with eagerness and enthusiasm for what's to come. Life seems to pulse through them, and that contagious surge of emotion sweeps itself over the whole boat until everyone is absolutely giddy with the prospect of getting back in the water.

Jason's Wall. Our fist site, Jason's Wall, was nothing short of spectacular. Towering coral heads rise up like monoliths on the precipice of an imposing sheer face that falls more than 400 feet. We levelled off along the edge of the drop off, and a hulking Jew fish scowled at us, as we passed. Kate spotted a group of banded shrimp congregating on a sponge that would make Shaquille O'Neil look positively puny and paused to get a picture. Nearby, a grumpy looking eel brandished its teeth and lashed its tail back and forth warning us to stay away.

We let the current take us along the coral face, and soon we heard Sam-I-Am wrapping his tank. He pointed out a much larger and much friendlier green moray poking his head out of his den. He was easily two meters long (6ft), and Kate and I waited for the rest of the group to get a good look before we lagged behind to take a few photos.

As I watched her preparing for the shot, I found myself marvelling at the amount of skill and effort it requires to get a quality underwater image. Fighting the current, Kate had to set the shutter speed, change the light settings, manually situate her strobes and avoid scraping her knees and shins across the jagged corals below her—all this while

LEFT TO RIGHT: Lack of overcrowding—guests willing to hike to the upper falls in Cockscomb Basin will often be rewarded with a gorgeous private swimming hole; Seahorse at Salt Water Caye; Much of Belize is covered in porous limestone creating caves like this one and the famous Actun Tunichil Muknal cave



keeping the twisting eel focused in the frame and not scaring the chary animal back into its hole. I realized that she had her wide-angle on, and I admit, I was more than a bit nervous when, after her equipment was set and ready, she got so close to the moray that the rounded glass dome of her housing was less than a centimeter from its open mouth.

Later, as we sat on the bow feverishly telling each other how incredible the dive was, she showed me the moray eel shot on the LCD screen of her digital camera, and I hugged her effusively in congratulations. Then I told her if she ever got that close to one of things again, I'd take her camera away.

Our surface interval took place in South Water's protected lagoon, and the crew cut up mango and watermelon for snacks. Just off the dock, Kate found an area of shallow water (only a few centimeters deep) where a small yellow stingray and three tiny black seahorses were foraging for food. While she put on her macro lens and checked her housing, I wandered the shoreline. There is a little resort on the island, but I only encountered one small group of college kids sunbathing and swimming. Further on, I came across a few snorkelers splashing along the reef that curls around the backside of the caye. Other than that, the island was empty, save a catamaran bobbing up and down in the cyan waters a few meters away. I sat down, digging my toes in the warm sand and took a large, satisfied breath.

Yellow stingray blends into the sea floor at Salt Water Caye

Jaguars, tapirs and snakes—oh my!

Less than 30 minutes drive from Hopkins village is the Cockscomb Basin Wildlife Sanctuary. Established in 1990 as the world's first and only jaguar reserve, the dense jungles and rugged mountains of Cockscomb cover roughly 388 square kilometers (150 square miles). It is also home to the greatest density of jaguars in the world.

We arrived in mid-afternoon after a morning on the water to take a short hike and escape the heat. Kate and I were joined by two more of our cousins who had flown in the night before.

The ranger station provided us with a map of the basin's trails, advising us to watch our steps and stay on the paths, as the rainforests of Belize are home to one of the deadliest snakes in the world—the Fer-de-Lance. If you're bitten by one, you have 30

Stewed chicken, beans n'rice with a cold Belikin is typical Belezian fare

Green moray eel with coral fan and blackbar soldier fish at Salt Water Cayes (left); Placencia sunset with sailboat (inset)

minutes to receive the anti-venom or the neurotoxin kills you.

We said a short prayer that none of us would encounter one and set off through the tangles of the reserve. The path we chose was a rather easy hike to one of the region's many waterfalls, and en-route, we crossed paths with Belize's national animal, the Baird's tapir. He was young and small but quick, and we only got a quick glance of his small elephant-like trunk before he disappeared into the bush.

The sound of the river grew louder and louder as we continued on, and soon we came to a small waterfall that emptied into a large, clear pool surrounded by thick jungle foliage. We wasted no time jumping in.

The four of us swam under the falls for 20 or 30 minutes before discovering a group of natural waterslides eroded into the dark black river bed that swooped down in terraced sections. Perfectly smooth and concave, each stone chute is a few meters long and spills into a larger pool below creating an idyllic natural playground, just right for an afternoon cool down.

As we towelled off and put our shoes back on, Tracy summed up the day best. "I can't believe we're the only one's here," she said. "I mean, this place is amazing and no one seems to know it exists."

Gladden Spit

—Whale shark country

Forty miles south of Hopkins, at the end of a long peninsula, flanked

SO, SHOULD I RENT A CAR OR WHAT?

When visiting the Northern Islands of Belize renting a car is usually not necessary. However, if you're staying in the South, I highly recommend that you do so. I'm not saying a vehicle is absolutely vital, as most hotels have shuttles for excursions, but if you want to do some sight seeing on your own time and visit the most secluded spots, renting a car is a great choice.

- **We picked up a gas friendly 4x4** (a must if you'll be visiting Mayan ruins or nature parks) from the friendly and accommodating folks at Jabiru Car Rentals and made the trip from Belize City to Placencia in just under three hours. The drive through the lush rainforests and dense jungle covered mountains is spectacular and relaxing but there are a few things you need to be aware of when driving in Belize. Here's a short list of things to keep in mind:
- **Night driving.** Many flights coming into Belize City arrive in mid-afternoon, so chances are you'll be doing some of your driving in the dark as you head south. This is not a big problem but I will warn you that the highways are poorly lit and road signs, while sufficient, are few and far between so keep your eyes peeled. Don't let this worry you as Jabiru gives you excellent road maps and Belizeans are super friendly and will be more than happy to give directions if take a wrong turn.
- **Speed bumps.** To cut down on speeding through the villages, the Belize Transportation Department has constructed "speed bumps" the locals call sleeping policemen along the highways, specifically at the beginning and end of each town. The term "speed bumps" is in quotes because they are really more like colossal, concrete road monsters waiting to eat your tires and chew up your suspension. Seriously . . . I'm not kidding, they're about 8-10 inches high. Each one is supposed to be coated with bright, reflective paint but only a few of them are so if you're driving at night and you see a yellow warning sign, for God's sake, SLOW DOWN!!
- **Narrow crossings.** The highway that runs North to South is just two narrow lanes and you'll have to cross at least four or five extremely narrow bridges (one lane only) that only accommodate one car at a time. Slow down and look out for oncoming traffic before crossing.
- **Road animals.** In and around the villages, the main roads are used for all kinds of foot traffic: horses, mules, bicycles and, of course, like any Caribbean destination, stray dogs and cats. Most pedestrians are difficult to see due to the inadequate street lamps and they like to take evening strolls down the middle of the roads so keep your speed to a minimum and watch carefully.

Again, none of this should deter you from renting a car and driving in Belize. It's a small country and having a vehicle makes it much easier to see as much of its natural beauty as possible during your stay. Just use common sense and keep your speed to a reasonable pace. ■

Belize

Azure vase with tube sponges (left) and coral garden of sponges, fan coral and azure vase (far left) at Salt Water Cayes

by a giant lagoon on one side and the Caribbean on the other, you'll find the bright and cheerful village of Placencia.

We arrived the first day of the full moon and were there to dive for a week searching for whale sharks with Seahorse Dive Shop. Started in 1992 by town dignitary and environmental champion, Brain Young Sr., Seahorse is world famous for pioneering whale shark diving in Belize.

Kate and I showed up at the dive shop with pastries for the crew from a local Swedish bakery. Mr. Young was preparing our boat, Deep Blue, and his oldest son, Brian Jr., helped us with our equipment. Sean Young, Brian's middle son, greeted us affectionately in unintelligible Creole slang and loaded a cooler full of Belizean stew-chicken on board. I had heard of this dish and was assured Sean was a master at preparing it.

The ride out to Gladden Spit took over an hour. Doren, resident dive master at Seahorse, used the time to brief us on the area and how the dives would be structured. Once we reached the edge of the reef, he told us, the boat would sail out into the deep blue where giant schools of cubera snapper came to spawn in the days following the full moon. Brian Sr. would use sonar to find the school and, once over the top of it, we would get in and hover in a tight circle above the swarming fish. Our collective bubbles would simulate the spawning of the snapper and the release of their eggs, a principle source of food for the whale sharks. If there were any of the 20-ton fish nearby, they would come to investigate.

Kate and I were beyond excited. Many divers classify a whale shark sight-

Green moray eel at South Water Cayes

GROWING PAINS

Placencia, for better or worse, has been discovered by the world at large and is growing at a steady pace. Compared to other well-known vacation destinations, it is still relatively small and unspoiled by hordes of tourists, but expansion and increasing popularity has forced the peninsula's residents to make some tough decisions regarding the future.

Brian Young Sr., a tourism board member, invited us to a town hall meeting of sorts at the village's soccer field where a couple hundred locals, business owners and tourist officials debated weather or not Placencia should allow cruise ships to construct a port of call in its harbor.

The economic recession and the resultant slowdown in tourism has hit the Caribbean hard the last several years and several locals, desperate for any trade dollars, were hopeful that cruise ship passengers would bring much needed finances into the area. But the majority of attendees were fervent about preserving their natural resources and keeping companies like Carnival out of Placencia's waters.

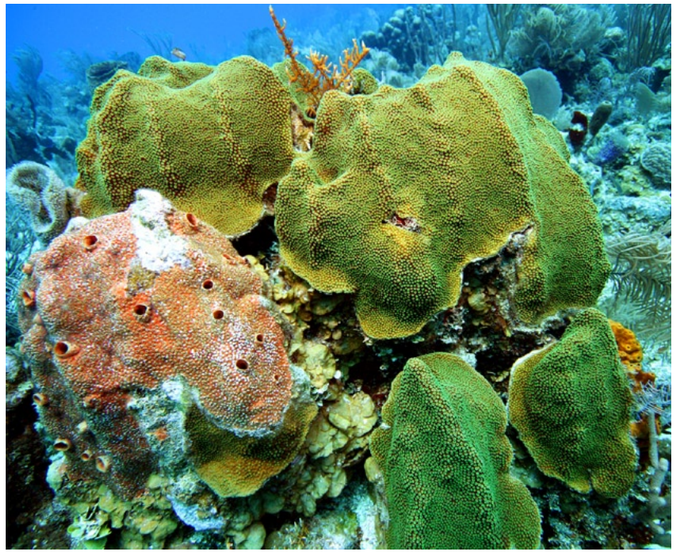
"Our reefs are all we have and we have to stand up and defend them," said one local guide in attendance. "And even though I'm watching my fellow Belizeans struggle, we can't give in to the ruination the cruise industry will bring for a little bit of fast money."

I asked Brian, as a local business owner what he thought. His answer, like his character, was passionate and heart-felt.

"I'm not in favor of bringing in massive, tourist-filled boats like they do in Belize City," he said. "The cruise trade has been a nightmare up there, and I won't allow that to happen here. But what I would like to see are small, 100-150 passenger boats come in for short stays throughout the year. We did this in the 90's and it worked well. The village was never overrun, and the tourists hired guides for diving, fishing, inland tours and nature walks.

"It worked well, and it can work again. We just have to be careful that our reefs and our lands remain the number one priority, or my grandchildren are going to be in trouble. We can't just look at a short term solution, we need to be looking at how our decisions today will affect our country and our families for the next several hundred years. If we make the right choice now, even though it may be tough for my generation, it will help sustain future generations. And that's far more important."

Well said, Brian. The world needs more people like you in it. ■



CLOCKWISE FROM LEFT: Diver hovers over sleeping nurse shark at Salt Water Cayes; Green cup coral and close-up of sleeping shark at Salt Water Cayes; Seahorse and trumpet fish at Salt Water Cayes

ing as the Holy Grail of diving, and we are no exception. Once we crossed the outer reef and entered the large, heaving swells of the open ocean the boat was immediately tossed back and forth in great listing yaws. A couple snorkellers who had joined us couldn't take it and spent the rest of the afternoon vomiting over the rails. After ten minutes of searching Brian Sr. yelled out from the captain's chair, and we all jumped in as fast as possible.

It's a strange sensation diving in the open ocean. You have no frame of reference, and you're totally surrounded by an endless expanse of blue stretching to infinity in every direction. We descended rapidly, trying to get below the swells and not wanting to lose the snapper.

Doren tapped his tank, beckoning us to follow, and off we went, down and down into the emptiness. After a few minutes of searching, Doren pointed out the silhouettes of thousands of twisting and slashing fish about 15 meters below us. We had been instructed to level off at 22 meters (70ft) and under no circumstances were we to drop below 25 (80ft)—that would only push the school down deeper and end our dive.

As we hovered, the immense group of fish began to ascend, and soon we were only a few meters above them.

Cuberas, I realized, are big fish, easily over a meter (3ft) in length and weighing close to 25 kilos (40 lbs). We followed them for quite awhile, as they drifted along, and soon we were joined by a second school—this one made up of several hundred horse-eye jacks.

The bright silver jacks seemed fairly inquisitive and surrounded our small group of divers, circling us in a spiralling column rising towards the surface. For a moment, I forgot about the snapper, but a large shifting shadow below caught my eye, and I turned back towards the cubera.

Three bull sharks, thick and lethal, cruised through the center of the school. My heart began thudding rapidly in my chest, my breathing involuntarily quickening. I'd never seen bull sharks before, and I'm not ashamed to admit I was a bit frightened. I could feel my body galvanize with adrenalin, and I grabbed Kate's arm, pointing at the three fierce-looking sharks. She nodded slowly, enraptured by them. I took a few deep breaths to slow my heart. It calmed me some to watch them move carelessly among the snapper, recognizing that these bulls were not concerned with us.

After 40 minutes, Doren signaled

SEAHORSE DIVE SHOP
—Tradition and excellence

I cannot say enough about the folks at Seahorse. This family-run dive business truly takes you in and makes you feel like one of their own. They treat you to homemade meals, let you fish off the stern at sunset on the trips back home form the reefs, invite you for drinks at local eateries where Carleton and his band play reggae tunes, and best of all, these guys know where to dive.

You'll more than likely be begging for a trip out to the Blue Hole, and they will be more than happy to take you, but listen when they suggest alternative sites with even more eye-popping scenery. I won't write the names of some of these dives here, lest I spoil their secrets, but let me assure you, they can take you to a few places you won't believe. Our favorite was a cave dive safe enough for any advanced cert. carrier that will absolutely blow your mind.

Opening his doors in 1992, Brian Young pioneered not only whale shark diving in Belize (he was featured in *National Geographic* and several other major publications) but also paved the way and led the efforts to establish marine parks, marine reserves, and protected fishing grounds throughout the reef.

If you find yourself in Placencia, there really is, in this diver's opinion, no other choice than Seahorse. You won't be disappointed. Visit: **www.belizescuba.com** ■

Still intact ancient Mayan steale carving (above) at ruins of Nim Li Punitt found via dirt road (right)

TOP TO BOTTOM: The largest, most impressive Mayan ruins in southern Belize are at Xuantunich; Ancient Mayan steps at Lubaantum's ruins; Friendly archeologists can be found roaming the ruins at Xuantunich

naled the end of the dive, and we headed up. No whale sharks today.

Placencia

—Crown Jewel of Southern Belize

I'm not sure what it is exactly, but Placencia stole a piece of my heart. There is something indescribable about the whole place that seems to seep into your bones and radiate through your soul. No matter what we were doing or who we were with, I found myself not wanting to leave.

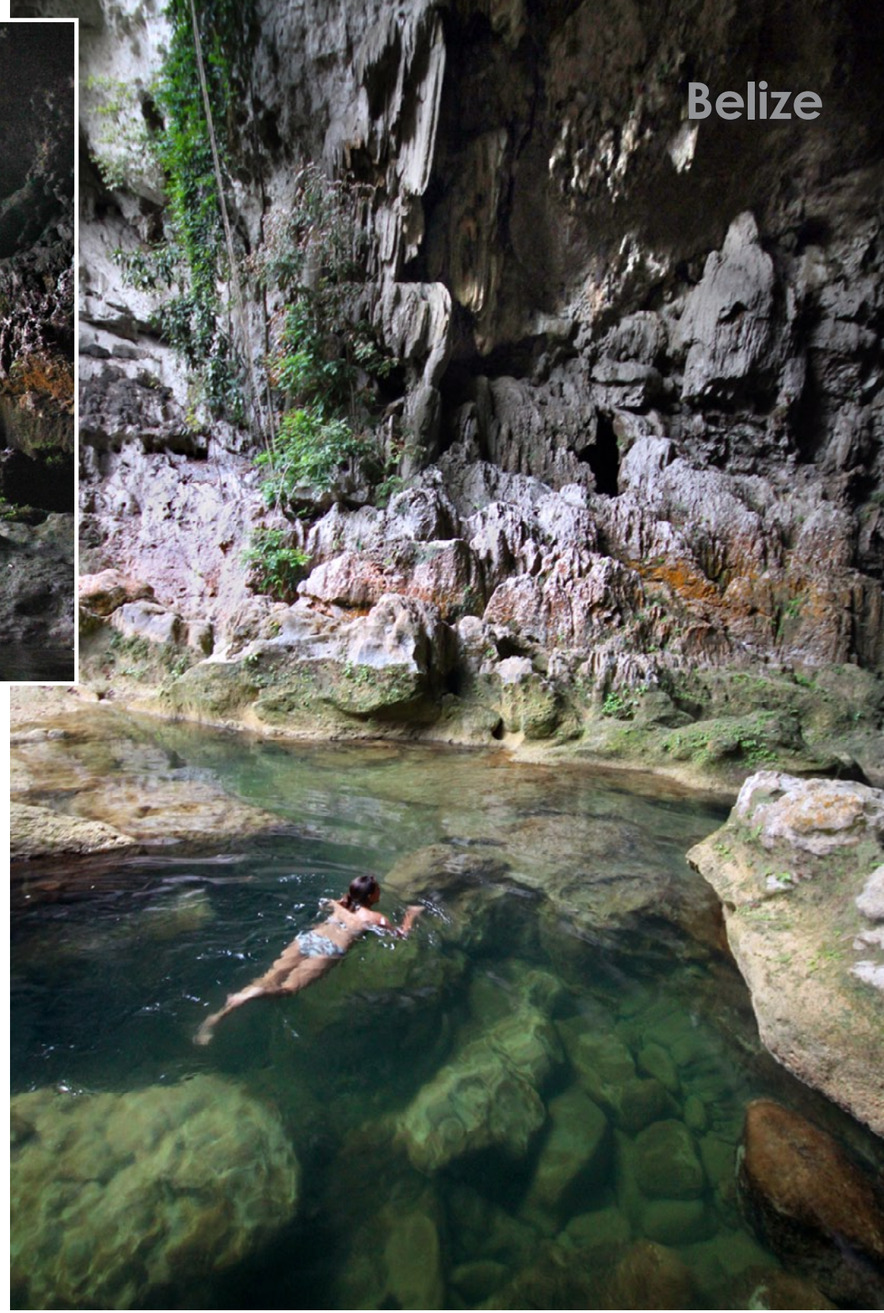
The locals are friendly, laid-back and personify the word, chill. The village itself is dominated by colorful clapboard houses, locally owned guest houses and beach side eateries, our favorites being the Tipsy Tuna and the Barefoot Beach Bar. Placencia also boasts some of the best beaches in the country, and you'll be hard pressed to find more than a handful of people on any of them.

The village is a perfect "base camp" for visiting Southern Belize as inexpensive puddle jumpers fly in and out regularly from Belize City, and now that a brand new highway has been completed, it is easier than ever to get to. We had planned a couple of inland adventures between diving days to check out what Southern Belize had to offer and, believe me, it does not disappoint.

Our first excursion took us less than an hour away to a Mayan ruin that our guide book dismissed as "unremarkable". Factually, I think the author must have been dropped on his head as a child, or maybe he was ridiculously hung-over when he visited, because the partially reconstructed sight of Lubaantun is absolutely breathtaking. This site is easily accessible by car, and despite the slightly smaller size, it's still very worth a visit and should not be missed.

After a short tour of the visitor's center, the four of us hiked among the towering rock structures and crumbling ruins, marveling at the complexity of the site. It was hard for me to wrap my mind around the precise mathematical symmetry used to build each structure. The amount of physical labor it took to construct the city was baffling.

We met a small group of Belizeans in sweat-soaked khakis who worked for the archeological



LEFT TO RIGHT: Dwarfed by the size of the cave opening, writer Kelly LaClaire gazes out at the Belizian rainforest that surrounds the cooling waters of Blue Creek Cave; View looking out of the cave entrance at the dense Belizian forest; A guest enjoys a refreshing swim at the cave

society, hacking back the ever encroaching jungle with nothing more than a few machetes. They were obviously hot and tired but seemed more than happy to stop and talk with us about Mayan culture and the various architectural aspects of the site. Lubaantun, they told us, is only one of two known sites in the Mayan world where all the rocks used in construction were smoothed down to have rounded shaped edges. No one knows why this was done.

I would like to have stayed there the rest of the day, exploring the ancient city's nooks and crannies, getting lost in its history, but the sun was beginning to sink and we wanted to get to our next destination before sundown.

As we were leaving Lubaantun, I looked back at the stone pyramids and green fields, counting the other visitors. I only saw one.

A short drive later we arrived at Blue Creek, named for the river that runs through the village. A few ladies lined the road selling Mayan trinkets and baskets while others sat on boulders in the creek washing clothes with stones. We set off on a clearly marked trail that follows the river and weaves its way through the trees and vines for about a half mile before it ends at the mouth of a stunning six-story cave.

After we swam in the pool at the cave's entrance, we pulled out our dive lights and gave three local kids five dollars each to take us spelunking into the black depths of the giant cavern. Cave systems like these are ubiquitous in Belize and spelunking is a popular sport with locals and visitors alike.

Our adolescent tour guides told us that Blue Creek cave extends back for over six miles, and that if you go back far enough, you'll find an underground waterfall that crashes out of the ceiling of the cavern. Thirty minutes in the spooky black interior was long enough for us, and we decided to turn back.

Outside, the sun was setting, and we got in another swim before a few swooping bats that had come out to hunt chased us out of the water and back towards our car.

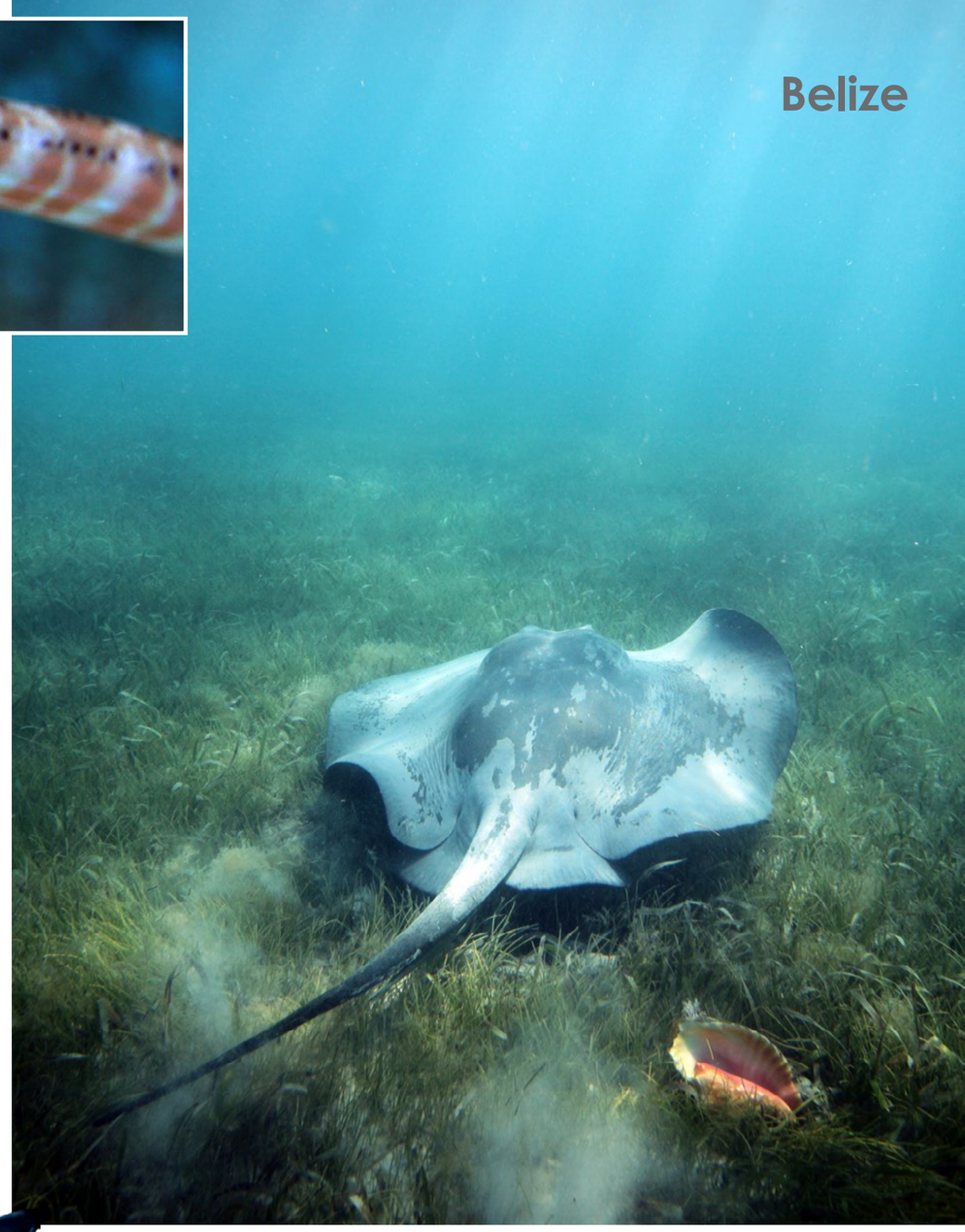
Guess how many tourists we saw.

Silk Cayes

We spent three frustrating days in search of the world's largest fish, but Mother Nature is often fickle, and the whale sharks never made an appearance. Kate was getting restless. So far, she had very little opportunity to get some macro shots. So

Belize

CLOCKWISE FROM FAR LEFT: Happy snorkeler and loggerhead sea turtle at Silk Cayes; Trumpet fish at Silk Cayes; Caribbean whip tail stingray; Doctor fish; Brain coral and cleaner goby



the crew at Seahorse took us out to a string of deserted islands known as the Silk Cayes where the reefs are rich and vibrant even at considerable depths. Perhaps the sea life there felt sorry for our previous days of fruitless searching because they came out in force. Turtles, eagle rays, eels, countless species of fish and a solitary reef shark all came to say hello. It was as if we brought along a diver's bucket list and got to check off nearly every item on it in one spectacular dive.

We ate homemade barbecue and fresh tuna salad under the shade of palms while watching a family of pelicans swoop and dive for fish at the island's edge. A group of three friendly and playful dolphins had come to investigate the small group of snorklers who were with us, and they were laughing about the experience while sitting in the sand.

Before we left for the day, our little boat stopped at a location I have sworn to keep secret. As we approached, I saw an old wooden boat bobbing up and down—its crew a group of leathery-skinned free divers cleaning the day's catch. Our group slipped into the water with just our snorkel gear and were treated to the best deco stop ever. Two giant loggerheads were sparring under the bow for conch scraps, and three or four spotted eagle rays slowly circled the stern waiting for their chance. Several large sting rays fluttered along the grassy seas bed, and a blacktip reef shark, followed by three nurse sharks came to investigate the free meal of fish offal being thrown overboard. It was the best snorkel dive of my life. Had that been our only time in the water, our entire trip would have been worth it.

On the ride back to Placencia, Carleton Young (aka "Patu")—Brian Sr.'s brother and part owner of Seahorse—handed Kate and I an ice cold Belikin and toasted our visit. He invited us to come back next spring break for a diving trip though the Cayes and down into Panama aboard a catamaran he charters called the *Wild Orchid*.

"Geeze, Carleton," I said smiling, "We'll need to think about that. I mean, we had planned a whole rain-filled weekend of diving in the freezing Puget Sound with 30 other divers and two scuba classes. It's gonna break my heart to have to give up the double 60mm wetsuit I usually shove myself into to keep my heart from stopping, just to come back here."

"I guess that makes sense," he laughed, sweeping his hand towards the empty sea. "It's pretty awful out here—and the crowds here are pretty hard to put up with." ■

Kelly LaClaire is a dive writer based in Portland, Oregon, and his cousin, Kate Clark, is an underwater photographer from the same city. They travel as a team to cover dive locations in the Americas, the Caribbean and the Pacific.

fact file

Belize

SOURCE: CIA.GOV WORLD FACTBOOK

RIGHT: Location of Belize on global map.
BELOW LEFT: Map of Belize
BELOW RIGHT: Belizian breakfast of black beans, eggs and fry jacks—deep-fried pieces of dough—available at the Maya Beach Restaurant in Placencia

History Belize was the site of many thriving Mayan city states until their mysterious decline at the end of the first millennium A.D. The British and Spanish fought over the land throughout the 17th and 18th centuries until it formally became the "Colony of British Honduras" in 1854. Full internal government was granted in 1964 and in June, 1963, the official name of the country was changed to Belize. Territorial disputes between the UK and Guatemala continued for years and delayed the independence of Belize until 1981. Guatemala refused to recognize the new nation until 1992 and the two countries are involved in an ongoing border dispute and military groups still patrol Belize borders near the Guatemalan borders although no incidents have been reported for years. Tourism has become the mainstay of the Belizean economy. Current concerns include the country's heavy foreign debt burden, high unemployment, and one of the highest prevalence rates of HIV/AIDS in Central America. Government: Parliamentary Democracy. Capital: Belmopan

Geography Belize is located in Central America, bordering the Caribbean Sea, between Guatemala and Mexico. Coastline: 386km. The terrain is dominated by lush tropical rainforests and low mountains in south. Lowest point: Caribbean Sea 0m. Highest point: Doyle's Delight 1,160 m. Note: Belize is the only country in Central America without a coastline on the North Pacific Ocean.

Climate Tropical; hot and humid. The rainy season runs from May to November and the average rainfall is 60 inches per year in the north and around 150 inches in the south. The dry season is February to May. The average temperature in Belize is 81 F. Belize has a hurricane season (June to November) and coastal flooding can occur but is not common.

One of the nicest things about Belize is the fact that all beaches are public property, so if you're walking around and find a nice shady hammock under some palms, buying a drink from the local restaurant or bar will earn you the ticket to enjoy that portion of the beach all day

Environmental issues
Deforestation is a concern; water pollution from inadequate sewage systems is a problem in localized areas; agricultural runoff is a factor in in-land areas. Belize is party to: Biodiversity agreements, Climate Change pact, Climate Change-Kyoto Protocol, Desertification treaties, Endangered Species acts, Hazardous Waste laws, Law of the Sea, Ozone Layer Protection, Ship Pollution treaties, Wetland salvation and preservation, Anti-Whaling laws.

Economy Tourism is the number one foreign exchange earner in this small economy, followed by exports of marine products, citrus, cane sugar, bananas and garments. The government's expansionary monetary and fiscal policies, initiated in September 1998, led to GDP growth averaging nearly 4% in 1999-2007. Oil discoveries in 2006 bolstered this growth. Exploration efforts have continued and production has increased a small amount. Growth slipped to 0% in 2009 and 1.5% in 2010 as a result of the global slowdown, natural disasters, and the drop in the price of oil. With weak economic growth and a large public debt burden, fiscal spending is likely to be tight. A key government objective remains the reduction of poverty and inequality with the help of international donors. Although Belize has the second highest per capita income in Central America, the average income figure masks a huge income disparity between rich and poor. The 2010 Poverty Assessment shows that more than 4 out of 10 people live in poverty. The sizable trade deficit and heavy foreign debt burden continue to be major concerns. Natural resources: garment production, food processing, tourism, construction, oil. Agriculture: bananas, cacao, citrus, sugar, fish, shrimp and lumber.

Currency Belizean dollars (BZD). The Belizean dollar is pegged to the American dollar at 2 to 1.

Population 321,115 (July 2011) Ethnic groups: mestizo 48.7%, Creole 24.9%,Maya 10.6%, Garifuna 6.1%,other ethnic groups 9.7%.
Religion: Roman Catholic 49.6%, Protestant 27% (Pentecostal 7.4% ,Anglican 5.3%, Seventh-Day Adventist5.2%, Mennonite 4.1%, Methodist 3.5%, Jehovah's Witnesses 1.5%), other religions 14% (2000 census).

Language Spanish 46%, Creole 32.9%, Mayan dialectSpanish 46%, Creole 32.9%, Mayan dialects 8.9%, English 3.9% (official), Garifuna 3.4%, German3.3%, other languages 1.4% (2000 census).

Hyperbaric Chambers
San Pedro, Ambergris Caye
Emergency: 501-226-2851
ambergriscaye.com

Websites
Placencia Tourism
www.placencia.com

Nurseries of the Seas

Mangroves

Text by Tyge Dahl Hermansen

Mangrove forests are significant habitats that exist throughout the tropical belt across the globe. Mangroves are adapted to the specific terms that exist in intertidal marine zones.

In America, New Zealand and Australia mangroves extend to the subtropical zone, and they have their range limits at the most southern point of Australia.[1] Eighty-four species of mangrove trees have been identified across the world of which 70 (including 12 varieties) are true mangroves, while 14 are semi-mangroves.[2]

A wide diversity of animals is found in mangrove swamps. Since these estuarine swamps are constantly replenished with nutrients transported by fresh water runoff from the land and flushed by the ebb and flow of the tides, they support a bursting population of bacteria and other decomposers and filter feeders. ■

Mangroves are obligate to mangrove forests and adapted to the specific conditions that exist in intertidal marine zones.[3] Dependent on the tides, mangroves grow in soft mud or sand and have adapted by localizing approximately half of their weight in the roots.[4]

Mangroves have a complex ecology because of their interaction with physical forces such as tides, surface sediment runoff, river and groundwater discharge, waves, and varying amounts of sediments, nutrients and saltwater.[5] They live in coastal settings with freshwater runoff, multiple substrate conditions, prolonged hyper periods, varying salinity, anoxic conditions, accumulation of toxic substrates, perpetually changing temperatures and changing oxygen concentrations.[6]

But throughout geological time,[7] they have proved very suitable for adaptations to these conditions, which is why they have survived until today. But it is hard to predict how suitable mangroves are for survival in the future because, as pointed out in a paper by Berger et al. in 2008: "When coastal landscapes become fragmented by urban transformation of regional and coastal settings, mangroves are [becoming] less self-maintaining as coastal processes are modified."

All these factors together with the pressure of global warming,[8] makes the conditions for the survival of mangroves in the future very difficult and a world without mangroves realistic.[9] They are one of the most threatened ecosystems in the world today, suffering from conversion, over-exploitation and pollution.[10]

For example, in the Mexican LaPaz region, 23 percent of the mangroves were "wiped out" in the years from 1973 and 1981,[11] and in Asia, 26 percent of the mangrove forests in the six countries that were most influenced by the tsunami on 26 December 2004 have been destroyed during the last 20 years.[12]

Furthermore, many people think that mangrove forests are negative ecosystems plaguing urban areas with swamps that act as hatching places for mosquitoes, beetles, wasps and other insects, which are unwanted in the human community, and it is thought that mangroves


NOAA

Grass shrimp


PETER SYMES

These mangroves in Florida are important ecosystems, which provide breeding grounds and nurseries for marine life

SCOTT BENNETT

Exposed roots of mangrove trees reach into nutrient rich waters

Mangroves

JOHN E RANDALL / USGS

Mangrove goby

produce poisonous bacteria, gases and bad smelling substances, which pollute the surrounding areas. Therefore, it seems that the common perception of the local community is that mangrove forests and trees should be erased from locations near areas under urban development or agriculturally important areas. Nothing could be further from the truth.

Why is it important to conserve the world's mangrove populations?

The importance of mangroves is obvious if one looks at the fact that they provide a variety of other ecosystems with a broad array of service functions[13] such as grounds for spawning, breeding, nurseries and hatching areas for many different marine species[14] including support of a range of economically and biota important to conservation.[15]

They protect coastlines against sediment movements[16] and promote sedimentation.[3][4] They protect people and coastlines against extreme weather conditions[17]—for instance, by reducing the height of waves, which protects fragile marine life against stormy weather of all kinds.[18]

Many people who died in the 2004 tsunami catastrophe in Asia might have survived if the mangrove population along the coast had been intact, which provides food supply for fishes, crabs, prawns and humans,[19] and regulates the air and water quality,[20] climate, soil formation, as well as the primary production and the circulation of nutrients and water.[21]

Mangrove systems belong to the most productive ecosystems in the world. For example, each hectare of the mangrove forests of Sumatra contribute approximately 500kg of shrimp and fish each year,[22] and in Mexico, within 13 selected marine regions during 2001-2005, around 10,5000 tons of fish and crab worth US$19 million were harvested. About a third of these fisheries have species that rely on mangrove habitats.

The Mexican mangrove areas are sold by the Mexican government for US$1,000 per hectare but produce a median value of $37,000 per hectare.[23] Mangroves also provide wood for timber and fuel.[24]

Furthermore, researchers have found that several towns described by Marco Polo as coastal towns in the 13th century, are actually located more than 100km from the coast today.[25] This phenomenon is partly caused by the deposit of sediments in the mangrove forests of Sumatra. The Millennium Ecosystem Assessment, 2005, classifies these ecosystem services into four groups—supporting, cultural, regulating and provisioning services.[26]

From this, one can see that the mangroves make up an extremely important habitat type that is decisive for the survival of the two other main coastal marine ecosystems: coral reefs and sea grass.[27] Because of this relationship and because mangroves and their inhabitants (as well as other species occupying coastal wetlands) are vulnerable to global warming,[28] urban and agricultural disturbances,[29] and because their capability to expand their range is restricted by the specificity of their habitats,[30] it is particularly important to intensify the research in mangroves' capability to survive in the future.

However, many of these problems have been faced by a number of countries that pay attention to induced or natural mangrove recovery.[31] Models that simulate management planes for protection, rehabilitation and restoration of mangroves have also been constructed.[32] These models could help governments through future planning of mangrove conservation, and further research in theoretical modelling is necessary to improve existing models or constructing new and even better models.

Furthermore, mangrove rehabilitation has been carried out or planned in several countrie. For example, the World Conservation Union (IUCN) and the United Nations development programme for the reestablishment of the mangrove populations in the 12 countries hit by the December 2004 tsunami—Mangroves For the Future (MFF)—will run over six years.[33] Such initiatives are mostly welcome and very helpful for the conservation of the world-wide mangrove population. ■

[1] GILL AND TOMLINSON, 1971; HOGARTH, 1999; DUKE, 2006
[2] WANG ET AL., 2003
[3] BALL, 1988; HOGARTH, 1999; DUKE, 2006; KRAUSS ET AL., 2008
[4] KOMIYAMA ET AL., 2008
[5] BERGER ET AL., 2008
[6] LUGO, 1980; BALL, 1996; HOGARTH, 1999; BERGER 2008; LAMBS ET AL, 2008
[7] ELLISON, 2008
[8] GILMAN ET AL., 2008
[9] DUKE ET AL., 2007
[10] FARNSWORTH AND ELLISON, 1997; DAHDOUH-GUEBAL AND KOEDAM, 2008; ELLISON, 2008
[11] DALTON, 2008
[12] DANIELSEN, 2005; FAO, 2003
[13] SEE ALSO: FAO, 2007AB
[14] BARAN, 1999; BARBIER, 2000; DAHLGREN ET AL., 2006; WALTON ET AL. 2006; DAHDOUH-GUEBAL AND KOEDAM, 2008; NAGELKERKEN ET AL., 2008; WALTERS ET AL., 2008; TSE ET AL., 2008
[15] DANIELSEN, 2005; CANNICCI ET AL., 2008; ELLISON, 2008; NAGELKERKEN ET AL., 2008
[16] MENDOZA AND ALURA, 2001; WALTON ET AL., 2006
[17] DAHDOUH-GUEBAS, 2005; DANIELSEN, 2005; WALTON ET AL., 2006; ELLISON, 2008
[18] DANIELSEN, 2005; ELLISON, 2008
[19] DANIELSEN, 2005; NAGELKERKEN ET AL., 2008
[20] WALTERS ET AL., 2008
[21] WALTERS ET AL., 2008
[22] DANIELSEN, 2005
[23] DALTON, 2008; UBERTO-OROPEZA ET AL, 2008
[24] ELLISON, 2008
[25] DANIELSEN, 2005
[26] WALTERS ET AL., 2008
[27] MOBERG AND RÖNNBÄCH, 2003; HARBORNE ET AL., 2006
[28] GILMAN ET AL., 2008
[29] HARTY AND CHENG, 2003
[30] THOMAS, 2006
[31] STEVENSON ET AL., 1999; LEVIS ET AL., 2005; BOSIRE ET AL., 2008; DAHDOUH-GUEBAL AND KOEDAM, 2008
[32] TWILLEY, 1997; FIELD, 1998, 1999; DOYLE ET AL., 2003; DUKE ET AL, 2005; TWILLEY AND RIVERA-MONROY, 2005
[33] STONE, 2006; IUCN-MFF; MFF

Mangroves For Fiji

Text by Scott Bennett

In the Pacific, mangrove habitats have been decimated via a culmination of over harvesting, urban development, reclamation for tourist resorts and the proliferation of squatter settlements.

Holistic approach

Despite the seemingly incessant reports doom and gloom, there are glimmers of hope. In Fiji, one local dive operator is playing a vital role to halt the destruction. Situated on the island of Viti Levu, Beqa Adventure Divers has initiated a holistic conservation project aimed at protecting this besieged environment.

Long striving to minimize their environmental impact, the company had found it difficult to substantially minimize its carbon footprint. With vehicles, boats and compressors an integral part of its business, the company was disturbed but its resulting high emission. With global carbon trading on the increase, the company could have easily paid an intermediary to finance a forest or windmill in some far-flung destination. A homegrown solution was sought, but when no such initiative was found, the company decided to run a project themselves. Called "Mangroves for Fiji", the privately-funded scheme combines the advantages of planting mangroves while offsetting their own carbon footprint. To do so, the company is offsetting the entirety of its carbon emissions by planting a corresponding number of mangroves throughout Fiji.

Sustainable results

In order to achieve sustainable results, Beqa Adventure Divers engages directly with local communities, schools and grassroots initiatives whilst availing welcome mediation by various Government Departments. Heading up the project is resident marine scientist Arthur Sokimi. Having studied Marine Science at Fiji's University of the South Pacific, he has garnered a wealth of information about the subject and ironed out the initial kinks by co-running a pilot project in Galoa village. Sivorosi "Sivo" Naivua is the President of the Galoa Village Youth and one of the absolvents of the company's village youth sponsorship programs. Having worked for OISCA, a Fiji Agro-Forestry Development Project, he has had extensive experience in mangrove planting, having co-managed the successful pilot project. The heart and soul of the operation is Nanise "Nani" Ledua, Beqa Adventure Divers' Office Manager. she provides a wealth of networking and organizational skills and is likely to be the first point of contact when contacting the company.

Government support

The project is supported by a number of government departments, including Environment, Forestry and Fisheries as well as the Marine Ecology Consulting, is Fiji and the South Pacific's leading company for Coastal and Marine Ecology Assessments.

Conservation of mangroves and their associated ecosystems has been identified as a key natural adaptation strategy and mitigation measure to climate change. Protection of these vital ecosystems also safeguards and enhances the livelihoods of coastal communities. In the Pacific, mangrove habitats are acknowledged to be especially important to the traditional lifestyles of its people.

Apart from the physically protecting coastlines, they are a valuable food source, providing a myriad of fish, crabs, prawns and shellfish as well as seeds that are consumed in many parts of the Pacific. Furthermore, they provide are an important source of firewood and building material for housing.

Carbon sequestration

For this project, it is assumed that one hectare of Mangroves (= 10,000 Mangrove trees) sequesters one metric ton of Carbon every year. Planting will be effected in cooperation with local stakeholders that shall be paid FJD 1,000 for every hectare of restored Mangroves. Beqa Adventure Divers operate and pays for a small project team that will be on call for establishing and keeping all the necessary contacts, inspect sites, share information, disburse the funds and assist any partners in Fiji and abroad.

With projects underway in a number of villages throughout the country, the future looks brighter for one of Fiji's most endangered ecosystems.

— *Reprinted from* AquaCorps, *Issue No. 2, July 1990*
The Independent Journal for Experienced Divers

20 years on... *AquaCorps* ...What has changed?

On Your Own: The Buddy System Rebutted

Buddies are not essential for a safe dive. On the contrary, buddies often increase the risk of a dive, either directly through unpredictable or unreliable actions, or indirectly, through an unfounded belief that security is enhanced by numbers alone, regardless of the training or state of mind of the buddy. In most instances, a competent solo diver would be much safer than the average buddy dive.

Text by Bob Halstead
Photos by Peter Symes

Most textbooks do not define the buddy system—an interesting point in itself. I define it as the situation that occurs when two divers of similar interests and equal experience and ability share a dive, continuously monitoring each other throughout entry, the dive and the exit, and remaining within such distance that they could render immediate assistance to each other if required.

Obviously, this definition represents the ideal, and upon honest examination, it's clear that it has little to do with the reality as practiced by most divers. The truth is that on most dives, the buddy system fails.

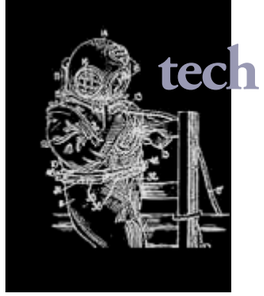
I've been an active diving instructor for 20 years, and a professional sport diver for 13 years; I've made over 5,000 dives and have personally supervised—without serious incident—over 90,000 dives. During this time, I've seen buddies that were incompatible either through interest of ability; buddies that spent their dives looking for each other; divers dependant on their buddies; divers who claimed to be buddies on the boat, but who ignored each other in the water; buddies who failed to communicate; buddies who fought in the midst of a dive; and divers who failed to recognize distress in a buddy, let alone attempt to assist.

"It is no light matter to make up one's mind about anything, and once it is made up, it is even harder to abandon the position. When a hypothesis is deeply accepted it becomes a kind of growth that only surgery can amputate. Thus beliefs persist long after their factual basis has been removed, and practices based on beliefs are often carried on even when the old beliefs, which stimulated them, have been forgotten."

John Steinbeck,
"The Log from The Sea of Cortez"

This last situation brings up a vital point. The buddy system implies that divers will be able to recognize a problem with their buddy and do something about it. Most are never put to the test, but experience indicates that if they were, many would fail. An analysis of diving fatalities in Australia and New Zealand over the past ten years found that 45 percent of the fatalities involved buddies who were separated by the fatal problem or who were separated after the problem commenced. Another 14 percent stayed with the buddy, but the buddy died anyway. Just being together is not enough.

From these observations, I've concluded that the buddy system is mostly mythical. It is unreasonable, unworkable, unfathomable, and unnatural. Rarely—very rarely—I see a couple who buddy dive as the ideal. In my view, most diving today is, in fact, solo diving, even if the divers claim to be buddy diving. Unfortunately, because it is taboo, most divers have



tech talk

had no specific training to qualify them for such solo diving.

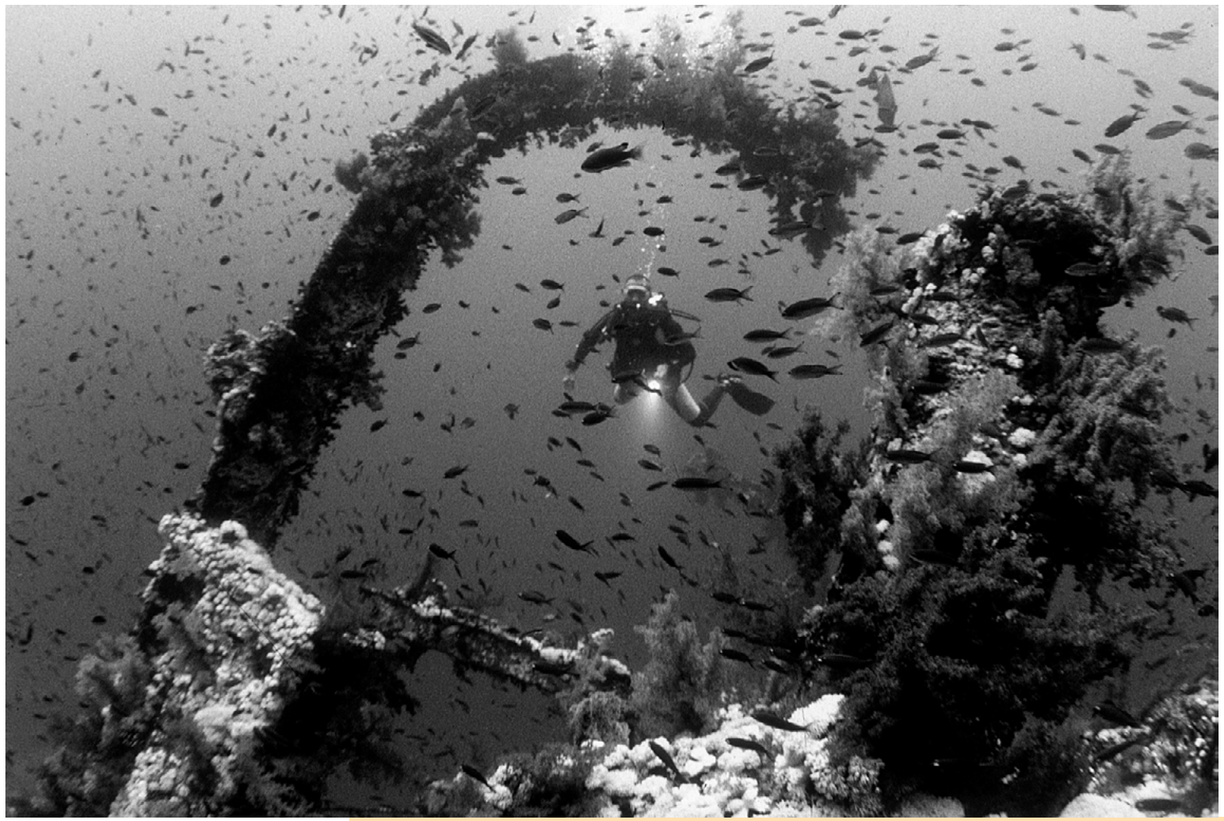
What does it take to be prepared for high-tech diving? Knowledge, practice, the right kit and good planning.

To Buddy or Not to Buddy...

How did we get ourselves into this mess? I am told that the "never dive alone" rule originated with the YMCA "never swim alone" program that was popular when dive instructor agencies were just getting going in the late 1950s. Why has the rule stayed with diving? Undoubtedly, because people are nervous about being out of their natural breathing element and at the mercy of the monsters of the deep. Fear is the motivation for the buddy system. Divers do not want to be eaten. There is nothing strange in this fear; what is strange is the response to it: get a buddy.

There is an old joke that the buddy system reduces the chance of getting eaten by percent. Regrettably, the divers that repeat this joke are often serious. Instead of finding out about real behavior of marine creatures, or developing fail-safe scuba gear and a back-up breathing system, the diving community has opted for the comfort of having a buddy. Many divers choose a buddy simply because they are alarmed at being alone, and not because there is a possibility of the buddy actually assisting in an emergency.

Unfortunately, few people defending the buddy system seem to address the critical point of whether it does, in fact, make diving safer as intended. Since the introduction of the buddy system 30 years ago, a large body of divers has developed who have made careers out of sport diving. These people must now look to their experience to decide whether or not the buddy system has worked, or whether it should be modified or even abandoned.



Analyzing Dive Risk

All diving involves risk. As soon as you step near a full scuba cylinder you are at risk. And every step that you take getting on and into the water increases your risk. In fact, there is an escalating scale of risk as dives become more complex. In general, the risk of a certain dive is a function of the technical requirements of the dive and the environmental conditions. It has nothing to do with the diver.

Novice divers, it seems from the accident reports do equally risky things, apparently without recognition of the risks involved.

In theory, we should be able to grade every dive for its risk factor. However, this is difficult in practice. Though many a cave dive have been graded, ocean dives are another matter. Ocean conditions, being variable, may make a dive low-risk one day and high-risk the next. Nevertheless, an accurate assessment of the risk factor for any dive must be made before the dive is attempted. This is why experience is so valuable and why risk assessment is a critical duty of dive masters and instructors.

The actual danger posed by any particular dive depends on three factors: first, the dive itself—the risk factor; second, the diver attempting the dive—the skills available to overcome the risk; and third, the buddy—the wild card—who may make the dive less or more dangerous.

Safe diving occurs when the diver's skills, experience and knowledge match or exceed

On Your Own

the skill, experience and knowledge requirements of the dive.

For instance, diving shallower than 30 feet in calm, clear, warm water devoid of marine life qualifies as low-risk. Yet, such a dive could be dangerous if the diver does not understand the consequences of breath holding on ascent. Similarly, a dive to 200 feet in dark, cold water with a strong current is undoubtedly a high-risk dive, but one that can be made safely if the diver has the appropriate abilities and back-up. Professional divers make these kinds of dives all the time.

Of course, judging the danger of a dive is more a matter of probabilities than absolutes. A dangerous dive is one where it is likely that an injury will occur, a safe dive where it is unlikely—but not impossible—that an injury will occur. The point is that a high-risk dive—one that is deeper, longer, colder, rougher, involves penetration of a wreck or a cave, encounters a current, involves dangerous marine animals, or is difficult to enter or exit from—need not be dangerous if the diver can identify the risk factors and overcome them with disciplined diver education and training.

We must also realize that there is no such thing as a completely safe dive. Nobody knows all the physiological risks associated with diving. In addition, many marine phenomena—as well as many buddies—are unpredictable. A safe diver is one who is able to assess the risk factors accurately and has a sober knowledge that his or her ability is sufficient to overcome these risks.

The crucial question in the debate between buddy diving and solo diving is how does the buddy affect the safety of the dive? Does he or she effectively add to the natural risk of the dive or reduce the risk of the dive? This obviously depends on the buddy. In many instances it would be safer to dive alone. For instance, many instructors would agree that it would be safer for them to be alone than with a student on a training dive.

The one remaining piece of the puzzle is to determine how being alone, per se, affects the risk of a dive. That is, does the buddy play an essential role in the dive? Is it possible to make a dive without a buddy and survive? Clearly, while we cannot survive a dive for more than a few minutes without a functioning regulator and a tank of air, we can certainly survive without a buddy.

Then what role does the buddy actually play? Theoretically, the buddy acts as a kind of safety factor. He is not essential, but has the purpose of preventing problems by recognizing them in the dive partner and stopping their development or affecting a rescue. Therefore, being alone does not affect the natural risk of the dive, but it does deprive the diver of a possible safety factor.

However, it is equally true that, although an ideal buddy might provide a safety factor, a less-than-ideal buddy might actually constitute an additional risk factor.

Dangerous Buddies

Let's examine some scenarios in which the buddy system makes diving more dangerous:

1. The dependent diver. This is the diver who depends on the buddy for vital information during the dive. Such divers are all too common. The dependent diver lets the buddy do the navigating, or keep an eye on the depth, or determine the safety stop, or even set his gear up for him. When he gets separated from his buddy, he is unable to cope, especially if he is afraid of being alone. The dependent diver is a direct consequence of the buddy system, and without it, he would not exist.

2. The psychological support syndrome. Two inexperienced divers have paid for a dive trip but when they arrive at the dive site, the conditions are worse than they have experienced before. Not wanting to let each other down, and boosting each other with comforting words, they attempt a dive of too high a risk level for their skills. Now they have to cope not only with the dive, but with each

On Your Own

other. A solo diver can choose to abort a dive without affecting anyone else.

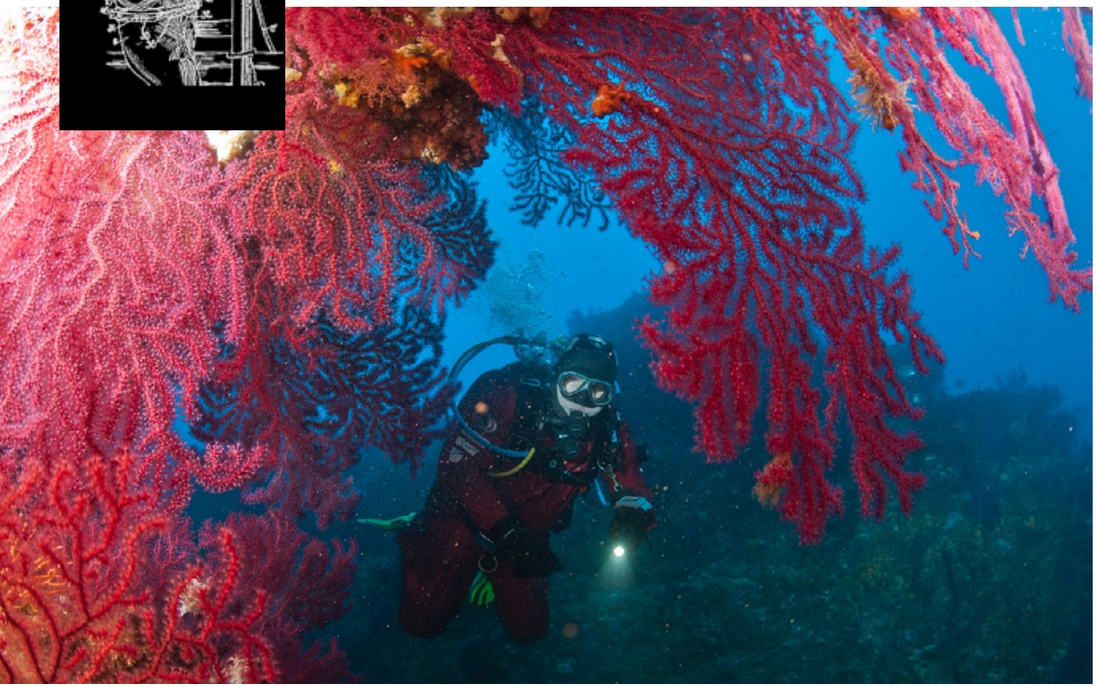
3. The angry diver. A diver really keen for a dive after a difficult week at the office gets buddied with someone who spends half the dive on the descent lines pointing to his ears and going up and down. The rest of the dive, the buddy is seething with frustration and primed for disaster if a problem occurs. A solo diver blames only him or herself for any dive difficulties.

4. The untrained diver. As mentioned earlier, divers are often, in reality, diving alone even if they have a buddy, yet very few are trained for it. They spend hours in the pool practicing buddy and octopus breathing—which are very soon forgotten—and not enough time on individual survival skills such as weight belt control, buoyancy control, solo ascents, self-rescue, and skin diving (I happen to believe that a far better rule for safe diving than "never dive alone" is "never dive deeper than twice the depth you can skin dive to"). A solo diver has every incentive to perfect his diving skills.

5. The falsely confident diver. Some divers actually believe that they will be able to communicate with their buddies in an emergency and that their buddy will be able to assist them. Underwater communication with that pathetic set of hand signals is a bad joke, and the divers most likely to be able to recognize problems and do something about it are experienced divers—the ones who are least likely to get into trouble. I have made two life-saving underwater rescues. In both cases, I rescued someone else's buddy. The other divers failed to recognize the problems and do anything about them.

6. The high-flying diver. This guy has gone hang gliding, parachuting, rock climbing,

On Your Own



kayaking rapids, and flies a stunt plane. He takes up diving, is a natural, and thinks it's the most wonderful thing he has ever done. Then he finds that he is not allowed to pursue this by himself. So, he develops the technique of getting a buddy and losing him as soon as possible during the dive, then having a great dive by himself. [Ed. note: women usually have more sense.] A solo diver does not have a buddy to lose.

In spite of all the failings of the buddy system as currently practiced, I believe buddies do have a place in diving. In fact, they are essential. But the buddy's place is not in the water with you, it is looking out from the boat or from the shore while you dive. Most diving incidents occur at the surface; the surface is surely the most dangerous place. Yet, divers who would not dream of diving alone think nothing of leaving an empty anchored boat.

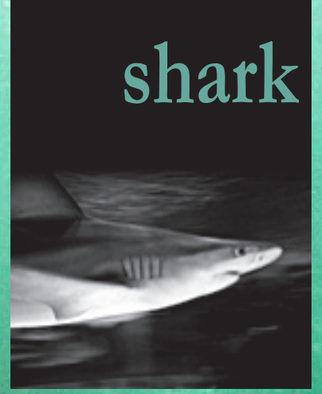
Buddy for Pleasure, Not Safety

Some of the most wonderful moments in my life have been when I have been alone in the ocean surrounded by its creatures—just nature and me. I treasure those moments and aim to have many more of them. I'm a very careful diver; I dive just about every day and test myself regularly with 60- to 70-foot skin dives. And I dive alone with the crew of my boat keeping a sharp lookout. However, sometimes I am able to share great ocean experiences with special people, and this can be wonderful too. But these divers are other independent divers.

For safety, all divers should be completely independent and focus their energy on keeping themselves out of trouble. For joy, share your dive with another independent diver. For training, dive with an instructor until you are ready to be independent in the conditions that you aim to dive in.

The buddy system is not essential for a safe dive since there are other ways of proving the same safety factor, such as carrying back-up breathing systems and gauges, improving diving skills, and diving well within one's limits. But if you do decide to dive with a buddy, it is vitally important that you are certain that the buddy will be a safety factor during the dive and not an additional risk factor. Any buddy is not safer than no buddy.

I believe that all divers should be trained primarily as self-sufficient—solo—divers. They must learn to take personal responsibility for their actions in the water. If they are not capable of this, then they should still be in the care of an instructor. Once they are capable divers, if they then wish to share their dive with another independent diver that they trust, that is excellent. But the present hypocrisy that states that solo diving is unsafe while paying lip service to a buddy system that is so obviously failing is retarding the development of diving and increasing its danger needlessly. ■



Diving with Dinosaurs

Text and photos
by Aaron Gekoski

Just off the Cape Peninsula, close to the pretty bay of Simon's Town in South Africa, lies an innocuous short stretch of ocean. Like much of the seascape here, kelp sprouts from the kryptonite green water, which laps at boulders straight out of *The Flintstones*. It looks a lot like the rest of this spectacular coastline. Yet this body of water harbours a prehistoric secret: just a short hop, skip and a dive away from the shore swim living, breathing dinosaurs.

The name of these astonishing creatures is the broadnose sevengill shark. Yet I prefer their more palatable, less adjective heavy name: cow shark. These fish have glided through our oceans for hundreds of million of years, unblemished by Mother Nature's marauding fingers. All sharks originally possessed seven pairs of gill slits. A period of tweaking and refining commenced and most species drop a couple of pairs. For some reason the cow sharks kept theirs. In fact, cow sharks have very few modern adaptations, which is why they remain one of the closest links we have to dinosaurs on earth.

For some unknown reason, the cow sharks just love this tiny stretch of water and congregate here en masse, just metres offshore. I'd read about this extraordinary site, yet before now had never had the opportunity to dive here. Shore diving remains one of my favourite methods of exploring the deep blue; there are no boats with their thumping motors, no launches, no travelling out for miles to sea. A shore dive simply features you, your breathing apparatus, your buddies, and a gradual descent into an underwater world packed full of goodies.

Unfortunately, these goodies come wrapped in a bitterly cold packaging. Even 10mm of neoprene, hoodies, gloves and boots do little to mask the freezing water here. Our dive guide was free diver and photographer Jacques de Vos. Jacques has spent countless hours underwater interacting with the cow sharks. He has built up an intimate knowledge of their behaviour and habits. He stressed that whilst the cow sharks may appear docile, we must maintain eye contact and not touch them. Attacks on divers are rare, yet it's important to remain vigilant when dealing with toothy predators like sharks. Especially ones that can grow to four metres in length and have been found with human remains in their stomachs.

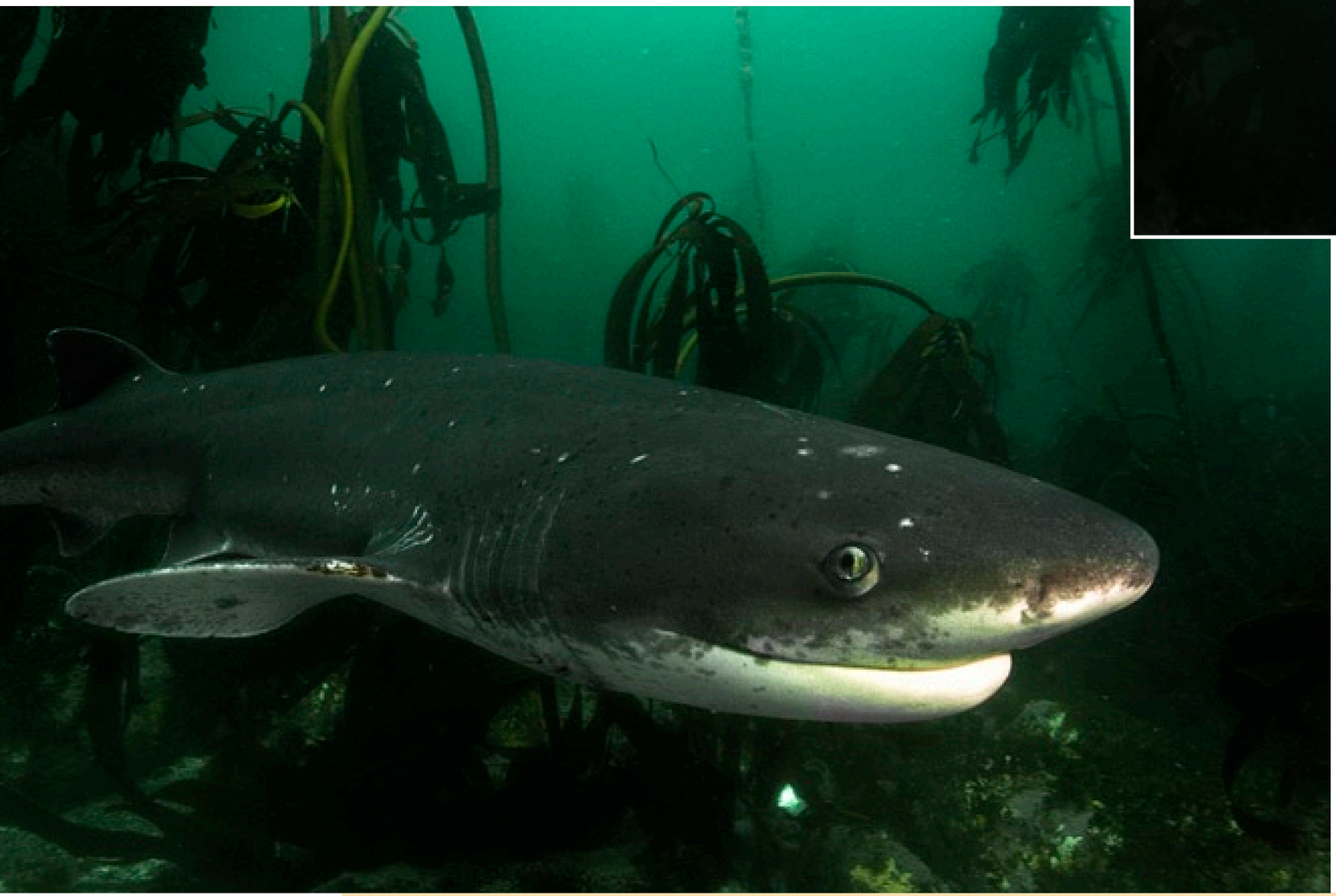
Jacques, divemaster Rob, myself and my colleague—the underwater cinematographer, Chris Scarffe—entered the water via the rocks. The

shark tales

► Watch video on Vimeo

Cape's waters welcomed us with an icy blast, jolting our systems, priming our senses. During descents into unfamiliar (and shark infested) territories, I frequently remind myself that each year more people are killed by their Christmas tree lights, or by falling off their chairs than by sharks. However, it's easy to lose sight of such rational thoughts in these famously murky waters.

My mind turned to the ridicule that would ensue at being chomped by a shark named after a chubby, milk-yielding herbivore. I'd never live it down. Thankfully the chances of being nibbled by a cow shark remain miniscule. My first encounter with a two metre male put me at ease. In fact, I could have sworn it was smiling at me. Much like dolphins, cow sharks' stubby faces are etched with perma-smiles. Depending on your point of view, this is either quite cute, or freakishly sinister. Either way, it's as unusual as it is mesmerising.



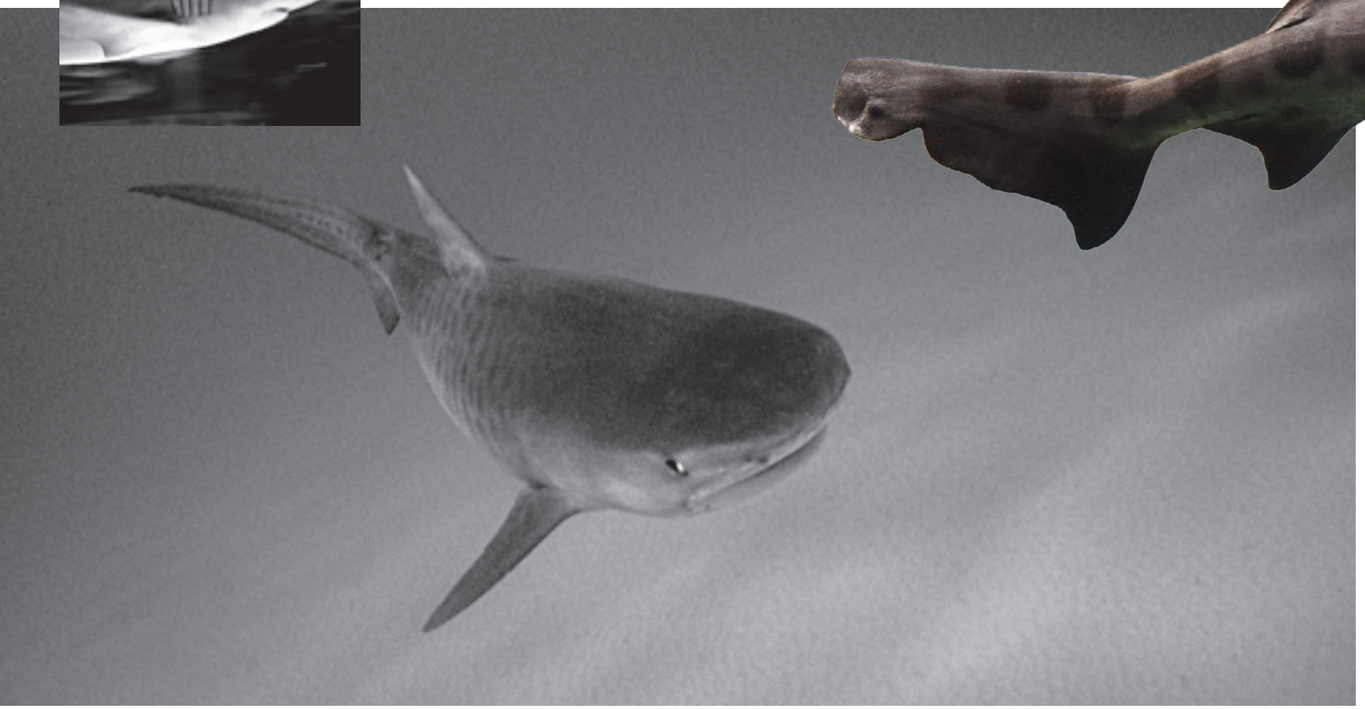
The other notable thing about these sharks is their curious, bold nature. Most sharks, despite their fearsome reputations, remain skittish when encountering humans. Cow sharks, on the other hand, will boldly check divers out, flash a wicked smile and then glide off momentarily, before returning for a second look. They move as if in slow motion, their stout bodies propelled by long, elegant sweeps of the tail. The sharks are a photographer's dream; willing posers for the camera, unfazed by the flashes of strobes and enveloped by the most spectacular studio imaginable.

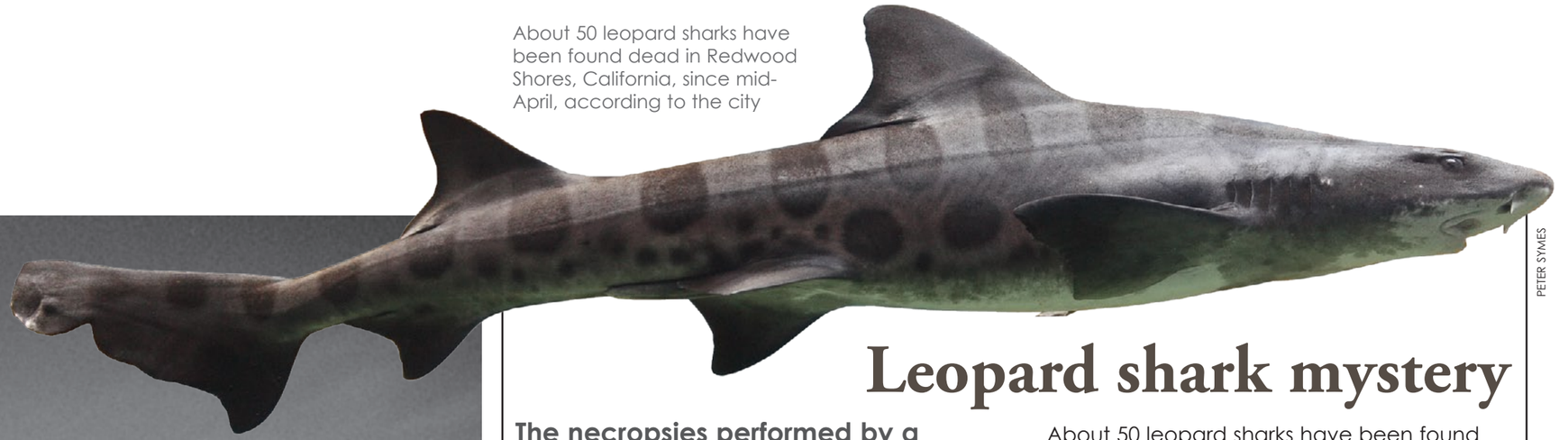
Sadly, the fate of the cow sharks may remain a familiar one. They are being fished extensively in these waters. Whilst I was diving there, reports began to surface of cow sharks being used as bait for great whites by several of the operators in Gansbaai.

Sharks, yet again are falling prey to the greatest predator to ever walk the earth, Man. Every year, we are responsible for the deaths of up to 100 million sharks. We kill sharks for their jaws and teeth which make tacky souvenirs. We kill them for the oil in their liver, their cartilage, flesh and fins. Now, unimaginably, we are killing them to feed to their own, by those who pass themselves off as shark conservationists.

I left this magical stretch of water full of wonder at the amazing smiling cow sharks of Cape Town, yet appalled at how, once again, we are changing the face of our oceans. Cow sharks have survived five mass extinctions and due to humanity's short sightedness and greed, they now face a sixth. ■

To see more of Chris' work please visit **www.mozimages.com**





About 50 leopard sharks have been found dead in Redwood Shores, California, since mid-April, according to the city

PETER SYMES

Leopard shark mystery

The necropsies performed by a California Department of Fish and Game pathologist in the United States found "inflammation, bleeding, and lesions in the brain, and hemorrhaging from the skin near vents". Bleeding was also detected around a female shark's internal organs.

Additional tests, such as a bacterial study and microscopic tissue analysis, may provide an answer, according to a statement released by Redwood City. Results could be available by the end of the week.

About 50 leopard sharks have been found dead in Redwood Shores since mid-April, according to the city. Redwood City is located on the San Francisco Peninsula in Northern California, approximately 25 miles south of San Francisco, and 27 miles north of San Jose.

The leopard shark occurs in the cool to warm-temperate continental waters of the northeastern Pacific Ocean, from Coos Bay, Oregon to Mazatlán, Mexico, including the Gulf of California. It favors muddy or sandy flats within enclosed bays and estuaries, and may also be encountered near kelp beds and rocky reefs, or along the open coast. Numbers have been known to gather near discharges of warm effluent from power plants. ■

Tiger sharks display 'yo-yo' swimming patterns during pursuit of prey

A joint research effort between the University of Hawaii at Mānoa's Hawai'i Institute of Marine Biology(HIMB), University of Tokyo, the Japanese National Institute of Polar Research and the University of Florida has shed new light on the hunting behavior of tiger sharks.

Cosmopolitan predators with large home ranges, tiger sharks consume a wide variety of prey, often moving hundreds of kilometers between oceanic islands and far out into open ocean to fill their resource needs.

In a study conducted off the west coast of Hawaii Island, scientists have been studying their swimming dynamics of the species by equipping four tiger sharks with high-resolution accelerometers (devices that record swimming speed, depth, temperature and acceleration) and digital still cameras. These methods allowed researchers to determine what tiger sharks were doing during vertical movements.

Yo-yo swimming behavior

Many open ocean fishes and sharks exhibit 'yo-yo' swimming patterns (repeatedly climbing and diving through the water while swimming). Scientists hypothesize this behavior may be linked to energy conservation, hunting or navigation. Previous studies indicated tiger sharks engage in yo-yo diving behavior but for reasons that had up to now remained unclear.

New research links swimming events to capture of prey during vertical movements. The accelerometers revealed tiger sharks beat their tails almost continually as they moved up and down through the water, suggesting energy conservation is not the primary reason for yo-yo diving in this species. Camera images showed tiger sharks frequently encountering a potential prey items such as reef and pelagic fishes, with prey fish observed in over 151 images from just one shark alone. One of the monitored sharks was shown to accelerate from the seabed towards a school of fish, remained with it for over 20 minutes.

New insights

"These findings are exciting because they have given us unprecedented new insights into the behavior of these huge and difficult to study marine predators," explained Dr Carl Meyer, a researcher at HIMB and the lead U.S. scientist of the project. Meyer also emphasized the importance of these results "although we have long debated the reasons for the yo-yo diving, we have only recently developed tools allowing us to directly measure the behavior in sufficient detail to understand what these animals are actually doing".

This research has shed new light on hunting behaviors by demonstrating that tiger shark yo-yo diving behavior is not primarily an energy conservation strategy, but a search strategy that effectively combs large three-dimensional spaces for prey. ■

Rare smalltooth sandtiger sharks of El Hierro intrigues scientist

The shark has been observed for five consecutive years in the marine reserve (Reserva Marina de La Restinga—Mar de Las Calmas) off the Canary island of El Hierro

Early August, 2010 the enigmatic smalltooth sand tiger shark was seen for the fifth consecutive year off the coast of El Hierro (Canary Islands, Spain), and the underwater photographer Francis Perez was able to make some of the best observations made so far. He is hoping the elusive sharks will appear again this year.

Since last summer, when the photographer Francis Perez was able to catch some great images of the smalltooth sandtiger shark (*Odontaspis ferox*) the researcher Pedro J. Pascual from the Spanish Institute of Oceanography (IEO) has been preparing to monitor this enigmatic species.

Humble sharks

Pascual did not want to lose the unique opportunity to study the smalltooth sand tiger and, despite financial difficulties to carry out this project, he is preparing to monitor the shark for the possible arrival at the coast of El Hierro.

"Its presence generated an avalanche of divers who wanted to see and photograph the animal," said Pascual.

Pascual, is a shark expert, who has written several books about these animals and is just about finishing one about sharks and rays in the North Atlantic.

"In the beginning, it was very humble, even letting me touch it, and now, when it detects a diver, the shark runs away, and hasn't been seen for several years," Pascual added. It was first observed in El Hierro in 2006, and since then, it has appeared every summer. However, the shark has also been observed in the Canary Islands before.

There have been several catches of this species, especially in the western Canary Islands where the sea floor is are made up by steep and rocky slopes. These catches are usually made at depths around 500 meters deep along insular slopes or underwater mountains. Some specimens are larger than four meters and weigh over 400 kilograms.

The smalltooth sand tiger sightings on the island of El Hierro match the most delicate moment of the species: the birth of their calves. Only females, emerge in coastal waters to give birth their calves every two years.

The smalltooth sand tiger is a species with very slow growth. It can live more than 40 years, his reproduction is biennial and each female gives birth two calves each time, making the moment even more delicate, said Pascual.

Reproduction

The smalltooth sand tiger has an unconventional reproductive strategy. Unlike most fishes, this shark produces very few offspring, but those are independent from birth. He is ovoviviparous, that is, their young are born from an egg but this is developed and hatched in the womb. In addition, the embryos practice the adelfofagia or intrauterine cannibalism; this means that the biggest of the litter is fed by his brothers in the late stages of development. The surviving calf can grow to over a meter after birth.

The delivery has never been observed, and according to Pascual, would be "spectacular" if it could be filmed. Most shark species share the same strategy: they do not give birth where they live. No one knows exactly why, but the most accepted hypothesis is that in this way they avoid predation by other sharks of the same species. The few things that are known about the biology of smalltooth sand tiger is largely by the extrapolation of the knowledge that we have of a close relative: the sand tiger (*Cacharhinus taurus*).

Monitoring

The main project, and the idea that accompanies all its actions, is to raise awareness and convey the idea that sharks are not dangerous enemies and disseminate a clear and unequivocal message that promotes their protection and conservation, Pascual said.

First, the idea is to continue with the identification of the specimens of El Hierro's population, thanks to the exceptional photos and films that the photographer Francis Perez took last summer. Pascual will try, together with the photographer, to observe the birth, research the reproductive seasonality and demonstrate that, as it is thought, it occurs once each two years. In a second phase of these studies, they will mark the specimens sighted with temperature and depth sensors. These instruments provide a continuous record of information that could define the habitat of the animal. ■

Smalltooth Sand Tiger Shark

Despite its extensive, almost worldwide, distribution in tropical and warm temperate waters, the smalltooth sand tiger shark (*Odontaspis ferox*) populations and occurrences are fragmented, and the species may be naturally rare.

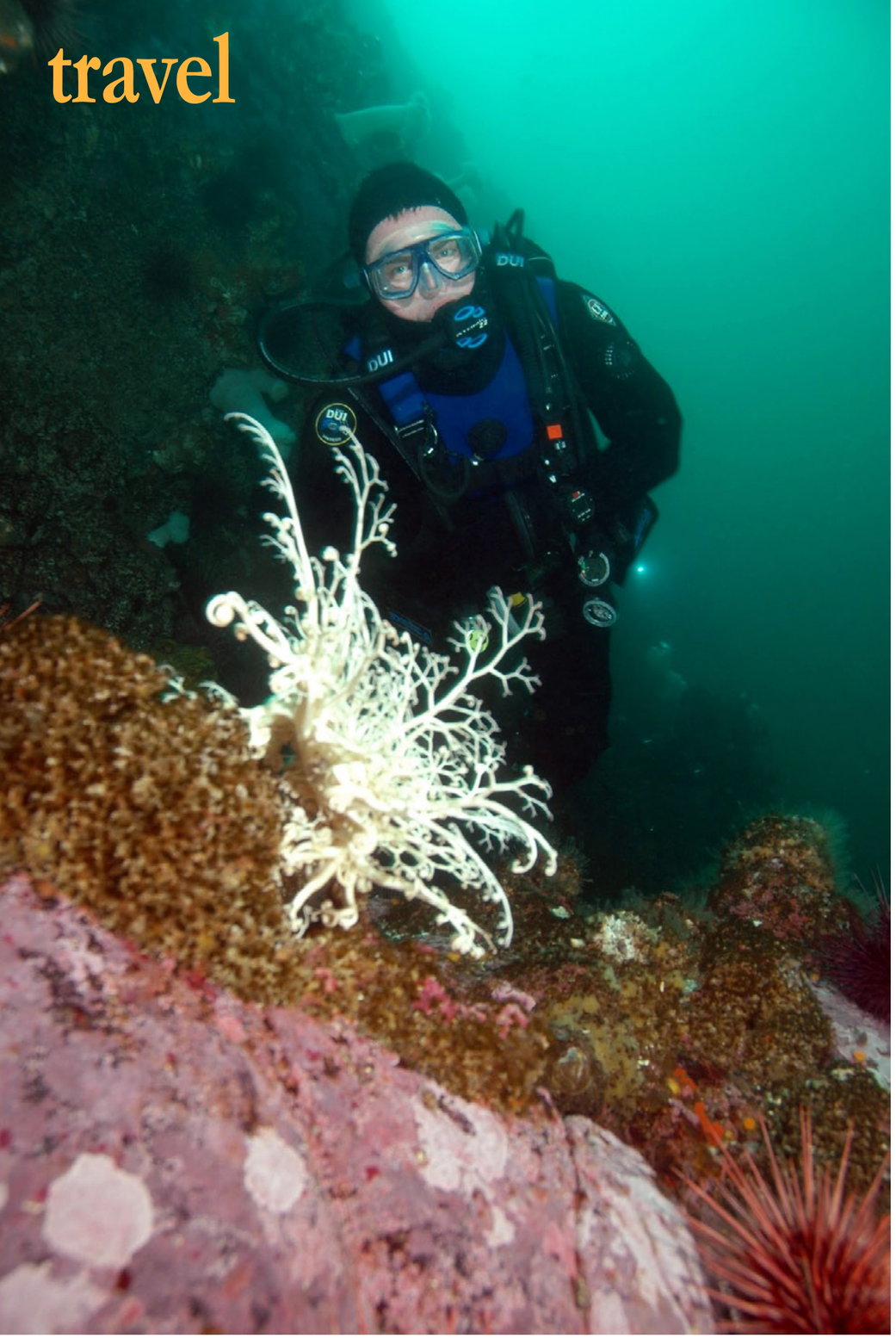
Records show a very disjunct distribution throughout most of the world's oceans. This rare shark, included in the IUCN Red List as vulnerable, usually lives at depths between 400 and 1,000 metres. They usually inhabit deepwater rocky habitats, though they are occasionally encountered in shallow water, and have been known to return to the same location year after year.

Mediterranean sites apparently favoured by *O. ferox* are typically located either along the coasts of islands lying contiguous to deepwater, near offshore seamounts or at mainland localities where continental shelves are narrow, e.g., within the Tyrrhenian Sea, around Sicily, off south-western Malta, off Lebanon, off the southern coast of Cyprus, and around the Dodecanese and Cyclades island groups of the Aegean Sea.

The shark is now repeatedly observed by divers near Beirut. There have also been unconfirmed, but reliable, reports by divers of small aggregations of smalltooth sand tigers off the Transkei coast in South Africa. These sightings have been in depths of 20-30m in areas of deepwater drop-offs. ■

British Columbia's Port Hardy aboard the Nautilus Swell

Text by Barb Roy & Wayne Grant
Photos by Barb Roy



Diver and basket star at Port Hardy (above); The crew of the *Nautilus Swelli* in Port Hardy (top right). PREVIOUS PAGE: Diver explores Browning Wall

It wasn't until Wayne and I were actually leaving Port Hardy aboard the new liveaboard dive boat, the *Nautilus Swell*, that I realized how much I missed this area of British Columbia. The beauty of a calm ocean at sunset with fresh air all around and the tranquility of stillness allowed the hustle and bustle of city life to simply melt away. Only the sounds from squawking seagulls taking flight and the chattering of bald eagles could be heard.

With the smell of dinner baking in the oven and a warm hot coco in hand, we rested against the boat's wooden rail enjoying the scenery. I was smiling because I could hear no ringing cell phones, no emergency vehicle sirens racing by and no worries to clog my brain with irrelevant particulars. A full week of escape from work is what Wayne looked forward to—especially the eating, sleeping and diving parts liveaboards seem to specialize in!

Al Spilde, a seasoned mariner for over 25 years and very familiar with this region, was our captain for the journey and predicted fair weather and good underwater visibility ahead. The rest of the crew included Chris and Belinda Miller, also longtime BC divers who have worked in the liveaboard industry for years. And our hostess, Claire Brosser, was determined to make everyone's adventure a memorable one.

Hussar Point. Of the three dives listed for the day, our first was a checkout dive at Hussar Point, just around the corner from the world-famous Browning Wall. Now most of you might think a checkout dive would be barren and sandy, hosting little to no life with plenty of room to once again become familiar with buoyancy skills. In Port Hardy, this is not the case. Here, every site is an awesome dive, chocked full of reefs, beautiful walls and something to see at each site.

From the 38-foot aluminum dive skiff, *Inde*, we all peered down into the water

CLOCKWISE FROM LEFT: *Inde* dive skiff at Port Hardy; Quillback rockfish at Lucan Chute; Diver shakes hands with an octopus at Browning Wall; Happy divers on the *Inde* get ready to dive

in anticipation, as Al moved closer to the wall. White and orange anemones clung to the rocks just below the surface and the schooling rockfish seemed to be in the hundreds, as they gathered in the boat's shadow.

Although the *Swell* will accommodate 12 divers comfortably, our group had nine, but only eight were diving. Needless to say, we divided up the 12 dive stations on *Inde* and had plenty of room for pony bottles, camera gear, video systems and so much more!

Diving

Everyone entered the water and descended into a lush forest of kelp. It was easy to follow the fronds down to the main part of the reef where everyone went in different directions. Wayne and I swam along a wall at 60 feet, admiring the colourful anemones, small darting gobies (fish) and beautiful brightly colored orange-peel nudibranchs. Wayne thought the large white basket stars were exceptionally cool to watch, as they slowly unraveled their branch-like arms in the mild current to feed.

Continuing on, we came across a tiny juvenile Puget Sound king crab sitting on a piece of kelp which was gently flowing in the current. The little crab, about the size of a person's hand, was a photographer's delight, boasting colours of red, yellow and splashes of radiant purple.

I have always found that it is captivating experiences like this—watching basket stars open up or a tiny crab surfing the current that makes dives like this so rewarding.

Other divers in the group enjoyed grunt sculpins, red Irish Lords and crimson anemones with candy-striped shrimp using the base of the anemones for

Swell

Rockfish school (far left) at Browning Wall; Belinda (left) of *Nautilus Swell* with platefuls of yummy seafood for dinner

visit the realm of deeper dwelling residents.

The wall is located on Nigei Island in Browning Pass, north of Port Hardy. The island itself is covered by a dense forest of hearty coastal trees, which seem to almost touch the water's edge. Other parts of the wall however are solid rock, revealing a sculpted topside terrain tinted with nature's gold and brown colours.

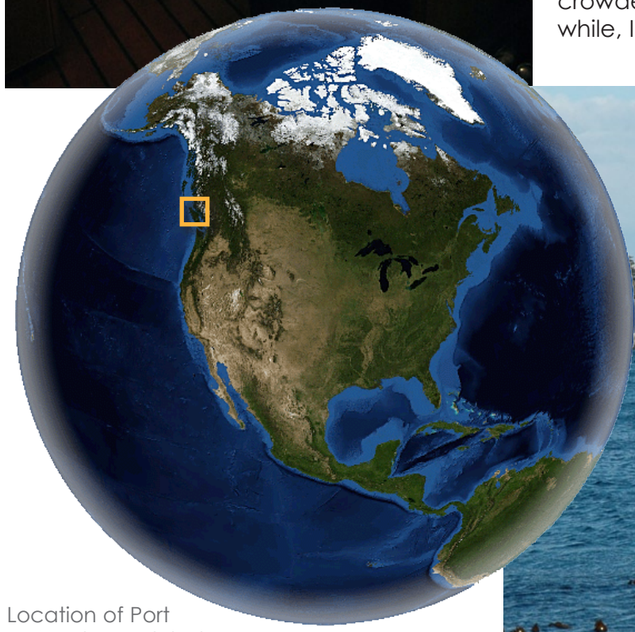
Within ten minutes after descending, Wayne and I came across our first octopus. It wasn't very big but moved contently around and over the wall's crowded collage of life. For a while, I thought Wayne and the

shelter. Probably the most treasured critter sighting, however, was a medium sized giant Pacific octopus out in the open. We were told it played with the divers for many minutes before moving on to other things of interest.

Back on the boat everyone shared their experiences, viewed one another's images and watched videos. After a scrumptious breakfast the next dive was Browning Wall, a dive site we were all excited about.

Wayne laughed at me when he saw my camera was in its housing and ready to go on the boat at least an hour before the dive! What can I say?

Browning Wall. As with the previous dive we saw hundreds of small rockfish next to the wall near the surface. Lengthwise, the site stretched horizontally a couple hundred feet and down to over 200 vertical feet. Unfortunately, we left the technical gear behind—although Trimix would have been wonderful on this dive, allowing us to



Location of Port Hardy on global map (above); The *Nautilus Swell* is a 90-foot classic tug boat (left and right)

THIS PAGE: Picturesque Port Hardy sports some the most awesome sunsets and rainbows

octopus were playing hide and seek because he would move behind a cluster of finger sponge and the octopus seemed to sit up and look for him, then it would do the same behind pink soft corals with Wayne trying to find it.

After about 15 minutes of photographing their play, we continued along the wall, staying in the 40-70 foot range. Visibility was always around 70 feet with my computer informing me the water temperature was 47 degrees Fahrenheit.

Every day in this small slice of Canada's paradise was gratifying, yielding octopuses or wolf eels on almost every dive and plenty of whales, dolphins, sea lions and otters to see and photograph. We had the option of doing at least three dives per day, every day and the occasional night dive.

Claire always had hot chocolate and freshly baked cookies still warm from the oven waiting for us after each dive. I can't say enough about how good the food was, which I believe is a big part of a liveaboard experience. The meals were always just prepared and varied to provide a tasty selection to meet anyone's palate.

Alex Rock. One of my favorite dives was at a remote site called Alex Rock. I would have to say the word "wow" doesn't do it justice for a description. Two playful sea lions greeted us with their large puppy-dog faces, performing before us a dance of speed and nimble grace.

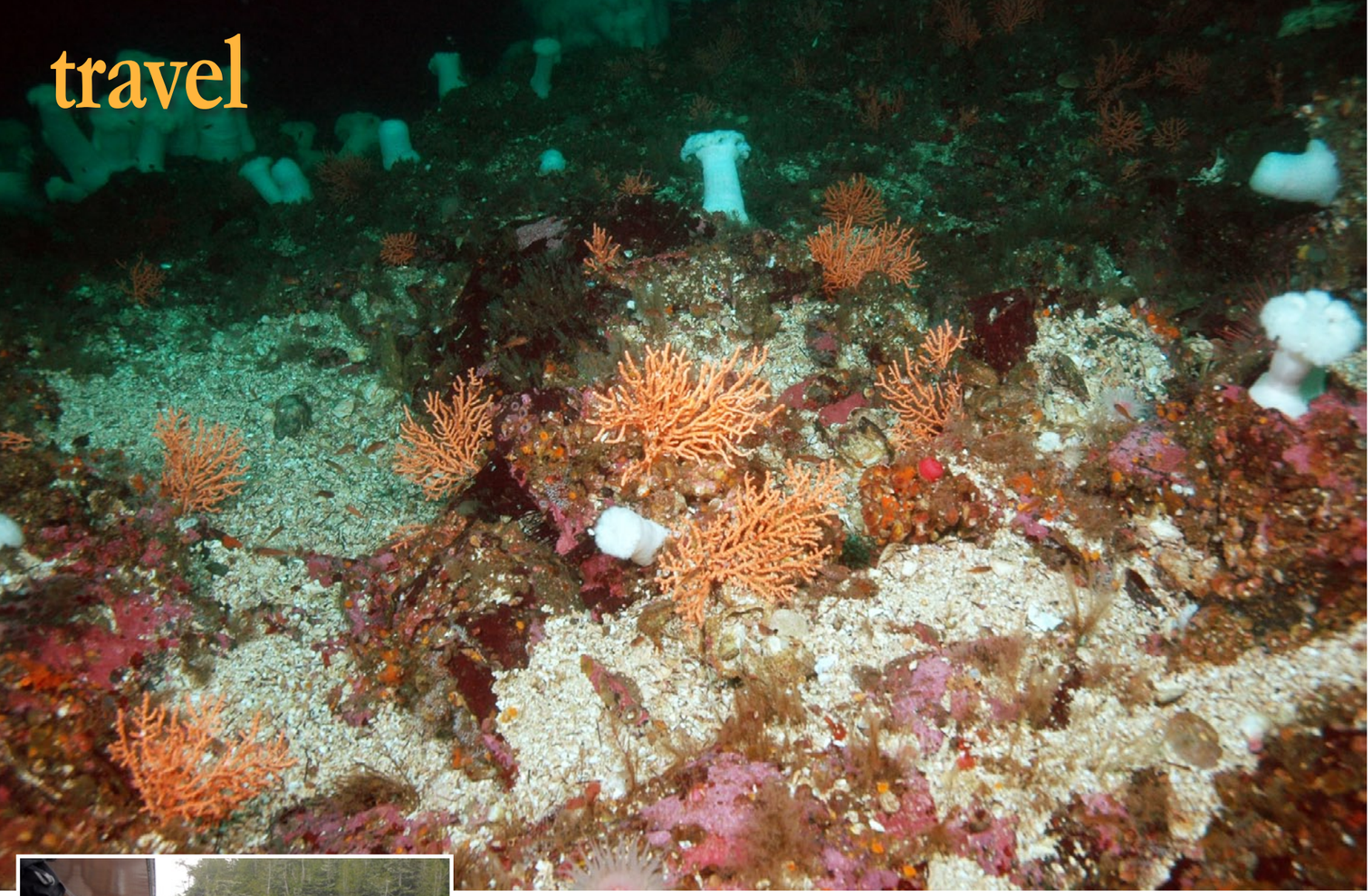
Moving down the reef's sloping side, we came across hundreds of large black rockfish intermingled with equally large yellowtails hovering in midwinter. They seemed to peer at us with their inquisitive eyes, as if we were their afternoon diversion. Perched on various rocks and outcroppings, male and female kelp greenlings and quillback rockfish watched us as well.

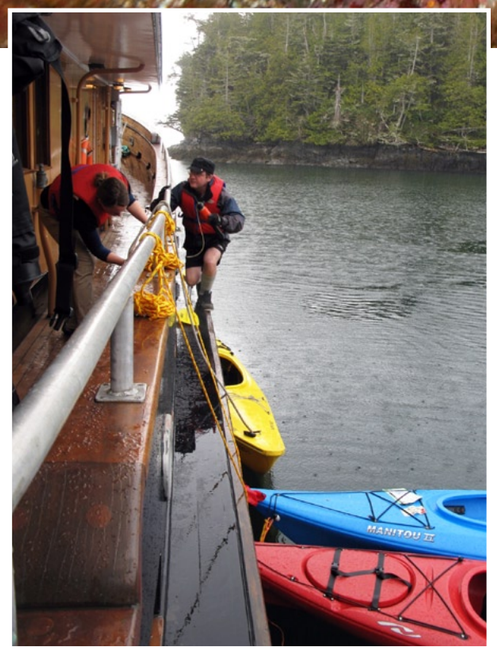
The photographers in our group with close-up lenses were happy to find pink and red soft corals, orange tunicates, large acorn barnacles, delicate hydroids and assorted shades of sea stars. Throngs of pink, white and red crimson anemones gave the reef splashes of color. Around the lower sections of kelp stalks, smaller brooding anemones could be found, many hosting tiny clone polyps.

The highlight of the dive for Wayne and I was coming across several small pink gorgonian sea fans in 70 feet of water. A few feet deeper we found a whole field of them! We were delighted since this type of gorgonian is usually found at depths of 90 feet or greater.

In an effort to see if they followed the wall down, Wayne dropped over the ledge to deeper water, but didn't see any more. He did however see more basket stars, of all shapes and sizes.

Wayne and I ended up using a patch of kelp for our safety stop. Within it we came upon a thick layer of bull kelp resembling tall flagpoles with wide golden ribbons blowing in the wind (current). Giant kelp intertwined, creating a sheltered canopy for otters floating above and millions of small fish swimming below. I really enjoyed burying myself and camera in the fronds, uncovering one layer after another to see what lay below.





CLOCKWISE FROM LEFT INSET: Wayne Grant goes kayaking off the *Swell* in Port Hardy; Gorgonians at Alex Rock; The *Nautilus Swell* cruises Port Hardy; Diver exits the water onto the *Inde*

Strawberry Hill, Fantasy Island. The dives that followed were at places resembling their names like Strawberry Hill (which I was able to name!) and Fantasy Island. The Strawberry Hill site reminded me of outer west coast dives because of the underwater terrain covered in small red anemones. Above the water the huge boulders were bare from winter storms of crashing waves. At Fantasy Wayne played with wolf eels while I photographed a selection of invertebrate life!

Fish Bowl and Snowball. Fish Bowl was another site worth mentioning because in only 20 feet of water the marine life revealed within the bed of kelp at the top of the reef was like discovering a new world. Wayne later said the site should be renamed to Salad Bowl since the kelp was so varied. The colour I guessed was partly from the fresh early spring growth.

Forming multiple small patches at the top of the reef was an almost iridescence purple and blue branching seaweed which shimmered in the early evening light. Behind it a light pink coralline algae highlighted its effects. When the kelp and algae was moved away we were thrilled to find millions of snails, chitons and limpets! Some of the lined chitons were extraordinary in their designs.

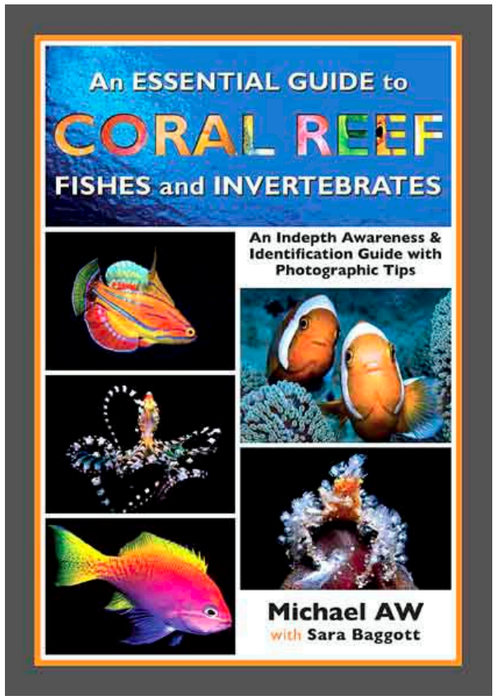
Nudibranchs were also everywhere, some with lacy circular egg casings nearby. Tiny abalone, shrimp and a few sea spiders made their home here as well. While the other divers explored the depths we decided to remain at the top of the reef because there were plenty of things to see.

Snowball, Lucan Chute & Toy Boy Gap. At Snowball we found millions of small white anemones. Lucan Chute had huge sea lions, large Puget Sound king crabs and many more current-dwelling inhabitants than we could count. Toy Boy Gap was where I found an immense Puget Sound king crab with two small females. The trio was surrounded by yellow sponge, pink soft corals, with a shallow bed of kelp above them.

Tonight was no different than any night so far, as we patiently waited for dinner while enjoying a glass of chilled red wine or a cold micro brew beer from the boat's selection (additional fee). Some nights 'B' has treated us to fish or chicken, but one night we devoured Prime Rib! Tonight the menu hinted of crisp fish tacos and tender beef enchiladas smothered in cheese. What a treat…

The Nautilus Swell, a refurbished 90-foot tugboat will be operating in the Port Hardy area during the Spring and Fall months, with excursions to Alaska throughout the summer. For more information contact www.nautilusswell.com or call 1-604-657-7614 for reservations. ■

media



An Essential Guide to Coral Reef Fishes and Invertebrates

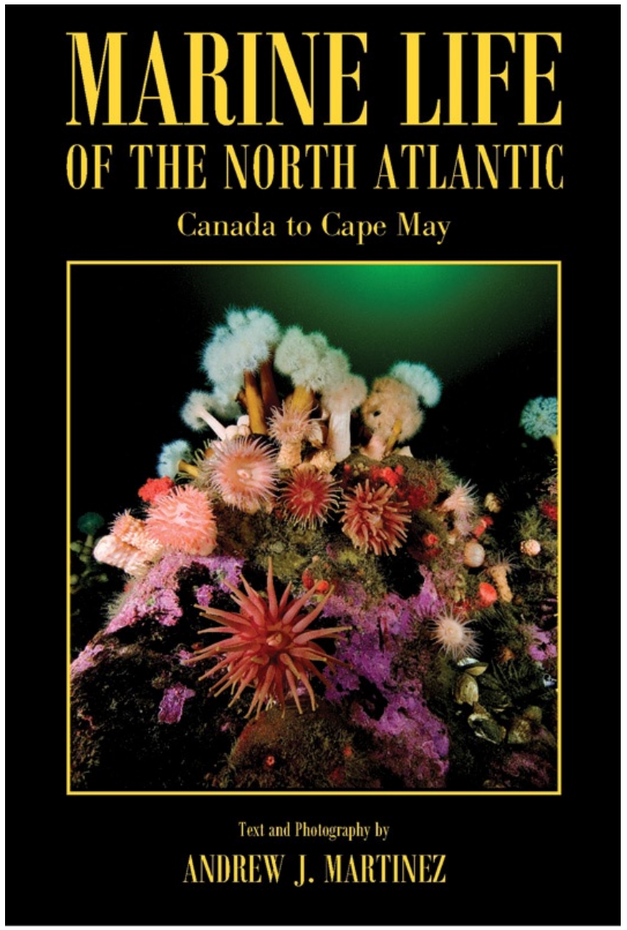
Michael Aw

This jam-packed book does not just cover fish. Invertebrates of all kinds are also given the 'Aw' treatment. From jellyfish to sponges, shrimps to feather stars and many other 'usual suspects' in between. The colour coding on these pages, while grouping types of life forms, is less significant than the fish zones, but it makes for a very colourful rummage if you scan the book at random!

These more static creatures are no less important in the book's contents and are also fully described in their habitats, movements, behaviour and of course, there are tips on how to photograph them successfully.

I was pleased to note both the contents at the front and index section at the back refer to both the latin and English names of the animals. This is not always true of id books and one can spend a long time trying to track down the beast in question, often resorting to flicking optimistically through the pages in the hope of a glimpse. This book is very clearly laid out and indexed.

The photographs to accompany all this fascinating information are typically colourful and vibrant. Michael explains that the pictures are, as they have to be, primarily used to document and identify different species and as such, are not always the most artistic depictions. But, you can't take the photographer out of the author and a lovely short section at the back of the book describes the art form of taking beautiful pictures underwater.



Marine Life of the North Altantic

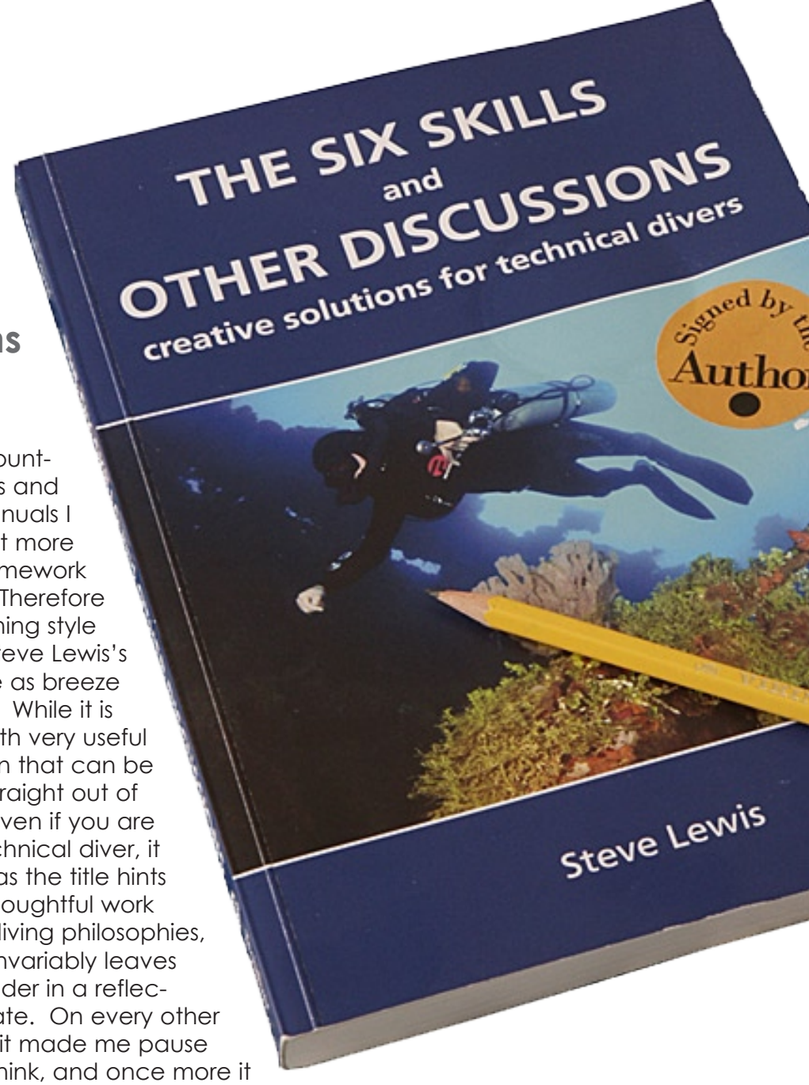
Andrew J. Martinez

This new and expanded edition of Andrew J. Martinez's classic marine life identification book, Marine Life of the North Atlantic, An invaluable reference for scuba divers, naturalists and aquarium enthusiasts.

This comprehensive, yet easy-to-follow guide, covers 278 species of fishes, invertebrates and marine plants. Over 390 color photographs, along with comments on the animals' identification, habitat, range and natural history, makes the Marine Life of the North Atlantic, Canada to Cape May an invaluable reference for scuba divers, naturalists and aquarium enthusiasts. Over 200 of the photgraphs are new to this edition. The author, Andrew J. Martinez, has been photographing marine life for over 40 years. His adventures have taken him from the frigid Canadian waters to the tropical wonders of Indonesia

The Six Skills and Other Discussions

Steve Lewis



Many of the countless dive books and mostly dry manuals I have read felt more like doing homework or studying. Therefore the entertaining style and wit in Steve Lewis's book came as breeze of fresh air. While it is packed with very useful information that can be applied straight out of the box even if you are not a technical diver, it is also – as the title hints at – a thoughtful work about diving philosophies, which invariably leaves the reader in a reflective state. On every other page it made me pause and think, and once more it wetted my appetite for bettering my skills. No mean feat considering I have been diving for quarter of a century and hold multiple instructor certifications. Therein lies the greatest achievement in this book. Like few… no… like no other book in the field it manages to go about the subject matter in a skilful and still serious, yet light-hearted and humourous way. Yes, we do need to take these skills and techniques very seriously if we want to venture into the realm of technical diving but as Steve Lewis so brilliantly reminds us, we must never forget that we also do it to live our lives and have fun and adventures. The individual chapters, there are 11 in total, deal with one subject at a time i.e. buoyancy, trim or breathing and can almost be considered individual lectures. I am going to bring this book on my next trip and use it to better my skills. I also consider this book to be an excellent birthday gift og christmas present to any aspiring diver. — *Peter Symes*

Tarpon and school of Silverside Minnows, East End, Grand Cayman Island. 10mm lens, ISO 50, Twin Sea & Sea YS100 flash, 1/80th second at F8

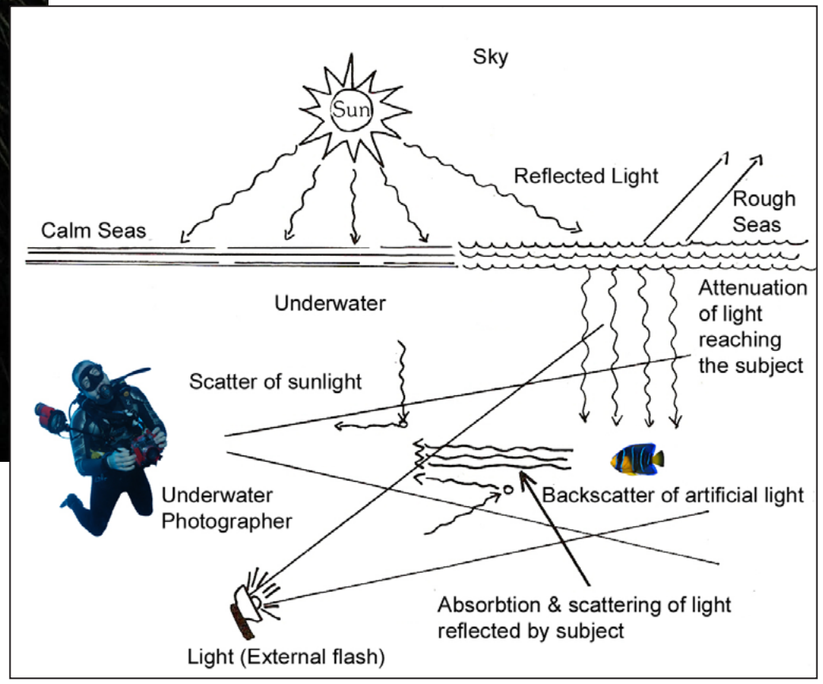
Flash Photography

Text & images by Lawson Wood

We already know that as you go underwater, that light refracts and changes colour with the density of the water. You loose the colour red in less than 2 metres (6.5ft) and that colour gradually loses intensity the deeper we go underwater. To compensate for this loss of light and colour, we either add a flash to illuminate the subject, a filter to alter the colour spectrum being 'seen' by the camera, change the white balance accordingly at the beginning of the dive or by a quick fix on Photoshop. This loss of colour is the underwater photographer's ultimate challenge, our goal is to bring back as much of the real and natural colour as possible, allowing the viewer to truly appreciate the splendour of our underwater world.

By far, the simplest (yet costly) way forward is to use flash. Most Compact Cameras have fairly adequate internal flash to illuminate close-up subjects, but this small flash is not strong enough to illuminate larger subjects or subjects at a distance of over 1metre (3.25ft). Those Compact camera owners are recommended to purchase an additional external flash unit that actually fires as a 'slave' to the camera's own internal flash by the use of a fibre optic cable, allowing for a greater spread of light to illuminate a larger subject area. White balance settings ultimately always help, but the addition of external flash is better still.

As you can see, light and its absorption causes all sorts of problems once it starts to penetrate the underwater realm.



The way light is affected once we go underwater

The principal problem which underwater photographers face is the fact that we are underwater and it is the water that gets in the way of the picture, or more accurately, it is the particles in suspension in the water, (which reduces the visibility) which get in the way of a clearly lit photograph. In low visibility, these particles in suspension, be they planktonic debris, bits of rusty particles knocked off an old wreck, small marine critters dislodged by a diver's exhaust air bubbles, the bubbles themselves or sedimentation; any and all of the above will produce an effect called 'backscatter'. This occurs when the burst of light produced by your electronic flash bounces off and reflects back to the camera's lens, before it has reached the subject to be illuminated.

When using flash to take a photograph of the subject, not only do we have to cope with the attenuation of light reaching the subject, we also have to deal

Clown Anemonefish (Amphiprion ocellatus), Lembeh Straits, Indonesia. 105mm lens, ISO 200, Sea & Sea YS110 flash, 1/125th second at F22

with various sea conditions; sunny or cloudy overcast days, highly reflective subjects such as silverside minnows or even a diver's bald head!

(Assuming that the water is crystal clear) The calmer the water the more light is able to penetrate into the depths and allow for natural light illumination of your subject. This obviously does not happen in poor visibility areas and these dives should almost be treated as potential night dives.

The rougher the water the more a higher percentage of the sun's rays are deflected back up into the atmosphere. Light does filter down from above to the subject, but due to the refractive index of light absorption, you lose the colour red in approximately 2m (6.5ft) of water. There is of course a scattering of light in the water column as well as the subject matter actually absorbing and reflecting light particles as you take the photograph.

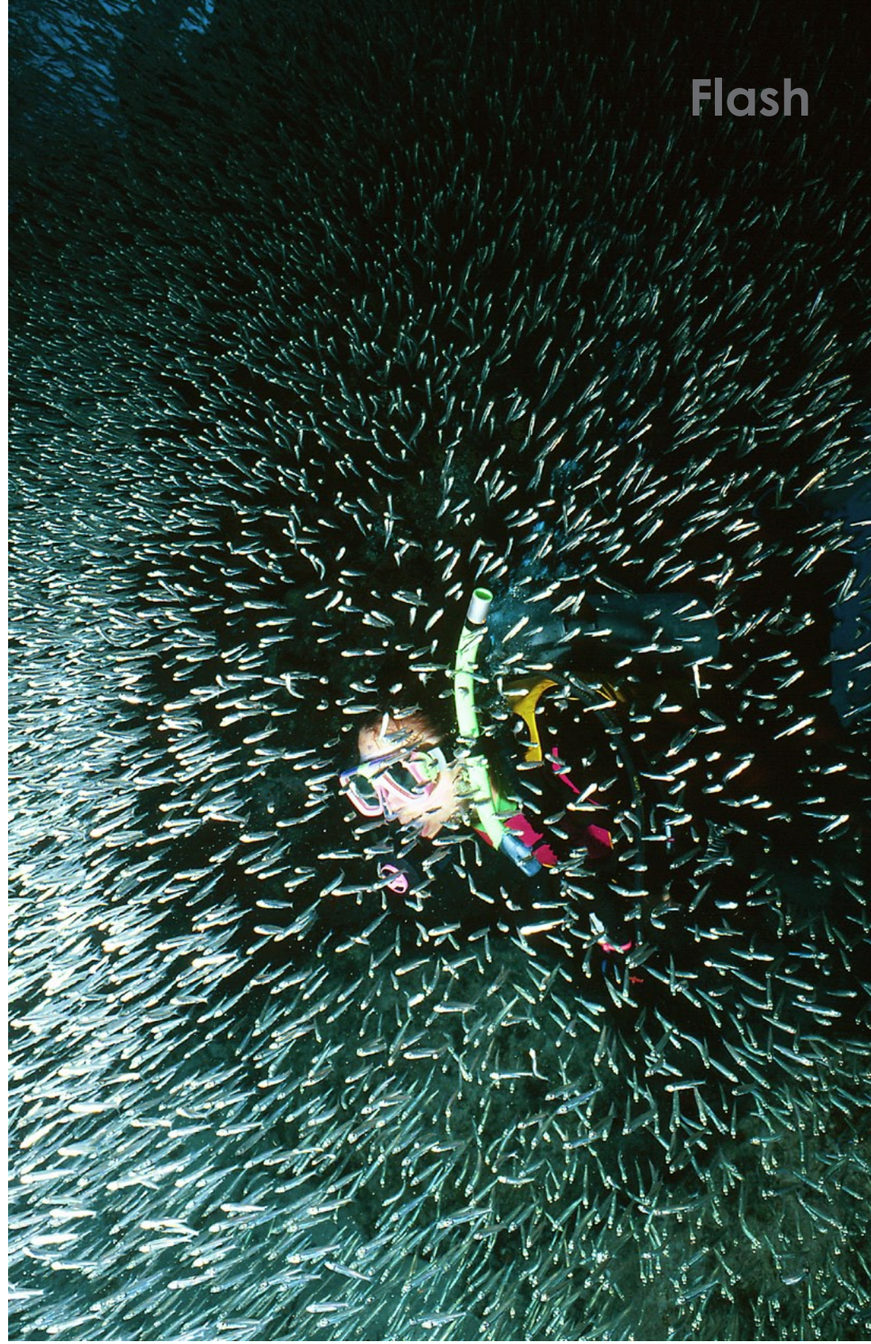
By concentrating the flash directly into the centre of the subject area, (See main image, previous page) I was able to illuminate all of the fish and the extreme wide angle of the lens gave the impression of vignetting with the outside of the frame fading to dark. Undoubtedly flash always enhances a highly colourful subject, but it is also extremely effective in illuminating fairly monochrome subjects such as the slivery fish.

On a compact camera, the use of the camera's internal flash (whilst it is powerful enough to illuminate the subject) it is incorrectly positioned due to the housing's manufacture and this will always create a shadow in the lower right hand side of the photograph, particularly when using the macro setting on the camera. The way to get around this anomaly is to keep the camera setting on macro, with the flash on; move further back and away from the subject (this also eases the stress on you and the critter) and use the camera's internal zoom lens to get closer once more and allow you to compose the subject with full illumination, no stress and no shadows.

Stareye Hermit Crab (Dardanus venosus), Dominica. Canon Powershot S95, ISO 200

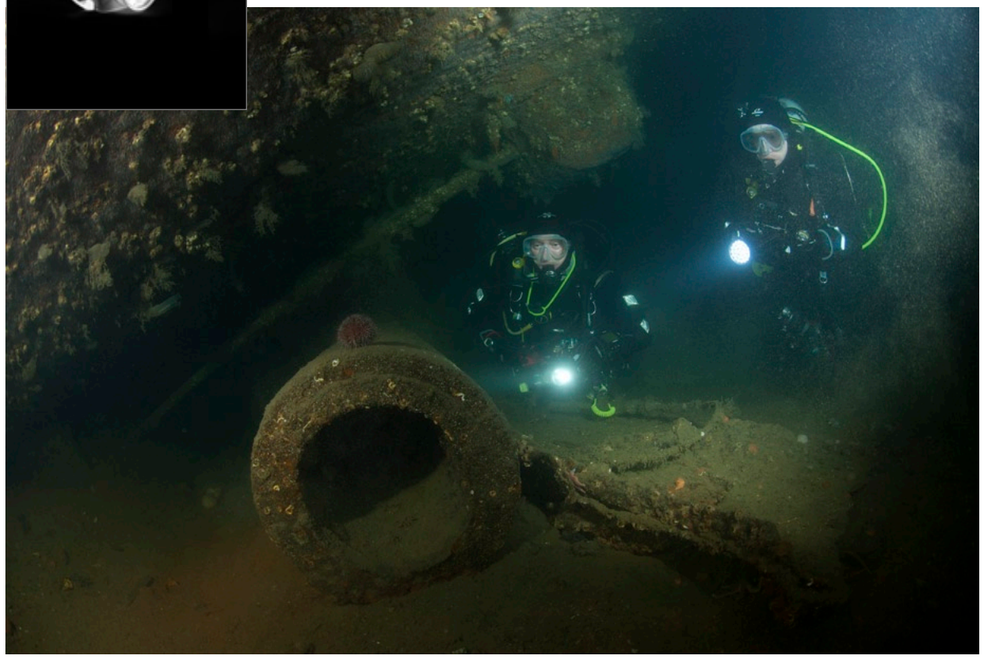
As you can see, clearly illustrated is the problem with the Canon compact camera's housing creating a shadow when working in close to the subject, yet it is cured by staying further back and using the zoom instead.

The use of 'fill-in' flash is perhaps the most rewarding as our camera's automatic settings do like to give their sensor's rendition of the colour of the background water, whether it be the green of Scottish waters or the brilliant cobalt blue of the Red Sea; Pacific or Caribbean waters. By using just enough flash to fill in the colours of the subject in the foreground, yet still take the photograph at the same aperture (of the natural light available), we are able to give colour and depth to the subject and the scene overall. The use of flash underwater in inevitably challenging. Take for instance these previous two photographs taken recently at Scapa Flow in the Orkney Islands off the northern shores of Scotland.



Reflective surfaces such as the sides of these silverside minnows have to be treated with caution, as too much flash will produce flare that will bounce back and overexpose the photograph.

Technical Diver Nat from Divetech on Grand Cayman Island. 10mm lens, ISO 100, Twin Sea & Sea YS110 flash, 1/80h second at F:11



Stern gun on the German Batlecruiser Kronprinz Wilhelm, Scapa Flow. 10mm lens, ISO 400, Twin Sea & Sea YS110 flash, 1/80h second at F:5.6

Stern gun on the German Light Cruiser Karlsruhe, Scapa Flow. 10mm lens, ISO 200, Twin Sea & Sea YS110 flash, 1/80h second at F:5.6

Both are in very similar conditions, but the first photograph on the Kronprinz Wilhelm is taken in 46m (150ft) and we are actually underneath the ship. The muddy seabed is getting stirred up, there is no natural light due to the deep shadow created by the looming shipwreck overhead and I have to completely illuminate all of the subject area. The second photograph on the Karlsruhe is taken in 26m (90ft). The underwater visibility is the same, but there is now enough ambient light to illuminate the subject area, but I still need 'fill-in' flash to highlight the divers and the wreckage of the gun in the foreground. The divers/models are using their dive lights and these also give the impression that it is the divers which are illuminating the gun, and not my camera's flash – perfect as far as I am concerned!

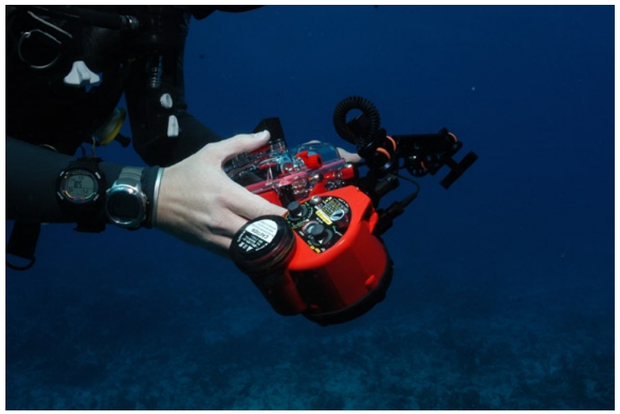
By not taking care in the use of the camera's command dial, I reversed the settings that I was aiming for and subsequently lowered the aperture and increased the speed of the shutter. Sadly my flash did not synchronize to the 1000th of a second shutter speed and failed to fully illuminate the subject. Care must always be taken when adjusting the camera speed and shutter control.

Banded Shrimpgoby (Neoturris pileata), Red Sea. 60mm lens, ISO 100, Sea & Sea YS180 flash, 1/1000th second at F3.4

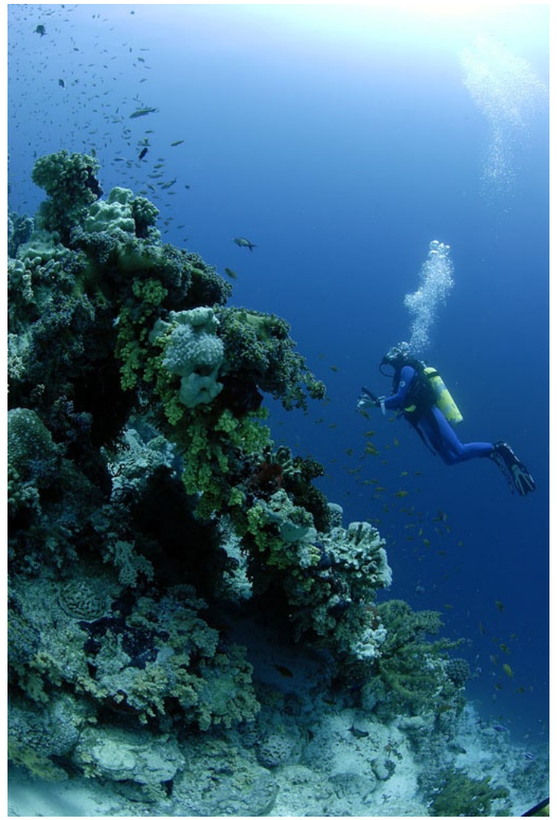
Green Turtle (Chelonia mydas) Sipadan Island, Malaysia. 20mm lens, ISO 100, Sea & Sea (misfired) YS180 flash, 1/8th second at F3.4

A similar problem, but at the opposite end of the spectrum happens when the camera is set on automatic and trusting that the flash will recharge in time to be able to synchronize with the shutter speed. Sadly the flash has not recharged in time to be able to fire and the automatic setting on the camera has reduced the shutter speed so low that the subject is not only moving, it is out of focus too. (Nevertheless, it is still a pleasing photograph!).

The sequence of two photographs that I am using to illustrate this example were actually taken with the flash (full colour) photograph on the right) first, followed instantaneously by the second photograph before the flash had time to recycle and fire again. The subjects are virtually identical, excepting that one can clearly see the effects of using or not using flash underwater to illuminate a subject area. The flash has clearly illuminated the brilliant colours of the soft corals, yet have failed in power to reach my dive partner Reeta in the background, exactly the effect that I was wanting to achieve. By reversing these images in a dissolve style audio-visual presentation you have the effect of a rather drab colourless photograph virtually coming to light before your eyes.



A Compact Camera with attached external flash



Reeta Tunney along a wall of soft corals in the northern Red Sea. 10mm lens, ISO 100, Twin Sea & Sea YS110 flash, 1/125th second at 8.

Hairy Squat Lobster Gangga Island, northen Sulawesi, Indonesia) 105mm lens with +2 dioptre, ISO 100, Twin Sea & Sea YS110 flash, 1/80h second at F:8

Undoubtedly, the use of flash underwater is absolutely essential to bring to light (please excuse the pun) the actual true and brilliant colours which the eye and the camera lens rarely see in all of their glory, except in extremely shallow water. Only with flash, set to the correct colour temperature as that of daylight (approx 6,500K) that you are able to obtain truly stunning colour renditions of a rather drab and usually colourless underwater world.
Flash photography, of course, is always used on night dives, as rarely do divers carry sufficient continuous and powerful lights to completely illuminate the seabed to allow your camera to use a natural light setting, even at night.
Sorry, but I have actually witnessed this! For the rest of us, the use of a camera and flash either internal or external on a compact camera and external on a housed dslr are dérigueur for all of us underwater photographers.

The use of a spotting light (often located inside the flash) such as some of the Sea & Sea flash; Ikelite and Inon models is an absolute must not only to aid composition, but for also finding immediately which brilliant colours are on display by many of the marine critters which are often only seen out at night.
No matter what type of camera you are carrying underwater, buoyancy control has to be second nature in approaching your subject matter.

No matter what type of underwater camera system you opt for, immediately you will note the distinct difference in size. They say size doesn't matter, well apparently it does! With more and more weight restrictions being levied on international airline travelers, the underwater photographer undoubtedly feels

A housed DSLR with attached external flash Subject: Snowy, Jackson Reef, northern Red Sea 10mm lens, ISO 100, twin Sea & Sea YS110 flash, 1/125th second at F8

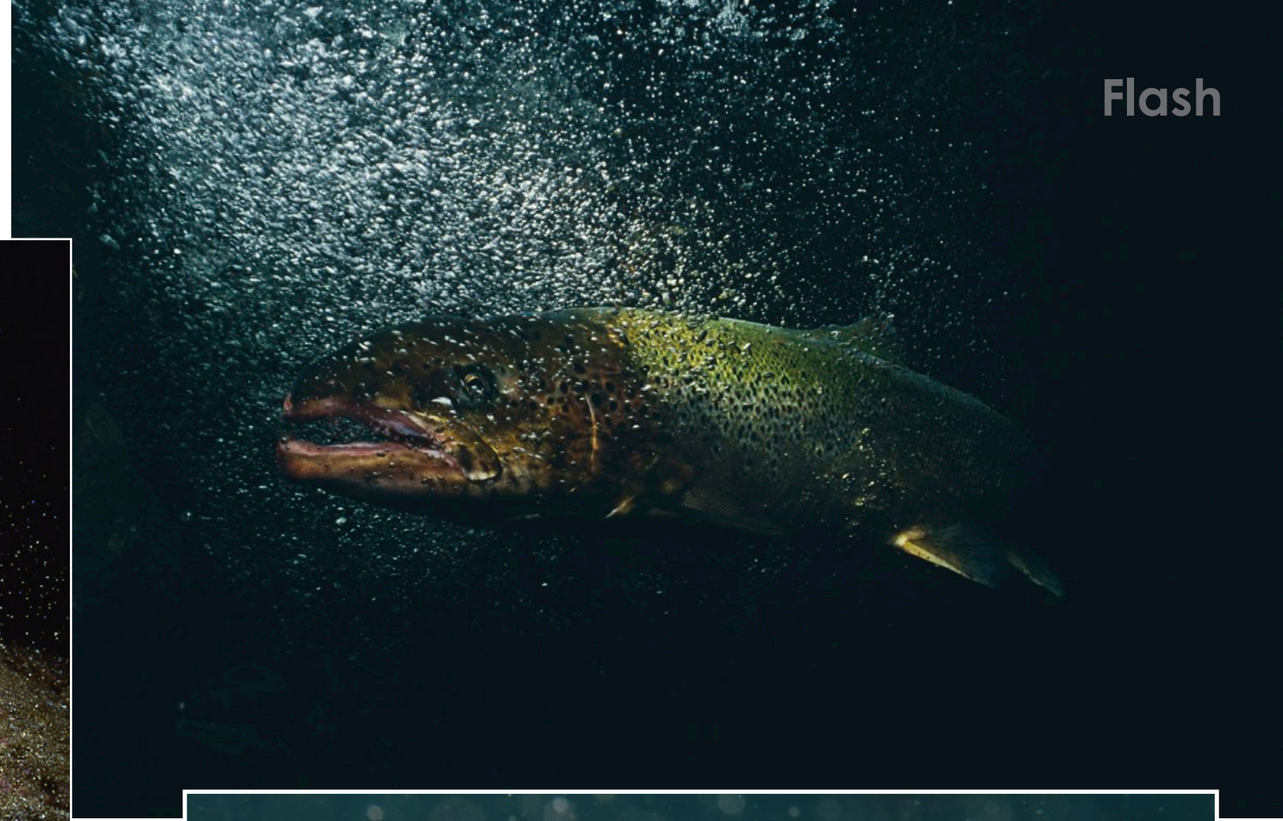
the brunt of these rules as invariably there will be additional costs levied onto your holiday travel cost.

With this in mind, many divers opt for the simpler (yet still very versatile) Compact Camera as it can be carried in hand luggage and rarely raises an eyebrow as it passes through X-Ray machines.
For those of us lumbered with large DSLR's, plus housing; plus perhaps two external flash; extendable arms; batteries; recharging units; numerous lenses; numerous ports for the housing to suit the lenses and inevitably we will also be trying to smuggle on board a laptop computer; external hard drives; memory cards and even DVD's. Can you imagine the apoplexy that the security guards have at airports when they see all that hardware in one case that can hardly be called hand baggage, as it weighs more than your hold luggage with all of your diving gear; torch lights; diving computer; clothes and wee home from home snacks to make your overseas dive trip more bearable, just in case you do not like the food!

Who on earth said that this was fun! But, when those little critters start to perform for you, or when that whale-shark just arrives at the same time as you, or when you find your first hairy squat lobster without the use of a dive guide, and you correctly illuminate a golden cup coral on a night dive, then all the effort is worth it.

Sometimes backscatter can be used to your

Salmon, Glen Etive Pools, Scottish Highlands
15mm lens, ISO 50, Sea & Sea YS120 flash,
1/125th second at F:11



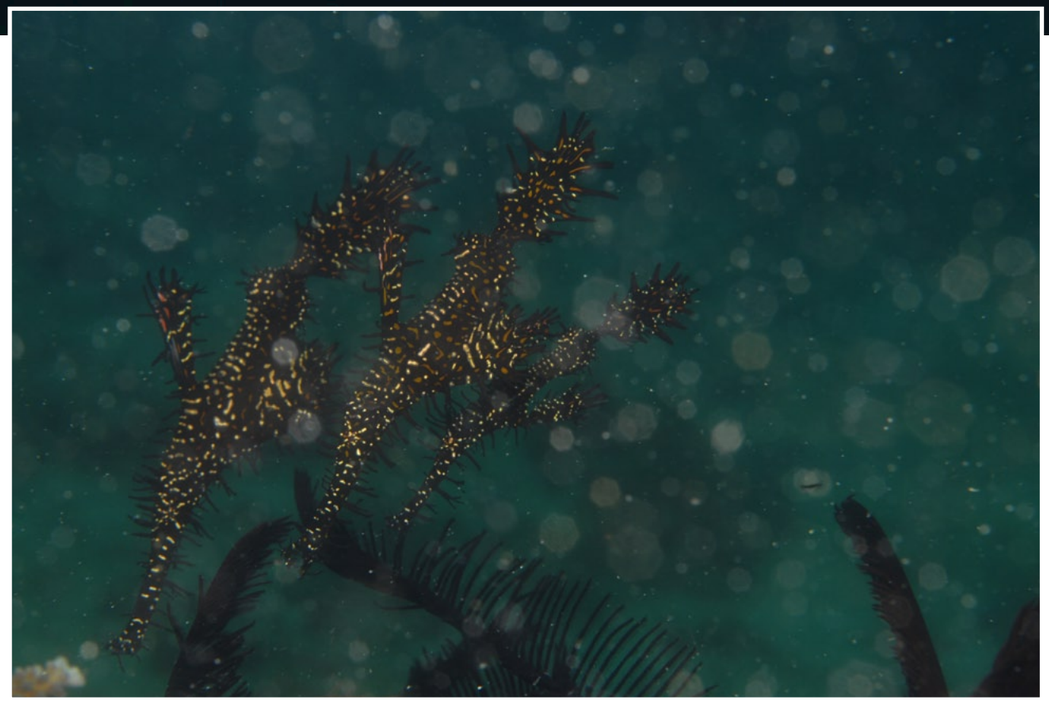
advantage. Undoubtedly these photographs work because of the backscatter. It gives a very real sense of being underwater and highlights the fact that not all of our diving is in crystal clear water in exotic locations. Most of us dive much closer to home and invariably our home waters are generally not as clear as we would like them to be. Here we are faced with lots of highly reflective air bubbles from the underside of a waterfall plunging into a fresh water pool and the

Golden Cup Coral (Tubastrea aurea), Red Sea. 60mm lens, ISO 100, Sea & Sea YS120 flash, 1/125th second at F:11

Dahlia Anemone (Urticina eques) St.Abbs, Scotland. 15mm lens, ISO 50, Sea & Sea YS200 flash, 1/60th second at F16

other is quite simply taken in extremely bad visibility where backscatter is expected, it is accepted and it is then used to create the photograph required.

Sometimes however, no matter how skilful you are in underwater photography and photoshop techniques, some photographs are just not worth rescuing. In this instance not only am I too close to the subjects, the visibility is just too poor; I have got my lighting wrong and generally this should be consigned to the digital bin. ■



Ornate Ghost Pipefish (Solenostomus paradoxus) Gangga island, North Sulawesi, Indonesia. 60mm lens, ISO 100, Sea & Sea YS120 flash, 1/125th second at F:11

News edited
by Don Silcock

Easydive Updates Video Housings

The Italian housing manufacturer Easydive has released details of an update to their Atlantis/Zeus housings. The innovative housing is available in three different lengths to accommodate all major camera models on the market—the models are the Zeus, Atlantis Mini and Atlantis. The updated Atlantis series has a new military-style 40 micron black anodized coating and removable front door that, using the threads located on the front flange, allows the use of any Easydive port. This allows the use of Easywide and Easymacro ports, as well as the optical Superwide Pro HD. **easydive.eu**

Light & Motion Provide Canon G10 Support

Light and Motion has formally announced that it will support the Canon G10 prosumer camcorder with its state-of-the-art Bluefin housing range. The California-based company typically focuses on professional grade camcorders, but the excellent performance possible with the prosumer Canon G10 has made it reconsider its strategy. Light and Motion have stated that "After several test dives it's obvious the G10 produces superior video results we haven't seen in a HD compact video system. The G10 is in a class by itself." **uwimaging.com**

Nautacam GH2 Housing

Nauticam has announced the release of a new housing for the highly regarded Panasonic GH2 Micro Four-Thirds System camera. The housing—the NA GH2—is constructed from aluminium, rated to 100m and is designed to provide underwater photographers with an option to use the Micro Four-Thirds System, which has won a lot of fans with its compact design and picture quality that rivals DSLRs. The Panasonic GH2 features RAW shooting capability, TTL mode, and 1080i/p at 60fps video and should perform very well underwater. The Nauticam NA2 housing provides access to all the most important controls on the GH2 camera using some innovative technology. **nauticamusa.com**

Bonica Seashell II Housing

In the fall of 2010, Bonica introduced the Seashell I, an underwater housing suitable for almost any compact camera featuring a pop-out external zoom lens. Hot on its heels, the company has introduced the Seashell II housing for cameras with an internal zoom such as the Sony T. Fitting most compact cameras, the Seashell series are easily adjustable with the provided spacers and shims, with the average user being able to fit a camera anywhere from a few minutes to half an hour. With a depth rating of 130 feet, both housings meet all the requirements for recreational divers Both the Seashell I and II are available across Canada and the United States for a suggested retail price of US$169. 00. **bonicadive.com**

Ikelite Releases Four New Compact Housings

Ikelite has announced the release of four new housings for compact cameras—the Nikon Coolpix S3100, Sony Cybershot DSC-W530, and the Canon ELPH 300HS and IXUS 220HS. The new housings share many of the same features and are made with Ikelite's standard polycarbonate material, depth rated to 200ft, and will retail for US$260. In addition, the housings share the ability to include optional add-ons like external filters, release handle trays, TTL exposure capability, and several external accessory lenses. **ikelite.com**

Fix Aquavolt 5000

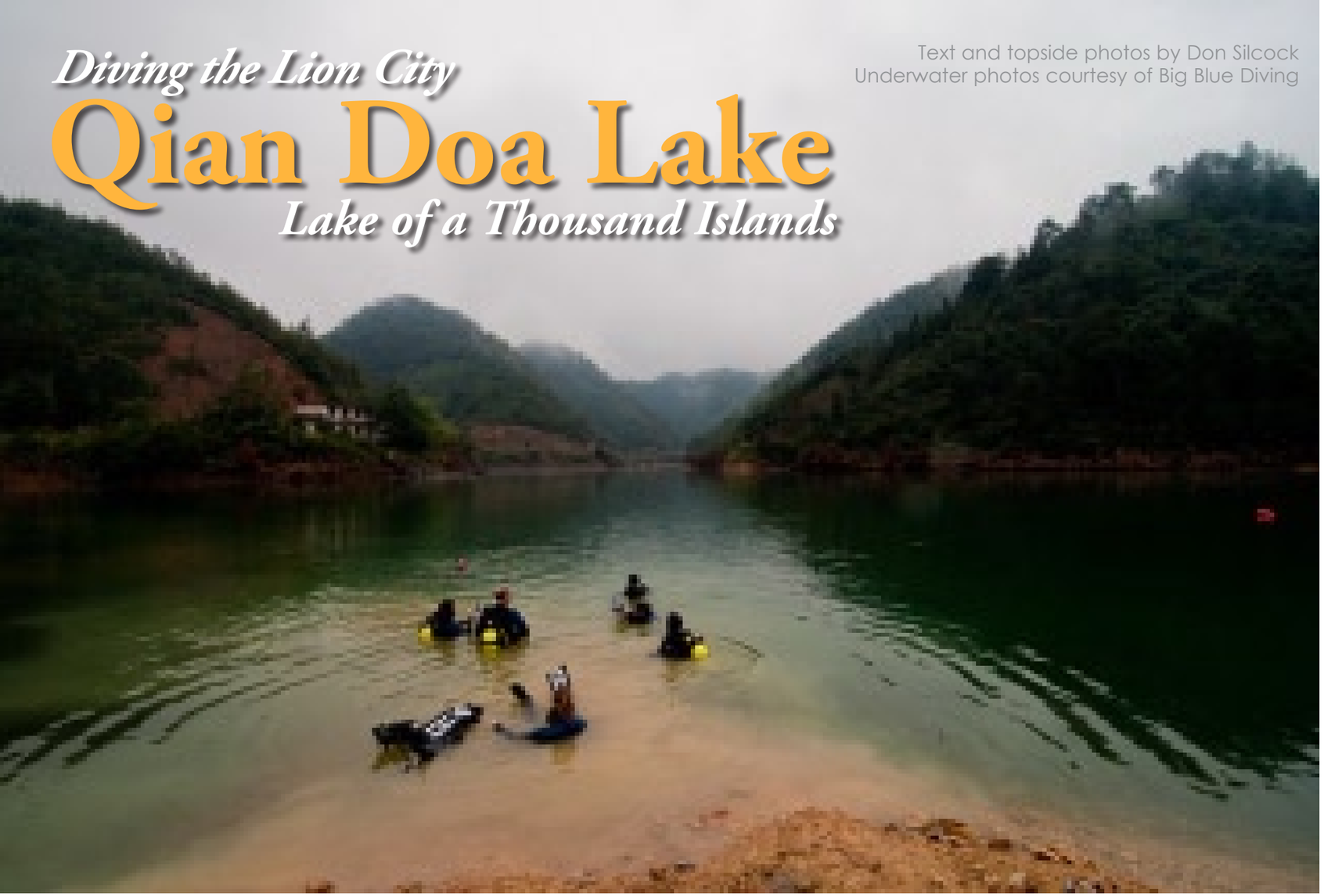
Japanese manaufacturer Fisheye has announced the release of the Fix Aquavolt 5000 underwater aiming light. The unit has 12 highly luminance white LEDs, which deliver up to 5,000 lumens of bright light over a beam angle of 120 degrees with a color temperature of 6500-8000K. The corrosion-resistant aluminum alloy body is designed to sustain the pressure of the depth up to the 100 meters. The Aquavolt 5000 has a Li-Ion rechargeable high capacity battery capable of up to 75 minutes of consequent lighting and no discharge.

Diving the Lion City

Qian Doa Lake

Lake of a Thousand Islands

Text and topside photos by Don Silcock
Underwater photos courtesy of Big Blue Diving



When I was asked to do an 18-month assignment in China in 2008, I thought the last thing I would need would be my diving and underwater photography equipment —but that was before I stumbled on the local diving community in Shanghai, where I was living.

I was quite surprised to discover that there are actually a few dive shops in Shanghai, but they seem to exist solely to train expats and take them on trips outside of China, as there is literally nowhere to dive around the city or along the nearby coastline because of the scourge of pollution.

Then I heard about Big Blue Diving, run by Leigh Chan, and their trips to Qian Dao Lake some five hours south-west of Shanghai in Zhejiang Province.

Qian Dao Lake was created in 1959 as part of the Xin Anjiang Dam and hydro power project—the lake being the reservoir for the power plant, but displacing some 290,000 people in the process. Many of these people's descendants had lived in the area since the main town, called Lion City was first established about 1,800 years ago. Lion City now lays 30-40m underwater but was found again when the main Chinese TV station, CCTV, located it with sonar as part of a project into lost ancient treasure.

A subsequent survey by professional divers found an intact wall running around the exterior of the city in a circular pattern, inside of which were many traditional Chinese buildings, many dating back to the Ming and Qing dynasties.

Big Blue had some recent photographs on their site from the exploration dives they had conducted, but they warned me that visibility could be pretty bad on the bottom and the lake itself was cold.

Undeterred, I signed up for the next trip and arranged to bring all my dry suit diving gear, plus my camera gear, back with me to Shanghai, and one Friday night in September 2008, we were off in the Big Blue bus for a weekend of adventure!

Six at night is not a great time to be trying to get out of Shanghai, and it seemed to take hours to get onto the new freeway heading south to Hangzhou. We stopped at the last service station before we left the freeway and headed west for Qian Dao, which signalled the change from modern China, with its idiosyncratic versions of western facilities, to the "real China" (read poor, but very interesting).

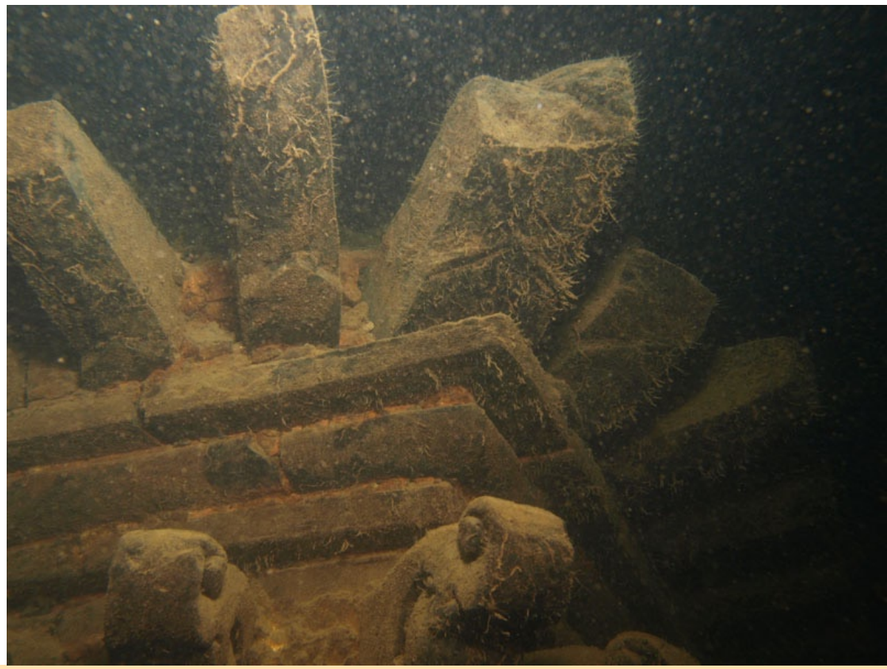
We did manage a couple of beers and a snack at the service station though, and then it was back in the bus for another couple of hours until we got to the edge of the Qian Dao National Park and our hotel for the night.

Five hours sleep later, it was up again, and after a quick local breakfast, we were back on the bus making our way to catch the ferry that would take us across the lake and to the town nearest to the site of the submerged Lion City.

The ferry journey was quite memorable because the lake with its 1,078 large islands and couple of thousand smaller ones is really very scenic. From the ferry, we got to our one-star hotel (the best in town—seriously!) and checked in, so we could dump all non-diving related gear and head for the dive site.

From the hotel, it was a 20-minute drive to the lakeside area where we were to kit up and, for those of us who were diving on the Lion City, board the "dive boats" to take us out on the lake.

The area we were using to kit up looked like it would eventually be the driveway to a well-heeled local's weekend lakeside retreat. The dive boats were local fishing boats, who are apparently taking advantage of the laws of supply and demand, to charge very high



City boarded the dive boats and chugged out to the dive site, guided by Leigh Chan of Big Blue Diving and his GPS. It was very peaceful out on the lake, almost serene in a sense, because apart from a large ship about a kilometer away, we were the only people out there.

When we arrived at the dive location, we were given a good briefing by Leigh and warned that the visibility may be quite bad, then it was into the water and, after a quick OK all round, we started our descent. At ten meters, I could tell that this was going to be quite an interesting dive, as it was going dark rapidly. At about 20m, I was no longer able to see my gauges, and shortly after my descent halted, I landed in what felt like deep and very soft silt.

rates to use them because there is simply no alternative.

The rest of the weekend's participants were using the trip to Qian Dao lake to complete certification dives and exercises from the shore area.

Those of us who were diving the Lion

At that point in time, I have to say that I was a little concerned—I appeared to have zero visibility, my buddies had disappeared during the descent, I was a very long way from any possible support and I was wondering how to explain all this to my wife, should I ever see her again.

I managed to turn the light on one of my strobes, and by manoeuvring the strobe right next to my face and holding my gauges very close to my mask, I was able to see that I was at 28m depth. My immediate thoughts were not entirely positive, but I thought follow the rules and wait for a minute or two to see if my buddies find me.

What I should have done, given the fact that I had brought my underwater camera gear all the way from Australia to photograph Qian Dao Lake, was take a photograph—but at that point in time, my self-preservation instinct had overcome any creative impulse!

But let me recreate the scene with the following "artist's impression": I subsequently returned safely to the surface and did another two dives that day, the second being a complete replication of the first but without the camera, and the

third, a kind of navigation exercise following a bearing Leigh provided to get us at the Lion City. I was diving that time with a nice lady from Canada who suggested we hold hands on the way down to avoid the inevitable separation.

On arrival back down on the lake bottom, we commenced the navigation exercise—which was not easy in almost zero visibility—and after about five minutes of following the bearing we literally bumped into a brick wall. Carefully moving sideways down the wall, we found a corner and carried onwards on the bearing, only to suddenly realise that we may well be inside a building!

It was at that point in time we managed to signal to each other that we should go up and very carefully started our ascent hoping to hit a roof or other obstruction.

Within 5m, we knew that our path to the surface was clear, and to great relief, made a controlled ascent and safety stop at 5m before getting back to the boat in general agreement that the diving was over for the day and for me—well that was it for the whole weekend, as I saw no enjoyment in doing it again.

On the boat on the way to back to shore, it became obvious why the underwater visibility was so bad. The fishermen explained that the large boat in the distance was actually a dredger—no wonder it was zero visibility on the bottom!

While the diving part of the weekend trip to Qian Dao Lake was memorable for its challenging nature, it was not the most enjoyable set of dives I have ever done. However, the evening spent at the hotel and the drive and ferry trip back to Shanghai were quite remarkable.

It was late afternoon by the time we left the lake on the Saturday, and it was starting to go dark. As we drove back to the hotel, we noticed that there were no lights on in town, and when we did get to the hotel, it was without a single light on. Apparently, power cuts are quite common in this area, as there is an overall power deficit, so the lights are turned off in the remote locations to allow them to stay on in the large cities of Shanghai and Hangzhou.

However, my thoughts were more on how we would get dinner if there was no power?

It turned out that the hotel kitchen staff were able to produce an excellent multiple course meal by candle light using charcoal braziers to cook the food. The only negative being that the beer was warmish, but after a couple of them, it did not seem to matter too much!

Altogether the trip to Qian Dao rates as one of my most unusual ones ever, and yes, I would go again, but I would want to know if that dredger was still operating on the lake first. ■