Skills for Technical Diving :: Sunglasses for Divers :: Cold & Hypothermia

X-ray mag

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Austria
Freshwater Diving

British Columbia
Pavillion Lake

Profile
Francis Toribiong

MICRONESIA
Palau

Grey Nurse
Sharks

UWPhoto
Preparation

Portfolio
Kendahl Jan Jubb

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COVER PHOTO: *Freshwater diving and fish platter in Grüblsee, Austria,* by Wolfgang Pölzer
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Diver in Fernsteinsee, with red filter, Austria. Photo by Wolfgang Pölzer

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Learn from experience

Formula One Diving

Formula one race driving used to be a very dangerous sport with drivers being frequently killed or seriously injured in dramatic accidents, which were broadcast all over the world. I suppose it is still a risky occupation and spectacular accidents do still happen with bits and pieces flying all over, clearly transmitted across the globe in HD.

But nowadays, more often than not, drivers climb out of their, often otherwise, completely crumbled vehicles, suffering little more injuries than a dented ego. It never ceases to amaze me to see something of blood and flesh crawl out the inside of a smoking piece of crumbled metal and carbon fiber.

But thanks to modern technology and safety measures, such as the carbon reinforced monocoques, that is exactly what they do. Well... mostly.

But what does that have to do with diving, if anything, you may ask? A lot.

Technical diving represents the same kind of technological forefront and developmental hotbed for new ideas, inventions and techniques, as Formula One (F1) does in the motoring industry. Many of the inventions and safety measures that are now commonplace on regular cars were first invented in F1, such as ABS brakes and traction control, to name a few, which are now standard and taken for granted.

As recreational divers, most of us are not meant to also go down the road of technical diving—not by a far cry—though, for a minority, it is a natural progression and/or an irresistible challenge. But in the same manner as ordinary drivers, both benefit from what goes on in F1 and maybe also feel inspired. Regular divers also benefit from experience and knowledge gained in technical diving. And therefore, we should look closer at what technical divers do and how they go about doing their thing.

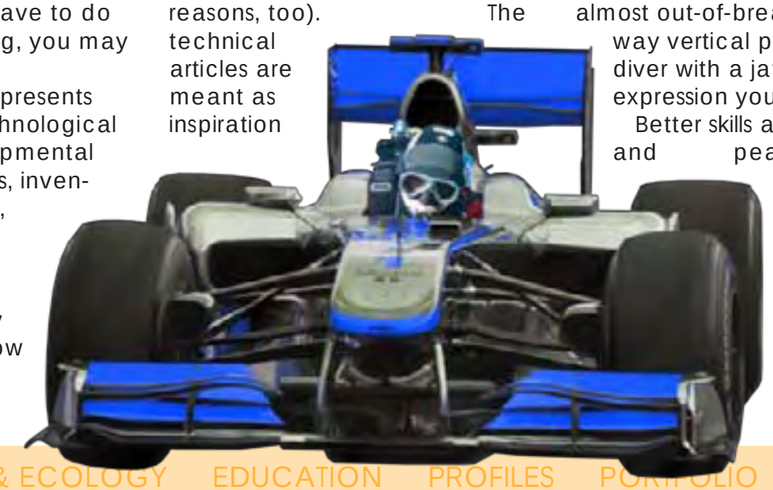
This is also why technical diving is a permanent column in this magazine, even though we are not a magazine for technical divers (though we hope they enjoy the magazine for other reasons, too). The technical articles are meant as inspiration and tools for better diving in general and to help those who aim to improve their skills move into these areas with some guidance and inspiration.

Maximise the fun, minimize the risk

Technical diving as such comes with a very different risk level, and the requirements for skills, diligence and discipline are much higher. So, it is clearly not anything we can advocate in this forum. That is a personal choice.

However, we can all become not only better and safer divers by adopting some of the practices and mind set of technical divers, but above all, we can have more enjoyable experiences in the water and more fulfilling encounters with wildlife in our gear while our technique is optimized. Just think of the last almost out-of-breath and half-way vertical pedaling novice diver with a jaw-clenched expression you saw.

Better skills also bring ease and peace of mind, even on simple shallow dives.



— Peter Symes, Editor-in-Chief

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X-ray mag

News edited
by Peter Symes
& Scott Bennett

Fresh off the cart

NEWS

"I know there have been fish kills reported in state waters, but I think they have determined they weren't a result of the oil spill."

Scientists in dispute over oil spill effects

Over six months after the start of the BP oil spill in the Gulf of Mexico, views and data of its aftermath seem to vary tremendously depending on the source. There is new evidence that massive amounts of crude oil are sitting at the bottom of the Gulf of Mexico, a finding that could further undermine the U.S. government's insistence that most of the oil spill has been cleaned up or evaporated.

LOPHELIA II 2010 EXPEDITION, NOAA-OER/BOEMRE.

A single colony of coral with dying and dead sections (on left), apparently living tissue (top right) and bare skeleton with very sickly looking brittle star on the base

Dr Samantha Joye of the Department of Marine Sciences at the University of Georgia described a centimetres-thick "layer of flocculent, sedimented oil" about 25 km from the ruptured BP wellhead. "The oil is not gone. It's in places where nobody has looked for it," she said.

In August, scientists from the Woods Hole Oceanographic Institution (WHOI) scientists mapped and confirmed the origin of a large, underwater hydrocarbon plume in the Gulf comprised of mixed oil and water measuring 1.2 miles wide, 22 miles long, 650 feet high and 650 feet high. The river of hydrocarbons is currently headed southwest, towards Mexico's coastline.

Persistent

According to scientists, the plume's concentrations of toxic chemicals are dispersing as they travel and a combination of cold water and high pressure are preventing the mix from coming to the surface. However the full impact of these deep-water plumes is not yet understood. The plume has revealed that the oil "is persisting for longer periods than we would have expected," said Richard Camilli, chief scientist on the two-week expedition.

Not degraded

Richard Camilli of WHOI's Applied Ocean Physics and Engineering Department, chief scientist of the cruise and lead author of the paper. "Many people speculated that subsurface oil droplets were being easily biodegraded" stated Camilli. "Well, we didn't find that. We found it was still there."

No fish kills reported

Yet two months later, federal and state officials overseeing the cleanup stated there is no evidence the spill killed any fish and captured commercial fish passed testing by multiple government agencies. "In federal waters, I can tell you, there haven't been any fish kills reported that are linked to the oil spill," stated Christine Patrick, spokeswoman for the National Oceanic and Atmospheric Administration (NOAA).

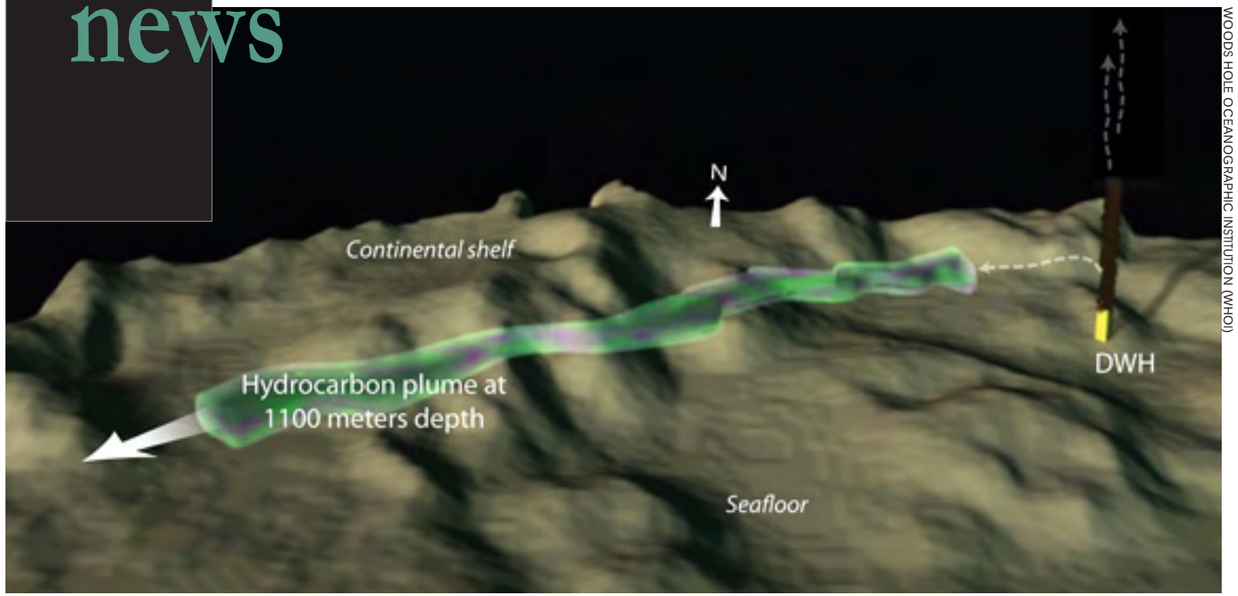
"I know there have been fish kills reported in state waters, but I think they have determined they weren't a result of the oil spill." Fish have died for seasonal related reasons, said Bo Boehringer, spokesman for the Louisiana Department of Wildlife and Fisheries. "We've investigated fish kills, but none have yet been tied to oil impacts."

Kevin Anson, chief biologist for Marine Resources Division of the Alabama Department of Conservation and Natural Resources added, "As far as wildlife, we have not observed or pinpointed any mortality in Alabama state waters of any fin fish that could be attributed directly to oil. We had observed a fish kill throughout the event when there was oil in the area or offshore. But we attributed those mostly to natural phenomenon."

"The oil is not gone. It's in places where nobody has looked for it."

The number of fish may be higher than ever according to Darrell Carpenter, president of the Louisiana Charter Boat Association and owner of Reels Screamers Guide Service in Jefferson Parish. Still, there could be long-term effects. "The fish are off the charts. There are no fewer fish. There are more fish, because they've been un-harassed all summer. There are more and bigger fish," Carpenter said. "The only uncertainty is all the biological science. The wildcard is fish internal organs, did their eggs

Damage to Deep-sea Corals observed



WOODS HOLE OCEANOGRAPHIC INSTITUTION (WHOI)

The plume of hydrocarbons emanating from the Deepwater Horizon oil spill. The plume was identified using the autonomous underwater vehicle (AUV) Sentry, instrumented with a TETHYS mass spectrometer

survive? Did they have healthy offspring? It will take a couple of years for that to unfold."

Beating

Nevertheless, the region's fishing industry took a beating, said Ewell Smith, president of the Louisiana Seafood Promotion and Marketing Board, a state fishing industry group. NOAA has teamed with the Food and Drug Administration (FDA) and the Environmental Protection Agency (EPA) to test the seafood along with various state agencies. "All of them have come back with a clean bill of health, which is all different groups doing the testing. That's the good news," said Smith. "It is the most tested food source in the world right now."

The lack of fish deaths and contaminations is not a surprise to Smith, who said fish just swim out of the way when they see something dangerous in the water. "It's like, if there is a burning building, you're not going to walk into it if you see it," Smith said. "You're going to turn around and walk in the opposite direction. That's what fish do. They're able to get out of the way."

Dying corals

Despite the seemingly large fish numbers, scientists on a recently completed research trip discovered dead and dying corals near the deep-sea well. Located 4,600 feet below surface, the damaged coral was "covered by what appeared to be a brown substance". A subsequent NOAA report stated it wouldn't be clear whether the substance was oil—and, if so, whether it was oil from the BP well—until further tests are done.

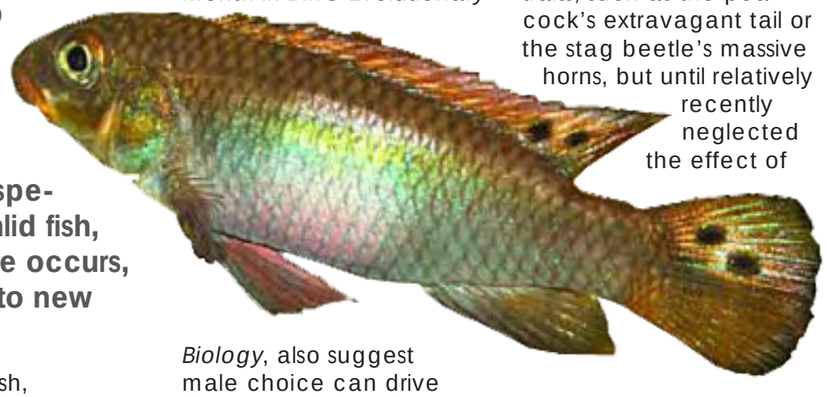
Apparently, the cold water and high pressure that exist at these depths are preventing the mix from coming to the surface. Dispersants may be playing a role as well.

This recent report is the latest to flag potential underwater environmental damage from the oil spill. Earlier this year, other researchers found sediment on the sea floor several miles from the BP well that was covered in a substance that appeared to be oil. Testing to determine the source of that substance is still ongoing, those researchers say. Scientists continue to fan out across the Gulf to try to determine the extent of environmental damage from the spill. In a statement after the research trip, NOAA Administrator Jane Lichens said the coral damage observed by the scientists "capture our concern for impacts to marine life in places in the Gulf that are not easily seen."

All and all, the consisent news reports on the state of the Gulf can be both overwhelming and confusing. Devastation or hype? In reality, it is probably a mixture of both. Ultimately, it will take years to see the full impact of the worst oil spill in U.S. history. ■

Female fish tango too

Researchers have long thought of males as the lone dancers in courtship display, leaving females to judge, but in one species of cichlid fish, the opposite occurs, according to new research.



Male cichlid fish, *Pelvicachromis taeniatus,* prefer females with a larger pelvic fin, which indicates good body condition, proving that male mate choice may lead to changes in the scale of a female sexual trait. *Pelvicachromis taeniatus* is a dwarf cichlid from West Africa that is occasionally kept as an aquarium fish In this species, females seek to impress potential mates as well by fanning out their large, violet pelvic fin.

The results, published this month in *BMC Evolutionary Biology*, also suggest male choice can drive females to evolve exaggerated traits, a finding that disputes the traditional belief that sexual selection is a one-way road, allowing only females to affect male appearance.

Scientists have widely studied the effect of female choice on male traits, such as the peacock's extravagant tail or the stag beetle's massive horns, but until relatively recently neglected the effect of male choice on female appearance.

Typically, females of a species will invest a great deal of energy into eggs or young, and males will invest nearly none, causing females to be highly selective with their mates and males to take whatever they can get. However, in biparental species, where both males and females invest equally in their young, "males will become very choosy as well," said Sebastian Baldauf, postdoctoral student at the University of Bonn in Germany and first author on the paper. ■

SOURCE: BMC EVOLUTIONARY BIOLOGY 2010, 10:301

Japanese Corals Change Sexes

Professor Yossi Loya from Tel Aviv University found that Japanese sea corals engage in "sex switching". The discovery may provide the key to the survival of fragile sea corals currently threatened by global warming.

In times of stress like extreme hot spells, the female mushroom coral (known as a fungiid coral) switches its sex so that most of the population becomes male. The advantage is that male corals can more readily cope with stress when resources are limited.

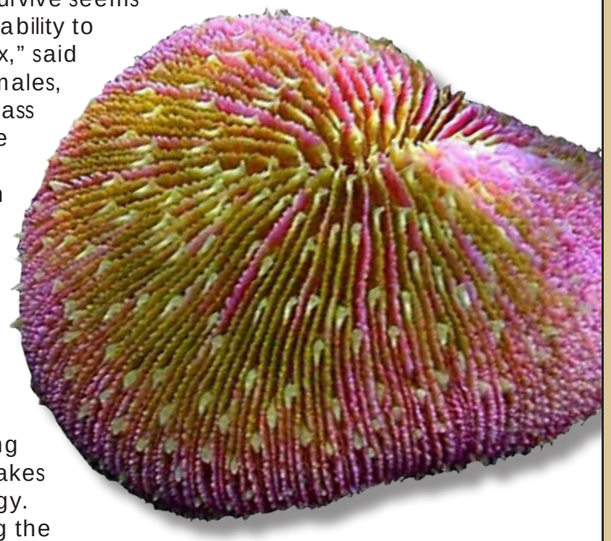
"We believe, as with orchids and some trees, sex change in corals increases their overall fitness, reinforcing the important role of reproductive plasticity in determining their evolutionary success," says Loya, whose findings recently appeared in the *Proceedings of the Royal Society B*.

Survival strategy

"One of the evolutionary strategies that some corals use to survive seems to be their ability to change sex," said Loya. "As males, they can pass through the bad years, then, when circumstances become more favorable, change back to overt females. Being a female takes more energy. And having the ability to change gender periodically enables a species to maximize its reproductive effort."

In stressful environmental conditions, male corals can "ride out the storm," so to speak, said Loya. "Males are less expensive—in the evolutionary sense—to maintain. They are cheaper in terms of their gonads and the energy needed to maintain their bodies," he added.

"This knowledge can help coral breeders. Fungiid corals are a hardy coral variety, which can be grown in captivity. Once you know its mode of reproduction, we can grow hundreds of thousands of them," said Loya, currently involved in coral rehabilitation projects in the Red Sea. ■



Mushroom coral

Edited by Don Silcock

The technology underpinning the construction of an artificial reef under Venice speculatively employs a species of carbon-fixing species of protocell technology that is engineered to be light sensitive.

Artificial coral to save Venice

Can programmable protocells—"smart salad dressing"—be used to establish the strong foundations needed to stop the historic city of Venice sinking into the spongy marshland it was built on?

Venice is located on the shore of a large inland lagoon some 50km from the northeast Italian coast. Simply stated, the city's foundations are not what they should be, and the city is slowly sinking, which combined with rising sea levels, has forced the city to look at huge civil and mechanical engineering projects to save it. Could "smart salad dressing"provide a viable alternative?

Futurevenice.org is an organization dedicated to looking at things differently and how rapid advances in science and technology could be harnessed to solve the extraordinary environmental and architectural challenges facing the iconic city of Venice.

The city was built on the lagoon some 600 years ago so that the surrounding waters could be used as a large "moat" that would help protect it, but beneath its stone foundations is soft clay, peat and watery sand, which is slowly but surely allowing the city to sink downwards.

Rising levels in the Adriatic Sea and changing tidal surge patterns has meant increasingly common incidents of flooding in the historic city over the last 30-40 years, and each flood causes further damage to its buildings and their foundations. An ambitious and very expensive series of 78 steel floodgates have been proposed to provide a controllable barrier at the lagoon's edge and preventing the flooding. But significant environmental, engineering and financial challenges face this approach.

A 18th century view of Venice by Venetian artist Canaletto

Salad dressing

This is where the smart salad dressing comes in. Collaborative research between Martin Hanczyc from the Southern University of Denmark with Neil Spiller and Rachel Armstrong from The Bartlett School of Architecture, University College, London, is attempting to utilize "metabolic materials" as a kind of living technology that can be deployed in the built environment.

The research focuses on the use of "protocells"—simple chemical agents that are able to move in their environment, sense it, modify it and perform complex behaviors. Protocells can also be programmed. For example, they can be made light-sensitive and migrate away from the light into the darkest areas.

Protocell

The concept for Venice is to design the metabolism of a light-sensitive protocell that can capture carbon dioxide from a solution and turn it into its solid carbonate, which would be released en-masse into the city's canals.

The photocell's would automatically move towards the darkened areas under the foundations of the city where they would interact with traditional building materials and turn the foundations of Venice into a limestone-like reef that would prevent further subsidence.

Such a reef would also distribute the point load of the city on the floor of the lagoon across a hard limestone-like base. Simultaneously, it would deposit solid material in any gaps between the buildings and their foundations, which would further stabilise the city base by extending the solid landmass around the city from the lagoon.

Finally, the reef would also reduce the volume of water flowing around the city, thereby buffering it against the effects of water erosion and large movements of subterranean soil. ■

Future Venice on Facebook >>>

Rachel Armstrong at TED (video) >>>

YouTube: Artificial coral to save Venice >>>

"At this point we do not know how these algae are able to exist in extreme environments, and it certainly highlights how little we know about deep reefs."

Coral Algae Found in Deep Water Black Corals

Inhabitants of deeper waters, black corals were considered to be void of symbiotic algae, because they are typically found at great depths where light levels are very low.

Black corals are of substantial cultural and economic importance in Hawaii. Some species are harvested commercially for the precious coral jewelry industry in deep waters off Maui, and black coral is considered the official gemstone of the State of Hawaii. Even though most people have heard of black coral jewelry, very few ever get to see these corals in their natural environments because of the depths in which they are found. As a result of their remote habitats, very little is known about the basic biology of black corals.

Scientists at the Hawaii Institute of Marine Biology (HIMB), examined 14 black coral species collected between ten and 396m from around Hawaii for the presence of algae using molecular and histological (tissue studies) techniques. Surprisingly, 71 percent of the examined species were found to contain algae, even at depths approaching 400m.

"Because black corals are predominantly found in deep and dark environments, most people assumed that they could not harbor these photosynthetic symbiotic algae. At this point, we do not know how these algae are able to exist in extreme environments, and it certainly highlights how little we know about deep reefs," said Daniel Wagner, who led the investigation at Hawaii Institute of Marine Biology (HIMB).

Mesophotic coral reef ecosystems (MCEs) are coral reefs located below the depth limits of traditional scuba diving (40 m) and extend to the deepest portion of the photic zone, which may be over 150m in tropical and subtropical regions with high water clarity. ■

NOAA

Important discovery

This new and important discovery also implies that some members of these algae have extremely diverse habitat preferences and broad environmental ranges. ■

SOURCE: PROC. R. SOC. B DOI:10.1098/RSPB.2010.1681

Black coral takes its name from the distinctive black or dark brown color of its skeleton. Its living tissue is brilliantly colored

Edited
by Scott Bennett

Sparks fly over theory that volcano caused BC salmon boom

Speculation has arisen that a 2008 volcanic eruption on an Alaskan island was responsible for this year's salmon glut in British Columbia. After dismally low numbers in 2009, sockeye salmon mysteriously returned in record numbers to the Fraser River this year.

Tim Parsons, one of Canada's most eminent fisheries researchers, has suggested that the boom may be the result of an eruption on Alaska's Kasatochi Island. The last big salmon run in the Fraser River occured in 1958, some two years after a huge eruption on Russia's Kamchatka Peninsula.

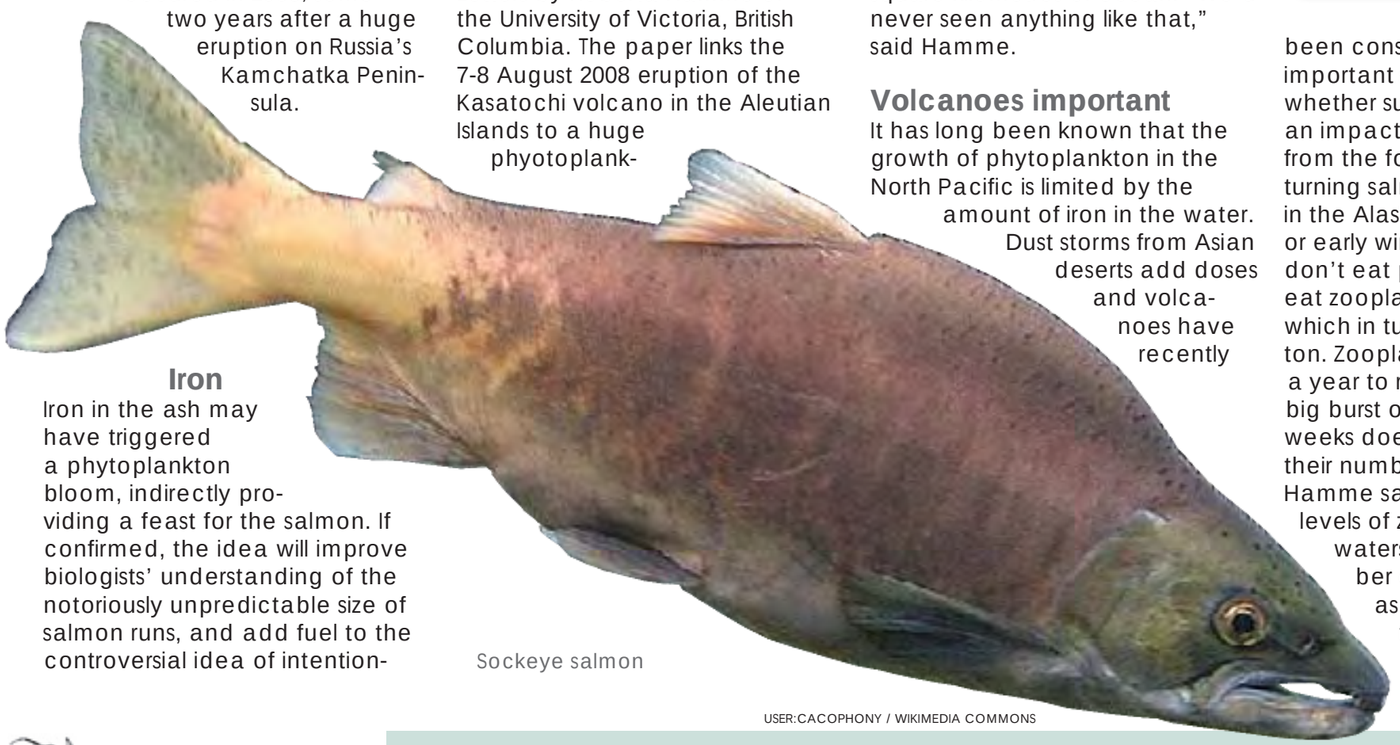
Iron

Iron in the ash may have triggered a phytoplankton bloom, indirectly providing a feast for the salmon. If confirmed, the idea will improve biologists' understanding of the notoriously unpredictable size of salmon runs, and add fuel to the controversial idea of intentionally seeding the ocean with iron to boost diminishing fish stocks. However, some researchers warn that the theory is "far fetched".

Parsons' suggestion relies on a study in *Geophysical Research Letters* by Roberta Hamme of the University of Victoria, British Columbia. The paper links the 7-8 August 2008 eruption of the Kasatochi volcano in the Aleutian Islands to a huge phyotoplankton bloom later that month. The eruption wasn't particularly large, but a storm spread its ash over a wide area. The resulting bloom was the biggest in 12 years of records, covering 1.5-2 million square kilometres of ocean. "We'd never seen anything like that," said Hamme.

Volcanoes important

It has long been known that the growth of phytoplankton in the North Pacific is limited by the amount of iron in the water. Dust storms from Asian deserts add doses and volcanoes have recently been considered to be another important source. The question is whether such eruptions can have an impact on salmon. To benefit from the food boom, this year's returning salmon would have been in the Alaskan Gulf in the autumn or early winter of 2008. Salmon don't eat phytoplankton; they eat zooplankton and small fish, which in turn feed on phytoplankton. Zooplankton take months to a year to reproduce, so a single big burst of food for them over 3-4 weeks doesn't necessarily boost their numbers much, said Welch. Hamme said there were high levels of zooplankton in surface waters in August and September of 2008, but not as high as in early summer, before the eruption occurred.



Sockeye salmon

USER:CACOPHONY / WIKIMEDIA COMMONS

A stretch too far?

If the Alaskan volcano was responsible, such a glut could happen elsewhere, too. However, for this hypothesis to work, a series of events have to coincide. The volcano has to have iron-rich ash and has to dump it in those parts of the oceans that are iron-limited: the northern and equatorial Pacific or the Southern Ocean. The eruption has to happen in the spring or summer, when phytoplankton growth isn't limited by low light, and it has to spur the growth of zooplankton rather than algae. Finally, the fish have to stumble on that particular patch during their critical growth period.

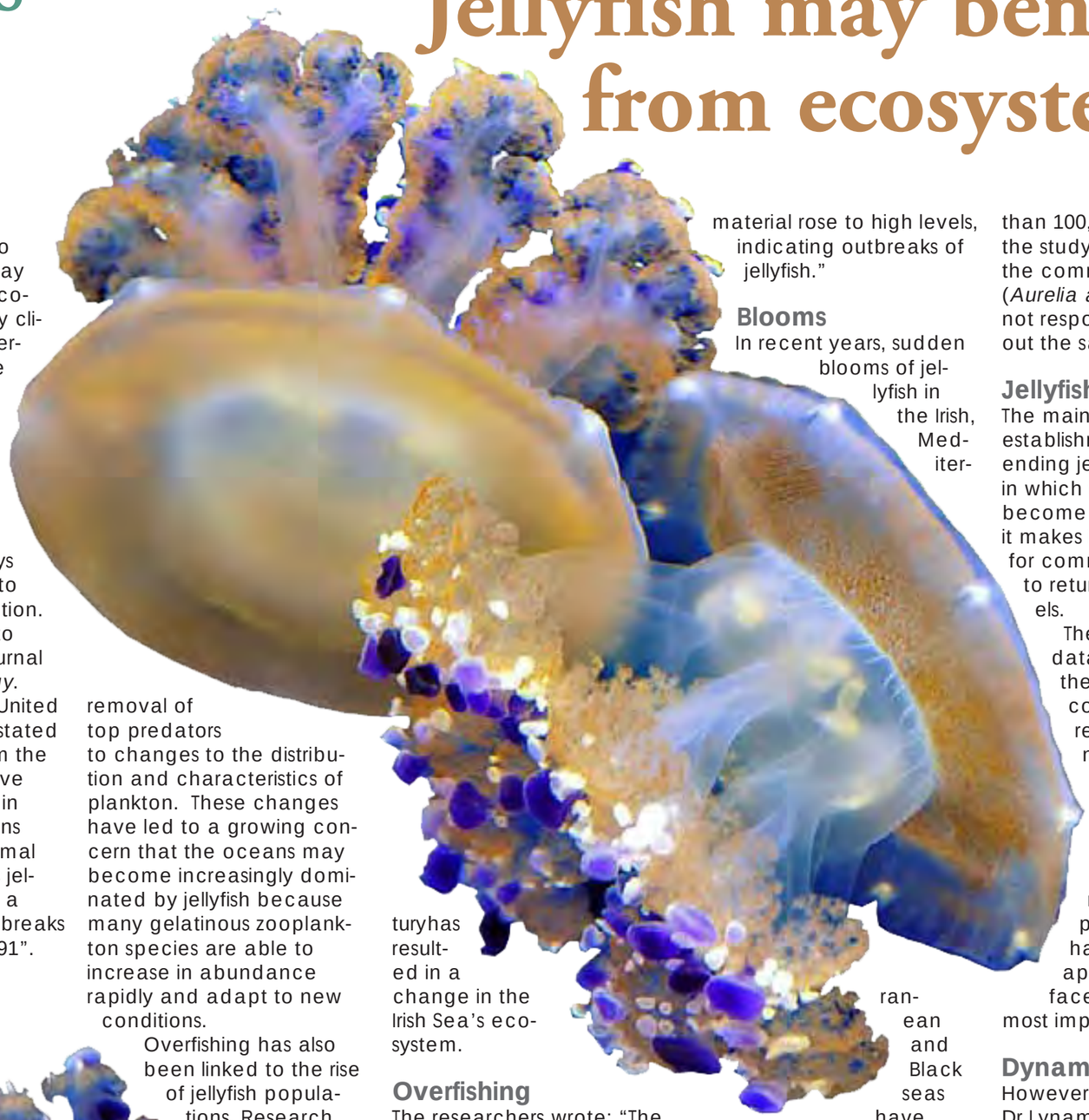
This could spur some to think of intentionally seeding the ocean with iron to increase fish numbers. However, is that a good idea? "Good God, no," stated Carl Walters of the University of British Columbia's Fisheries Centre in Vancouver. "Our experience with fertilizing things is it's way too easy to fertilize the wrong thing. In general, it's a pretty dangerous thing to do."

Official inquiry

Canadian Prime Minister Stephen Harper ordered an inquiry into what is happening with salmon numbers, and why predictions of the British Columbia salmon runs have been so wrong in recent years. They are now considering whether the 2010 boom is a sign of improvement, or just a fluke event — whether caused by the volcano or by something else. ■

News edited by Scott Bennett

Jellyfish may benefit from ecosystem instability



A team of researchers have been trying to identify how jellyfish may benefit from marine ecosystems destabilised by climate change and overfishing. Concerns have arisen that increased jellyfish populations could prevent the recovery of depleted commercially important fish stocks. However, a study by European scientists says more data is needed to fully appraise the situation.

The findings are set to be published in the journal *Global Change Biology*. Researchers from the United Kingdom and Ireland stated samples obtained from the Irish Sea since 1970 have recorded an increase in material from cnidarians (the division of the animal kingdom that includes jellyfish and coral), "with a period of frequent outbreaks between 1982 and 1991".

Domination

Previous studies have recorded changes to marine ecosystems as a result of various factors ranging from the removal of top predators to changes to the distribution and characteristics of plankton. These changes have led to a growing concern that the oceans may become increasingly dominated by jellyfish because many gelatinous zooplankton species are able to increase in abundance rapidly and adapt to new conditions.

Overfishing has also been linked to the rise of jellyfish populations. Research suggests that commercial fishing during the 20th century has resulted in a change in the Irish Sea's ecosystem.

Overfishing

The researchers wrote: "The overexploitation of herring during the late 1970s was followed by a period of ecosystem instability in the 1980s in which the frequency of occurrence of cnidarian material rose to high levels, indicating outbreaks of jellyfish."

Blooms

In recent years, sudden blooms of jellyfish in the Irish, Mediterranean and Black seas have killed fish and closed beaches. In 2007, an invasion of mauve stingers (*Pelagia noctiluca*) wiped out Northern Ireland's only salmon farm, killing more than 100,000 fish. However, the study was dominated by the common moon jellyfish (*Aurelia aurita*), which was not responsible for wiping out the salmon.

Jellyfish joyride

The main concern is the establishment of a "never-ending jellyfish joyride" in which the creatures become so established that it makes it almost impossible for commercial fish stocks to return to historical levels.

The team, using data provided by the U.K. Met Office, commented: "The regional seas of the northeast Atlantic have been warming for the past 15 years at a rate not experienced in recent centuries. For the recent period where we have good data, it appears as if sea surface temperature is the most important variable."

Dynamics

However, team member Dr Lynam explained that they had looked at whether factors such as changes to the climate and overfishing were responsible for the increase in jellyfish abundance. "I don't think that the hypothesis that jellyfish will come into an area and dominate, not allowing anything to come back again, is really supported. Such a nightmare scenario does not seem to be the case, when you consider the data and studies that have been carried out. It is quite a complicated set of possible linkages that need to be drawn, which we really only have a vague insight at the moment."

Limit fish catches

However, he cited examples in the North Sea and Black Sea where fish species had declined, leading to an increase in jellyfish abundance, but the introduction of measures such as limits on catches had resulted in a recovery of fish stocks. The team urged for the monitoring of jellyfish to continue, and concluded: "The move to ecosystem-based fisheries management requires extensive ecological knowledge and an understanding of the risks posed by any indirect effects... of our utilisation of the sea's resources." ■

Edited by Roz Lunn

EuroTek 2010

The bi-annual Advanced and Technical Diving Conference was held on Saturday the 16th and Sunday the 17th, October, 2010 at the International Convention Centre, Birmingham, England.

This year saw 500 delegates travel from 18 different countries to attend EUROTEK.2010. Over the two days of the conference, 35 leading diving experts delivered 45 different seminars, workshops and presentations covering recent expeditions, wrecks and diving in mines and caves. Technical topics included in-water recompression, CO_2 issues, modern decompression advancements and accident analysis. In addition, Rich Stevenson chaired a Rebreather Panel where delegates were able to discuss and get their questions constructively answered by leading manufacturers in a candid open forum.

EUROTEK.2010 was kicked off by Leigh Bishop who delivered a poignant and brutally honest presentation about the events that led up to the death of EUROTEK Co-founder Carl Spencer. Carl lost his life in May 2009 whilst filming a National Geographic programme on *HMHS Britannic*. Illustrated by stills and footage of the incident, Bishop explained what went wrong and the hard lessons that were learnt from this tragic accident. The emphasis of this presentation was to hammer home the harsh lessons learnt and to hopefully save lives, thus preventing this incident occurring again.

A trbute to the late Carl Spencer

Carbon dioxide monitoring issues were a key topic of the conference and Austrian speaker, Arne Sieber, showed delegates a glimpse of the future with some very interesting developments in cell technology. Briefly, Sieber has built a tiny CO_2 monitoring system with two monitors (encapsulated in ceramic) approximately the same size as a rubber on the end of a pencil. These are neatly fitted into the mouthpiece of a CCR, and the CO_2 is monitored by electronics housed in a box about half the depth of a matchbox, mounted on the exterior of a rebreather bail out valve. Currently, this system looks to be a distinct reality within half a decade, with one industry expert of note enthusiastically commenting that this was how he felt 30 years ago when he was pushing the frontiers of biomedical electronics.

In the exhibition halls, several new products were on display for advanced divers to see, touch and play with including the world debut of the new Kiss Gem diving system from Jetsam Technologies. The GEM system is a gas extender, marketed as one of the lightest, smallest and most inexpensive rebreathers on the market today. The unit is likely to be perfect for the recreational or travelling diver.

The Conference was organized by Divers Leigh Bishop, Roz Lunn, Mark Dixon and Crispin Brake

At the Gala

On Saturday night, 430 delegates and luminaries from the diving industry sat down to a gala award dinner and raffle. During the evening, over GB£2,000 was raised for Deptherapy, the disabled diving charity headed up by Fraser Bathgate. The star prize, an X-Scooter Deep Ideas Cuda Scooter, was won by a Spanish delegate who was thrilled, because his next purchase was going to be a Scooter.

The dinner guests then celebrated success with Ric Waring who recently made DIVER news. Ric was voted EUROTEK.2010 Diver of the Conference because of his phenomenal diving season exploring and identifying British shipwrecks. Waring was also noted for his devotion to shipwreck exploration and his significant expedition to date has been to *RMS Carpathia*. She now lies in 155 metres in the challenging Atlantic Ocean.

Well know cave diver Martyn Farr was awarded the EUROTEK.2010 Lifetime Achievement Award and received a warm and enthusiastic standing ovation from the room for his consistent contribution to cave diving, which has advanced and opened up the field of technical diving. Martyn thanked the delegates of the conference who voted for him, "I am honoured to receive such a prestigious award at such a unique event as EUROTEK."

EUROTEK.08 saw Mark Powell

Mark Powell, who also writes for X-Ray Mag, gives a presentation

How fast can you perform a shutdown-drill? Clock is ticking

Watch it on video here
Eurotek 2010 Shutdown Contest: The Badger

Oh were we having fun? It is not too often we get to wear our penguin suits but it was nice to see them dusted off and worn on a lot that is usually clad in drysuits. As some delegate mumbled: If the roof were to fall in tt would take out 85% of the world's leading technical dives and expertise in one foul swipe. Anyhow... we enjoyed ourselves immensely and the food was excellent.

launch his book *Deco for Divers*. It was therefore fitting that Powell received the award for the EUROTEK.2010 Publication of Significance. *Deco for Divers* is now on its second print run, because it is considered by many divers to be an advanced or technical diving publication that has educated, inspired and influenced delegates in diving.

The noted EUROTEK.2010 Innovation Award was given to Narked @ 90 for their Cell Checker. This was considered by the delegates as an Advanced or Technical Diving Innovation that has enabled divers to further their diving and /or making their diving safer. The Cell Checker will contribute to diver safety, because it helps the individual to check their true milli volt readings of oxygen sensors in the rebreathers.

Industry stalwart John Womack of Divers Warehouse/ Otter Dry suits received a special EUROTEK.2010 Award for Outstanding Contribution to the Diving Industry for over 40 years of service to divers and industry individuals and for sponsorship of advanced diving expeditions such as *HMHS Britannic*.

Co-Organiser Rosemary E. Lunn told Diver, "EUROTEK. 2010 was the perfect opportunity for networking and meeting divers who enjoy the same kind of diving as you. Thanks to the support of the diving industry we were able to meet everyone's expectations, however we've been quite stunned that many delegates have already asked us how they can reserve tickets for EUROTEK.2012. Just keep on watching www.eurotek.uk.com for further information."

Jan Willem Bech schlepped his impressive collection of historical dive equipment over from the Netherlands

About EUROTEK

EUROTEK is a bi-annual advanced and technical diving conference and exhibition, co-founded by Leigh Bishop and Carl Spencer, and co-organised by Rosemary E. Lunn.

In 2009, Carl Spencer tragically lost his life diving *Britannic*. The Diver of the Conference Award was renamed the Carl Spencer Diver of the Conference Award in his honour.

The Lifetime Achievement Award is named in memory of technical diver Keith Morris.

Following Carl's death, Leigh and Roz welcomed Mark Dixon and Crispin Brake to the team in 2010. ***www.eurotek.uk.com*** ■

A 20-year study shows an alarming decline of krill in the Southern Ocean

ØYSTEIN PAULSEN / MAR-ECO

Krill (*Meganyctiphanes norvegica*)

The scientist leading the krill project, Dr Graham Hosie, said he cannot explain the drop in numbers but is hoping to get some answers from the latest scientific expedition to Antarctica,

"Plankton are extremely sensitive to their environment. We've found that even subtle changes in pattern across the ocean with the oceanography, natural patterns, the plankton can respond very abruptly in composition.

"So they're very good at telling us what's happening in their environment. What we need to do is try and interpret that. So we are using the plankton as an indicator of the ocean health. The hypothesis is that, because they are so sensitive to their environment that they will change earlier than other parts of the system.

"And because they're the foundation of the system, if they're changing, we then look to see if there's any flow-on effect through the rest of the ecosystem."

Krill is the common name given to the order Euphausiacea of shrimp-like marine crustaceans. Also known as euphausiids, these small invertebrates are found in all oceans of the world.

Krill are considered an important trophic connection—near the bottom of the food chain—because they feed on phytoplankton and to a lesser extent zooplankton, converting these into a form suitable for many larger animals for whom krill makes up the largest part of their diet. Over half of this biomas is eaten by whales, seals, penguins, squid and fish each year, and is replaced by growth and reproduction. Most krill species display large daily vertical migrations, thus providing food for predators near the surface at night and in deeper waters during the day. ■

Rhode Island adopts nation's first Ocean Special Area Management Plan

Using the best available science and working with well-informed and committed resource users, researchers, environmental and civic organizations, and local, state and U.S. federal government agencies—the Ocean Special Area Management Plan (SAMP) provides a comprehensive understanding of the complex and rich ecosystem of the state's offshore resources.

The SAMP lays out enforceable policies and recommendations to guide CRMC in promoting a balanced and comprehensive ecosystem-based management approach for the development and protection of Rhode Island's ocean resources within the Ocean SAMP study area. The SAMP will also dictate the location of the state's offshore wind projects.

"This collaborative two-year process is a model for all other states in marine spatial planning, and will make Rhode Island the first state in the United States to zone its offshore waters for renewable energy development, while also protecting commercial fishing, critical marine habitats, and marine transportation," said Governor Donald L. Carcieri. "Rhode Island is truly fortunate to have such a dedicated team at CRMC and knowledgeable scientists at URI's Graduate School of Oceanography." ■

SOURCE: GOVERNOR OF RHODE ISLAND

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Discus fish can be surprisingly attentive parents

A recent study has suggested that tropical fish actually wean their fry, "encouraging" them to forage for themselves, and when it comes to looking after their young, discus fish have more in common with mammals. This nurturing in discus fish is a well recognised behaviour, but this is the first time it has been studied in detail.

Jonathan Buckley from the University of Plymouth, United Kingdom, was a member of the team that carried out the study. Along with his supervisor, Dr Katherine Sloman, and colleagues in Brazil, he discovered that, when it comes to looking after their young, discus fish have more in common with mammals than with most other fish. "For the first couple of weeks—when the fry first hatch—the parents take amazingly good care of them," explained Buckley.

Both parents' skin is covered in the mucus; the offspring surround the parent and constantly nibble on it. At this stage, the tiny, vulnerable fry are never on their own. The male and female even share parental responsibility, "flicking" the young from one parent to the other when they need a break from feeding them. This behaviour has been likened to mammals suckling their young.

Like mammals

The team have now documented some even more striking similarities between the way these fish take care of their fry and the way mammals nurture and feed their babies. After the first two weeks, the parents appeared to deliberately wean their young.

"In week three there's a change—the parents are constantly swimming away," Buckley explained. "We think this is the beginning of the weaning period—they're trying to make it more energetically efficient for the fry to forage rather than feed."

When the researchers studied the mucus itself, they found that it contained antibodies—immune system-bolstering substances. "This transfer of antibodies to offspring is primarily a staple of mammalian parental care and [previously] unseen in fish," he said. ■

Guam: Bill could penalize for damage to reef

A new bill, the Guam Coral Reef Protection Act, could create a legal avenue for penalizing boaters who damage coral reefs by running aground, dropping anchor or spilling chemicals.

US NAVY

Aerial Photo of Apra Harbor, Guam

If passed, the bill would allow the government of Guam to fine boaters who damage local reefs. The money would be used to fund government projects that restore or benefit the reefs. Federal laws collect similar fees, but that money doesn't go to the Government of Guam, Vice Speaker Benjamin Cruz said. It could also allow the government of Guam to claim millions of dollars in damages if the military moves ahead with a dredging plan. The Navy plans to build an aircraft carrier wharf in Apra Harbor. Both current possible wharf locations require about 70 acres of sea floor to be dredged.

According to the bill, civil penalties can be levied if someone anchors a boat on a reef, or for "any other damage to a coral reef." That would include dredging, Cruz said. "If I am going to want to protect the coral reef, then I need to protect the coral reef from everyone who is damaging it."

According to the draft Environmental Impact Statement, the Navy estimated about a third of the dredging area is covered in coral. Using those estimates, Cruz's bill could levy about US$283 million in penalties if the dredging occurred, according to a proposed fees in the bill. If all 70 acres are deemed to have coral, Cruz's bill could levy almost $850 million in penalties, according to the proposed fees.

Largest threat

Guam Governor Felix P. Camacho said the military buildup "is the largest threat to coral reefs on this island."

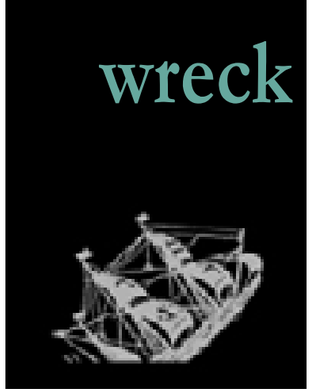
The military buildup involves the relocation of some 8,600 U.S. Marines and their 9,000 dependents from Okinawa, Japan, to Guam. It also involves the construction of facilities and infrastructure to support training and operations on Guam and Tinian for the relocated Marines.

"I stress that our ability to manage our resources and our infrastructure during the military buildup and beyond will affect our island and our families for generations to come. The efforts of local natural resource managers will be wasted, if the military buildup is not handled in a manner that respects the people of Guahan [Guam] and the natural resources we rely on-for sustenance, for economic viability, for our culture, and for our way of life," Camacho said.

Extensive dredging

One of three major projects related to the military buildup in Guam is a deep-draft wharf for transiting aircraft carriers. The U.S. Navy earlier chose the Polaris Point in Guam's Apra Harbor as its preferred site for a carrier berth.

This would require some extensive dredging of sand and coral to accommodate the 1,325-foot wharf, designed for the larger Nimitz-class carriers, a "turning basin" in the harbor, and a widened ship channel. ■



Parks Canada 2010 Arctic Surveys *HMS Erebus* and *HMS Terror*

In 1992, the Government of Canada declared the wrecks to be a national historic site of Canada. This designation came as a result of their association with Franklin's last expedition—namely its role in the history of exploration of Canada's north and the development of Canada as a nation.

A memorandum of understanding (MOU) was signed in August 1997, between Great Britain, as owners of the vessels, and Canada, as the nation in whose water they were lost. If and when found, the MOU assigns control over site investigation, excavation or recovery of either wrecks or their contents to Canada. Mandated to protect and present subjects of national significance, Parks Canada has been identified as the federal agency responsible for the search and subsequent preservation of the vessels.

The search for *HMS Erebus* and *HMS Terror* is extremely complex due to the vastness and harsh conditions of the Arctic, coupled with the varying interpretations of Franklin's history. Although a number of attempts to locate *HMS Erebus* and *HMS Terror* have been unsuccessful to date, a general search area has been identified based on one particular interpretation supported by Inuit knowledge. ■

Search for *HMS Erebus* and *HMS Terror* heats up

Two British naval ships belonging to the renowned explorer Sir John Franklin—lost 165 years ago while navigating the famed Northwest Passage—are once again at the centre of an intense search.

What happened to Sir John Franklin's two superbly equipped ships when he and all 150 members of his expedition died in the search for the North-West Passage more than 160 years ago? The fate of the 1845 expedition haunted Victorian imagination, and expensive rescue expeditions continued for almost 20 years, spurred on by Franklin's formidable widow, Jane Griffin. Evidence confirming Franklin's death was only discovered in 1859. Dumped supplies were recovered along with personal possessions, letters describing his death and those of many of his senior officers, and finally bodies, but his twin ships—the *Erebus* and the *Terror*—have never been located.

Although Franklin's crew left two messages in the Arctic at a cairn for any rescue mission, according to naval protocol, the details of their last position was either never recorded or has yet to be found.

Huge reward

The British Admiralty's reward at the time Franklin and his men disappeared—20,000 pounds sterling or 100,000 dollars (the equivalent of a million pounds today)—sparked one of the greatest rescue efforts in naval history. Even this summer, Parks Canada searched for the boats, encouraged by its discovery earlier this year of *HMS Investigator*, a British naval ship sent to locate Franklin before also becoming stuck in ice farther along the Northwest Passage at Mercy Bay. Now, if he can borrow a Canadian government icebreaker for next summer's diving season, Robert Grenier, the archaeologist who has led the hunt for the past 30 years, believes he can close in on the *Terror* at last.

Buried journals

Meanwhile local Inuit in the remote Arctic hamlet of Gjoa Haven are also touting the possible excavation of some alleged lost journals, which could shed light on the vessels' location. Organisers today hope to unearth these ancient journals—believed to have been buried in an ancient cairn some time over the past century. Brothers Andrew and Wally Porter claim that their grandfather, George Washington Porter, buried the papers 60 years ago for prosperity. ■

WIKIMEDIA COMMONS

HMS Terror thrown up by the ice. Engraving after a drawing by Captain George Back, from his 1836-37 Arctic expedition

IMPERIAL WAR MUSEUM

HMS Snaefell laden with troops during WWII

Famous WWII paddlesteamer found in the English Channel

A paddle steamer that helped ferry troops back from Dunkirk has been found 69 years after it was sunk by German warplanes

The sunken remains of one of the most famous of Dunkirk's "little ships" has been found by a team of divers, after 69 years of mystery over where they lay. The wreck of *HMS Snaefell* was discovered eight miles off Sunderland, some ten miles south of her last engagement with Nazi aircraft in the summer of 1941, *The Guardian* writes.

The paddle steamer, which saw service as a minesweeper in both the First and Second World Wars, was bombed and sank in 1941, and all trace was lost.

The *Snaefell* was a classic paddle steamer built in 1907 for pleasure trips off south Wales. It was converted into a minesweeper and served in both world wars. It avoided bombs on trips to Dunkirk, which saw it rescue more than 1,000 British soldiers, but was crippled off Whitley Bay by a direct hit and sank soon afterwards, with the loss of three lives.

Previous searches have focused north of the Tyne, but the broken-backed wreck was located by eight members of the Silent Running diving team who were checking stretches of seabed off the County Durham coast. Allan Lopez, who skippers the launch *Spellbinder II* out of South Shields, said that the strange silhouette had come as a shock.

"Paddle steamers are rare ships. When one of the divers reported that he had seen paddles, we didn't believe him at first. When we went down a second time, we saw them, and we knew this was something special," he said.

The team's leader, Brian Matthewman, told *The Guardian*: "The paddles are huge, the size of houses. The wreck was not meant to be in that area, so it was difficult to identify what we had found." ■

2000-year-old pills found in Greek shipwreck

In 130 B.C., a ship fashioned from the wood of walnut trees and bulging with medicines and Syrian glassware sank off the coast of Tuscany, Italy. Archaeologists found its precious load 20 years ago and now, for the first time, archaeobotanists have been able to examine and analyse pills that were prepared by the physicians of ancient Greece. DNA analyses show that each millennia-old tablet is a mixture of more than ten different plant extracts, from hibiscus to celery.

"For the first time, we have physical evidence of what we have in writing from the ancient Greek physicians Dioscorides and Galen," said Alain Touwaide of the Smithsonian Institution's National Museum of Natural History in Washington, DC.

The box of pills was discovered on the wreck in 1989, with much of the medicine still completely dry, according to Robert Fleischer of the Smithsonian's National Zoological Park, also in Washington, DC. ■

SOURCE: NEW SCIENTIST

Ottoman frigate *Ertuğrul* goes on display in Japan

Artifacts from a famous Ottoman ship that sunk off the coast of Japan more than a hundred years ago have now been put on display in the southern province of Mersin, Turkey.

After sailing in Asian waters for more than a year, a time filled with various mishaps and difficulties, the *Ertugrul* arrived in June of 1890 in Japan, where Osman Pasha and his crew had a successful visit with the authorities and the imperial family. On the return voyage, however, the Ottoman frigate sank in a severe typhoon on the 16th day of September after foundering on dangerous sharp rocks off the coast of Wakayama in southwest Japan. Except for a mere 69 survivors, the waves of the Pacific Ocean claimed the Pasha and his men. One of the striking remains in the exhibition is a small perfume bottle, which is believed to have been sent by the captain's wife and believed to hold tears.

Tufan Turan, the leader of a multinational expedition that has been working on the *Ertuğrul* shipwreck for the past three years, said they started working on the *Ertuğrul* shipwreck in 2007 and added that Turkish, Japanese, Spanish and U.S. researchers study the ship at Oshima Island, near Kobe, every January and February. The research teams work underwater two hours a day, Turan said, adding that more than 6,000 pieces have been removed from the shipwreck since 2007.

The exhibition will visit other Turkish cities in 2011 before traveling to Japan for display. ■

On 15 September 1890 at noon, *Ertuğrul* set sail from Yokohama for Istanbul. The very good weather conditions at the departure changed the next day in the morning

said they started working on the Ertuğrul shipwreck in 2007 and added

Worldwide Dive and Sail Announces New Maldives Liveaboard

With over 3,000 coral reefs offering spectacular pelagic encounters with sharks, manta rays and whale sharks, the Maldives tops many a diver's wish list. The free flowing tides of the monsoons have resulted in the creation of one of the world's richest diving coral reef areas, with over a thousand species of fish and other underwater creatures to be observed. Add shipwrecks, channel dives and 50m visibility to the mix, and you've got a destination guaranteed to enrapture the most jaded divers for a lifetime.

From July 2011, Worldwide Dive and Sail will offer four different itineraries around the Indian Ocean nation on their newest vessel, the *S.Y. Maldives Siren*. A traditional Indonesian gaft-rigged Phinisi, handcrafted from ironwood and teak, the 34-metre *S/Y Maldives Siren I* has been custom-made with all the luxury facilities for the modern diver. Catering up 14 guests aboard each trip, the vessel has been specialized for the underwater photographer and videographer.

All itineraries are ten nights in duration and cost 2,400 Euro per person, all offering the Siren Fleet's renowned level of service. In addition, itineraries will feature land excursions to many of the many stunningly beautiful tropical and uninhabited islands and, where possible, visits to a local community. ■

www.worldwidediveandsail.com

Diver left behind in open ocean awarded US$1.68 million

A Los Angeles County Superior Court jury has awarded Daniel Carlock, a Santa Monica aerospace engineer US$1.68 million in damages in his five-year legal battle against Venice-based Ocean Adventures Dive Co. and Long Beach-based Sundiver Charters who abandoned him floating in the ocean 12 miles off Long Beach during a diving excursion.

The *Sundiver*, carrying 20 scuba divers, was staging a dive near the oil rig, Eureka, when Carlock surfaced 400 feet from the vessel after having trouble equalizing the pressure in his ears. Despite his absence, a dive master for Ocean Adventures marked him on the dive roster as present on the boat. Then, to escape strong currents, the boat moved to a second dive site seven miles away. Once the vessel was there, Carlock was again marked on the roster as having taken a second dive — although by then he was bobbing alone in the ocean miles away.

"Being abandoned at sea is not a risk inherent in the sport."

After a 23-day trial and two and a half days of deliberations, the jury assessed total damages in the negligence suit at US$2 million. But it reduced Carlock's award on the grounds that he was partly responsible because he had been told to surface closer to the boat.

Amorpheus standards

"Dan has changed the industry's safety standards so that other divers won't be left out in the ocean and endure this kind of terror," said Carlock's attorney, Scott Koepke. He said industry standards had previously been "amorphous" on how to count divers. "Now they have to have visual verification and redundancy. And the dive boat captains, not just the dive masters, are responsible for the count."

Assumed risks?

Lawyers for the companies had contended that by participating in the dive, Carlock had assumed certain risks, thereby waiving his right to hold operators responsible. But a judge refused to dismiss the case, saying that being abandoned at sea is not a risk inherent in the sport.

Stephen Hewitt, an attorney for Ocean Adventures, acknowledged that "everyone involved had some obligation to look for and account for Mr. Carlock." ■

SOURCE: LOS ANGELES TIMES

Text and photos by Wolfgang Pölzer

Underwater Austria

—a freshwater view of diving

PREVIOUS PAGE: Breath-taking scenery at the lake, Gosausee

Austria

Completely landlocked doesn't necessarily mean that diving is out of the question. Austria is best known for alpine skiing, historical Vienna and delicious cakes, but also offers some really spectacular diving. Here, one can dive wrecks and walls, enjoying a rich aquatic life in lakes with great visibility.

Before we take you on a trip through the top ten list of freshwater diving in Austria, let's have a look at some facts. Since the break-up of the Austrian-Hungarian Empire in 1918 Austria hasn't had any access to the ocean. On the other hand, freshwater is in rich abundance in this small central European country. Together with countries like Norway, Sweden, Iceland and Finland, mountainous Austria is one of the areas in Europe richest in freshwater. And the water is clean. Ninety-nine percent of Austrians have access to potable ground- and spring water. Austria boasts a whopping 9,000 lakes, of which two thirds are natural and the last third are man-made. The man-made lakes are mostly created to support hydroelectric plants.

Widely known secret

For many divers, freshwater diving is not real diving. No coral reefs, no sharks. Cold and dark. Even amongst Austrian divers, their own backyard is a secret. Contrary to popular belief, freshwater diving can be exciting.

Enjoying clear vis in Grünersee

THIS PAGE: Grünersee from above and below; Diver and rainbow trout at Grünersee

As in the ocean, you need to choose your dive site according to what you want to see, water conditions and best time of the year. The most important aspect of freshwater diving is the season.

During the year, the temperatures in the lakes change between freezing and warm; the transparency of the water fluctuates; the vegetation differs; and fishes change their favorite hangouts. In places where you, for example, can observe perch hide in full green vegetation during the late summer months (August-September), you will only encounter a desert-like sea floor in the spring (March-April).

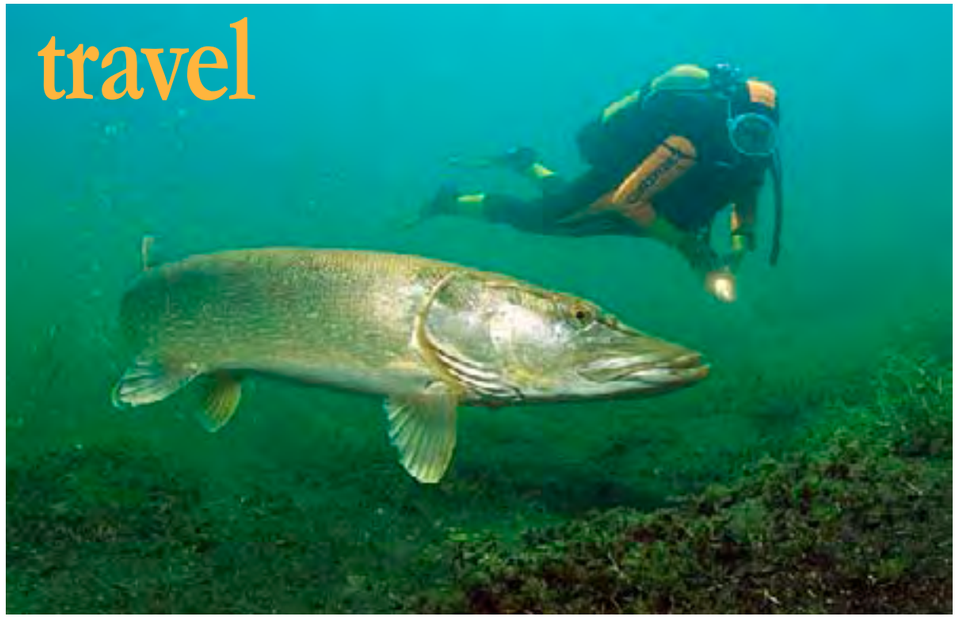
If you are looking for fish, my tip is to dive in the summer months (May-August) and stay in the shallows (1-5 meters / 3-16 feet) near land. Some species will be sleeping, while other will be hunting. Another treat is the water temperature at the water's edge often allows for a 5mm wetsuit and no gloves.

Top ten dive sites

Grüner See (Green Lake)
This is by far the lake in Austria with the best visibility. It's situated in the heart of Steiermark (Styria), one of Austria's nine federal states. The distinctive character of this lake comes from the fact that its water source is almost entirely made of melted snow. Because of this, the lake actually only exists from late spring until late summer. The rest of the year it is often nearly dried out. During the dry season the lake-bed serves as a hiking trail. The water level usually peaks during June, and floods not only the dry rocky lake-bed in the middle, but also the surrounding grassland and forest. Diving the Green Lake gives you an opportunity to dive among park benches, wooden board walks and along hiking trails. This is also a popular fishing spot, and every year, trout are released into the lake. When melting snow from the surrounding mountains, starts to fill up the lake in the spring, it passes through sand and gravel, which function like a filter. The water is therefore mostly very clear. This also means that the lake is very cold. The average temperature hovers around 6-8˚C (43-47˚F).

BASIC FACTS
Depth: 12m / 36ft
Best season: beginning of May until end of August
Entrance fee: EU€ 8 per person per day, available at the main parking area
Dive center: no center, but it's possible to fill your tanks at the Gasthof Seehof: www.seehof-gruenersee.com
Tourist info: www.tragoess-gruenersee.at
(Call/write ahead to check the water level, just in case).
YouTube: www.youtube.com/v/WkDSlFexs-Y?

Samaranger See (Lake Samaranger)
This is another gem in the collection of Austrian freshwater lakes well worth a few dives. The lake is very small, just about 100 meters, or 328 feet, across. You will usually find yourself diving in crystal clear water and almost be able to get a complete view from the

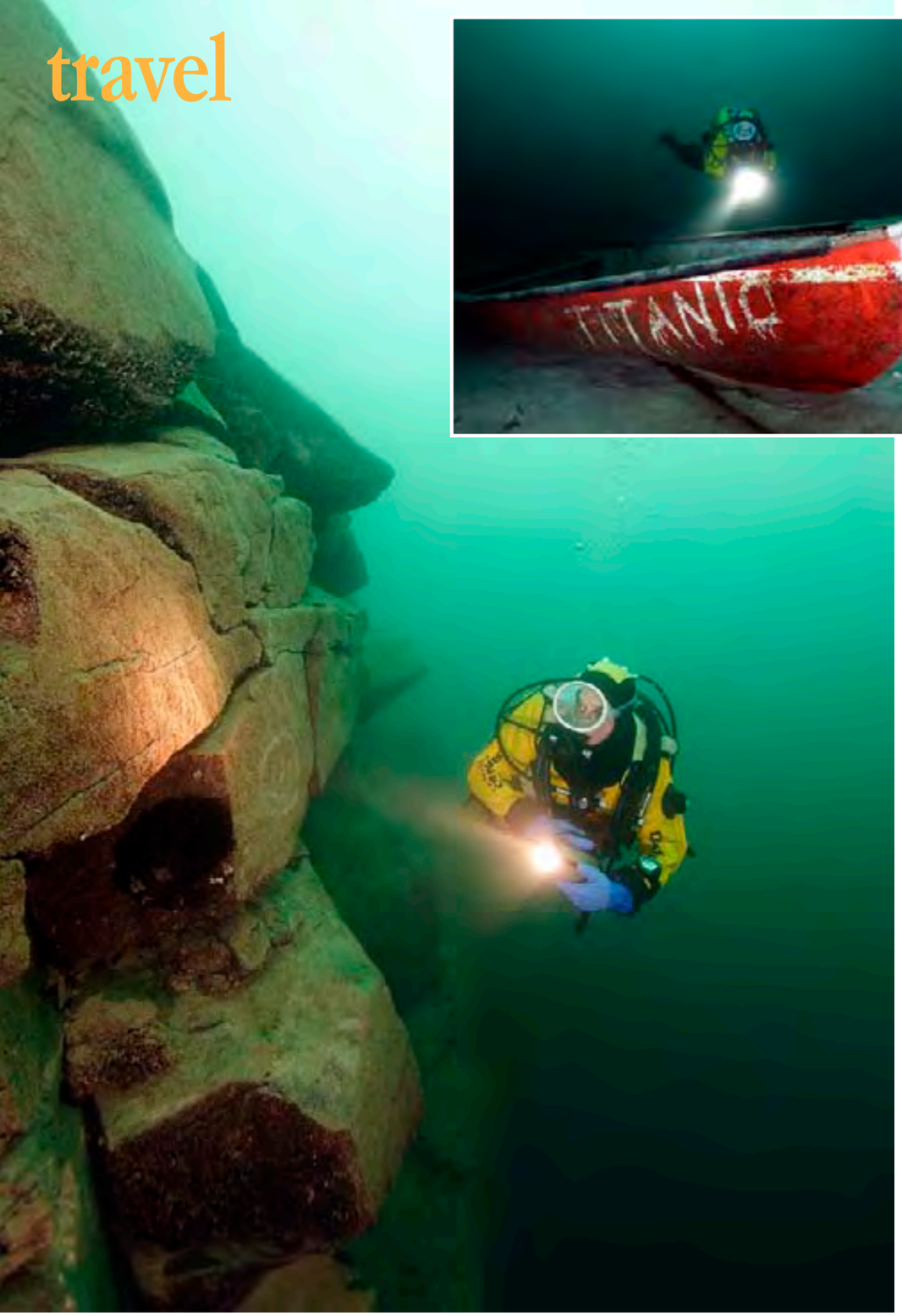


CLOCKWISE FROM ABOVE: Diver and northern pike; Beautiful scenery around Erlaufsee; Northern pike hiding in folliage; School of common rudd

middle of the lake. For the best visibility, visit during the late autumn (September – October). Besides a few rainbow trout, there isn't much fish life in the lake. The lake is full of tree trunks and branches, which are partly overgrown by algae. This allows the creative photographer to create some mysterious images. The lake bottom is covered with very fine silt, so move around with controlled fin strokes. The Tyrolean lake is situated a few hundred meters from the Palace Hotel Fernsteinsee, which is named after another nearby lake. Both lakes can only be dived with permission from the hotel, which owns the lake and the surrounding lands. You need to stay at least two nights at the four star hotel to gain a diving permit.

BASIC FACTS
Depth: 12m / 36ft
Best season: late summer and autumn (July – September)
Entrance fee: two night's accommodation at the Schlosshotel Fernsteinsee.
Dive center: no center, but it's possible to fill your tanks at Schlosshotel Fernsteinsee: www.fernsteinsee.at
Tourist info: www.mieminger-plateau.at
Lake Samaranger on YouTube: www.youtube.com/watch?v=_wEEWrY8zK0

Erlaufsee
This lake is considerably larger than the two previous lakes. Erlaufsee is right on the border between Styria and Lower Austria, not far from the tourist village of Mariazell. This lake provides you with a visibility of 10 to 15 meters / 30 – 45 feet most of the year, except in the spring (March – April) when melt-water tends to cloud the lake with particles. This lake has rich fish life, so try to get here when the visibility is good.
The Erlaufsee is known for its large stock of northern pike (*Esox lucius*). The pike like to hide in the dense vegetation in shallow water. Don't be surprised if you observe at least a dozen perches during a dive. Another great feature of this lake are the numerous rudds (*Scardinius erythrophthalmus*) that inhabit the Erlaufsee. Also look for the European perch (*Perca fluviatilis*), European eel (*Anguilla anguilla*) and the spiny-cheek crayfish (*Orconectes limosus*). This freshwater body even boasts a wall that drops off to 30 meters. The usual tree trunks and branches that have fallen in from the surrounding forest make this lake one of the most versatile dive sites in Austria. Diving here is strictly regulated. Use only the three well -marked entry/exit points. You also need to carry an Austrian Divecard, which can be bought for € 15, and is valid for many of the Austrian lakes for a full year.



BASIC FACTS
Depth: 38m / 125ft
Best season: summer and autumn (June – September)
Entrance fee: Austria Divecard, EU€ 15 per person per year
Dive center: Harry's Tauchschule in St. Sebastian next to the Gasthof Seewirt: www.tauchschule.co.at
Tourist info: www.mariazell.at
Google Earth: 47°48'0"N 15°17'0"E
YouTube: www.youtube.com/watch?v=tJzDFrTk7_k

Attersee
This is one of the largest and deepest lakes in Austria. It is also the most dived lake. The reason for this is good visibility year around, varied underwater landscape, many possible entry/exit points and good parking facilities around the lake. And last but not least, you dive here for free! The 20 kilometer- / 12.5 mile-long lake is nested between alpine mountains and soft rolling hills. Along the highway, which runs along the edge of the lake, you will find many sign posts of entry/exit points. At the dive sites, you will also find info-boards with detailed descriptions and drawings of suggested dives. This gives you the choice of what you want to do under water: photograph tree trunks shrouded in algae, explore ship- and car wrecks or just enjoy diving in a varied landscape with walls and deep water. Just remember to check your depth gauge often, as you decend into the clear water. Even at 40 meters depth, you will have good natural light on a sunny day. Besides the lure of the deep end, you should also venture into the shallows and vegetation-rich zones along the lake sides.

BASIC FACTS
Depht: 171m / 561ft
Best season: Summer and autumn (June-October)
Entrance fee: free
Dive center: Nautilus Dive-Company, at Weyregg, directly on the lake, www.nautilus.at
Tourist info: www.attersee.at (The tourist infrastructure in the area is very good. There are several places to fill your tanks in addition to a variety of accommodations and eateries).
Google Earth: 47°54'N 13°33'E
YouTube: www.youtube.com/watch?v=0xb6gd2LGBA

Gosausee
This alpine lake is surrounded by the impressive peaks (2,500 meters / 8,200 feet) of the Dachstein mountain range

CLOCKWISE FROM ABOVE: Exploring the landscape under Attersee; Diver and *Titanic* canoe wreck; Divers and kayakers at Attersee; Burbot (Lota lota)

CLOCKWISE FROM ABOVE: Scenes under the surface of Gosausee; Silurus glanis in Klopeinersee; Delicate flora and fauna in Klopeinersee

at the border of Upper Austria and Styria. The tiny lake is best dived between early summer and late autumn (May – October). The present water level is a result of a dam, which was built 100 years ago. As it is a water reservoir, the water level can fluctuate as much as 30 meters. When you arrive at the lake from November until June, it can give you the impression of an half empty bathtub. In the spring, the melting snow fills up the lake again. You can dive here all year round, but when the water level is low, it is difficult to haul heavy diving gear down the rocky slopes. Also, the best visibility is only had when the water levels are at their peak. Expect up to 50 meters visibility at depth. This is the real highlight of the lake, but before you reach this visibility, you need to penetrate a couple of thermoclines and endure a water temperature of 4°C / 39°F. The lake-bed slopes at an angle of 45˚. There are a few smaller walls at around 20 meters depth. The lake is dominated by huge boulders creating an exciting underwater landscape to explore. Stuck amongst the rocks, you can come across old tree trunks and roots, which make great photo subjects. It is forbidden to dive in the vicinity of the water intake for the hydroelectric plant. There is a 5x2 meter / 15x6 foot metal grid here, but the 3,000 foot-long pipeline creates some current. There is little of fish and vegetation in the lake due to the big difference in the water level.

BASIC FACTS
Depht: 85 m / 279 ft
Best season: Summer and autumn (May-October)
Entrance fee: Austria Dive card, EU€ 15 per person per year.
Dive center: Tauchclub Dachstein-Salzkammergut, directly on the lake, www.dive-adventures.at
Tourist info: www.gosau.com
Google Earth: 47°35'0"N 13°32'0"E

Klopeiner See

In stark contrast to the previously mentioned lake, the Klopeiner See has rich fish life and is warm enough to be a popular place in which to swim. At only 1.1 km² / 0.7 mi², the Carinthian lake is not big. The higher temperature lessens the visibility, though, which will be in the range of 8–10 meters at its best. The lake still has its attractions for divers. Due to the profile of the lake bottom and the fact that there are seldom strong winds here, the different water layers don't mix very well. Below 30 meters / 99 feet depth, there is a nearly oxygen-depleted water layer. The area around the lake is a mix of farm land and villages, which have had a strain on the lake. To keep up the water quality, the local government installed a "deep water ventilation plant" that at least partly enriches the lake's oxygen levels. One of the positive effects of the distinct layers in Klopeiner Lake is that the top layer heats up to around 25˚C / 77°F during the summer months. This makes it the warmest lake in Austria and attracts more than a fair share of lakeside tourists. The

CLOCKWISE FROM BOTTOM LEFT: Juvenile Wels catfish (*Silurus glanis*); *Lepomis gibbosus*; Diver and huge Wels catfish resting on ledge of Klopeinersee; Diver prepares to dive Weissensee; Scenes below the ice in Weissensee

nice temperate water makes this lake more inviting to plant and fish life than other lakes in Austria. Klopeiner Lake is inhabited by 17 species of fish. The avid fish lover can encounter slightly exotic fishes such as Eurasian ruffe (*Gymnocephalus cernuus*), or pumpkinseed sunfish (*Lepomis gibbosus*) and the impressive Wels catfish (*Silurus glanis*). Getting close to one of these bottom dwellers, which can reach a length of more than two meters and weigh as much as 250-300 kilograms / 550-660 pounds, would spike any diver's adrenalin levels. Besides the ecological curios, you can also see a more than 300-year-old tree at 10 meters / 33 feet depth. For those chasing depth, there are a few places with drop offs as well.

BASIC FACTS
Depth: 48m / 157ft
Best season: Autumn (August - October)
Entrance fee: EU€ 1.50 per person per day
Dive center: Tauchschule Easy Dive, at the Strandbad Süd, www.easydive.at
Tourist info: Klopeinersee.com
Google Earth: 46°36'16"N 14°34'59"E

Weissensee

This lake in the southern part of Carinthia is good for diving all year. This 11 kilometer- / 6.8 mile-long but less than 1 kilometer- / 0.68 mile-wide body of water is walled by high mountains rising up to an altitude of 930 meters / 3,050 feet. It freezes over completely from January to March, and good ice makes it popular for ice-diving. Under the ice, the visibility is usually good at 20 meters / 66 feet or more. This lake offers some breathtaking walls—some of them with large overhangs, and even some caves. Add to that the usual collection of tree trunks, some wrecks and good fish life, and you have dive sites for any taste. It is easy to dive the Weissensee, as you can rapidly reach all the different dive sites with a boat. The lake is rich on calcium, which gives the lake its name— Weissensee, or the white lake. The lake bed is covered with calcareous mud. Fish seem to like this because as many as 24 species inhabit the Weissensee. Northern pikes (*Esox lucius*) are easily observed. The common carp (*Cyprinus carpio*) appears in large schools. If you are looking for greenery, you need to stay in the shallows at the water's edge. As many of the fish like to hide here, this makes for good dives in summer nights.

BASIC FACTS:
Depth: 99m / 325ft
Best season: Autumn (August - October)
Entrance fee: free
Dive center: Tauchschule

CLOCKWISE FROM FAR LEFT: Ice hole for diving in Blindsee; Stone loach (*Nemacheilus barbatulus*); A zander (*Stizostedion lucioperca*) is a species of fish related to perch; Diver approaches zander; Zander in Blindsee hovers over its nest

Dive World, at the Strandbad Stockenboi on the eastside of the lake, www.dive-world.at
Tourist info: www.weissensee.com
Google earth: 46º 42'22.17" N 13º 20'34.55 E

Blindsee

This is a small alpine lake with some rare species of fish. You can find the lake at 1,100 meters altitude in Tirol. On sunny days, the turquoise water surrounded by evergreen needle tree forests crowned by snow capped mountains, makes a great photo. Just like the previously-mentioned Samaranger See, this lake is on private land and connected to the four star Mohr Life Resort. The kilometer-long lake attracts divers because of its special fish population. Of the handful of species, which have made the lake their home, the large amount of slender silvery zander (*Stizostedion lucioperca*) quickly catches one's eye. These tasty predators are best seen in the spring during their mating rituals. During this period, the males build nests at two meters depth where the females place the eggs to be fertilized. The males then guard the eggs ferociously against other predators. This fish has even been known to attack divers, biting them while defending their eggs. The smaller and evidently less aggressive stone loach (*Noemacheilus barbatulus*) are also an abundant in Blindsee. These finger-long bottom dwellers are rarely seen by divers in other lakes in Austria. Should you grow tired of fish-watching, you will find an intriguing pile of trunks interesting. They resemble a pile of Mikado sticks. They are the result of an avalanche that swept parts of the forest at the water's edge into the lake about 30 years ago. You can swim around his labyrinth of waist-thick tree trunks.

BASIC FACTS
Depth: 23m / 75ft
Best season: Autumn (August - October)
Entrance fee: free for hotel guest, others EU€ 12.50 per person per day
Dive center: Tauchen in Tirol (this is an operation from Innsbruck, which has an outlet at the Mohr Life Resort, www.tauchen-in-tirol.at
Tourist info: www.mohr-resort.at

Grüblsee

Feeding fish while diving is normally banned in Austria, but at the Grüblsee, nobody will frown upon you if you bring a plastic container with some treats for the fish. And since our scaled friends are quite used to this practice, they will quickly descend upon you to get a bite of the goodies. On the other hand, this lake is not natural. It's actually a large "foil pond" found at 1,160 meters / 3800 feet altitude. Not made for divers or swimmers but as a reservoir to feed all the snow-canons used by the ski-resorts in the area during the winter season. Flexible as the

CLOCKWISE FROM FAR LEFT: Diver and schooling brook trout and Rainbow trout; Divers prepare for a freshwater dive in Grüblsee; Diver under the waves and kayaker on the surface at Traunfälle; Diver with sterlet (*Acipenser ruthenus*) of the sturgeon family

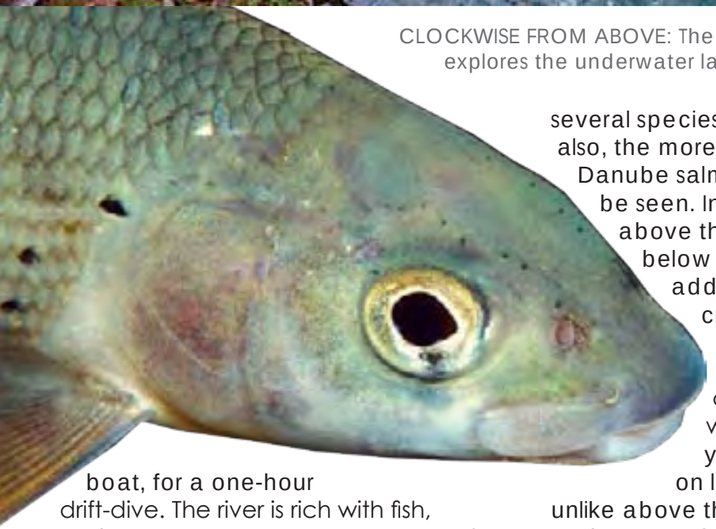
Austrians are, they convert one of the ski huts into a dive center during the summer months. The local ingenious dive base owner has also stocked up the lake with 14 species of fish over the last eight year—not only fish but also European crayfish (*Astacus astacus*) and swan mussels (*Anodonta cygnea*). If that isn't enough, the lake offers divers underwater platforms, statues, treasure chests, a Christmas tree forest and other bizarre sculptures. Still, for most divers, the unafraid fishes are the highlight. Rainbow- and brook trout feed right of your hand. A little more shy but more impressive are the three species of sturgeons found in Grüblsee. These fish can, after all, grow to be several meters long. The tiny 200x100 meter- / 660x330 foot-large lake easily gets warm during the summer months, which makes diving here rather pleasant. You can dive safe and hassle-free in the shallow pond and still enjoy 20 meters / 66 feet of visibility.

BASIC FACTS
Depth: 9m / 27ft
Best season: summer and autumn (May-October)
Entrance fee: EU€ 3 per person per day
Dive center: Tauchschule Präbichl, a small center directly on the lake, www.grueblsee.at
Tourist info: www.vordernberg.at

Diving in Grüblsee

Traunfälle

At the end of our list, but not by far the least excellent diving, is the Traunfälle, or Traun waterfall. This is one of the best rivers to dive in Austria. The Traun River, which has its source in the Salzkammergut, runs through several lakes and then empties into the mighty Danube. The best part of the river to dive is situated in Upper Austria. A dam was built on the river in 1922. At a safe distance from the hydroelectric plant, the new dam was erected at a wider part of the river. Here, you can find a canyon-like riverbed with polished rock formations and a maximum depth of 19 meters. When the water flow isn't too strong, you can dive through 30 caverns and tunnels. The best way to dive here is to let the local dive center drop you at the best and safest places with a



CLOCKWISE FROM ABOVE: The falls at Traunfälle; Divers brave the rapids; Diver and common barbel; Diver explores the underwater landscape of Traunfälle; A grayling, *Thymallus thymallus*, of the salmon family

boat, for a one-hour drift-dive. The river is rich with fish, and you can encounter more aquatic life here than on many ocean dives. Fish like northern pike (*Esox lucius*), common barbel (*Barbus barbus*), burbot (*Lota lota*), grayling (*Thymallus thymallus*) and several species of trout are plentiful, but also, the more rare and endangered Danube salmon (*Hucho hucho*) can be seen. In addition to the river above the falls, you can also dive below the waterfall. Springs add clear water into the river creating pockets of good visibility of ten meters or more. Due to the a wider and flatter riverbed, the water flow is stronger, so you won't be able to dive on long stretches of the river, unlike above the falls—at least not with scuba gear. If you enjoy snorkeling, you can traverse some of the stronger flowing parts of the river with fins, mask and snorkel. To do this kind of "drift snorkling", contact the local dive center and do this with a guide.

BASIC FACTS
Depth: 19m / 62ft
Best season: summer and autumn (May-October)
Entrance fee: EU€ 10 per person per day
Dive center: Atlantis Qualidive, in the village of Viecht above the waterfall, www.flusstauchen.at
Tourist info: www.schwanenstadt.at
Google Earth: N 48° 00.909' E 013° 47.962'
YouTube: www.youtube.com/watch?v=DsLMCVGIkrU

Wolfgang Pölzer is a native of Austria. He has written a book on diving in Austria together with his wife Barbara Lackner entitled, Die schönsten Tauchgewässer Österreichs, *ISBN 3-900323-73-9. For more*

fact file

Austria

SOURCE: CIA.GOV WORLD FACTBOOK

History Austria was once the center of power for the large Austro-Hungarian Empire. After its defeat in WWI, it was reduced to a small republic. Austria's status remained unclear for a decade following annexation by Nazi Germany in 1938 and then occupation in 1945 by the victorious Allies. In 1955, a State Treaty was signed which ended the occupation and recognized Austria's independence, forbidding unification with Germany. That same year, a constitutional law declared the country's "perpetual neutrality" terms for Soviet military withdrawal. The meaning of the nation's neutrality was altered after the collapse of the Soviet Union's in 1991 and Austria's entry into the European Union in 1995. In 1999, Austria was a prosperous, democratic country entering the EU Economic and Monetary Union. Austria assumed a nonpermanent seat on the United Nations Security Council for the 2009-10 term, in January 2009. Government: Federal republic. Capital: Vienna

Geography Austria is located in Central Europe, north of Italy and Slovenia. The terrain in the west and the south is mostly mountainous (Alps); along the eastern and northern margins it is mostly flat or slopes gently. Coastline: 0km (Austria is landlocked). Lowest point: Neusiedler See 115m. Highest point: Grossglockner 3,798m. Note: This landlocked country has a strategic location at the crossroads of central Europe with numerous easily traversable Alpine passes and valleys. Austria's major river is the Danube. Because of steep slopes, poor soils and low temperatures elsewhere, its population is concentrated on eastern lowlands.

Climate Austria's climate is temperate. It is continental and cloudy, enduring cold winters with snow in mountains, and frequent rain and some snow in the lowlands. Summers are moderate with occasional showers. Natural hazards include landslides, avalanches and earthquakes.

Environmental issues Austria's challenges include some forest degradation due to air and soil pollution; soil pollution due to the use of agricultural chemicals; air pollution due to emissions of coal- and oil-fired industrial plants and power stations as well as trucks moving between northern and southern Europe. The nation is party to agreements including Air Pollution, Air Pollution-Nitrogen Oxides, Air Pollution-Persistent Organic Pollutants, Air Pollution-Sulfur 85, Air Pollution-Sulphur 94, Air Pollution-Volatile Organic Compounds, Antarctic Treaty, Biodiversity, Climate Change, Climate Change-Kyoto Protocol, Desertification, Endangered Species, Environmental Modification, Hazardous Wastes, Law of the Sea, Ozone Layer Protection, Ship Pollution, Tropical Timber 83, Tropical Timber 94, Wetlands, Whaling.

Economy Austria has a well-developed market economy and high standard of living. It is closely tied to other EU economies, particularly Germany's. The nation's economy has developed a big service sector—with strong commercial relations in banking and insurance sectors—a solid industrial sector, and a small, but well-developed agricultural sector. However, the country was affected by the recent global economic downturn and financial crisis, after enjoying several years of healthy foreign demand for Austrian exports and record employment growth. A recession in the country persisted until late 2009, although unemployment has not risen as much as in other European countries since the government subsidized working hour reduction schemes allowing companies to retain their employees. Current challenges include developing knowledge-based sectors of the economy, creating greater labor flexibility and participation to offset unemployment growth, dealing with an aging population and an exceedingly low fertility rate. Natural resources: oil, coal, lignite, timber, iron ore, copper, zinc, antimony, magnesite, tungsten, graphite, salt, hydropower. Agriculture: grains, potatoes, sugar beets, wine, fruit; dairy products, cattle, pigs, poultry; lumber. Industries: construction, machinery, vehicles and parts, food, metals, chemicals, lumber and wood processing, paper and paperboard, communications equipment, tourism.

RIGHT: Location of Austria on global map
BELOW: Location of Austria on map of Central Europe
FAR RIGHT: Paddle boaters on Klopeinersee

Currency euros (EUR)

Population 7,8,210,281 (July 2010 est.). Ethnic groups: Austrians 91.1%, former Yugoslavs 4% (includes Croatians, Slovenes, Serbs, and Bosniaks), Turks 1.6%, German 0.9%, other groups 2.4% (2001 census). Religions: Roman Catholic 73.6%, Protestant 4.7%, Muslim 4.2%, other groups 3.5% (2001 census). Internet users: 5.937 million (2008)

Language German is the official language nationwide at 88.6%, Turkish 2.3%, Serbian 2.2%, Croatian (the official language in Burgenland) 1.6%, other languages including Slovene (the official language in Carinthia) and Hungarian 5.3% (2001 census)

Hyperbaric Chambers

Dept. for Thoracic Surgery & Hyperbaric Surgery, County Hospital, University Medical School, Auenbruggerplatz 29, Graz, Austria 8036
Tel. +43 (0) 316 385-2827

Medical University of Vienna, Anesthesia and Intensive Care Medicine, Währinger Grütel 18-20, Vienna Austria 1090
Tel. (+43) 1 40400 1001

Websites

Austria Tourism
www.austria.info

Edited by
Wayne Fenior

POINT & CLICK
ON BOLD LINKS

Blazin' Equipment

Cathx

The Cathx Ocean offers lights for the advanced dive explorer or underwater photographer. Boasting a very bright 1,250 lumen output in both models, the lights also have emergency S.O.S. flashing and strobe mode that will last 24 hours. The aluminum construction is sealed for life ensures integrity of the unit that charges through the body. Rated for a depth of up to 250 meters, the dual LED circuit provides redundancy. The smart battery recharge and discharge ensure a lifetime of use. Options include cam-band tank mount and Goodman handle. **Cathxocean.com**

Nova Scotia Semi-Dry

Scubapro's semi-dry concept combines the comfortable low profile fit and simplicity of a wetsuit with the technical features of a drysuit. Nova Scotia's versatility guarantees minimal water entry and maximum flexibility in challenging diving conditions. Constructed entirely of 6.5mm Everflex neoprene for extreme comfort, insulation and fit, the plush interior keeps you comfortable and warm. A heavy duty self-repairing dry zipper across the back shoulders keeps water out. A 3mm fold over collar and semi-dry neck seal combined with 6mm hood and 3mm face seals protect the diver from water entry. The suit has wrist and ankle 3mm double seals in ultra smooth Glideskin neoprene for additional dry protection. Finished with Silverskin-lined dry hood interior for comfort and warmth and knee reinforcements, this semi-dry suit provides a warm alternative for the diver not wanting a drysuit
Scubapro.com

Retro fin

This new fin utilizes the same monoprene blend that was popular with its customers in the 90's. The EXP offers the best balance of power to work ratio, providing efficient finning in high flow and stiff currents along with the plenty of snap as a benefit. Being lightweight prevents legs from getting tired even after miles of finning. The blade fin is designed to work with a variety of kicks: including frog kick, modified flutter and power kicks. A stainless steel heel strap with pull tabs and a comfort heel pad round out the fins. Available in four standard sizes XS – XL.
DiveRite.com

Neptune predator

Ocean Reef of Genova, Italy, continues to lead the innovation in underwater verbal communication for scuba divers. The Neptune Space Predator is the newest innovation in the Predator series of full-faced masks. With critical regulator parts made of Ergal (a lightweight aluminum compound used in aeronautics and other applications requiring high resistance), the Predator is designed for professional and high performance applications and comes with a lifetime warranty. Utilizing GSM DC (Global Submarine Messenger), the transceiver equips the diver with two-way communication to the surface or to other working divers, and is capable of operating on two frequencies.
Oceanreefgroup.com

Thruster Dolphin

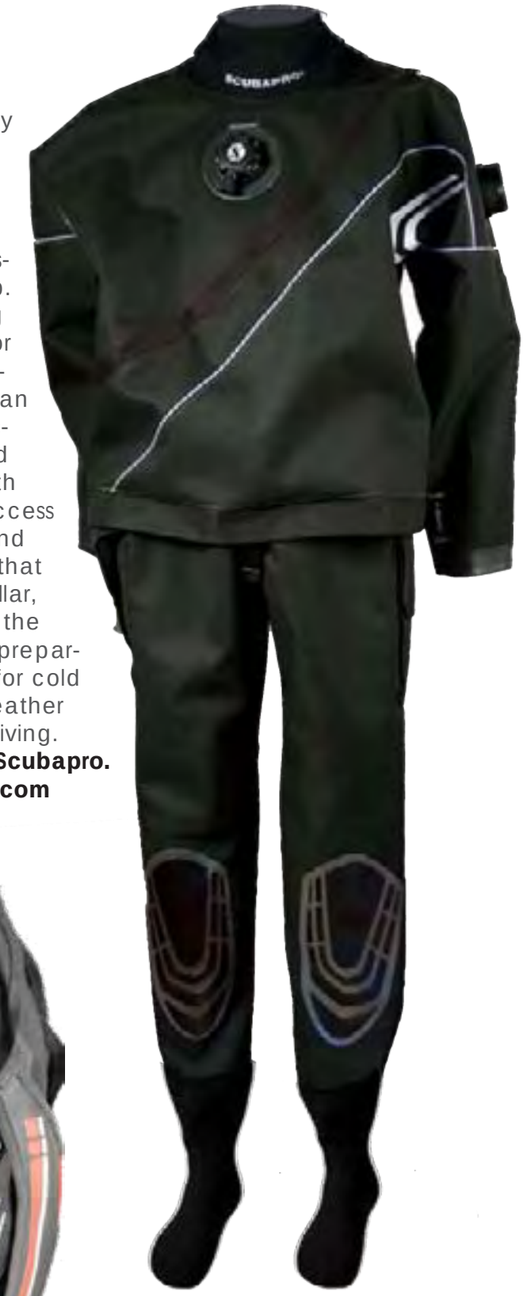
The Pegasus Thruster, already in use by military and port security personnel, has launched the Pegasus Dolphin for the consumer market. Competing at a price-point below other consumer models, the Dolphin is constructed of plastic versus anodized aluminum in the original Pegasus single unit and Hammerhead (two propeller dual unit configuration). Common features of all units is the unique tank mounted design, which allows the diver free usage of both hands. Also, all units employ a unique clutch drive train that prevents the Thruster and diver from damage if the propeller comes to an abrupt stop. The battery is expected to last 35-40 minutes in constant use. Divers can purchase additional batteries that can be changed at depth for extended dives. **Pegasusthruster.com**

NHeO3

A large icon driven dive computer VR NHeO3 Computer that covers all your gases from: air, to nitrox, trimix, open circuit and closed circuit rebreather. The unit also features infra-red transmission to your PC (no wet connectors). The multi-profile, multi-gas algorithm has full decompression look-ahead and the reliability that you have come to trust from VR Technology. You can also switch or add gasses underwater at any time, and the NHeO3 calculates your new profile. The combinations are unlimited! **TechnologyInDepth.com**

Scubapro EverTec

Constructed from a heavy duty tri-laminate (membrane) material, the suit is extremely durable, fast drying, yet, remains light weight. The telescopic torso has elastic suspenders and a crotch strap. Flex seal seams and a long diagonal front zip make for easy donning and flexibility. The neoprene socks can be worn alone, with neoprene boots, or the Fjord Rock Boots. Finished with SI-TECH valves, easy access thigh utility pockets, and an warm neck collar that protects the latex collar, the suit is perfect for the diver preparing for cold weather diving. **Scubapro.com**



Diablo

The Seac Diablo maximum volume BCD has sharp looks and functional features. With six 50mm stainless steel D-rings (plus two 25mm), three dump valves with pulls, removable weight integration pockets, and dual real weight pockets anchored on the tank. Constructed of polyurethane-coated 1000 denier nylon cordura, with a 420 D nylon inner bladder, makes this a high-end dive professional product. **SeacSub.com**

POINT & CLICK ON BOLD LINKS

Cool Shades

Protection, Polarization & Style

Text by Kelly LaClaire

Quality sunglasses are an important part of your dive gear in any tropical or sun-filled location, but how do you choose the right pair for you? This month *X-RAY MAG's* Kelly LaClaire takes a look at several styles and brands of ultra-functional (and ultra-cool) sunglasses, breaking down all the significant points to consider when purchasing your next pair of shades.

UV Protection

Most medical professionals will tell you —in fact, they will insist upon it—that you should only buy sunglasses offering 100 percent UV protection. But what exactly does that mean? The letters UV stand for ultra-violet light—the frequency of light that damages your skin and what you are trying to keep out of your eyes. Ultra-violet is broken down into three distinct types: UVA, UVB and UVC.

UVA is considered by some experts to be the most dangerous type of sun ray, as it penetrates much deeper into your skin than the others, and it is believed to contribute heavily to some types of skin cancer and cataracts (a clouding of the eye and vision).

UVB only penetrates the top layer of skin and is what helps gives you a suntan. But don't be mislead, UVB is still very dangerous, and severe over-exposure is linked to skin cancer and temporary blindness.

UVC is generally ignored, as our Earth's atmosphere absorbs most all of it coming from the sun. There is evidence, however, that ozone depletion is now allowing more and more UVC through, and brief exposure can cause sunburn of the skin and eyes. Any good pair of sunglasses will have UVC protection built in, but if you're concerned, ask a retail sales representative or check the company's website.

The absolute minimum protection that the American National Standards Institute (ANZI—the company that monitors standards and regulations for various manufacturers) requires of sunglass lenses is that it block out at least 95 percent UVA and 65 percent UVB. While this level of protection is acceptable, it is certainly not optimal.

What you want for yourself and your children—as their eyes are still developing—is 100 percent UVA and UVB protection. Most all sunglasses, even less expensive brands, will have this kind of ultra-violet guard built in, but you should always check the labels and lens stickers to be sure.

Occasionally you will find companies that advertise their lenses as having "UV 400" filters. This is a very fancy and grand way of saying that the sunglasses are 100 percent UVA and UVB. If you see this label, know

Suncloud

For anyone who has felt the wallet-squeezing affects of recent economic conditions around the globe, you may be looking for a trusted name brand that is slightly less expensive (without sacrificing quality) to take with you on your next scuba excursion to your favorite destination. Well, look no further. Each high-grade Suncloud model sells for US$50 and has every feature and high-end attribute you could ask for in a performance pair of sunglasses. The ATLAS (below), our personal favorite among the men's styles, has strikingly clear, optical quality polarized lenses made of impact and shatter resistant polycarbonate as well as supple and soft Grilamid TR90 frames housing rubberized nose and temple features for excellent fit and durability. The ATLAS is available in several lens tints, including the well-known Suncloud rose, and each pair comes with a lifetime warranty against defects. Highly recommended! For the ladies, one of Suncloud's most popular and elegant models has to be the VANNA (left). Beautiful lines and a slightly oversized frame offer stylish fashion and great sun protection in any condition and in any setting. Each pair is fully polarized and blocks 100 percent of UVA/UVB rays. Colors include black frame with rose lenses, tortoise frames with brown lenses or chocolate brown frame with brown lenses. As with any Suncloud, a lifetime warranty is extended. To see all of the styles in the ladies line, please visit **www.suncloudoptics.com**

Sunglasses

KIDS NEED SHADES TOO!
As boys and girls are growing and developing so are their eyes. For this reason is it critical that your children have good quality sunglasses too. Here are the key points to keep in mind when buying shades for kids.

- Be sure to buy only sunglasses that offer one-hundred percent UVA and UVB protection. Check the labels and tags before purchasing.
- Many sunglasses for toddlers and pre-teens have very light tinted lenses in fun colors. This is perfectly alright as these lenses generally offer just as much UV protection as dark lenses. Again, read the stickers and packaging to be sure.
- When fitting your child, make sure the sunglasses are not too tight. Parents tend to buy their kids sunglasses that won't fall off even in a wind tunnel but unfortunately this will give your little ones headaches and cause pain behind their ears or at their temples. Remember, children won't wear sunglasses that aren't comfy so you want a nice, soft fit. If you're worried about the glasses falling overboard, buy an inexpensive lanyard.

that you are covered, but don't let the hyperbole fool you into thinking they are somehow more protective because of the large number.

Polarized

Many divers, as they spend so much time on the water, are familiar with this type of lens, but here is a quick overview, if you are unsure. Polarized shades are made to block out light that reflects off certain surfaces— especially long, flat surfaces like snow, ice, windshields and, of course, lakes, rivers, etc. A normal, non-polarized sunglass allows light to enter the lens from any direction causing haze, but a polarized lens will deflect any light that hits a surface and bounces upward towards the eye. In doing so, virtually all glare is eliminated giving the wearer an ultra-clear, soothing field of vision and the ability to actually see down into bodies of water. Polarized lenses do not give extra eye protection as many people suppose (only UV filters do this) but they do offer certain advantages and a level of comfort most divers consider necessity.

For all their benefits, however, polarized sunglasses do have a few drawbacks that may need to be considered before you buy.

First, polarized shades can reduce the visibility of some liquid crystal (LCD) displays used in newer car or boat gauges, GPS and ATM screens as well as cell phone covers. Second, some wearers—only a rare few—have reported a "3-D effect" to their vision when wearing this kind of sunglass. If possible, be sure to try on sunglasses outside and not just inside the store when you are considering a purchase.

Blue-Light

New research suggests that a portion of the sun's rays, called High-Energy Visible (HEV) Radiation, or "blue-light," may increase your long-term risk of contracting macular degeneration. Macular degeneration occurs when the macula (the sensory membrane lining the back of the eye and responsible for the sharp, clear vision needed for driving) begins to deteriorate. Currently, this eye disease is the leading cause of blindness among Americans 65 and older, and while this research has not been proven conclusive, it may be wise to make sure your next pair of sunglasses have a blue-light filter built in—usually referred to as "blue-blocks."

Blue-blocks generally have brighter, amber tinted lenses that increase color contrast and let in more visible light that gives wearers a crisper, sharper view, which actually improves clarity of vision. Many high-end shades, such as Maui Jim and Serengeti, offer lenses with blue-light filters, giving consumers a sunglass that blocks out all UV and blue-light as well as being fully polarized. If you are recovering from macular degeneration surgery, or are worried about future eye problems, ask the salesman you are working with or check websites to find out which

SCHÄEDZ.COM/SUNHATS.AUSTRALIAFIRST.COM

Smith Optics

The TENET from Smith Optics brings the ultimate visual experience to the most discerning eyewear customer. First and foremost these shades are a commitment to optics, and the workmanship is second to none. When you try them on, you'll find each pair packed with every high end feature you could ask for including: ultra-lightweight, polarized glass lenses with superior visual clarity; scratch resistant and anti-reflective hydroleopphobic (oil hating) coatings that repel water and actively resist fingerprints and grease; a nearly indestructible grilamid TR90 (super durable nylon) frame with soft and supple temple and nose pads that actually increase their grip when wet (for less heart attacks when your glasses slip off your face and sink into the abyss); Italian stainless steel spring hinges for maximum comfort and less temple-pinch no matter the face shape or size and the ability to put prescription lenses in the frames. Add to that unique and striking logo plaques and beautifully rich color palette, and you have in the TENET a pair of sunglasses to truly covet.

An exceptionally crafted women's sunglass, the CAMEO boasts a handmade, acetate frame with gorgeous curves and stylized logo work. The gray tinted, polarized lens is made of the most scratch resistant optical plastic lens on the market today (CR39) and wraps perfectly around your eyes for outstanding coverage and maximum protection. Each pair gives 100 percent UVA/B protection and comes in three colors: black frame with gray lenses, Tortoise frame with pearl amber lenses and a deep, sexy red with a gradient rose lens. Smith's customer service is exceptional and they stand behind their products, offering a lifetime guarantee on all sunglasses -see their website for details. **www.smithoptics.com**

Sunglasses

models and brands offer a blue-light (HEV) lens.

Style

Now that we have all that techy jargon out of the way, let's get down to business and dive into what we all care about most—looking fantastic out on the water! The following shades are guaranteed to not only turn heads but also keep your eyes totally safe and your image even safer. ■

NAME BRAND VS GENERIC
— WHAT'S THE STORY?
Are high-priced sunglasses really better than inexpensive, generic sunglasses? Well, yes . . . and no. As far as overall eye-protection is concerned, it does not matter weather you paid five dollars or five-hundred dollars IF they both block out one-hundred percent of ultra-violet light. In fact, many generic sunglasses can be purchased that are not only fully UV protected but also fully polarized and offer very clear, optical quality lenses. The major difference comes in materials. The best name brand sunglasses – like the ones detailed in this article – use only the highest quality glass and plastics available for their lenses ensuring superior optics and unbeatable scratch resistance. They also use premium grade metals and plastics for the frames, hinges and screws giving maximum comfort and durability. Moreover, each of the shades outlined here come with a lifetime warranty and repair/replacement program you won't find with most inexpensive generics or smaller, lesser known brands. ■

DARKER IS BETTER — *A COMMON MISCONCEPTION*
Some people try to find the darkest sunglasses they can in the misguided belief that they give better eye protection. This in fact is not true. Ultra-violet light is invisible to the human eye and, while it may give you one heck of a sun burn, it cannot be seen. If your eyewear has a good UV coating, lenses with no tinting at all (like the ones on regular eyeglasses) are just as safe as those with pitch black lenses. In fact, some scientists have concluded that very dark sunglasses make the pupils of your eyes open wider than usual, allowing more harmful UV into your eyes. The darkness of the lens only keeps you from squinting but does not itself offer any eye protection. If your eyes are super sensitive use a sunglasses that has both polarized and blue-light filters added or try different tints (gray, green, amber, rose, etc) as some colors are more soothing to certain eyes than others. ■

Maui Jim

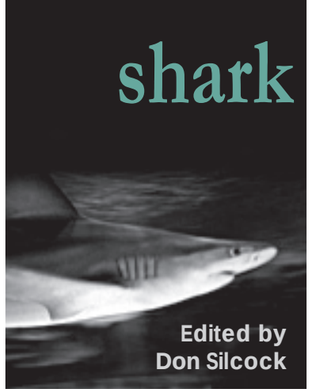
DAWN PATROL (far left), a new retro style introduced by Hawaiian favorite, Maui Jim is perfect for both men and women wanting outstanding eye protection coupled with old school fashion. Fitted with paper thin, polarized glass lenses, each pair is coated with waterproof and oleophobic treatments (that's a gnarly Greek word for oil-resistant) which shed water and snow as well as repel fingerprints and grease. High-grade nylon frames give long lasting durability for medium faces and can be fitted with almost any prescription lens type you need. The finer points include nickel-silver spring hinges for added comfort and non-slip, rubberized nose pads. Three lens tints are offered: neutral gray, bronze and the patented and unmatched, Maui rose. Don't be afraid to take these out on the sea as they are super coated with saltwater protectant.

The new ALOHA FRIDAY (left) style takes it cue from the classic Risky Business look of the early 1980's but has been radically updated and fully outfitted with every top-scale extra our new millennium has to offer. Each pair comes equipped with polarized glass lenses that actually boost color intensity surrounded by ultra high quality, lightweight acetate frames with a high-gloss finish that are specially treated to withstand saltwater and coastal conditions. Each pair comes with a custom case and cleaning cloth and can be fitter with prescription lenses if need. Colors available: gray fade, chocolate fade, tortoise. Interested in other classic styles? Log on to **www.mauijim.com**.

Costa Del Mar

Aggressive technology meets comfortable "forget-the're-on" fit with Costa Del Mar's uber-cool FISCH (far right) model. Taking their name from Chris Fischer, the legendary shark tagging angler from *National Geographic's Expedition Great White*, these sleek and stylish beauties feature a no-slip, rubberized lining along the entire length of frame interior giving the wearer one of the most comfortable sunglass fits ever designed for medium and large faces. In addition, this model is equipped with Costa's signature three-hole venting system to eliminate fogging and humidity buildup around the eye. Of course, each pair is polarized and offers 100 percent UVA/B protection and comes with extraordinarily clear, high-definition glass or shatter-poof polycarbonate lenses. Frame colors include tortoise, black or silver and each can be fitted with a myriad of lens tints.

Get acquainted with the newest unisex sunglass style in Costa Del Mar's already impressive outdoor line, the SKIMMER (above). This extremely lightweight, semi-frameless sunglass is meant for serious outdoor enthusiasts who know that lens color matters and need to switch with variable light conditions on a moment's notice. Each pair features interchangeable, polarized lenses that allows you to match the exact lens needed to the exact amount of sunlight, water color, glare intensity and fishing conditions you may be facing. Obviously, sunglasses of this caliber offer maximum UV protection and extreme clarity of vision as well as sporting frames that are nearly indestructible. The Skimmer comes in tortoise or black and a host of lens colors to choose from. For more information on styles, technology, warranties and retail locations visit **www.costadelmar.com**.



How to dive with the Grey Nurse Shark

Text and photos by Don Silcock

Large enough to get your complete and undivided attention is how American underwater photographer Marty Snyderman once summed up an encounter with the grey nurse shark (*Carcharias taurus*). Big and fierce-looking, with a set of prominent sharp teeth, the grey nurse moves through the water in a slow but determined manner, which creates a physically intimidating presence guaranteed to raise the blood pressure of the uninitiated observer.

My first such encounter was about 15 years ago at Flat Rock near Stradbroke Island in Moreton Bay, Queensland, Australia. I was diving the shark gutters on the northeast side of Flat Rock, where grey nurse sharks are known to gather from June to October each year. Although thoroughly briefed on what to expect and do prior to entering the water, I have to admit I was more than just a little concerned when I saw the first shark heading in my direction.

We had been told not to obstruct the shark's path in anyway and just stay calm while they swim past. Sure enough, the big female, almost three meters long, did exactly that... completely ignoring me!

Since that first encounter, I have been fortunate to spend a fair amount of time underwater with grey nurse sharks, and been so close that I could tell whether they had halitosis—bad breath. But I can honestly say that I have never once felt threatened or in any real danger.

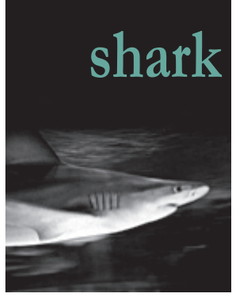
So, why is it that in just 40 years the grey nurse has gone from one of the most common sharks in Australia, to an endangered species, when it is not a dangerous shark?

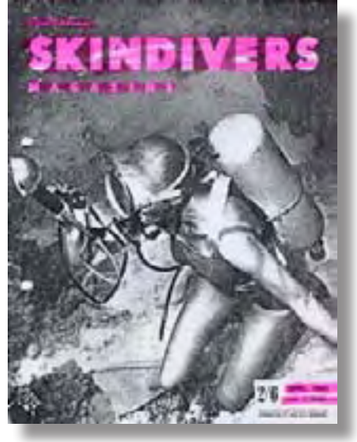
A Bad Case of Mistaken Identity...

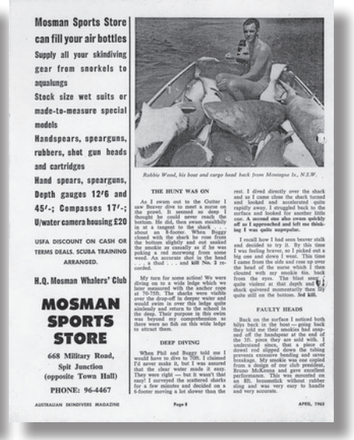
The early 1960s were a time of increasing prosperity for the "Lucky Country" and our urban population turned increasingly to the sea for sport and entertainment. Surfing, spearfishing and game fishing became increasingly popular, and the macho image of these water sports suited the times well.

Marine science was also in its infancy; very little was known about the inhabitants of our coastal waters. Sharks were generally considered to be very dangerous creatures and large sharks like the grey nurse were automatically assumed to be man-eaters. Just as Australian newspapers today automatically assign a shark attack to the great white, back in the 1960s, the grey nurse was the "usual suspect".

Catching one of these supposed man-eaters was considered a heroic act and







An old issue of *Skindivers* magazine from the 1960s features hunters showing off their catches of grey nurse sharks. The 60's were a time when the prevailing opinion of grey nurse sharks were that they were man-eaters

one guaranteed to draw a big crowd back on the beach when the dead shark was hoisted up for all to see.

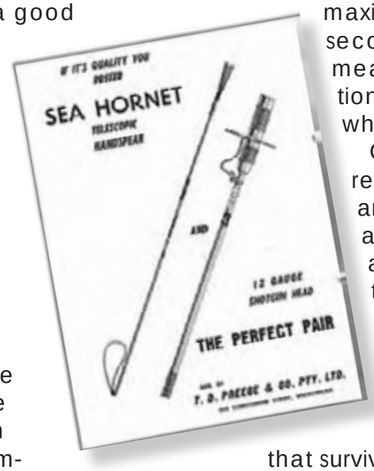
Grey nurses hunted

Although predominantly solitary in nature, grey nurse sharks congregate at certain times of the year as part of their mating patterns and these colonies added to the confusion because they were perceived as "shark infested" locations—particularly if they were anywhere near public beaches, such as with the one at Magic Point near Maroubra, just round the headland from Sydney's famous Bondi Beach.

Aggregating in such a predictable way meant that the grey nurse, compared to other large sharks, was relatively easy to catch or spear, and the sentiment of the times was, *the only good shark, was a dead one*.

The 1960s were really not a good time to be a grey nurse, as later in that decade saw the introduction of the explosive underwater powerhead, which tilted the odds well away from the grey nurse and in favor of the many spearfishermen using them, resulting in hundreds of sharks being killed.

The impact of this widespread slaughter was twofold. Initially, it decimated the grey nurse population on the east coast of Australia. But in the longer term, it had a compounding effect, because it takes between six to eight years for a juvenile grey nurse shark to reach sexual maturity, and once they start breeding the birth rate is a maximum of two pups every second year (see sidebar)—meaning that the population grows very slowly even when things are normal.



Grey nurse sharks reach a maximum size of around 3.5 meters and are believed to live for about 25 years, hence the widespread killing of so many mature, and therefore, sexually active, sharks in the 60's and 70's meant that it doomed those that survived the carnage to potential extinction unless dramatic changes occurred.

It seems sadly ironic that what we now know as a quite docile shark could be hunted to the verge of extinction in such a way.

GREY NURSE SHARK BREEDING CYCLE

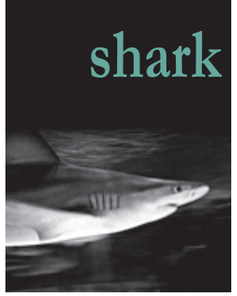
Grey nurse sharks breed slowly and are ovoviviparous, which means the embryos feed on a yolk sac in the mother's uterus until all the yolk is consumed, when they then turn on each other in what is known as "intra-uterine cannibalism". There are upto 15 embryos initially, but this Darwinian survival of the fittest process results in only one pup actually making it, meaning a maximum of two pups per litter—one from each of the mother's two uteri.

The pups are between 80 to 100cm in length when they are finally born, meaning they are quite small and relatively vulnerable to attack, further adding to the pressure on the overall grey nurse population.

The gestation period is believed to be nine to 12 months, and the overall reproductive cycle, about two years, because the mother rests for a year or so before mating again. ■

Turning the conservation tide

Perception, as they say, is reality, and to change the public's widely held belief that a large and dangerous-looking shark such as the grey nurse was, in fact, no danger to them at all, requires exceptional effort. To get politicians to do anything is even harder, but the latter is virtually impossible until the wheels start to turn on the former.



Video camera used for capturing shark patterns used to idenify individuals. It consists of a regular underwater video housing, but with a long flat bracket across its top and waterproof laser lights clamped to it on either side of the housing

Australian diving icons Ron and Valerie Taylor were amongst the first to realize that the grey nurse should actually be protected, rather than hunted, and they were able to both use their high public profiles and enlist an unusual ally to the cause.

Ron, a former world spear-fishing champion, told me that when they first started spear fishing back in the late 1950's both he and Valerie were utterly convinced that the grey nurse was a man-eater. However, over time, as they moved more into scuba diving, they came to understand that the grey nurse was relatively harmless to humans, and by the mid 60's, were both actively campaigning for its protection.

Ron highlighted two key events that helped to turn the tide of opinion—the first being enlisting the help of Australian game fishing legend Peter Goadby, who added significant weight to the conservation argument by confirming that the grey nurse was not a game shark at all.

Game fishermen in the late 1960's were not known for their environmental or conservational predisposition, so having such a well-known personality as the late Peter Goadby on the side of the grey nurse was a huge coup.

The second event was the film Ron and Val made in 1973 called, *The Vanishing Grey Nurse*, which went to air as part of a series of thirteen 30-minute documentaries made for Australian TV called, *Taylor's Inner Space*. The film was the first to challenge the public's perception of the grey nurse and introduce the reality of the situation. It played a significant role in changing public opinion.

The fight to protect the grey nurse from extinction was helped by numerous other people, many of whom went to great lengths, and in 1984, a major breakthrough was achieved when the state government of New South Wales formerly declared the grey nurse as 'vulnerable' —making it the first protected shark in the world.

The lead of NSW was eventually followed in Queensland, Western Australia and Tasmania with fisheries legislation to protect the grey nurse, and then it was listing as 'critically endangered' under Commonwealth legislation. The highly-rated Swiss-based International Union for Conservation of Nature (IUCN) has also listed it as vulnerable, meaning the grey nurse faces a high risk of endangerment in the wild—one step down from high risk of extinction in the wild.

Sean Barker and Peter Simpson of Spot-A-Shark, which tracks grey nurse sharks

Spot-A-Shark

About three years ago on a day trip to a grey nurse aggregation site at Magic Point, I noticed a rather unusual looking video camera, consisting of a regular underwater video housing, but with a long flat bracket across its top and waterproof laser lights clamped to it on either side of the housing.

Curious, I introduced myself to its owner, Sean Barker, and asked what the

SPOT A SHARK

Sean Barker and Peter Simpson launched Spot A Shark in 2009, with the aim of building on the work done by Phil Bowman of Seal Rocks in the early 1990s with his Grey Nurse Shark Migration Project.

Bowman's project was focused on the use of non-invasive methods to better understand shark movements and population, and Spot A Shark builds on this by attempting to harness the large number of previously unrecorded underwater encounters between divers and grey nurse sharks to greatly enhance the size of the database. The basic concept being that many divers now carry a camera with them, so if the results of those encounters can be collated and entered into the existing database, a significant step forward may be possible with positively identifying the overall shark population and their migration patterns.

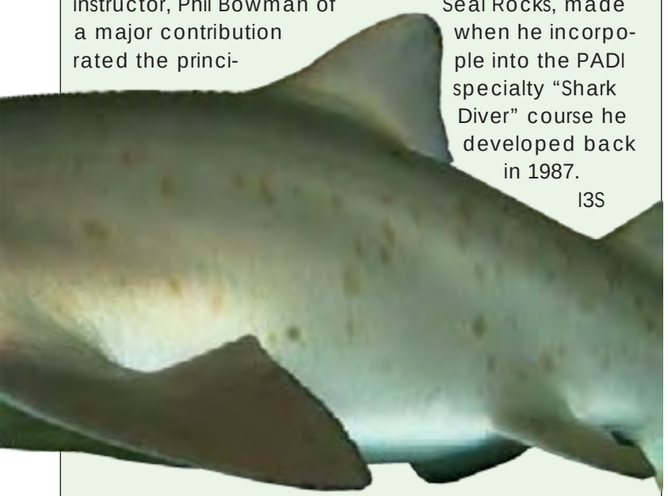
At the end of the day, the only way to ensure the long-term survival of the grey nurse is to get a full and proper understanding of their actual situation, so that programs can be put into place to ensure their survival.

Sean and Peter are enthusiastically committed to the Spot A Shark project, and the overall goal of grey nurse conservation, but are quick to point out the significant efforts of others in this field, such as Queensland-based marine scientist Carly Bansemer, Nick Otway and, of course, Phil Bowman.

Website: **www.spotashark.com**

GREY NURSE SPOT PATTERNS AND I3S

Exactly where the original concept of using the spot patterns came from, in the first place, is not completely clear, but there is no doubt that Australian dive instructor, Phil Bowman of Seal Rocks, made a major contribution when he incorporated the principle into the PADI specialty "Shark Diver" course he developed back in 1987.



I3S was first conceived in 2003 by Dutch marine scientists, Jurgen den Hartog and Renate Riejns, while in South Africa studying the impact of divers on the Ragged Tooth (Grey Nurse) Shark at Aliwal Shoal, 40km south of Durban. They were diving with Anna Mieke van Tienhoven, who had published the idea of using the spot patterns on the flanks of the shark as a kind of unique identity fingerprint, but was using manual comparison to do the analysis—something that got harder and more time consuming the more sharks she photographed.

What Hartog and Riejns did was develop the theory of using a software algorithm to compare spot patterns, based on the principle that the pattern on each shark is unique. The I3S software they developed stores the pattern as a "fingerprint file" and uses that to compare each additional image added to the database.

Although initially for use in identifying Grey Nurse Sharks, the I3S software has been used successfully with Whale Sharks identification, as they also have unique spot patterns, and a modified version has been used in the identification of Manta Rays. **www.reijns.com/i3s**

Grey nurse shark swimming in he cave at Magic Point off Queensland, Australia

contraption was for? It turned out that he was working on a project to identify sharks using something called I3S—Interactive Individual Identification System—for an honors degree in marine science.

I subsequently learned that I3S is a software program that works on the basic premise that the pattern of spots on the flanks of the grey nurses are unique, in the same way that fingerprints are with humans. Therefore, if sufficient images can be collected from the locations where grey nurse are known to congregate, then migration patterns can be identified.

While the spot pattern remains the same, the distance between the spots increases as the shark grows, so I3S also provides a way to determine the growth rate of a previously identified shark, if the dates it is spotted and photographed are known. The laser lights Sean was using were to introduce a known dimension into the image of the shark, so that the growth rate could be calculated.

Sean explained that his problem was getting enough images to build a decent database, and being a one-man band, meant it was virtually impossible to gather enough to really get his project moving. So, he had approached one of the diving publications in Australia seeking support for an advertisement requesting copies and dates of grey nurse shark images taken in eastern Australia.

The advert produced a strong response and led to Sean teaming up with another Sydney-based diver and self-confessed shark addict, Peter Simpson, who had been diving Magic Point regularly since 2000 and had collected lots of images that could be used for the project.

Together Sean and Peter developed the Spot-a-Shark website (see sidebar), which greatly increased the number of images in the database, and together, they have now positively identified over 430 sharks and nearly 25 migratory patterns.

The exact patterns of migration, aggregation and mating are still not fully understood

Face to face

An underwater encounter with any large creature is an exciting event, and the size and physical presence of the grey nurse shark makes interacting with them a truly memorable experience.

Most of my experience, and certainly all of my up close and personal, face-to-face contact, has been in the cave at Magic Point off from Maroubra in Sydney. Typically, you are not allowed to enter the cave because of the potential impact on the sharks, but in the process of getting the images for this article, I was allowed to spend a reasonable amount of time in there, after being extensively coached on what and what not to do.

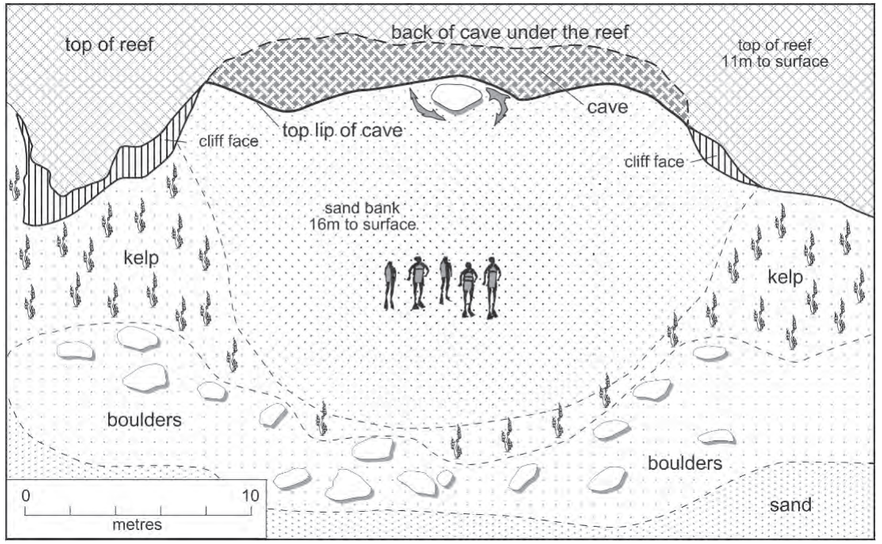
Sean Barker's and Peter Simpson's work with grey nurse sharks has shown that when they aggregate together at certain times of the year, they establish swimming patterns that keep them away from each other's "personal space". So the presence of a large creature like a diver—with the curtain of bubbles they create—can disturb that pattern, stress the sharks and possibly drive them away from the area.

So, in a confined area like the cave at Magic Point, multiple divers entering it is certain to impact the swimming pattern and is a really bad idea. A lone diver on the other hand, with a slow and cautious approach can enter the cave area successfully from either end, which minimizes the impact on the sharks and gives them plenty of time to adjust their swimming patterns.

Clear signs of stress are changes in breathing rate, indicated by gaping of their mouths, and the speed at which they flick their tails. The two are linked because an unstressed grey nurse will swim in a relaxed manner at a rate that provides enough oxygenated water passing through its mouth and over its gills. A stressed shark, on the other hand, has to move faster to increase the flow of water through the gills, and initially "gapes" its mouth to boost the oxygenation effect.

Sean believes that the stress threshold is around 24 tail flicks per minute, but the shark's overall "body language" is a sure sign that they are becoming stressed. If you observe that behavior, take it as your cue to back off and leave them alone—not that you are in any significant danger, but they are a big creature after all and so common sense should prevail.

The exact patterns of migration, aggregation and mating are still not fully understood, which is why the work of people like Sean and Peter is so important, but the basic fact is that, as divers, we are very luck to be able to see the grey nurse in its natural environment—particularly in light of its vulnerable status. So, we owe it to them to respect them for the magnificent creatures that they are. ■



turtle tales

Edited by
Bonnie McKenna

Plastic bags kill sea turtles

Around the world, as human communities continue to develop, consumption of plastic continues to rise. This waste is contaminating the ocean with billions of tons of plastic, which harms and kills approximately 100,000 sea turtles and other marine animals each year. Sea turtles are particularly at risk because they often mistake floating plastic bags for their favorite food, jellyfish. Always take a reusable grocery bag to the store. ■

Pacific Leatherbacks on their annual migration from California to Hawaii

Every summer into the fall, giant leather-back sea turtles gather off the coast of California, Oregon and Washington to feed on an abundance of jellyfish in the cold California Current, and most years, will swim out to warmer Hawaiian waters for the winter. After several years of feasting offshore of the United States, they make the long journey back to their natal nesting beaches in and around Indonesia to lay their eggs and propagate the next generation. These are the largest turtles on earth, growing to over six feet in length, weighing up to 2,000 lbs, and are able to reach depths of more than 3,000 feet below the ocean's surface. ■

SCOTT R. BENSON, NMFS SOUTHWEST FISHERIES SCIENCE CENTER

The oil and the turtles

The devastation of the oil spill from the Deepwater Horizon blowout has directly affected the critically endangered Kemp's Ridley turtles. Along the beaches of the Gulf of Mexico, only 8,000 females nested in 2009, and the adult males are thought to be even fewer. Most of the surviving juveniles inhabit the waters 20 to 30 miles from shore, feeding and growing in the same currents that collected the bulk of the oil. There are confirmed reports of Ridley's being burned alive in the pools of corralled, concentrated oil that BP burned off.

There is fear among biologists that the internal damage from hydrocarbons to the organs of the Ridley's could make them unable to reproduce.

Barbara Schroeder of the National Oceanic and Atmospheric Association thinks the spill is unlikely to spell the end of the Ridley, but it is definitely a setback to the turtle's recovery. "We are going to have to enhance our efforts to get the species back on the trajectory it was on, and we will need to re-look at the most significant human threats —bycatch from shrimp and other trawlers and gill nets, hook and line-fishing and boat strikes."

That the four million barrels of oil seem to be dissipating more quickly than expected does not mean the turtles are no longer affected. So, the crisis is not over; it is only the beginning. The biological consequences of this disaster will possibly be felt for years. ■

Turtles and Dugongs are at risk in Australia

The turtle and dugong capital of the world is the northern Great Barrier Reef and Torres Strait region report increased pressure under climate change and human fishing, hunting, pollution and onshore development.

"Depletion of turtle and dugongs increases their vulnerability to threats and their ability to cope with changes," said Dr Mariana Fuentes of the ARC Center of Excellence for Coral Reef Studies and James Cook University.

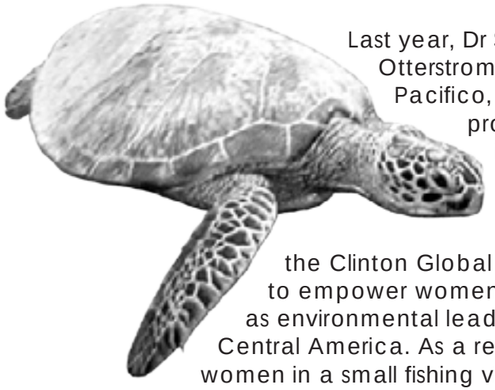
Fuentes said that turtles are especially vulnerable to the effects of these changes, which include decreases in hatching success and loss of nesting areas. Overheated beaches can cause a decrease in the turtle's reproductive output and significantly alter the sex ratio of hatchlings.

Fuentes research programs involve green and flatback turtles as well as dugongs in an effort to establish priorities for the management of marine megafauna to increase their resilience to climate change.

"Under the current conditions the nesting grounds are producing more females. With increasing temperatures, these turtles are at risk of stretching out the ratio, though we can't predict exactly when it will cause an unbalanced population," Fuentes said.

Sea turtles have survived large climatic changes during their evolutional history, but modern rates of change are much faster and are coupled with additional human pressures. It is unknown if the turtles can adapt to these changes. ■

Rural women in Nicaragua lead an effort to protect sea turtles



Last year, Dr Sarah Otterstrom of Paso Pacifico, a non-profit organization, made a commitment at the Clinton Global Initiative to empower women and girls as environmental leaders in Central America. As a result, the women in a small fishing village in Nicaragua are now protectors of nesting sea turtles. They earn money for every hatchling they help to enter the sea.

In rural Nicaragua, women must rely on informal employment to obtain cash. Women earn an average of US$30 per month through selling beads and sewing clothes. The ten women participating in the Paso Pacifico program now earn the same amount of money for protecting a single nest. The women earn 35 cents per hatchling and each nest has more than 100 eggs.

Rather than individually receive funds for each protected sea turtle they opted to pool the money and equally distribute it across the group.

"Nurturing baby sea turtles is very rewarding," said Carolina Coronado a turtle protector. "After a sea turtle nests at night, we carefully move the nests to a hatchery we have built and where we protect the nests from poachers and livestock. When the baby turtles hatch, we count them and feel fulfilled as we watch them crawl to the ocean." ■

Humble shrimper credited with ingenuity to save a species

Sinkey Boone, who died September 1, was born into a shrimp fishing family. Sinkey was more than a shrimp fisherman; he was also a welder, a net-maker, a purveyor of folk wisdom and an inventor.

One of his inventions has saved the lives of hundreds of thousands of sea turtles and brought the sea turtle and shrimp fishing communities together to better understand each other's motivations and needs.

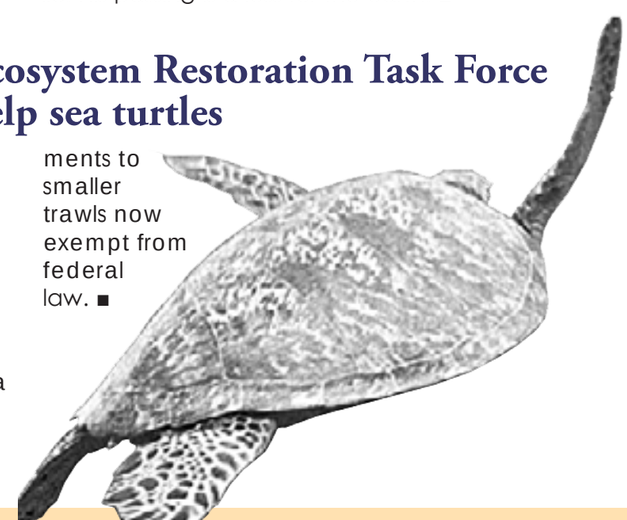
Boone is credited with inventing the turtle excluder device, better known as a TED. Originally called the "Georgia Jumper", it was a modification of Boone's earlier invention called the Jelly-ball excluder, a device used to keep jellyfish from clogging shrimp nets and damaging the catch.

Boone liked to call it a "trawling efficiency device" because it helped reduce unwanted catch of many species besides sea turtles, and he though it would make shrimpers more accepting of the device.

While Boone had an economic interest in the device, his concern for the sea turtles, the shrimpers and the oceans was his strongest motivation. He worked diligently to promote understanding among environmentalists, shrimpers and the public. His passing is a loss for the earth. ■

Report urges the Gulf Coast Ecosystem Restoration Task Force to reduce fishing pressure to help sea turtles

A new report recommends the Task Force implement changes in Gulf of Mexico fisheries as a necessary measure for recovery of endangered sea turtles harmed in the BP oil spill. Scientists have determined many of the sea turtles found dead during the BP oil spill perished in shrimp trawl nets not using Turtle Excluder Devices (TEDs), which are required by federal law but largely ignored in Louisiana. Sea turtle recovery, the report argues, will depend on more rigorous enforcement of TED laws throughout the Gulf and to extend TED requirements to smaller trawls now exempt from federal law. ■



The turtle lady with HEART

Text by Bonnie McKenna

Carol Allen has been fascinated by turtles since she was five years old when her brother brought home a little red-eared slider—a fresh water turtle.

"I was just enthralled by that turtle and the others that came to live at our home," said Allen.

In 1973, when Allen and her family moved to Houston, she learned about sea turtles in Texas after a visit to the National Oceanic and Atmospheric Administration (NOAA) Fisheries Service in Galveston. There NOAA scientists were attempting to recover the decimated Kemp's Ridley turtle population by raising turtle hatchlings in buckets until they could fend for themselves.

Kemp's Ridley turtles are found in the Gulf of Mexico and the Atlantic Ocean. It is one of the most endangered turtle species, worldwide.

"In 1982, I organized a field trip for my daughter's class to see the turtles in Galveston. The kids were captivated by the turtle hatchlings. During that visit, we learned that the program's funding was being cut. The kids really wanted to do something to help the turtles, so we formed HEART (Help Endangered Animals Ridley Turtles). The kids wrote letters to President Reagan asking him to help the turtles. The story of the kids writing the president was picked up by the media and soon the program was funded for another ten years," Allen said.

After learning that HEART was a volunteer project, schools from across the nation became interested in joining the turtle project. Allen made sure each child that sent HEART a $4 donation, enough to feed a hatchling for a year, received a certificate of thanks. At that time, NOAA was releasing thousands of hatchlings into the gulf and thousands of turtles were being killed by trawl techniques used to catch shrimp. Although sea turtles were on the endangered species list and protected from being killed or captured by the Endangered Species Act, there was little enforcement of the law.

Sea turtle advocate, Carol Allen, with poster for the film, *The Heartbreak Turtle*

"We lost thousands of turtles because of shrimp trawls. Remember, a turtle is not a fish; it needs to breath. Of course, the shrimpers and fishing industry argued that their trawling techniques were harmless, but we could prove it was not harmless by the number of dead turtles being washed-up as the trawlers moved up and down the coast," said Allen.

After a lot of experimentation, the National Marine Fisheries Service developed the Turtle Extruder Device (TED)—a device that allows turtles to escape the trawl nets. A law now mandates that all shrimp trawlers have TEDs on their nets.

"The shrimpers fought us tooth and nail, and they really resented a homemaker telling them to change the way they fished," Allen said with a laugh. "We ended up having to sue the national Fisheries Service to get the TEDs on all the shrimpers. We won the case, but our work is never done."

As a result of the hard work done by Allen, the National Park Service Division of Sea Turtle Science at the Padre Island National Seashore in Texas and the hundreds of volunteers that generously give their time to protect the turtles, the population of the Kemp's Ridley is growing. During the 2009 nesting season, a record 195 nests were laid on the Texas coast.

Allen's latest project made a debut this October. It is the sequel and updated version of her film, *The Heartbreak Turtle*, which tells the story of the plight of the Kemp's Ridley turtle.

"The original film was made 30 years ago. The sequel will be about how far we have come with regards to the shrimpers, the TEDs and the turtle recovery plan," she said.

Allen is also actively trying to encourage Texas to declare the coast of Texas or at the very least, Padre Island, a critical habitat for the Kemp's Ridley sea turtle.

"And to think," Allen said, "This all started with a red-eared slider."

Allen continues her work to protect the Kemp's Ridley turtles through HEART and the Sea Turtle Restoration Project (STRP) which fights to protect endangered sea turtle populations worldwide. For additional information on Kemp's Ridley sea turtles, go to www.seatrutles.org or to learn more about Carole Allen, go to www.SaveTexasSeaTurtles.org. ■

Wild pigs and dogs pose a new but serious threat to leatherback nests

Populations of feral pigs and dogs, which live in the jungles behind the Leatherback nesting beaches in Papua New Guinea, have in the recent years expanded out of control. It is estimated that in 2009, 20 percent of healhy nests were destroyed by wild dogs and pigs. In 2010, that number may rise to 60 percent.

Along a 600km coastline in North Queensland, Australia 90 per cent of the turtle eggs have been destroyed.

The predation issue is serious on all turtle nesting beaches

Neither pigs or dogs are native to the Indonesian jungles but are domestic animals that have escaped from villages. The villagers let their "domestic" pigs wander in the jungles in hopes that they will get fatter faster. Due to lack of natural predators, these populations have since expanded to a point where they are now out of control and a threat to the existing ecosystems. A wild pig or a dog can annually produce two litters of up to 12 piglets or pups. Dogs are allowed to breed without any control.

25,000 hatchlings lost

In 2009, the dogs and pigs destroyed approximately 20 percent of the healthy leatherback nests above the tidal damage line. At approximately 100 eggs per nest, that loss approximates 25,000 hatchlings lost to feral pig and dog predation. The 2010 data indicates that 60 percent or more of the nests will be destroyed. This loss of hatchlings before the eggs can hatch can, if not curtailed, be more destructive to the species than the slaughter of the adults by the Asian long line boats, which continues to be a constant danger to species survival. The combination of nest destruction and at sea killings is the most serious combination of species elimination. Unfortunately, all who have knowledge of this impending disaster continue to stick their collective heads in the sand and do nothing, pretending that there is not a problem.

Why not just shoot them?

One may think an array of simple solutions may be at hand: Shoot the pigs and dogs; put a bounty on snouts; poison the critters; dig pig traps on the habitual pig trails and catch and destroy them. However, in those jungles for each "simple" solution there is opposition from environmentalists, local villagers, local government agencies and the Indonesian army and police. And while the bickering goes on, the pigs keep on reproducing, fattening themselves on rich leatherback eggs. Save Our Leatherbacks Operation (SOLO) has developed a simple, green and workable solution copied and modified from that used in Papua New Guinea.

Grids

We have initiated a trial effort on the beaches and instructed the villagers on ways to construct and set bamboo strip grids and place them over the center of a marked leatherback turtle nest. Provided they are anchored deep into the sand, a pig or a dog should be prevented from digging up the nest. The hatchlings can scamper under and over the grid to freedom and stumble to the seas. The grids are made from jungle bamboo, so there are no associated costs aside from labor. They can be reusable, post hatching for other new laid nests and into the next year.

Pilot project

Presently, this is a small test project. The villagers can construct the grids, place them over a nest and in so doing, obtain a "hands on" step toward the SOLO objective of helping them become self-sufficient in the husbanding of this critical environmental resource. The initial dozen of these grids were made for SOLO by the villagers we assist. If this test project is successful, SOLO will employ the village men to place and to relocate the grids and maintain the integrity of the hatching process.

The ultimate solution, given that the feral animals cannot be killed, is to relocate all of the nests as rapidly as possible into sturdy korrals, which the pigs and dogs cannot access. We have also employed village women to be the protectors (like new babies) of the eggs and hatchlings. This will provide the village women with needed incomes. Trial efforts to pay the women on a per successful hatch out basis have been quite successful—different and exciting to the families—and give women jobs. Village guards will be placed on duty at night to either kill or drive away marauding animals and human poachers.

There *is* hope

SOLO is confident we can roll back the feral predation by employing the grids now and begin a 100 percent relocation effort in to 2011 nesting season. This is a straight forward application of village efforts to protect their natural assets (the leatherbacks) and to become gainfully employed in the process.

A big but

SOLO does not have sufficient funds to accomplish this. An additional US$65,000 is required for the 2011 nesting season. Subsequent seasons will cost less. The situation is now critical to the survival of the species but the challenge can still be met and the situation remedied if we act now.

Please contact us at:
info-saveourleatherbacks@earthlink.net

We need your help with donations and finding corporate or entertainment sponsors.

— Save Our Leatherbacks Operation

FILE PHOTO: ANDREY BIZYUKIN

As we are fast approaching midwinter in the northern hemisphere, not everyone is packing away their diving equipment for the season. However, if you enjoy scuba diving in cold water while air temperatures are below zero, there are a few prosecutions to take. For those of our readers enjoying the summer season in the southern hemisphere, don't forget that hypothermia can be a problem even in the tropics.

Low temperature diving environments

Text by Dr Carl Edmonds (adaption by Arnold Weisz)

Awareness and assessment of the environment in which you are diving is an important factor for safe diving. Low temperatur diving—less than 10°C or 50°F—demands that you adjust your equipment and your dive planning.

Cold water can disrupt the performance of both the diver and his equipment. Diving in cold water requires the insulating qualities of a thick wet suit or dry suit, with gloves, boots and a hood.

The wet suit, unfortunately, loses its efficiency when the insulating air layer is compressed with depth. The cooling effect of compressed air expanding in the regulator, added to the low temperature of the water, makes freezing of the regulator a significant problem. Modified regulators that reduce these occurrences are available but cannot be fully relied upon.

Ice diving

Diving under ice requires special equipment and know-how. It shares many of the hazards and precautions of cave diving but has the added complication of freezing conditions. Being trapped under ice can be an alarming experience for a diver with a frozen and therefore non-functioning regulator. Full reliance should not be placed in specialized "ice diving" regulators in which the water is replaced by oil, alcohol or air. These can also freeze especially on the surface, using octopus regulators and with over-breathing. Attention must also be paid to the exit procedure, as holes can ice over rapidly. Protection may also be needed for surface tenders, as they may be exposed to wind and much colder temperatures than the diver, who is only at 0°C or 32°F.

Deep diving

Neoprene diving suits compress the deeper you dive, and this reduces its insulating properties. Often this happens at the same time as the diver passes into colder deep water. Even in tropical and sub-tropical waters thermoclines can make water temperatures drop considerably. Dives deeper than 30 meters gives you the combination of less thermal protection from your suit and a lower water-temperature. For long and deeper dives, it is recommendable to use a semi-dry or drysuit. And also to wear a hood and gloves to minimize the amount of skin exposed to water. ■

Cold & Hypothermia

Text by Dr Carl Edmonds (adaption by Arnold Weisz)

Adapting to your surrounding environment is vital for all scuba divers. Using the correct protection will make your dives enjoyable and prevent medical difficulties. If you still get cold and maybe suffer from hypothermia, there are ways to deal with it.

A diver is usually immersed in water, which is considerably colder than the normal body temperature of 37°C (98.6°F). Unfortunately, water is particularly efficient at removing body heat, having a conduction capacity 25 times that of air and a specific heat—the amount of heat necessary to raise a given volume by a certain temperature—1,000 times that of air. Without insulation, a diver will lose body heat much faster in water than in air at the same temperature. This can cause hypothermia, a harmful drop in body temperature to below 35°C (95°F).

The body can reduce temperature loss by generating heat through metabolism, exercise and shivering, and by restricting blood flow to the skin. The rate of heat loss also depends on factors such as the temperature of the water, the thickness of body fat, presence a wetsuit or other insulation, and the posture of the diver.


FILE PHOTO: ANDREY BIZYUKIN

Clinical features

All divers will have experienced the early features of cold—numbness, blueness or pallor of the skin (especially in peripheral areas such as the fingers, toes and earlobes), clumsiness and shivering. If the body temperature falls by about 2°C (36°F), loss of co-ordination and uncontrollable shivering may impair the ability to swim and render the performance of finely coordinated movements (like manipulating equipment and assisting buddies) impossible.

After a body temperature drop of 3–4°C (37-39°F), the diver may become weak, apathetic, confused and helpless. Drowning is a real possibility at this stage. A body temperature less than about 30°C (86°F) results in unconsciousness. This may be confused with other causes of unconsciousness in divers. Often the diver appears to just lose consciousness without other obvious clinical manifestations.

A victim who is unconscious from severe hypothermia may have a very slow respiratory rate, and a barely detectable pulse, and may appear dead to the inexperienced observer. It is important to not assume the worst in this situation. He may even have fixed dilated pupils and still be resuscitated. Do not presume that he is dead, unless he is warm and dead.

Cold & Hyperthermia


FILE PHOTO: ARNOLD WEISZ

First aid

If required, the basic life support (BLS) first aid management principles take precedence. Removal from further danger is followed by assessment and treatment. It is recommended that expired air resuscitation (EAR) and external cardiac compression (ECC) be performed at half the normal rate in cases of hypothermia because body metabolism is slowed. However, unless the rescuer is confident that hypothermia is the sole cause of the victim's collapse, the usual resuscitation techniques and rates are probably indicated.

The diver must be handled gently. Both active and passive movements are to be avoided, as these tend to trigger serious or lethal cardiac arrhythmia's. While the patient is hypothermic, ensure that he remains horizontal, as the vertical position can cause death. Always clear the airway, check for any evidence of heartbeat or respiration, and begin resuscitation as necessary. The aim of management is to keep the victim alive, while returning the body temperature to normal. The usual methods of treating the diver include wind-proofing, insulation and active warming.

Treatment

If medical or hospital facilities are available, many other treatments are more effective than the first-aid and warm water immersion regimes, mentioned below. The immersion treatment is probably only indicated for those victims who have sudden or severe hypothermia.

Wind-proofing is essential. Unless the diver is protected from the wind and the wet, he will continue to lose heat. Usually, it is best to dry the victim and clothe him, but under some exposed situations, it may be necessary to leave his wet suit on and cover it with other materials, to supply insulation. If a wet suit has to be removed, it is preferable to cut it off. Wet weather gear used alone, without a heat source, may help with insulation but may not be very effective, as they do not generate heat, and the victim's heat output is very slow.

Wrapping the diver in blankets, plastic (garbage bag), tarpaulin or even newspaper, may also help with insulation by reducing air flow over clothes, wet suit or skin. A reflective survival blanket over clothes and normal blankets may aid in wind-proofing and insulation. Facilities to warm a diver are usually limited at a dive site and improvisation may be required. Wrapping the victim in blankets with other divers may be one way of transferring body heat to a mildly hypothermic diver. Warm diver buddies, especially of the opposite sex, may be sought by some unscrupulous divers who only pretend to be hypothermic. The engine room of larger vessels is often warm enough to be of value in the management of hypothermia and engine cooling water may be a source of warm water in an emergency.

Stimulating drinks such as tea and coffee should also be avoided. Although alcohol produces a warm inner glow, it actually worsens hypothermia by increasing blood flow to the skin, accelerating heat loss. It should not be given to hypothermic patients. Warm water, glucose or electrolyte drinks may be given to fully conscious patients.

Re-warming is most simply achieved by immersing the victim in a warm bath at a temperature of 37–38°C (99-100°F). A warm shower is a less efficient alternative and certainly not with the patient standing. A pleasantly warm bath or shower is approximately the right temperature. Warm packs or hot water bottles over the axilla, groin and abdomen may help—but avoid scalding. It is possible that oxygen administration may be of value, especially if warmed or if used in a re-breathing system. The latter will reduce heat loss by re-breathing warm humidified gas. Massage, alcohol or stimulant drinks (coffee), heat packs direct onto the skin and exposure to intense sources of heat (such as radiators), are all best avoided.


FILE PHOTO: ANDREY BIZYUKIN

Prevention

Alcohol and other drugs may predispose one to hypothermia by dilating peripheral blood vessels and losing heat by conduction into the water. Diving in cold water is the most common cause, but even in tropical waters, loss of body temperature during a dive is likely if the diver is not effectively insulated. The most popular and convenient insulator is the wet suit. Air bubbles enclosed in synthetic rubber provide an insulating barrier between the diver and the water without the need for the suit to be waterproof—hence the term wetsuit. They are available in various thicknesses depending on the expected water temperature. Wetsuits have the disadvantage of compression of the air cells at depth, which reduces their insulation and causes inconvenient changes in buoyancy.

This problem is reduced in professional diving operations by the use of a drysuit, which uses air as the insulating material. Other variations include electrical, chemical or hot water warming procedures, or even an inflatable air pocket enclosed in a wetsuit. When immersed and in a survival situation, heat loss in an uninsulated person can be minimized by floating in the H.E.L.P position, a curled-up posture ("fetal" position) with the knees near the chest and the arms by the side, so covering the body areas that lose heat the most (axilla and groin). This can obviously be done only if the diver has a flotation aid. Huddling together with other survivors may be of value. Restriction of movement will also minimize heat loss. To reduce heat loss, it is best not to swim more than a short distance, as although swimming generates some metabolic heat, this is more than offset by heat lost into the water during movement.

Divers should abort dives once they start feeling cold, and should ensure adequate time on the surface, in a protected and warm environment, before returning to dive. Hours are needed to regain the deep core body temperature. Sweating is a good sign that hypothermia no longer is a problem. ■

Palau

Pearl of the West Pacific

Palau, the pearl of the West Pacific, has enchanted many an underwater adventurer. Nestled in the archipelago of the Caroline Islands, it boasts one of the richest most diverse underwater ecosystems on Earth. To each who visit, Palau is personal, leaving lasting impressions and profound experiences with her guests. So special is Palau, that we have not just one but three enthusiastic accounts from this magical realm at the edge of Micronesia. What follows are tales of discovery...

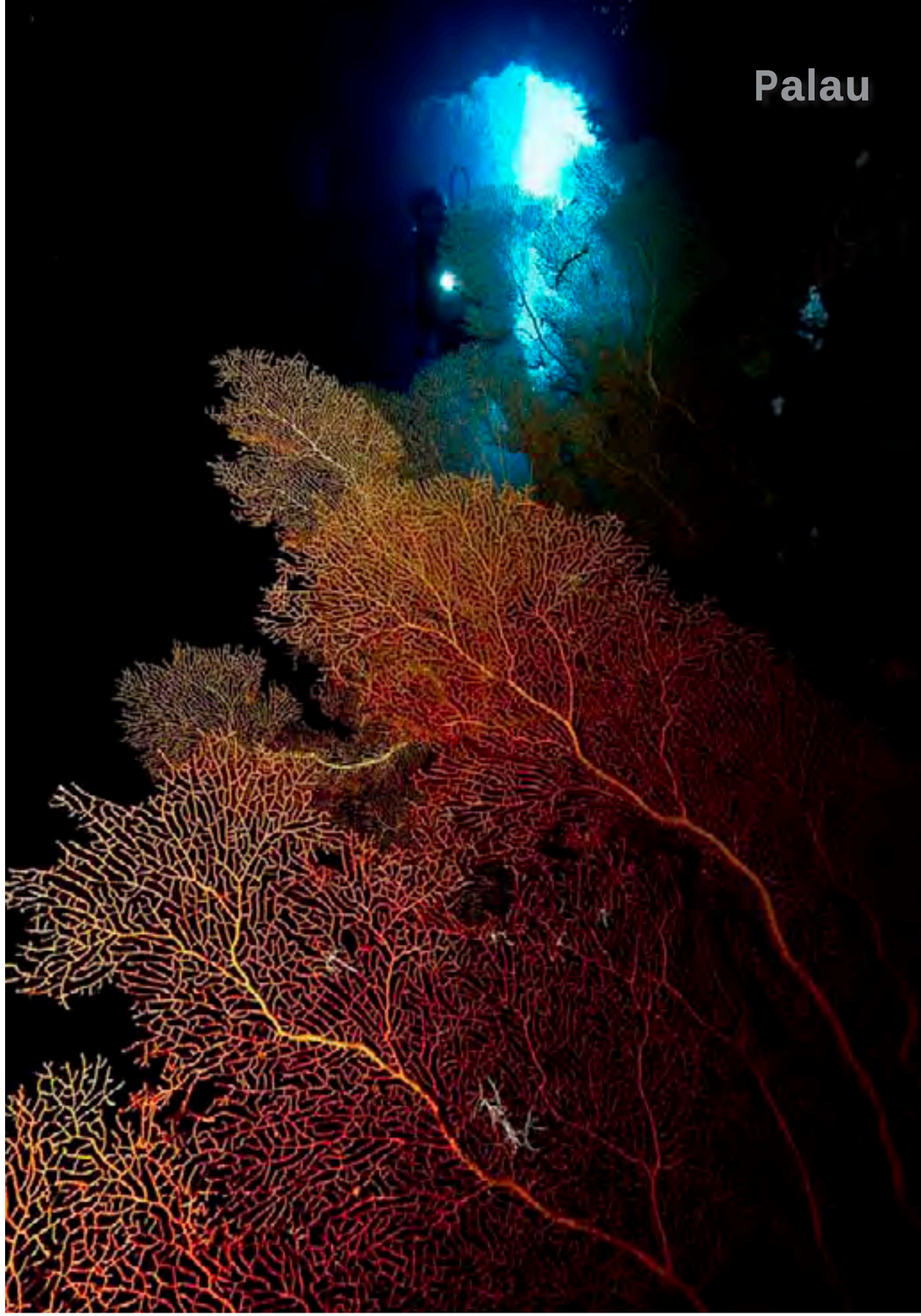
TIM ROCK

Text and photos by Michael AW

Palau Pleasures

—A Photographer's Playground

TIM ROCK

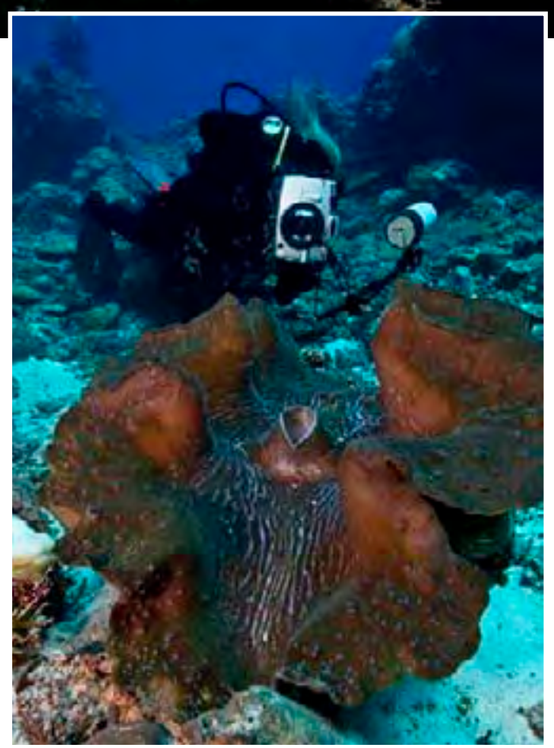


Appearing like nebulous emeralds adrift over an expanse of a deep blue ocean, Palau is richly endowed with some of the world's most stunning and unique terrain above and below the sea. Geologically, the islands are pinnacles of an undersea ridge of volcanic mountains, part of the "Pacific Ring of Fire" known for its violent subterranean activity. Its vast lagoon is sheltered by a 105-km-long barrier reef, which extends down the west from Kossol to Peleliu sheltering over 200 mushroom shaped islets—These Rock Islands are significant of Palau's natural wonder. The bases of these rounded limestone isles have been undercut by eons of water and biological process, creating an optical illusion of them being afloat on the turquoise lagoon. Among the labyrinth of twisting channels, white sand beaches, underwater caves and secluded marine lakes are nurseries for juvenile animals.

Situated closest to the Coral Triangle, the reefs of Palau profuse with wealth of over 1,500 species of fishes and equally astounding in coral diversity. Reef flats plummet quickly to depth beyond 2,000m. Blue holes, huge caverns and immense growths of sessile life are easily accessible in clear water with visibility averaging 30m. Vast number of sharks, mantas, eagle rays, turtles, dolphins and migratory pelagic convene at a unique crossroad of world's three major ocean currents. Because the best dive sites are located outside the lagoon, it is wise to choose a seven-day liveaboard to dive the best sites and the best times without the crowd and long boat rides from resort-based

Underwater photographer in split under-over water shot with Fish'n'Fins dive boat; Diver in cave filled with large fan corals. PREVIOUS PAGE: Diver and playful sea turtle

Lusciuos soft and hard coral gardens decorate the reefs off Palau (above); Diver peeks through reef window covered with coral life



Underwater photographer and giant clam

operations.

Albeit many others, three 'must dive sites' that are distinctive include Blue Corner, Chandelier Cave and the enchanting Jellyfish Lake. Situated off edge of Ngemelis Island, Blue Corner is the epitome of adrenaline diving, sensory overload in local terminology. Abundant in shark action, the site teems not just with large school of Moorish idols, but Napoleon wrasse, groupers, barracudas, grey reef and whitetip sharks, turtles, moral eels, jacks, mantas and huge marble rays. Especially when the current is running, the action seems endless and electrifying. The reef starts at about 12m, jutting out sharply into the sea before dropping abruptly into the deep abyss. Gorgonian fans and large plate corals are also prolific. Over a seven-day trip on the *Ocean Hunter III* run by Tova and Navot, you will dive the Blue Corner and other signature sites of Palau at the best time.

If you have ever been curious about cave diving, the Chandelier Cave is the place to start. It is safe and one of the most unique marine caves easily accessible to open water divers with large entrance into the four inter-connecting relatively large chambers lying beneath a Rock Island.

The cave was once an air-filled cavern, possibly millions of years ago when the sea was much shallower. The entrance is at 8m below the surface and the short tunnel opens up to a huge chamber with a ceiling of stately stalactites and clear water creating an illusion of endless visibility.

Farther back in the deeper recesses, the chambers are filled with a sparkling field of stalactites, delicate calcite crystal mirrored upon the lens of still clear water evoke a feeling of neither up nor down. Even with dive lights, the senses are easily tricked, until you break surface to find air-filled chambers dripping with twinkling stone formation in yesteryears.

The Chandelier Cave is world renowned and has been featured

Underwater photographer and swimming nautilus

Underwater photographer surrounded by stingless jellyfish in Jellyfish lake

Palau

QUICK GUIDE:

Water temperature: 75°F average

Visibility: 50-120 feet

Best time to go: Generally Palau is dive able all year round but the best time to visit is January to April.

Rainy season: Between July to October

Highlights: Shark mating season is from February to May. Moorish Idol migration is known to be in March. Like in Tahiti, the Groupers spawn in May and June. ■

in *National Geographic, Conte Nest Traveller* and glossy lifestyle publications.

Land-locked marine lakes, once linked to the sea are breeding ground for endemic specie of jellyfishes, and rare critters. A short hike up a tropical rainforest easily reaches an uplifted lake that is home to millions of sting-less jellyfish. The lake is a surrealistic milieu and hauntingly beautiful. While Palau is known for its fast fish action there are many small critters like squat lobsters, gobies, worms, and nudibranch to amuse the macro enthusiast as well.

At several sites, the majestic mandarinfish predictably comes out each evening showing off their courting and mating antics are subject for the keen photographers. Hanging out with the sharks and jacks at Blue corner, venturing deep into the inner recesses of the Chandelier caves and swimming in the half-light environment of the jellyfish lake fringe by lush rain forest are all part of Palau marvelous diving experience. ■

Author Note: in my opinion, the best way to dive Palau is with the MV Ocean Hunter I *and* III*; both vessels are rated among the best in the world. The service and standards are superb, and they get you to the each site at the optimal time.*

Freediving "mermaid" caught on film frollicking under the *Ocean Hunter I*

Palau's Treasures

Diving & Dining Fiesta Diversity

STUART WESTMORLAND

Text by Svetlana Murashkina. Edited by Gunild Symes
Photos by Svetlana Murashkina, Tim Rock,and Stuart Westmorland

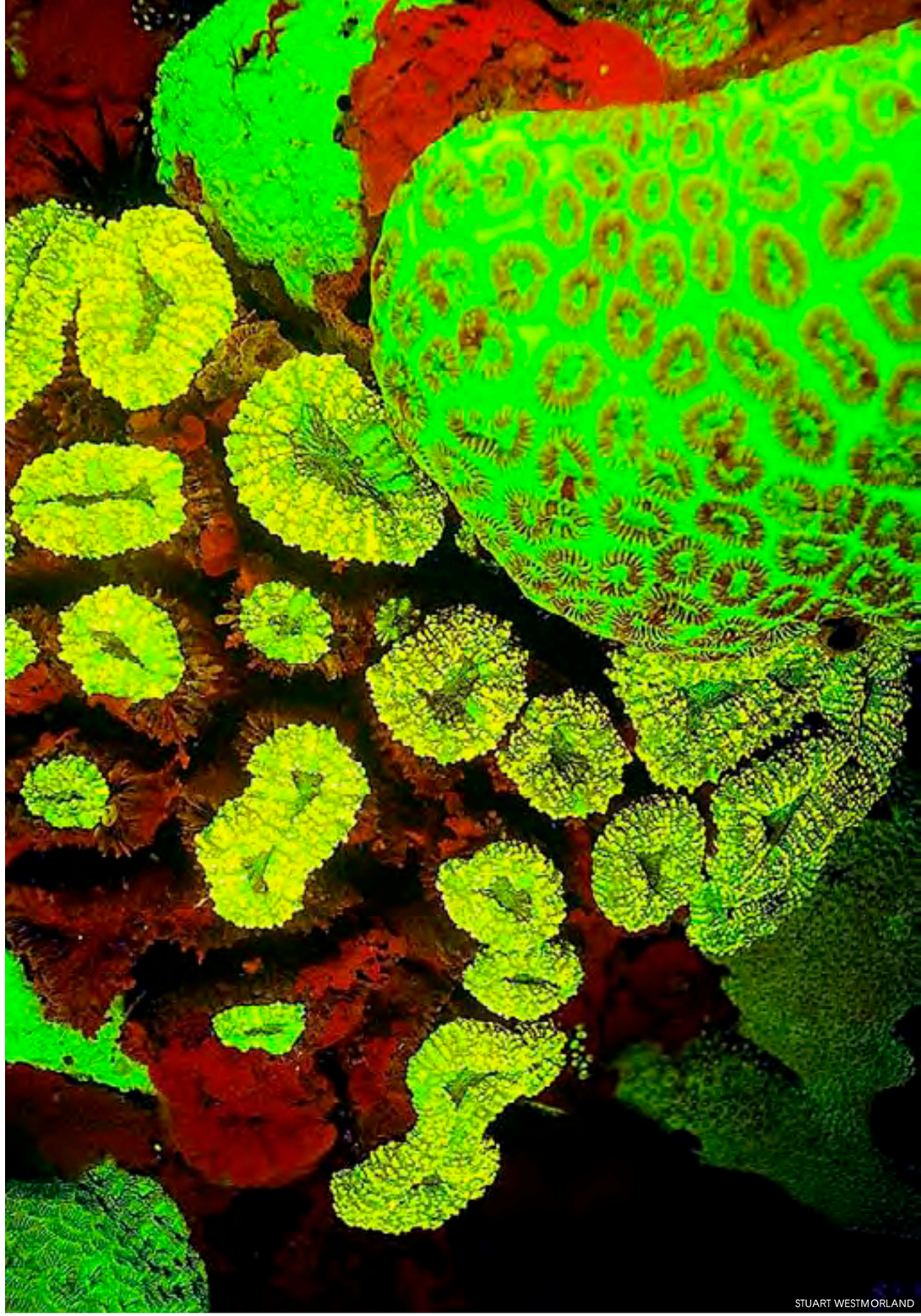
On the table, there was an invitation in a pale yellow envelope, soft to the touch. It read, "Palau Pacific Resort and Fish'n'Fins have the honor to invite you to dinner, *Fiesta Diversity*."

And this was just our first morning in Palau! A fiesta diversity is exactly what was promised by Tova Bornovski of the Fish'n'Fins dive center, with whom our group was going to dive. However, we had yet to gain our bearings. It was not surprising after such a long flight to lose orientation in time and space. Our flights took us from Moscow to Doha to Manila to Koror—a total of 16 hours in the air, plus time waiting for transfers.

Outside, we heard the characteristic metallic zing-zong sounds of air cylinders being loaded by a Japanese dive center at a nearby resort. They were going for a dive from the pier opposite our balcony. But we were not in a hurry, because we were going to be taken out diving by Fish'n'Fins.

Instead, we thouroughly investigated the resort, Palau Pacific Resort. We saw the footpaths among the thickets; the tennis courts (which were too darn hot); the remarkable beauty of the flowers; the swimming pool and bar; the beach of white sand and palm trees; and the ocean. It's what paradise probably looks like.

We waited in great anticipation of this "Fiesta" to which we were invited, for on each day planned, we were not just going to a new dive site to enjoy a



STUART WESTMORLAND

Huge school of barracude (left); Phosphorescent green and yellow hard coral (right)
PREVIOUS PAGE: Snorkeler at The Arch, one of the 200 Rock Islands in Palau

TIM ROCK

TIM ROCK

TIM ROCK

LEFT TO RIGHT: Snorkeler drifts with stingless jellyfish at Jellyfish Lake: Blacktip shark patrols the waters around Palau; Intimate view of the Rock Islands which seem to hover over the sea

new diving experience, but also each evening, we would be trying a new cuisine. We knew that scuba diving in Palau was legendary—it is, undoubtedly, one of the best dive locations in the world. But, as one of my old college buddies once aply pointed out, "Food is included in my list of sensual pleasures." And why not in Palau, too?

Diving and Dining

The organizer of the event, which will most likely become a most popular attraction, was Tova Harrel-Bornovsky of the Fish'n'Fins dive center. Partners in the program included the Wine Company Shimbros, Hotel Landmark Marina, Palau Pacific Resort and several of Palau's best restaurants—all supported Tova's project.

The basic premise of the project is to provide opportunities for guests—after visiting various dive sites (wrecks, sharks, caves, coral gardens, blue holes)—to be able to enjoy a gourmet dinner each evening at a different restaurant on the island. The menu would be composed of local products and culinary gifts of the islands, accompanied by complementary wines from the Pacific rim region. All this was scheduled for September. And here, we finally were. So let's dive in...

Diving on Palau

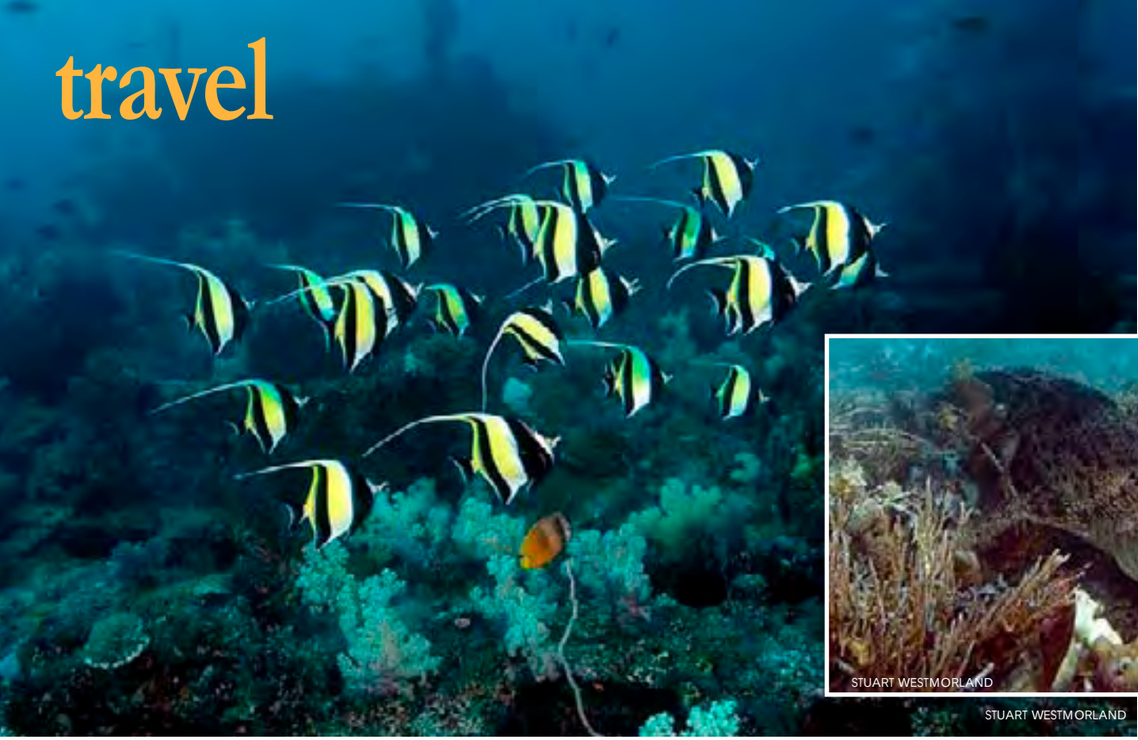
The western Caroline Islands, which host the state of Palau, are situated close to the triangle with the greatest biodiversity on Earth. Here, there are 1,500 species of fish, five species of sea turtles and 700 species of corals and anemones. There are whitetip, blacktip, gray reef, bull, leopard and hammerhead sharks as well as manta rays and Mandarin fish. Dive sites on Palau are very well described, known to millions of people due to articles and photographs in the media. So, in this article, it will be personal feelings, which are unique to each individual, that will be presented.

Naturally, we wanted to dive with Fish'n'Fins. It was the first dive center on Palau, founded in 1972 by the famous local diver, Francis Toribiong (see the profile article on Toribiong in this issue). He was one of the pioneer divers who discovered all the local dive sites. The Bornovski family (Tova and Navot) are the current owners and managers of the dive center, which has been in operation (with Francis) since 1986.

When the young sailors, Navot and Tova, first came to the island, they worked on the first dive liveboard in Palau called, *San Tamarin*. Then, Navot returned home to Israel to continue his education at the university. He received a diploma in the field of ship building and mechanical engineering.

The family decided to develop a dive business in Palau (*in Heaven!*) and bought a boat in Florida, the *Ocean Hunter*. They took both their children (a girl of four and a boy of three) and headed out to sea on the boat. Navot was the captain, Tova, the sailor, cook and everything else. The journey took nine months. When they got to Palau, they operated the boat themselves, and Tova did the cooking until they trained a new cook how to create their culinary specialties.

By the way, it is very common for Tova and Navot to teach and train staff—it is their manner of conducting business. This practice is especially valuable in Palau in terms of developing occupations for the local population. Initially, very few Palauans did scuba diving. But



STUART WESTMORLAND

STUART WESTMORLAND

TOP TO BOTTOM: Schooling sargentfish; Aligator; Neon green and yellow coral

Fish'n'Fins was constantly doing orientation programs for the local community to train, certify, and often in the summer, invite the classmates of their children to come diving with them.

Now the dive center (which started in 1998) has nearly 50 employees. The staff each have multi-specialities, so employees can step in for one another. The staff includes a manager, marketing officer, accountant, drivers, guides, dive guides and motorists. Absolutely everyone, including the cafe workers are educated in safety rules and first aid.

The local dive guides are *grown* from zero to PADI divers—some have already reached instructor level. All the captains are also local, starting from scratch and educated to captain. Training and diving personnel are educated by Navot. He is a PADI instructor and the captain of the ship. He is also a technical diver.

Indeed, Fish'n'Fins provides support for technical divers. Few *techies* come to Palau, but when they do, they are happy. The depth, wrecks, organization and great opportunities are here—everything that techies may want or need.

On the other hand, Tova never obtained a significant number of diving certifications despite the fact that she has thousands of dives under her belt. Her strengths are in commanding the general organization of the operation and managing the business as well as speaking several languages. In the dive center, they speak Palauan, English, German, French, Spanish, Japanese and Russian. Tova personally speaks many of these.

And, of course, her café is a winner, where delicious food is cooked as well as terrific *lunch boxes* prepared so divers can enjoy snacks between dives. There's also *real* Italian coffee here (the only such place in the

STUART WESTMORLAND

TIM ROCK

Clouds of stingless jellyfish pass under the rays of the sun at Jellyfish Lake

whole state, yes, probably, as well as nearby islands).

Dive sites

Almost all the dive sites are reachable in 20-40 minutes by boat. Every morning, Tova, like a general preparing for battle, commands the boats, which are often at odds. Part of the job requires her to coordinate the vessels: one goes to the wrecks; the other through the Milky Way for snorkeling; the third, to Blue Corner, and so on.

For more distant or long trips, they use a fleet. Their first boat, *Ocean Hunter I*, is a veteran (but still in excellent shape) and has room for six people. The construction of the boat allows it to operate close to the reefs and walls, which is important when navigating between the Rock Islands of Palau, especially during low tide. All the local skippers are very experienced navigators.

Ocean Hunter III is a luxury yacht for 16 guests, designed by Navot, based on his own experience. It is on this vessel that a few times a year they send expeditions to the remote south western island.

On some of the islands, there are only a few people residing. Others are generally uninhabited, so that nature on these islands is really untouched.

Dinner on the beach

After a long transition to the tropical climate, we decided to go to an island nearby where in the evenings one will find tables, candles and torches, and bamboo leaves serving as napkins. The white, white sand, waves, warm water... Yes, this was paradise!

Cave Candelabra. The next day, we went to Cave Candelabra. Through the 130-meter-long tunnel, leaving the deep karst base island, Ngerchaol, with caution, we floated into the cavity of crystal clear water. Here, it was like a castle! The stratagems that decorated the chambers, made it look like a cathedral by Gaudi. It is undoubtedly one of the most loved dive sites of Palau, and very well-known, thanks to the spectacular photographs taken by renown underwater photographer, David Doubilet, using dramatic lighting. Such equipment, by the way, is available at Fish'n'Fins.

The following day, we went to dive a new drop off. Along a stunning wall, we descended down slowly to 30 feet, to admire a bizarrely overgrown screen and frame. Everywhere on this trip, the water temperature is always 29°C. I casually lifted my head and saw that a very small shark (about 50-70 centimeters, no larger) was swimming almost straight up! I could not pull my eyes away. The shark reached the surface, looked up a little and turned down. She did something there, and then, once again went back to the surface. This was the first time I had ever seen this behavior.

German Channel. This channel is marked in my logbook with six exclamation points! The channel was dug by the Germans in the beginning of the 20th century in order to facilitate navigation. We saw sharks, including leopard, and a huge school of barracuda. Mantas and rays could be found at a cleaning point where they awaited to be pecked free of algae by cleaner shrimp and fish. Mantas could be seen even from the dive boat!

In the evening, we had dinner at a very cosy small "home-style" Japanese restaurant, whose

CLOCKWISE: *Ocean Hunter III* caters to luxury travellers and divers; Graceful young dancers entertain guests at Palau Pacific Resort; Delicious, vibrant dishes prepared for guests; Tranquil seaside accommodations

owners were good friends of Tova's. There was, of course, the freshest sashimi, a salad of red and green papaya (such as I have never eaten before), prawns in sweet and sour sauce, tofu and lamb. And for dessert—fruit.

This family has lived on the island for 45 years. They have their own home recipes, and there is a plantation where they grow organic fruits and vegetables.

Incidentally, when Palau was under Japanese control, there was a plantation of pineapples and even a plant to process them. Now Americans are pretty happy with Hawaiian pineapples and do not import pineapples from Palau. These fruits cannot be preserved for a long time, but they are delicious!

Jellyfish Lake. I'd read about the lake and saw the sea of images, but the gentle touching of the jellyfish cannot be described in words or photographs —you have to feel it. To get there, we had to walk right through the mangroves, along the narrow rather steep trail, slide down the wooden walkways and jump into the blue turquoise water. Jellyfishes. Thousands of them. Basically, they are light golden honey orange in color (*Mastigias papua*) or white and transparent (*Aurelia aurita*)—very small, with thin circular lace-like edges. The small were very small, the big, very big—pulsating, moving, floating... Most importantly, over the millennia of isolation in the local lake, the jellyfish have lost the ability to sting!

That evening, the Palau Pacific Resort hosted a school band and a dancing troup with graceful little girls wearing swishing straw skirts. In the group was Gail, the youngest daughter of Tova and Navot. And then came the haute cuisine exclusively designed by Chef Alex Suzuki, who deserves distinction. Everything was perfect. The second course was a clear broth, or bouillon, of reef fish with mango leaves. I wanted to write "fresh fish" but realized it was pointless—there are no "unfresh" fish, or anything else not fresh on Palau. It just doesn't happen. And, of course, for dessert—Banana Pancakes, served with California wine, Ironstone Cabernet Franc. The incentive behind the program, "Fiesta Diversity", was that when you pre-ordered dinners, you could receive them at special "package" prices.

Blue Hole and Blue Corner. These are the most famous dive sites on Palau—and it's all true. Here, I have nothing to add to the words of previous dive writers who usually describe the place as: "Blue Corner = many sharks", and vice versa. It was funny when the weight of a school of sharks shifted to the point where I hung very close to the bottom, grasping a reef hook, they were soon replaced by a huge cloud of Napoleon wrasse, which, as noted by our dive guide Ken was, "good for all".

At Taj Indian Restaurant that evening, we enjoyed the atmosphere of an aristocratic Indian house of the early 20th century. The cheerful owner, Robert Ckaria, brought us traditional Indian tea with milk and spices; fresh bread with nuts and dry fruit; and kebabs straight from the grill. We had to taste everything, for later that night, we'd be gone.

All images this page by Svetlana Murashkina

New feature

Another surprise came at the end of the trip. Recently, the airport opened a private waiting room called Ocean View Lounge. The basic idea is simple: avoid the hassles of a crowded terminal. The place is elegant and includes amenities: Internet, work desk, bar, showers—oh, and relaxing massage, a home theater with lean-back leather chairs. How do you get in? By booking through Fish'n'Fins, of course.

Afterthoughts

While writing about this trip, I remember that we did not dive on Peleliu, nor did we visit the Falls, nor did we reach the petroglyphs that can be seen on the rocks. We did not buy the traditional jewelry decorated with local coins made by the local woman, nor did we buy the carved wooden paintings, worked on mahogany, that are produced by locals in prison at the center of Koror. We also did not get to see the pineapple plantations, nor the relics of the WWII still standing on the Rock Islands. One week was just not enough. ■

Svetlana Murashkina is a doctor of geographical science and editor of the Russian dive magazine, InVertum.

Palau Announces Massive Marine Sanctuary

Palau has declared that all of its territorial waters, an area encompassing more than 600,000 square kilometres, would be a sanctuary for whales, dolphins, dugongs, sharks and other species.

Text by Scott Bennett
and Kelly LaClaire

Aerial view of the Rock Islands of Pulau

On October 22, the Republic of Palau announced the establishment of a wildlife sanctuary for marine mammals in its waters. The Sanctuary, which covers more than 600,000 square kilometers (230,000 sq. miles), was unveiled during Japan's Ocean's Day—an event where representatives from all sectors, including governmental agencies, private sector groups as well as associations of science and industry, gathered to address the loss of ocean and coastal ecosystems. The sanctuary, which has served as the world's first shark preserve since 2009, now extends its protection to all whales, dolphins and dugongs.

"There will be no hunting or harassment of marine mammals and other species in our waters," said the Honourable Harry Fritz, minister of the environment, natural resources and tourism of the Republic of Palau.

"We urge other nations to join our efforts to protect whales, dolphins and other marine animals," Fritz said at a press conference during Oceans Day at the meeting of the Conference of the Parties to the Convention on Biological Diversity in Nagoya, Japan.

"Palau now supports conserving marine mammals, along with sharks and other species," said Susan Lieberman, director of international policy for the Pew Environment Group, a large U.S. NGO. "This is a very significant announcement," Lieberman told IPS.

Opportunity

An area size of France, the tiny island nation's waters are also home to 30 whale and dolphin species, including a breeding population of sperm whales. "This sanctuary will promote sustainable whale-watching tourism, already a growing multi-million-dollar global industry, as an economic opportunity for the people of Palau," he said.

Despite a global ban on commercial whaling since 1986, Japan kills 600 to 900 minke whales (*Balaenoptera acutorostrata*) and a few fin whales (*Balaenoptera physalus*) each year in the Antarctic for what it calls "scientific research", which is allowed under the ban. Norway and Iceland also hunt a limited number of whales off their coasts. Those countries and some others have lobbied hard to end the ban on commercial whaling of some species such as the minke, where populations are estimated to be well over a million. Most whale species have critically depleted populations, including those in the Pacific, due to past commercial whaling largely by foreign companies, Fritz noted.

Palau's sanctuary may be in name only, with just one boat supplied by Australia but operated by the Palau government to patrol the vast region. "We are thankful to Pew for a recent grant for fuel so they can go out more than twice a month," he told IPS. "Last August I received a report from the U.S. officials in Guam showing more than 850 vessels fishing illegally in Palau's waters," Fritz added.

Fines

Some of those were prosecuted and fined by Palau government, he confirmed. They also have an agreement with the small Pacific island state of Niue to do aerial patrols of their shared waters. Scuba diving, snorkeling and other forms of tourism are the major foreign revenue source for the country, said Lieberman. "Whales and sharks are worth far more alive than dead to the people of Palau," she said. ■

Palau

A Diver's Addiction

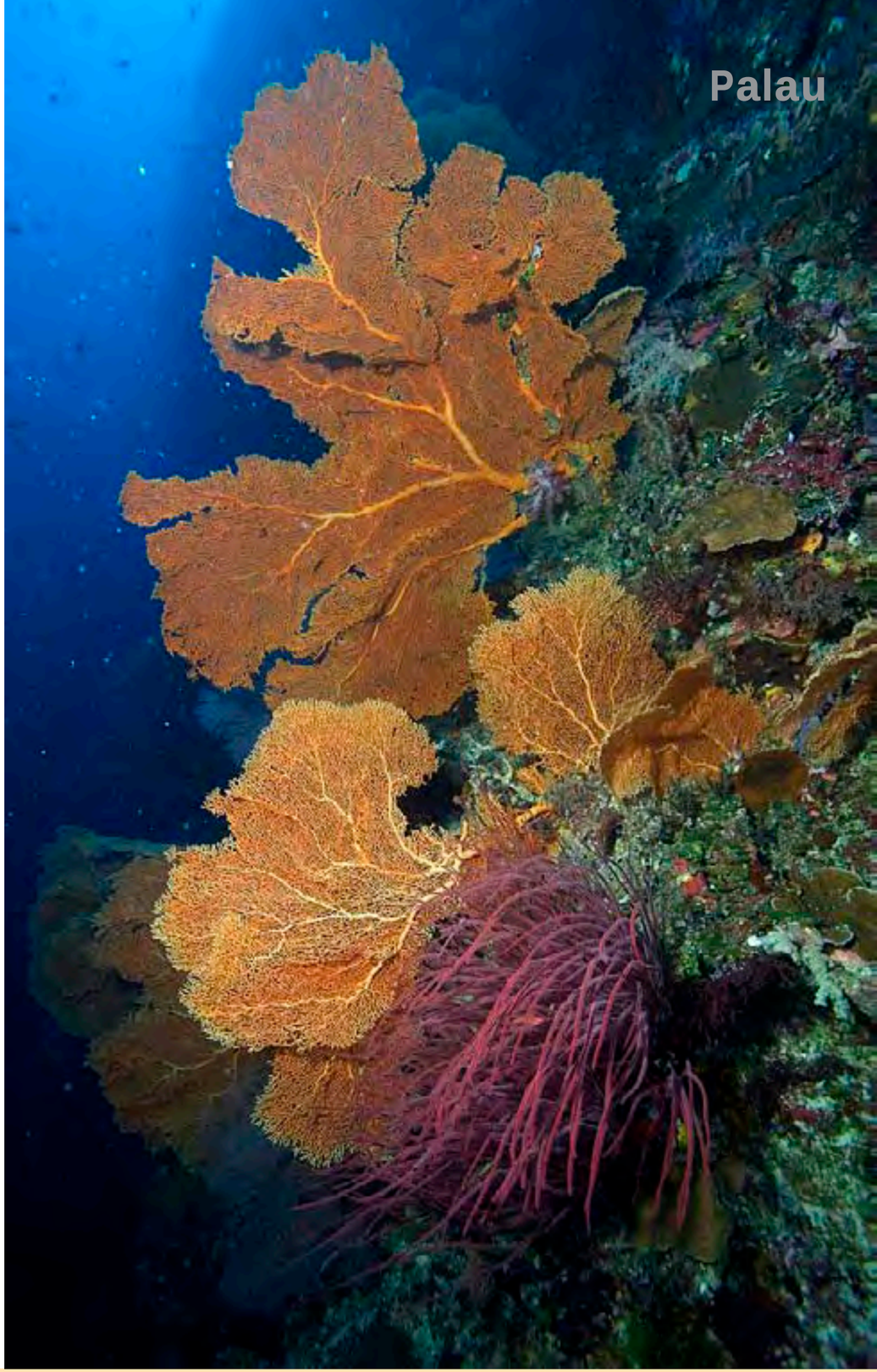
Topside view of Palau (above); Diver cruising with the gentle giant, a manta ray (right)

Text and images by Todd Essick

AUTHOR'S NOTE: I'm an underwater fine art photographer. You may have seen my work featured here in X-RAY MAG *or elsewhere. I am an artist who happens to have the ocean as my studio. I do not consider any aspect of my life as being typical. When it comes to being an artist, diver, photographer or traveler, my perspective is that of a dreamer—a dream that I get to live out everyday. I really do not generally photograph the type of nature pictures depicted here, which you see in this or other underwater magazines. Though, when I am traveling, I have been known to photograph something underwater that does not include a model. I am primarily known for photographing nude and semi-nude women underwater with sea life. I travel and dive around the world pursuing the dream of sharing the connection that we all have to the sea with everyone through my photographs. I am fortunate enough to travel to some beautiful dive locations searching for inspiration and locations to create my art. When I spoke to my friends at X-RAY MAG and told them of a newly formed personal connection with Palau and how moved and inspired I was by this incredible destination, they asked me to share this with you.*

Palau—prior to a few years ago—was just a name that meant a distant dive destination on my list of places to go. I had seen the periodical article written with its crystal blue water emerald green rock islands and sea life and coral combinations like no other place diving. A dive site called Blue Corner, sounded like fantasy land, almost as if it were thought up by Walt Disney himself, if he were a diver. In the back of my mind I knew that I would get there one day. I just never thought it would make the impression it did and change my life.

I am not a diver first. I am an artist/photographer, but as I was fortunate enough to move to Florida in the United States as a teenager, diving has been a part of my life for 30 years. Most of my diving for well over 20 years was primarily in Florida and the Caribbean. During



Luscious coral gardens decorate the reefs of Palau (above); Huge fan corals sprout out of a reef wall (right)

that time in Florida, diving became second nature. I did it so often, sometimes while looking for lobster, I honestly forgot I was diving. I had grown a little complacent, which as we know as divers, is not a good idea; but Palau changed that, and it brings me to this question.

Love affair with diving

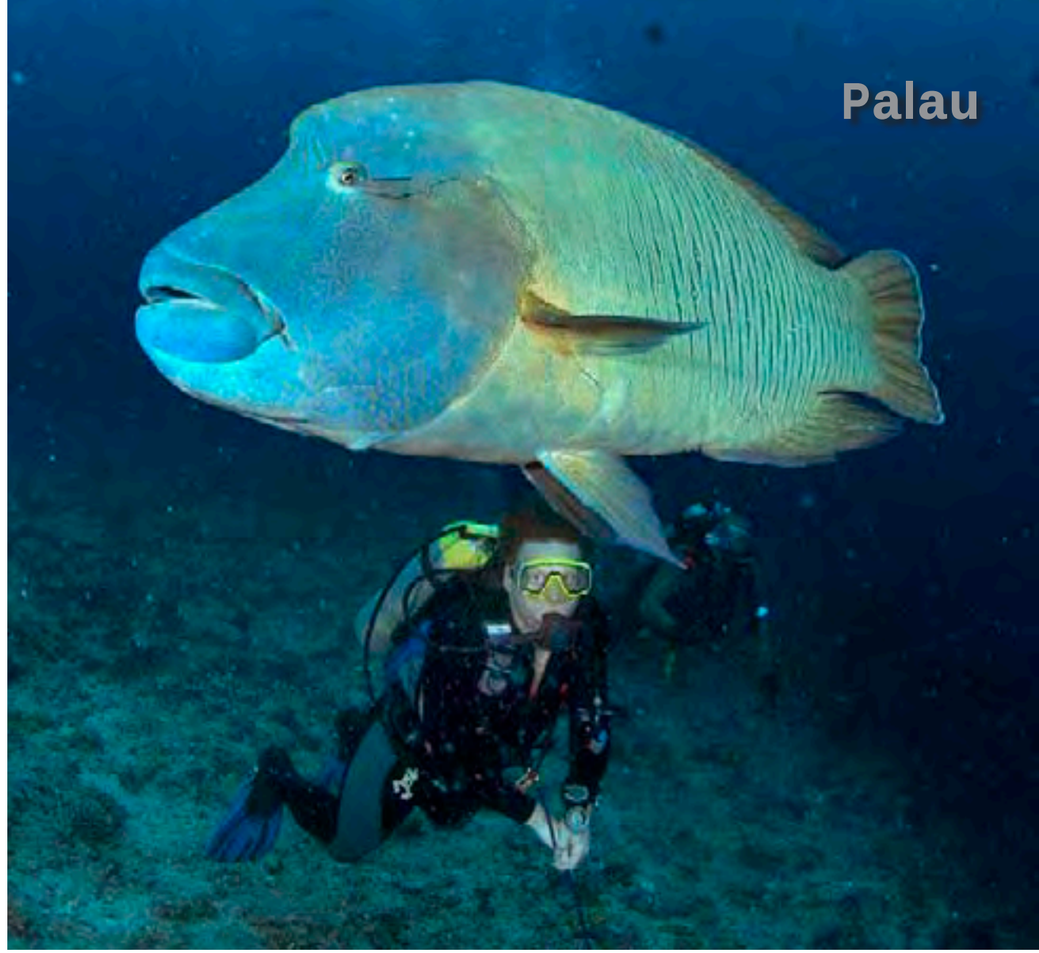
Have you ever lost that loving feeling for diving? Not that you don't want to dive any more, nothing that extreme, but you remember when it was just new and exciting like a new relationship, burning red hot. Now diving has become a constant, reliable and reasonably predictable, safe, and still makes you happy, yet...

This is to all those divers who may have grown just a little complacent in their diving or have been diving the same dive spots so many times that you almost forget you're diving as I had. As for the new divers out there, you may not know what I am talking about—your love affair with diving is still burning, red hot. Your desire to be underwater never changes. You're just happy to be underwater anywhere anytime. Well, when those flames die down a little, or to those who just need or want to bring back that spark, and spice it up a little, I have the place—Palau.

For most divers Palau is on the list of dream places to go, right up there with the Galapagos Islands and Cocos Islands, and Raja Ampat.

East of the Philippines

Palau, for those of you who don't know, is located in the middle of the Pacific, east of the Philippines, south of Yap. Palau was for three decades part of the U.N. Trust Territory of the Pacific under U.S. administration, this western most group of the Caroline Islands went for independence in 1978 rather than join the Federated States of Micronesia. A Compact of Free Association with the United States was



approved in 1986 but not ratified until 1993. It came into effect the following year when the island nation gained independence.

The addiction starts

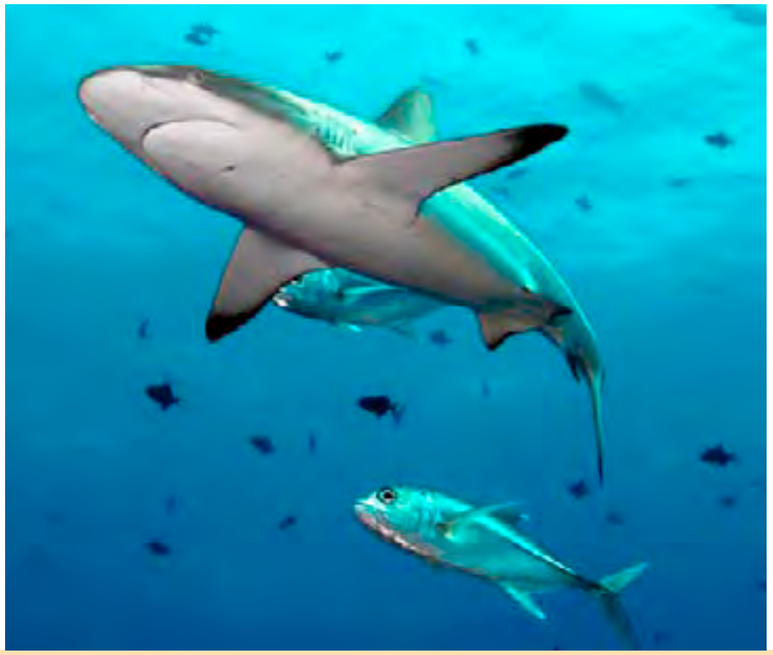
Palau has become of a bit of an addiction to me in the last few years. It all started with winning a photography contest to Yap. The plane flight was flying through Palau, so I stopped there first for a week. I was lucky enough to have met Sam Scott, the founder of Sam's Dive Tours, at DEMA the previous year. He was very interested in my photography and made me feel welcome to come to Palau even before he knew I was coming.

Upon arriving, Dermot Keane, the general manager at Sam's Tours—the person who started the shark sanctuary in Palau and was instrumental in getting the President to declare all of Palau a shark Sanctuary—greeted me and dialed me in for all my scheduled diving for the week.

From the first moment of my first dive in Palau, I have been in rapture—gliding past table corals in sizes and multitudes that cannot be described other than to say "you have to see it to believe it"; seeing countless species of fish in every direction looking for a place to hide but all the spots are taken already so they are on full display despite their stage fright; then, it is looking over the edge of a wall and me seeing sharks just going back and forth along the wall in anticipation of an easy meal either above or below. The larger reef fish made cameo appearances. The Napoleon wrasse, bumphead parrot, jacks, and giant trevallies, all take part in the show.

This was my first taste of Palau. I was reborn as a diver, at the very least, reinvigorated and reintroduced to diving with the same excitement as it had been on my first dive 30 years ago—unbelievable!

In Palau, I regained a wide-eyed wonderment that had been lost on some decompression stop a long time ago.



CLOCKWISE FROM TOP LEFT: Divers are watched by a patrolling reef shark; Napoleon wrasse dwarfs onlooking diver; Reef shark is shadowed by a couple of trevally; Close-up look reveals the silvery sheen of a trevally

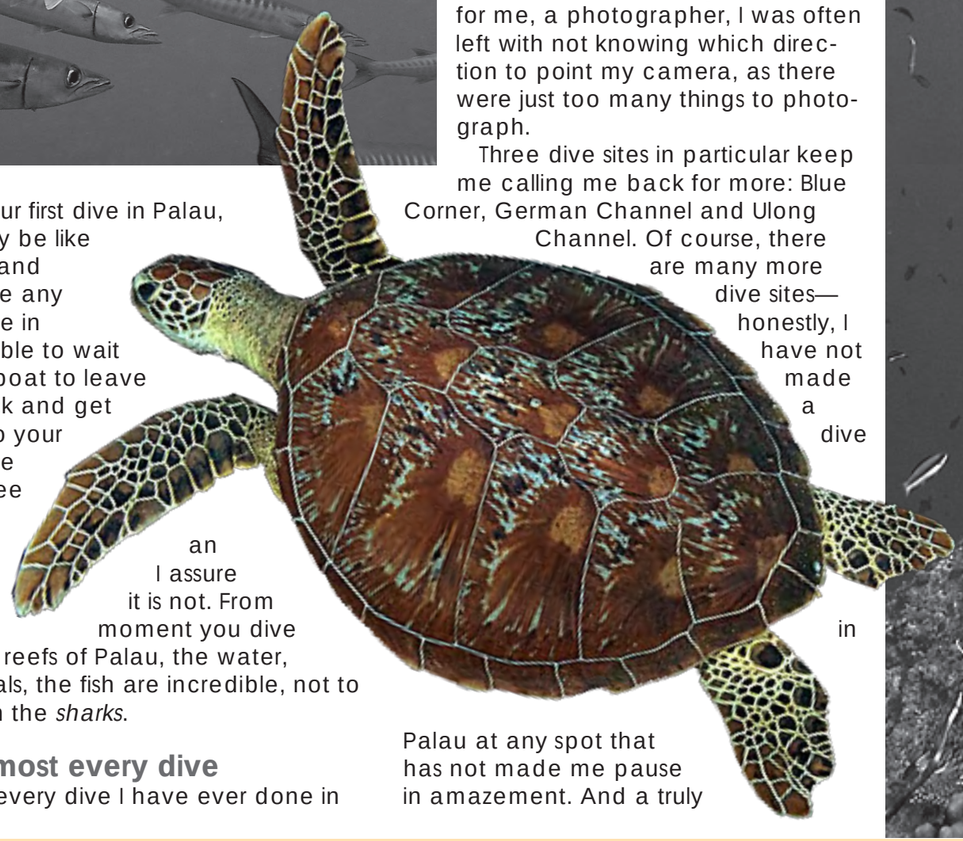
Palau

Palau has had sharks, mostly grey reef, with whitetips almost so plentiful you stop seeing them.

I went diving for a week, in Palau, before I went onto Yap. After Yap I was supposed to go to Manado, Indonesia, for ten days, but Palau had me under her spell. I barely remember being in Yap or changing reservations to stay in Palau. I just went back to Palau for as long as possible and have managed to spend over 180 days on several trips since.

Along with the sharks, barracudas, sea turtles, jacks, giant trevallies, bumphead parrots and the friendliest Napoleon wrasse are numerous. The countless species of fish and endless colors of fans and corals will put a diver into sensory overload. As for me, a photographer, I was often left with not knowing which direction to point my camera, as there were just too many things to photograph.

Three dive sites in particular keep me calling me back for more: Blue Corner, German Channel and Ulong Channel. Of course, there are many more dive sites—honestly, I have not made a dive in Palau at any spot that has not made me pause in amazement. And a truly

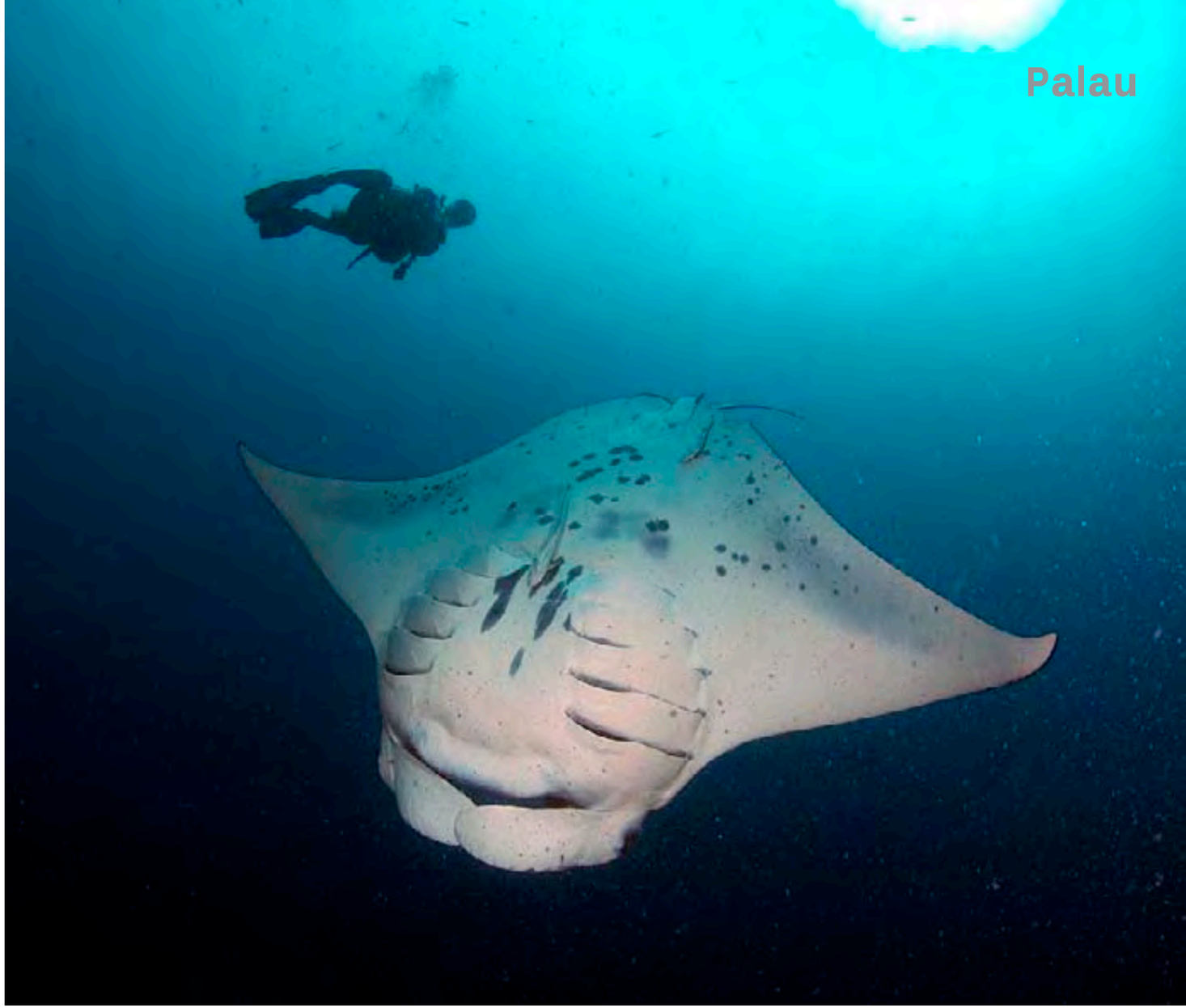


CLOCKWISE FROM ABOVE: Resting reef shark; Schooling barracuda; Sea turtle rests on reef as reef shark passes overhead; Soaring sea turtle displays an intricate shell pattern

After your first dive in Palau, you may be like a child and not have any patience in being able to wait for the boat to leave the dock and get going to your next dive just to see if it was all just an illusion. I assure you, it is not. From the moment you dive into the reefs of Palau, the water, the corals, the fish are incredible, not to mention the *sharks*.

On almost every dive

Almost every dive I have ever done in



Schooling jacks and trevally meet under the waves; Sometimes mantas will let you swim with them at a leisurely pace

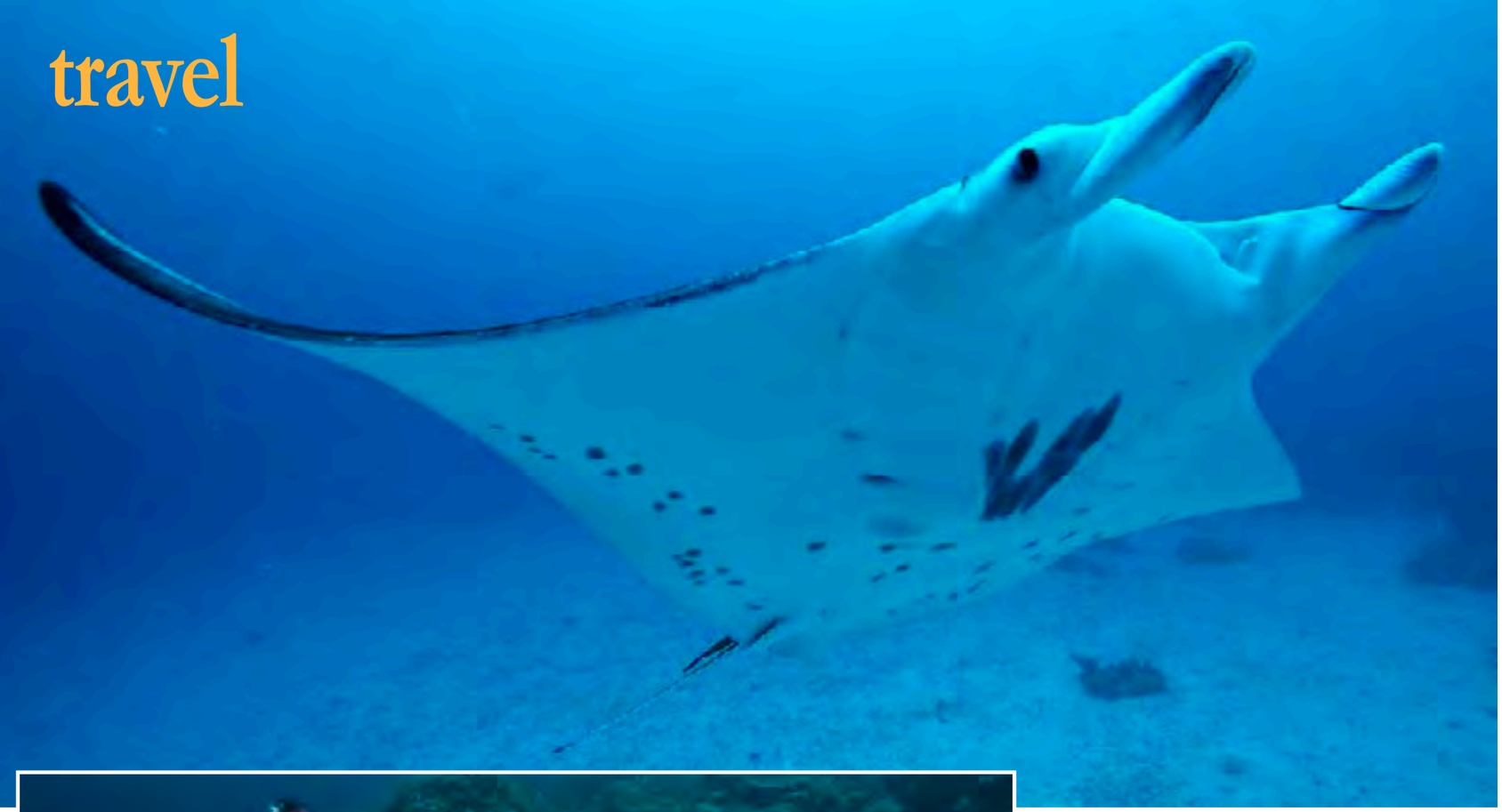
spiritual experience snorkeling will be enjoyed at Jellyfish Lake. Every dive is great in Palau, and just goes up from there, but Blue Corner has offered the most wow moments for me; it gets top billing on the marquee for Palau.

Blue Corner

Blue Corner is a corner, an elbow of sorts. It comes out from the reef, starting in shallow water and dropping off to well over 1,000 feet. The Corner's main plateau is at 60 feet (18 meters), though a shallow plateau at 45 feet can offer just as much action as the deeper spot.

The topography lends itself to creating strong currents, as the flow of water comes across this outcropping of coral. The currents, changing with the tides, can approach the Corner from either the north or the south, with the speed of the current changing based on the moon phase. This is considered an advanced dive and can be tricky your first time.

As you swim or actually drift to Blue Corner, you will have the wall on your side. If you are lucky, you will be able to observe hunting parties including



Swooping manta ray with mandibles out-stretched; Various table corals decorate the reef

Napoleon wrasse and giant trevally going after reef fish, with a follow up of whitetip sharks and an occasional grey reef shark coming in from the deep blue with rocketing speed to get in on the action.

As you get to the plateau, you cross on top of the reef, often greeted by barracudas, or jacks hovering above the turtles or reef fish gathering. The bumphead parrotfish can be very active here, like a street gang moving through the neighborhood.

On either the upper or lower plateaus, you move as close to the top of the wall and pick a spot on the reef near the edge. You hook in using the legendary Palauan reef hook to minimize damage to the reef. You put a little air in your BC after hooking in and start floating up; you, in essence, are like a kite in the wind, and you might hang there in the current only for a few minutes before watching the real action start.

Sharks will circle over and over, above and below, riding the currents, allowing you the opportunity to photograph or just observe

Pufferfish camoflage blends in with table coral

The limestone outcroppings of the Rock Islands of Palau have been worn away through the ages so that the islands look as if they are floating above the water (left); Large fan coral with featherstars; Large grouper resting on sea floor. PREVIOUS PAGE: School of bluestripe snapper, *Lutjanus kasmira*

them up close and personal. The sharks will get more comfortable with you as the minutes pass and will come within an arm's length very often.

This can be an experience of a lifetime. Time stands still, or more accurately, is moving in slow motion, as the sharks, with very little effort and speed, move against the current. You are tethered to the reef as you hover with them, and they come closer. Your ability to look them in the eye and observe the most minute body movement and detail is better than any High Definition movie.

You will mainly see two species of sharks during a dive: the gray reef shark and the whitetip shark. But many other species of sharks are in Palau.

While the dive described above is very typical during the best tides, Blue Corner has a personality all its own. It can be experienced outside of perfect tide conditions and still be amazing, with schools of fish very abundant.

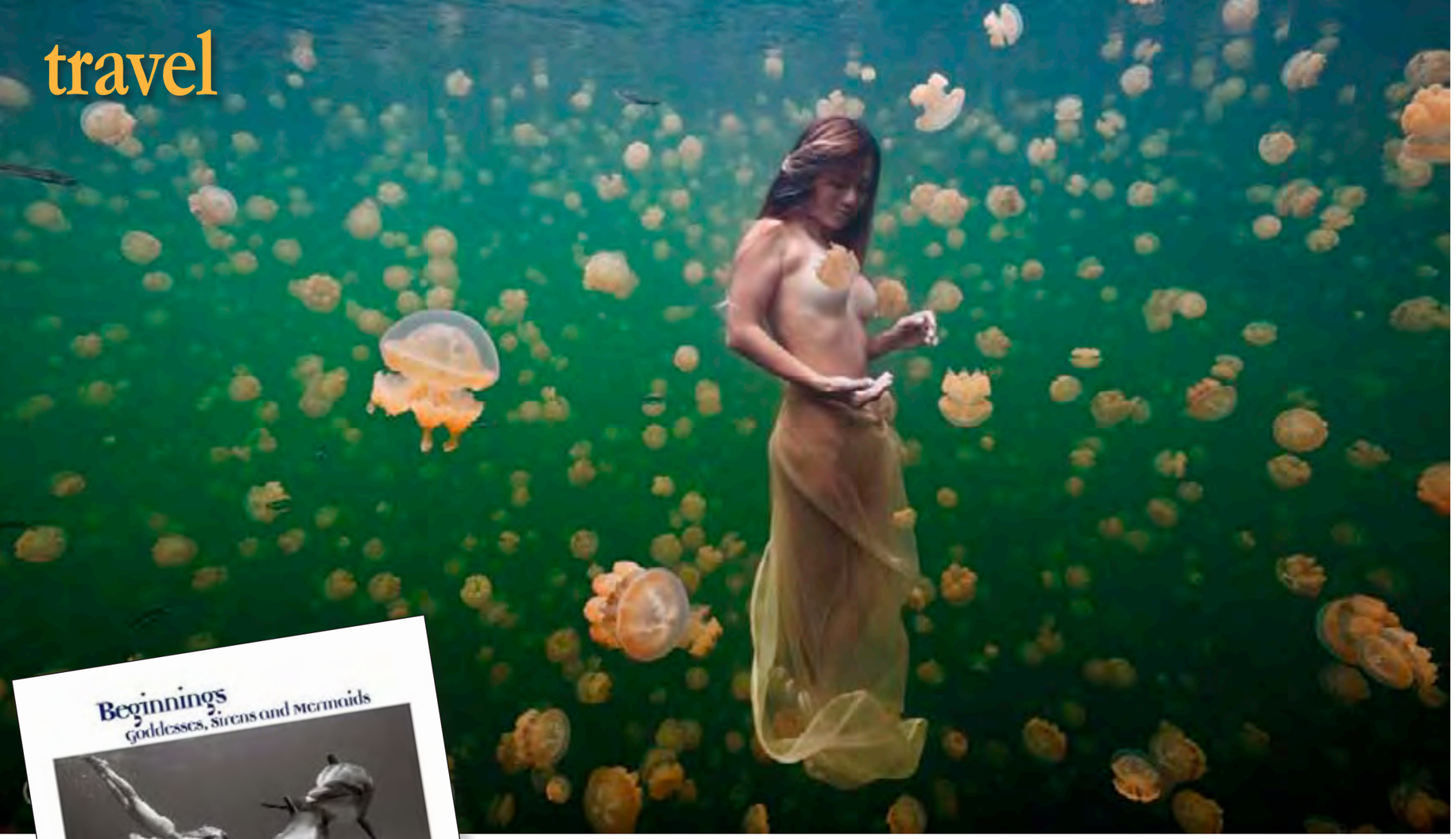
German Channel

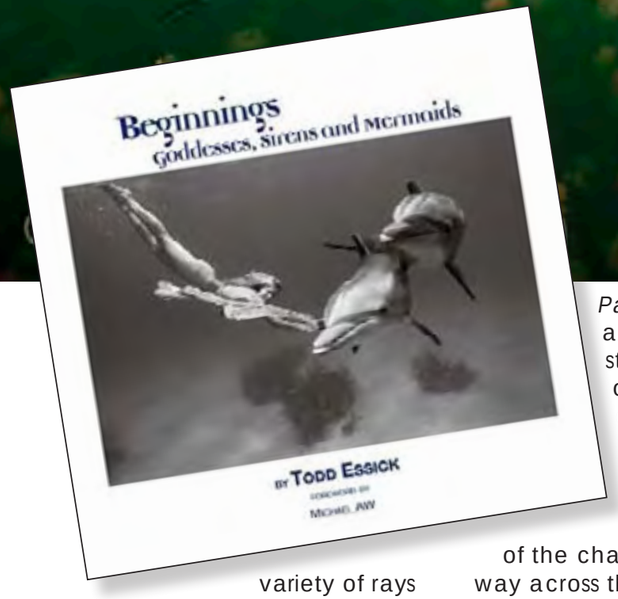
German Channel was built in the 1900s, when the German administration blasted through the reef to complete the natural channel and allow ships—primarily carrying bauxite—to pass from the southern islands of Peleliu and Angaur to Koror. Today, it is used as a passage through the southwestern barrier reef to many of the outer dive sites. At 10ft (3m), the man-made channel is too shallow to dive and really does not have much to look at. But as you go through the channel, passing rays and fish can often been seen. The outside mouth of the channel slopes down to a sandy bottom at about 75 feet.

This dive is popular for its manta cleaning stations, where the mantas come in, sometimes in large numbers. Divers will group in semicircles around the cleaning stations and be treated to swooping and friendly mantas stopping to get cleaned. Occasionally, reef sharks come to be cleaned by cleaner wrasse also.

Sometimes, the mantas will allow you to swim along with them and go at a leisurely pace—allowing a truly moving experience for sometimes as long as your air and your legs will allow.

Schooling fish being chased by grey reef sharks is an added attraction to the mantas. Sleeping whitetips in the sand are a common site, along with resting leopard sharks and rays. You can see a





Model and stingless jellies at Jellyfish Lake. FAR LEFT: Cover of Essick's book, *Beginnings; Goddesses, Sirens and Mermaids*

variety of rays including stingrays, spotted eagle rays and ornate eagle rays.

Ulong Channel

Ulong Channel is a cut in the reef near Ulong Island, which was featured on the TV show, *Survivor Palau*. Ulong Island is also a popular lunch stop for divers before or after diving the channel.

Diving Ulong Channel starts with a short drift wall that leads to the opening of the channel. You make your way across the opening where you will be treated to spectacular table corals in sizes and shapes not seen in many places.

There is a spot to view the many sharks that gather at the opening to the channel. When the current is strong, you can use a reef hook to stay in place and have sharks pass by incredibly close. After enjoying the concentration of sharks at the mouth, you make your way down the channel on what can be a fast and exciting drift dive, depending on the current.

There is always a lot of fish life in the channel. A large congregation of groupers live there and will move out of your way as you fly down the channel. A huge wall of lettuce coral awaits you, and if you are lucky, you might pass a shark making its way back to the opening of the channel. Be sure to follow your guide the first time, as there are plenty of triggerfish around in a few areas, but the guides will keep you at a safe distance to enjoy the ride.

The best time to dive Ulong Channel is on an incoming tide and preferably when the incoming current is strong. Ulong Channel offers some unique experiences that separate it from other dive sites in Palau. When on Ulong Island enjoy the great natural beauty and the ruins of an ancient Palauan village.

Jellyfish Lake

This lake is a spiritual experience, for sure. I was completely moved the first time I went there. It is truly serene. You will feel, on the inside as well as on the outside, as though you have dropped into an alien world. The visual sensation of seeing millions of jellyfish is incredible but to also feel these gelatinous creatures sliding down your skin can take a minute or two to get use to.

I knew just after a few minutes that I would have to photograph a series of underwater fine art here. I watched other swimmers, with a youthful fascination, embrace the jellyfish.

After spending time interacting with the jellies, I had to complete my task. I was lucky enough to meet a Japanese dive guide who offered to model for me at the lake. I created pictures that I hope capture the feeling of the connection we all share with nature and the sea.

The lake is only open for snorkeling, no scuba equipment is allowed in the lake.

Stingless

Jellyfish Lake is a landlocked body of water with a large population of defenseless jellyfish that over the course of millennia have completely lost their ability to sting, because they have not had to fight off predators. Instead, they float their

JELLYFISH LAKE (Palauan: Ongeim'l Tketau, "Fifth Lake") is a marine lake located on Eil Malk Island in Palau. Eil Malk is part of the Rock Islands, a group of small, rocky, mostly uninhabited islands in Palau's Southern Lagoon, between Koror and Peleliu. There are about 70 other marine lakes located throughout the Rock Islands. Jellyfish Lake is one of Palau's most famous dive (snorkeling only) sites. It is notable for the millions of golden jellyfish, which migrate horizontally across the lake daily.

Jellyfish Lake is connected to the ocean through fissures and tunnels in the limestone of ancient Miocene reef. However, the lake is sufficiently isolated, and the conditions are different enough that the diversity of species in the lake is greatly reduced from the nearby lagoon. The golden jellyfish, *Mastigias cf. papua etpisoni*, and possibly other species in the lake have evolved to be substantially different from their close relatives living in the nearby lagoons.

— *Wikipedia*

Diver and huge fan coral sprouting out of a reef off Palau (left); Swirling barracuda (right)

days away leisurely, pulsating gently from one side of the lake to the other, while catching and following the sun's rays and farming their own food supply of algae.

The effort to get to the lake adds to the allure of going there. A short but steep hike up and down to get to the lake is part of the adventure. The view of the lake before descending down to the water's edge is breath taking.

These are just a few of the dive sites in Palau that have inspired and excited me back to the days when I started diving. Palau offers so much more in dive locations, land tours (especially the rock islands) and the amazing culture of the Palauan people. In what I have written, I hope I have been able to relate in these few words just enough of an introduction to interest you in Palau. I hope the included photographs will be worth another thousand words in your own mind and will inspire you to go to Palau and see it for yourself.

When in Palau I prefer a land-based dive operation. This is, of course, just a personal preference. I recommend Sam's Tours; they offer great packages with various hotels in Palau. And with one of the best all around staffs—whether dive guides, boat captains, office staff or operations staff—they will all make you feel welcome and work hard to assure you have a good experience. The Bottom Time Restaurant at Sam's is a great place to eat or to have that post dive beer, and Sam's Tours can also help arrange discounted air flights from Guam or Manila.

There are a couple of liveaboards, if this is how you like to go, and is completely understandable if you are limited on time and want to get in as much diving as possible. I like getting out and socializing with the locals, and of course, a liveaboard will curtail this along with missing out and experiencing two great restaurants in Palau. The first is the Taj run buy Robert from New Deli, India. It has amazing traditional dishes, food and hospitality not to be missed. Robert worked for many years serving India's dignitaries and elite but found a home in Palau. The other restaurant is Kramer's run by a German. Before you say or do anything, this guy can really cook. Rene (and his wife, Jayne) serve up nightly specials along with locally caught fish. They serve a very international menu. Also, Tuesday night is spaghetti night, and if you can eat three plates, it's free. I heard someone did it three weeks in a row. I guess he really liked the spaghetti almost as much as he liked Palau.

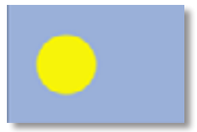
Above and below the surface of the water, Palau puts on a hell of a show and should not be missed. Once you go, you will want an encore performance and will be trying to figure out how and when you'll get your next ticket to the show.

Originally from Chicago, Illinois, Todd Essick began his career as a photojournalist in Miami, Florida, which led to his work as an internationally published underwater photographer and writer. He has authored a book of underwater photography entitled, Beginnings: Goddesses, Sirens and Mermaids. *For more information, visit:* ***www.essickphoto.com*** ■

A stingray (left) buries itself under sand and awaits passing unwary prey; Grey reef shark (far left)

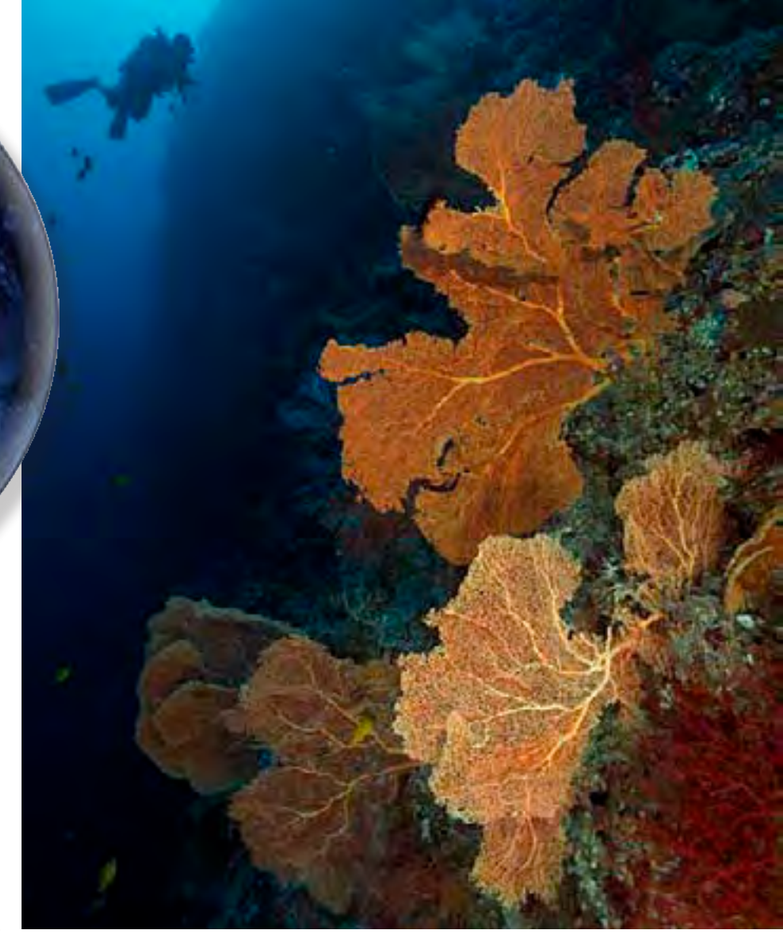
fact file

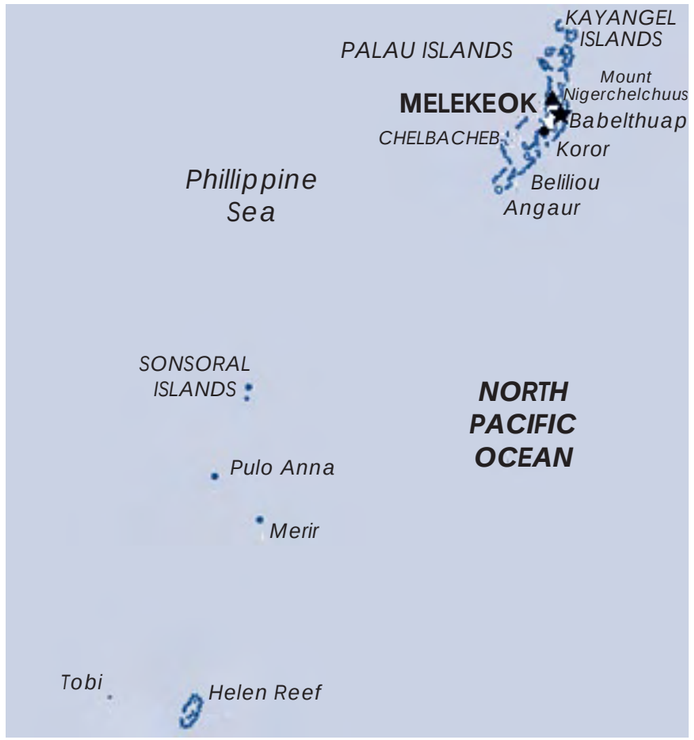
Palau



SOURCE: CIA.GOV WORLD FACTBOOK

RIGHT: Location of Palau on global map
BELOW: Location of Palau on map of North Pacific
THIS PAGE: Underwater scenes from Palau





History Palau, which is the westernmost cluster of the Caroline Islands, opted for independence in 1978 rather than join the Federated States of Micronesia, after three decades as part of the U.N. Trust Territory of the Pacific under U.S. administration. In 1986, a Compact of Free Association with the U.S. was approved but was not ratified until 1993. The following year the Compact entered into force when the islands gained independence. Government: Constitutional government in free association with the United States. Capital: Melekeok

Geography Palau is located in Oceania. It is a group of islands in the North Pacific Ocean, southeast of the Philippines. Terrain varies geologically from high mountains on the main island of Babelthuap to low, coral islands commonly fringed by large barrier reefs. Coastline: 1,519km. Lowest point: Pacific Ocean 0m. Highest point: Mount Ngerchelchuus 242m. Note: The westernmost archipelago in the Caroline chain, Palau consists of six island groups totaling more than 300 islands, which includes the World War II battleground of Beliliou (Peleliu) and the world-famous rock islands.

Climate Palau's climate is tropical, hot and humid, with the wet season occuringMay to November. Natural hazards include typhoons (June to December)

Environmental issues Palau's challenges include a lack of adequate facilities for disposal of solid waste; threats to the marine ecosystem from sand and coral dredging, overfishing and illegal fishing practices. Palau is party to several agreements including Biodiversity, Climate Change, Climate Change-Kyoto Protocol, Desertification, Law of the Sea, Ozone Layer Protection, Wetlands, Whaling

Economy Palau's economy is primarily based on tourism, fishing and subsistence agriculture. While relying heavily on financial aid from the United States, the government is the major employer of the work force. After the Compact of Free Association with the United States took effect 1 October 1994, U.S. aid amounted to US$700 million over the following 15 years in exchange for Palau furnishing military facilities. In 2007, visitors on business and tourists numbered 85,000. As a result, the population of Palau has a per capita income approximately 50 percent higher than that of the Philippines and much of Micronesia. Expansion of air travel in the Pacific, rising prosperity of leading East Asian countries, and the financing of infrastructure development by foreigners has bolstered long-run prospects for the key tourist sector. Natural resources: forests, minerals (especially gold), marine products, deep-seabed minerals. Agriculture: coconuts, copra, cassava (tapioca), sweet potatoes; fish. Industry: tourism, craft items (from shell, wood, pearls), construction, garment making.

Currency U.S. dollar is used

Population 20,879 (July 2010 est.) Ethnic groups: Palauan (which is Micronesian with Malayan and Melanesian admixtures) 69.9%, Filipino 15.3%, Chinese 4.9%, other Asian groups 2.4%, white 1.9%, Carolinian 1.4%, other Micronesian groups 1.1% (2000 census) Religions: Roman Catholic 41.6%, Protestant 23.3%, Modekngei 8.8% (indigenous to Palau), Seventh-Day Adventist 5.3%, Jehovah's Witness 0.9%, Latter-Day Saints 0.6%, other religions 3.1% (2000 census)

Language Palauan is primarily the official language in all islands except Sonsoral where Sonsoralese and English are official; Tobi where Tobi and English are official; and Angaur where Angaur, Japanese, and English are official. Other languages include Filipino 13.5%, English 9.4%, Chinese 5.7%, Carolinian 1.5%, Japanese 1.5% (2000 census)

Hyperbaric Chambers
Belau National Hospital, Koror

Websites
Palau Tourism Authority
www.visit-palau.com

Francis Toribiong

Text by Arnold Weisz
Photos courtesy of Navot Bornovski of Fish'n'Fins Dive Center in Palau

In January 2010 Francis Toribiong received the ultimate honor and recognition in the diving industry—he was inducted into the Scuba Hall of Fame, an honor given only to a select few. He shares company with such luminaries as Jacques-Yves Cousteau, Lloyd Bridges, Sylvia Earle, David Doubilet and Rodney Fox. *X-RAY MAG's* Arnold Weisz caught up with Toribiong to learn more about Palau's scuba diving pioneer, his thoughts and visions for diving, past, present and future.

Palau dive pioneer, Francis Toribiong

AW: In your early diving days Jacques-Yves Cousteau visited Palau. What kind of impression did a legend as Cousteau make on you?

FB: During my inexperienced youth, to tell you the truth, I was more impressed with Palauans who were diving at that time. When Cousteau came to Palau in the late 60's, I thought, "If I had the money he has, I could do that too!" But Palauans, at that time, had no resources, but still figured out how to dive, salvage war wrecks and repair broken equipment with nothing!

With limited news and limited exposure to western culture in early 1960s, not many people around the Pacific knew who Cousteau was. In retrospective, it was a great honor to have the chance to meet with him when everything just started.

AW: Starting a diving operation on a remote location, such as Palau, could be considered, in the 1970s, like a daunting task. Did you ever regret your choice of career?

FB: No, because I love to be challenged. Being a pioneer diver in Palau was a fulfilling challenge that also provided great reward.

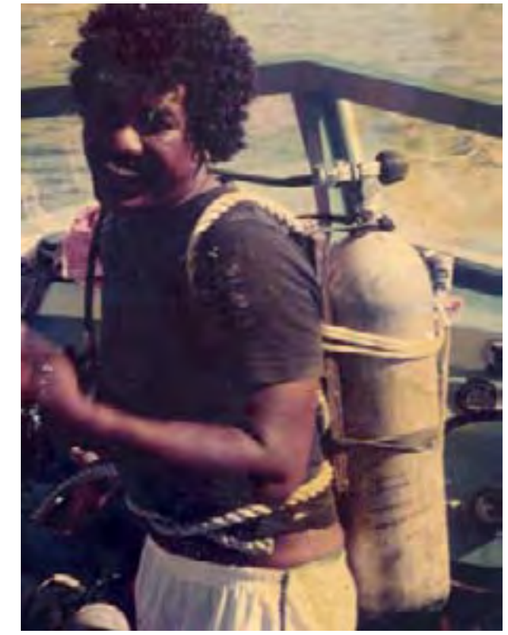
AW: What is your most memorable diving experience?

I have very many memorable diving experiences, but if I have to choose two, [one would be] discovering Blue Corner. At the time in Palau, there were only two main dive sites: the quadruple Blue Holes and Shark City. Due to weak current at the exit from Blue Holes, we always followed the current and followed the wall toward the north. One day, I decided to turn left and came upon the corner. The next day, I briefed my guides, "When you leave the Blue Holes, follow the reef south to the corner," and soon after, it became Blue Corner, and the rest is history. [And the second one would be] finishing the search for WWII wrecks with Klaus Lindemann.

We found six new wrecks. It is part of Palau's history. Being there and helping uncover the mystery and location of the lost fleet was a once in a lifetime experience.

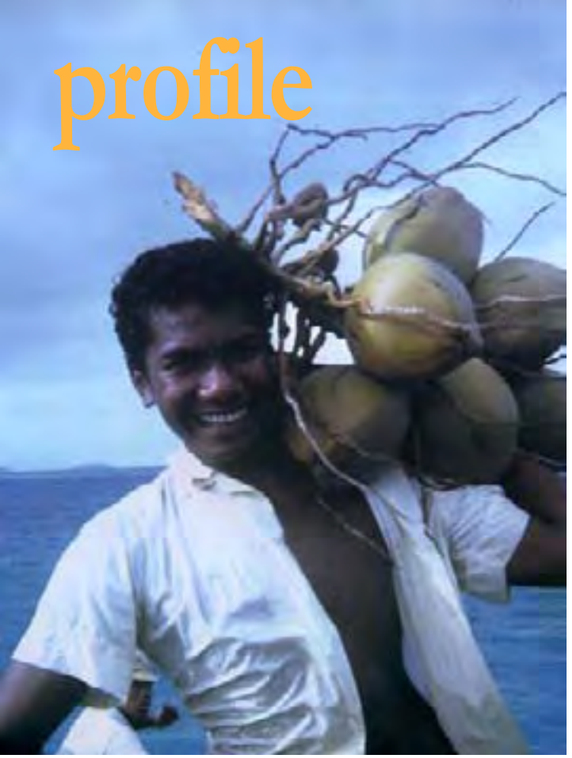
AW: Together with your family, you went on screen in the Academy Award nominated IMAX documentary film, The Living Sea. *The movie was very well-received by audiences all around the world. How did participating affect you as a diver? And did the movie raise awareness of Palau as a scuba diving destination?*

FB: *The Living Sea* was one of the first IMAX features. At the time, I did not know what an IMAX film was, so when MacGillvary contacted me, I thought it was just going to be a movie like others before it (i.e. raising awareness of Palau as a destination). Even now, more than 15 years later, we still get divers coming to Palau because they saw the IMAX movie when it first came out, and they have been dreaming and saving since then to come to Palau and see it for real. The movie was also instrumental in raising world-wide awareness of ocean conservation.



Francis Toribiong receives award at his induction into the Scuba Hall of Fame

AW: What has it meant to you being inducted into the Scuba Hall of Fame, where your name will be mentioned in the same breath with diving pioneers such as Jacques-Yves Cousteau,



Francis Toribiong

Respect for nature and conserving resources are part of our Palauan tradition and our heritage and goes way back to our ancestors.

Lloyd Bridges, Sylvia Earle, David Doubilet and Rodney Fox?

FB: I have meet Cousteau a few times. I dove with Silvia Earl and David Doubilet, and I respect these people very much. To be mentioned with them was very humbling.

AW: You are not the only one in your family having a tremendous impact on conserving Palau's marine environment. Your brother Mr. Johnson Toribiong, who is the current president of Palau, officially recognized the world's first shark sanctuary. It must make you immensely proud that your brother shares your passion for protecting the ocean?

FB: Yes. Our father used to tell us—don't just talk, "walk the talk". Respect for nature and conserving resources are part of our Palauan tradition and our heritage and goes way back to our ancestors.

THIS PAGE: images from Francis Toribiong's past and present, as a pioneer in establishing and developing scuba diving in the Republic of Palau in the early days and today

AW: Palau, as so many other nations, has to balance its economic development with the exploration of the nation's natural resources. You have been involved as the Marine Biology Coordinator for Palau Pacific Exploration (PPX), which has secured a million-acre drilling concession on the North Block of Palau located at the Velasco Reef in Kayangel State. Do you find it difficult to combine your role as an environmentalist and serving as the adviser to an oil company?

FB: No—again it is a challenging task. At this point, it is an assessment of the potential to find oil or gas not drilling! I feel it's important for me to be on the 'inside' and know what is going on with a project like this and be able to raise concerns rather then to be at the mercy of information coming from the newspaper.

AW: As a native of a small island nation, what are your concerns about the environmental challenges ahead, such as global warming and rising sea-levels—for Palau and the rest of the planet?

FB: My concern is just like everyone else's living on an island. Traditionally, Palau has been involved in protecting the environment for many generations. Palau is currently protecting, by law, 45 percent of its marine areas and 20 percent of its terrestrial areas.

As a member of the United Nations, we are one of the smallest contributors to global warming, yet one of the first to be affected by it without anyway to improve the consequences. Ultimately, Palau may pay the biggest price. ■

Skills for Technical Diving

Learning to dive involves learning a new set of skills. Mask clearing, buoyancy control, regulator recovery and all the other skills that you learn on an open water course are essential for dealing with the underwater world. As a diver progresses through diving they learn additional skills such as using a drysuit, wreck diving or how to rescue their buddy. With technical diving there are again some new skills that need to be learnt. In addition with technical diving there is a greater focus on ensuring that skills are not just learnt but also practiced and mastered.

Using a long hose makes the ascent and decompression stops much easier

Text by Mark Powell

The reason for this change in emphasis is that decompression diving introduces what is known as a virtual overhead environment or glass ceiling. This increases the risks of the dive but also increases the consequences should there be a problem. On a recreational, or no-stop dive, the surface is only a few minutes away, and should the diver have to ascend immediately due to an equipment problem, there would be relatively little risk.

On a decompression dive, the diver cannot ascend without risking decompression illness. The diver may need to perform an hour or more of decompression before they can safely reach the surface.

As a result, they must be able to deal with any situation that may occur. They must also be able to complete the correct decompression for the dive they have carried out. This means following a specific ascent rate and holding decompression stops even if other things are happening. This can only be safely done if the relevant skills are practiced and mastered.

Buoyancy

Buoyancy control is the essential skill that is fundamental to all div-

A diver demonstrates good buoyancy control on a decompression stop

ing. Most divers go through a number of stages in achieving buoyancy control. At first, when they are initially learning, they have little to no control. They don't understand how to change their buoyancy or the factors that are affecting whether they are rising or sinking. By the time they achieve their open water qualification, they should have moved to the second phase where they understand how to control their buoyancy but it is an ongoing effort. They may have their hand on the BCD control constantly and have to make a conscious effort to control it.

After further practice, they reach the third stage where buoyancy control is now automatic. They can swim around maintaining buoyancy with little to no obvious effort and are able to maintain a good level of buoyancy control providing everything is going well. Most divers only ever reach this third level of control and many experienced divers who are considered to have good buoyancy control are at this level.

However, if a problem occurs, or their attention is focused on something else then that buoyancy control starts to become more erratic. Unless a diver has experience of dealing with problem, they are unlikely to be able to maintain their buoyancy whilst at the same time dealing with the problem. Technical divers must reach the fourth stage of buoyancy control where they can deal with one or more problems whist still maintaining their buoyancy.

Once the technical diver has achieved this point, they can focus on solving the problem at hand. This level of control provides a stable platform for all of the other skills required for technical diving.

Controlling ascent rate

Controlling the ascent rate is one of the key skills of technical diving. This type of diving almost always means decompression diving, and so a controlled ascent rate is essential.

Decompression tables or computers are based on a given ascent rate, and it is essential that the diver sticks to the correct rate. Not too fast and not too slow. There has been a gradual movement towards slowing down ascent rates, and for recreational diving, this can only be a good thing. For technical diving, it is slightly more complicated.

Many recreational divers who move to technical diving end up ascending far too slowly at depth but then too quickly from the last decompression stop. This is the exact opposite of what they should be doing. If the diver ascends too slowly, they may in effect extend their bottom time and end up incurring more of a decompression penalty.

For this reason, the technical diver should always ascend at the correct rate. This doesn't mean fast but just means at the rate prescribed by the decompression model they are using. Many decompression models use an ascent rate of ten meters per minute from the bottom up to the first decompression stop.

Deco stops

Once the diver reaches their decompression stops, they need sufficient buoyancy control to be able to hold these depths. For a safety stop, it is not essential that the stop is made at exactly the prescribed depth or that the diver maintains exactly that depth for the whole of the safety stop.

However it is a different story for a mandatory decompression stop. The diver must now be at exactly the depth required. Any deeper and they will not be releasing the gas that has built up in the body fast enough, but any shallower, and they may be releasing it too fast, possible resulting in decompression illness (DCI). For this reason they need to maintain their stop depth plus or minus no more than half a metre. Clearly good buoyancy control is essential here.

Gas switches

On most technical dives, the diver will switch from the gas they were breathing during the bottom part of the dive to a separate decompression gas. This decompression gas will speed up the rate at which dissolved gas is released from the body and reduce the length of the decompression stops.

The gas used during decompression is a rich Nitrox mix. The danger with using these gases is that if the diver drops below a certain depth there is a risk of central nervous system (CNS) Oxygen Toxicity. In order to safely use these gases, the diver must be able to maintain his depth and ensure they do not drop below the maximum operating depth for the gas.

If more than one decompression gas is carried, each will have its own maximum operating depth (MOD). The diver must ensure that he does not switch to the wrong gas at the wrong depth and risk CNS Oxygen Toxicity. For all of these reasons, the diver must be able to carry out their gas switches ensuring that they always switch to the correct gas whilst maintaining their depth to within half a metre.

Controlling the ascent rate is one of the key skills of technical diving.

Switching to a backup mask

Buddy watch

During the gas switch, it is essential that your buddy checks that you are switching to the correct gas. This is just one example of the level of buddy skills required for technical diving.

The technical diver should always be aware of their buddy and work as a team to anticipate and avoid potential problems. It is all too easy to focus exclusively on the task you are carrying out and forget about your buddy. No matter what you are doing, you should always be aware of your buddy and be ready to assist if they have problems.

The worst case situation is if your buddy runs out of gas and has to share your gas supply. This indicates a serious lack of planning or awareness, as the technical diver should plan their dive and monitor their consumption to ensure that they never run out of gas.

If the worst case does happen and your buddy runs out of gas, then you will need to perform an ascent, carrying out any decompression stops, to the surface or to the point where you can switch onto one of your decompression gasses.

In this case, a long hose on the regulator you donate to your buddy will make this task much easier. Rather than being just a few inches from each other, a long hose allows enough room between the divers to enable a comfortable ascent and decompression stop.

Again this is a situation where buoyancy control is essential if you are to ascend and hold your decompression stops whilst simultaneously sharing gas.

Surface Marker Buoys

Using a Delayed Surface Marker Buoy (DSMB) is a common occurrence on technical dives. Returning to a shot line at the end of the dive is not always desirable, and strong currents decompression on a shot line can be an uncomfortable and potentially dangerous option.

Procedures vary from one region to another, but the most common method of decompression in the UK is to send up a DSMB from the wreck or near the start of your ascent, and then drift with the current.

With a long decompression, the DSMB allows the boat to track the drifting divers, even in a strong current. A DSMB makes long decompression stops easier for the diver by providing a depth reference. For these reasons, it is essential that technical divers practice sending up a DSMB until they can do it easily.

For deeper dives, it is sometimes the case that the DSMB is not long enough to reach from the maximum depth to the surface. For this reason, it is also important for technical divers to be able to deploy a DSMB from a decompression stop or whilst ascending from one stop to another. In order to do this, it is essential that the diver has mastered both skills individually before combining them.

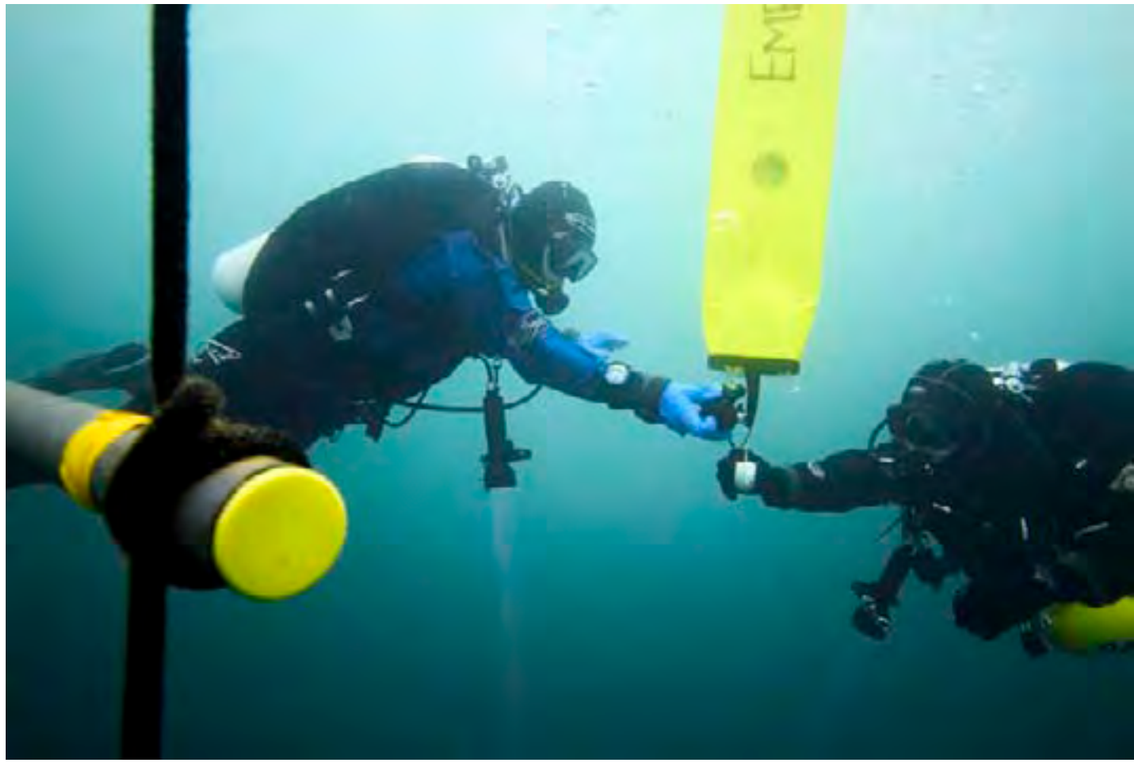
Know your equipment

As well as their DSMB, the technical diver should also be familiar with all of their other equipment. In the case of a problem, they should be able to easily find and use any piece of equipment. If a diver carries a piece of backup equipment but has never practiced using it, there is no guarantee that it will work as expected when needed.

Many divers carry a backup reel and DSMB but very rarely practice using them. If the main reel has a problem, that is not the time to be trying to remember how the backup works.

Similarly many divers carry a backup mask but have never practiced getting it out and putting it on in the water. If you loose your mask, that is not the best time to find out that it is very difficult to undo the pocket that holds your backup mask.

Passing a decompression stage to a buddy



Sending up a delayed SMB from mid water

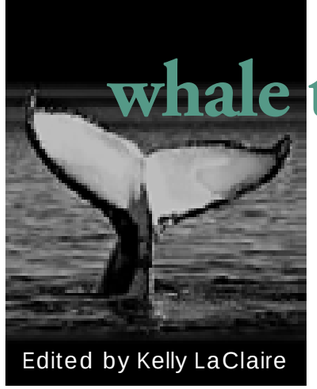
Practice makes perfect

It is for these reasons that technical divers frequently practice key skills. The thinking behind this is that if an emergency happens then the worst time to be trying something for the first time is when you need it for real. Equally, if you have not practiced a skill for a long time it is likely to be rusty. The reason we practice these skill is not that we think it is likely that we will need to perform that skill regularly. Quite the opposite, they are practiced because it is hoped that we will never need to use them, but if we do, we will be able to carry out the skill without a problem.

For example, many technical diving courses include practice in removing the stage cylinder containing your decompression gas and then refitting it. This is not because we anticipate taking it off regularly, there are very few times when you would want to take off a stage cylinder. However, if the diver gets a line tangled around his stage cylinder, or needs to pass off the stage cylinder to his buddy, it will be invaluable if they have previously practiced this manoeuvre.

Technical diving builds on the key skills that are required at any level of diving but as we can see there is more of an emphasis on practicing and mastering each of the skills. The implication of not having mastered a skill in technical diving is potentially more serious than in recreational diving, but regular practice of skills and planning for the worst case is something that is very useful at all levels of diving.

Mark Powell is one of the leading technical diving instructors. Mark has been diving since 1987 and instructing since 1994. He is a full time technical diving instructor for a number of the leading agencies and teaches all levels up to and including Advanced Trimix. Mark has led a number of expeditions to various parts of the world including the Middle East, Costa Rica, Malta and the Red Sea but is usually found diving the wrecks around the coast of the UK. ■



whale tales

Edited by Kelly LaClaire

Robots to protect marine mammals down under?

Unmanned Aerial Vehicles (UAVs) are being used over Western Australia's Shark Bay in an attempt to discover if drones could be a better way to monitor marine mammal species than manned aircraft. Dr Amanda Hodgson of Murdoch University in Perth has been funded by the Australian Marine Mammal Centre to head the research. "A huge benefit of UAV is that they eliminate human risk," Murdoch told the Australian Associated Press. "We don't have to have observers flying low over large areas of ocean in small planes. In addition, they should allow more accurate detection, location and identification of species."

Currently, Hodgson and her researchers are working with Boeing's Institu Pacific (a defense division of the global aircraft giant that utilizes drones for military and commercial applications) and hoping to benefit from the advantages of the unmanned crafts. UAVs can fly at attitudes approaching 6000 meters (around 18,000 feet) and have an operational power source that lasts up to 28 hours allowing surveys of cetaceans to be conducted in ways that traditional airplanes cannot. "Large areas of the Australia coastline have never been surveyed for dugongs or humpback whales and UAVs capable of flying long distances may allow us to access these remote areas." Murdoch's studies are only in their first stages, but conservationists are hopeful the data collected will go far in replenishing depleting whale, dolphin and dugong numbers in Australian waters. ■

SOURCE: SMH.COM

NASA

Taiji to hold meeting discussing dolphin slaughter

Local activists and political leaders in Taiji, Japan, will meet in November to hold the country's first meeting to discuss the annual slaughter of thousands of dolphins and other cetaceans. Made world famous by the Oscar-winning, U.S. documentary, *The Cove*, the whaling village of Taiji is falling under increasing world-wide pressure to end its yearly hunt of hundreds of dolphins and whales sold as meat or waterpark attractions.

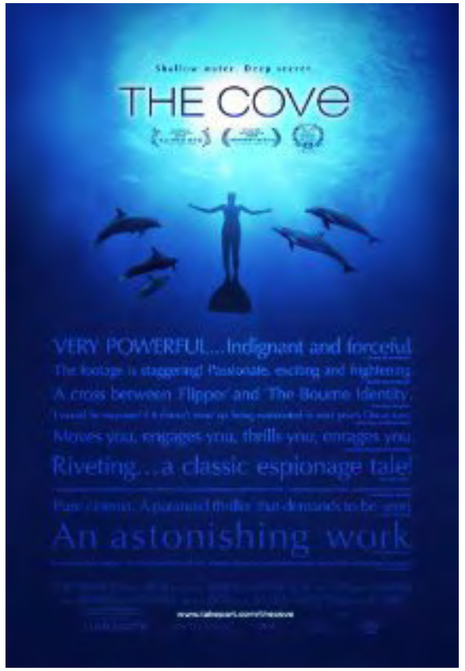
According to official organizers the meeting will be attended by Mayor Kazutaka Sangen, senior officials of a local fisheries cooperative and representatives of several anti-hunt groups who have been demonstrating around the town since September when this year's hunt began. The media has been openly invited and each side will have a chance to express their opinions and debate over pre-written questions that will be decided on before the event begins.

Scene from the annual dolphin slaughter in Taiji, Japan. Photo courtesy of Savejapandolphins.org

Local fisherman and whaling organizations point out that the annual hunt is a cultural right and 100 percent legal under law and are bewildered that Westerners find the dolphin culls extreme and cruel.

One fisherman who spoke anonymously to the reporters said most of the village's people are descendants of fishing families who have lived there for generations and don't view dolphins any differently than tuna or other fish. "They're food," he says.

A 1994 statement by Taiji Mayor S. Hamanaka directly addressed to environmentalists illustrates the viewpoint of locals succinctly: "We believe we know more about our own sea in Taiji than anyone who lives hundreds or thousands of miles away from us. We also believe we are more concerned with its protection and assume more responsibilities than anybody else in the world. We are sure that the same view is shared by Alaskan Eskimos, Faroese, Greenlanders, Icelanders, Norwegians and Russians in Chukotka as well. We hope many environmentally concerned people in the industrialized nations will understand our views and trust us as rational and humane people, and stop making whaling a 'scape goat' of the environmental crusade and making inhumane attacks on whaling people."



Poster for the film, *The Cove*, directed by Louie Psihoyos

Activist and concerned environmentalists, however, aren't buying it, especially Ric O'Barry, world famous for his efforts on the issue. O'Barry claims that he was told in private by town officials that tradition is not the real reason for the hunts. "It's pest-control," he told *Japan Focus* reporter David McNeill. "They're over-fishing and want to kill the competition for the fish. That's unacceptable." Other anti-hunt groups agree, as witnessed by the recent activities of the Black Fish, who took credit for sending divers to cut the nets of sea pens holding captive dolphins in an attempt to free as many as possible.

Whatever the outcome of the meeting, groups such as O'Barry's are taking a major win on raising awareness around the globe and consequently bringing the Japanese to the negotiating table. ■

REMIE BAKKER / MANIMAL WORKS FOR DEINSEE WW.NMR.NL

Hypothetical reconstruction of Hoekman's blunt-snouted dolphin (Platalearostrum hoekmani).

Extinct 'Balloon-Head' Dolphin Discovered

Boasting a short, spoon-shaped nose and high, bulbous forehead, the new species has been identified from a fossil found in the North Sea.

Named *Platalearostrum hoekmani* after Albert Hoekman, the Dutch fisherman who discovered the skull bone in 2008, the species measured up to to six metres in length and lived two to three million years ago.

As museum researchers Klaas Post and Erwin Kompanje wrote in the museum's journal *Deinsea*, the North Sea has been a rich source of fossils in recent decades as bottom-trawling has become more prevalent. The practice has yielded tens of thousands of pieces of the fossil record, many of which defy classification.

Oceangoing

What is clear from the singular bone found by Hoekman is that the animal fits into the family of marine mammals known as Delphinids—ocean-going dolphins that actually includes both killer and pilot whales.

Pilot whale cousin

The bone shows an unusually large tip region containing six teeth known as the premaxilla. This feature suggests the broad, blunt nature of the creature's snout. More specific classification within this family is somewhat speculative.

Based on analyses of similar fossils and modern relatives within the family, the researchers are convinced they have found a new species whose closest living relative is the pilot whale.

The rostrum bone along with a model of the dolphin are now on display at the Natural History Museum, Rotterdam. ■

SOURCE: DEINSEA, VOLUME 14, 2010

Noise pollution limitting habitats of endangered northern right whales

NOAA

The northern right whale is the rarest of all the large cetaceans on Earth and now, in addition to the dangers of illegal whaling, increasing water pollution and depleting food sources, this severely endangered creature faces yet another uphill battle in its fight for survival. Recent studies at Scripps Whale Acoustic Lab has brought forth evidence that anthropogenic (man-made) ocean noise levels have risen markedly—doubling every decade for the past 50 years—and are diminishing feeding, hunting and mating grounds for right whales and many other species.

To understand the detrimental effects that excess noise levels have on whale species, one first has to have a on grasp how whales "see" their environment. According to director of Cornell University's Bioacoustics Research Program, Chris Clark, marine mammals live in an "acoustic-dominant world" and use sound as their primary means of sensing and measuring their habitats. When noise decibels reach critical levels, the acoustic environment becomes chaotic and foggy with underwater white-noise, negatively impacting a whale's ability to interpret the surrounding environment and perform basic survival activities such as finding food, attracting mates, and communicating with other pod members. As an analogy, imagine your neighbors blasting death metal 24 hours a day while you try to eat dinner, talk to your children or have a relaxing evening on the couch with your significant other, all while blindfolded.

Of chief concern to researchers are low frequency sound waves that travel furthest underwater. Boat propellers, oil rig drills, large diesel engines, etc., create a particularly cacophonous environment for right whales, whose calls are typically softer and easily disrupted by conflicting sound waves, effectively driving them away from fertile feeding and mating grounds. For instance, in Cape Cod, where right whales return perennially, man-made noise has reduced acoustic habitat by as much as 80 percent, said Clark. For a species with a population of only a few hundred, that kind of impact could be the final straw.

Currently, in an effort to document habitat loss and help revive their numbers, Clark and his colleagues are monitoring right whales in several locations via high-tech sound recording devices on the ocean floor. Hopefully, in the future, this data can be used to help legislators make informed decisions on such things as shipping lanes, marine technology development, cruise ship activities and oil rig placement.

To learn more about Scripps Whale Acoustic Lab visit their website at: Cetus.ucsd.edu. To find information on Cornell's Bio-Acoustic Program go to: Birds.cornell.edu/brp/research/animal-communication-research.

If ocean noise continues to increase as a result of human activities, whales may soon have nowhere to go.

The approach is important for conservation because it will help researchers in efforts to document habitat loss, which has legal ramifications under the Endangered Species Act. For instance, such findings will play into decisions about the location, timing and technology of marine development—including cruise and cargo ship traffic, oil and gas rigs and offshore wind farms (which create high levels of noise during construction and moderate levels when operational). ■

SOURCE: SCIENTIFICAMERICAN.COM

Whale strikes prompting U.S. Coast Guard to study shipping lanes

The Farallon National Marine Sanctuary surrounding the entrance to San Francisco Bay, California, USA, is a 1,250 square mile cetacean haven protecting grey, blue, humpback and right whales that migrate through the rich feeding grounds in the spring and summer months. This same area is home to some of the busiest shipping traffic in the western United States and, unfortunately, the whales—as usual—are caught in the perpetual human battle between safeguarding the environment and maximizing profits.

In recognition of the potential environmental fiascos of massive ocean-polluting container ships, California recently mandated that all shipping companies use lower-sulfur fuels when within 24 miles of its coastline. However, this measure, while potentially solving one problem seems to be exacerbating another.

Due to the higher cost of cleaner-burning fuels, ships are trying to reach the 24-mile line as swiftly as possible when leaving port, so they can switch to main engines that run on far dirtier, cheaper fuels. Fast moving ships crisscrossing the feeding grounds of slow moving whales is, obviously, a recipe for disaster.

So far this year, at least six whales have been struck. One incident involved an endangered blue whale and its fetus, while another found a whale impaled on the bow of a ship that wasn't noticed until the vessel reached port.

Appropriately, the U.S. Coast Guard has begun a "Port Access Route Study" in an effort to minimize the increasing number of whale deaths by large commercial vessels. Meetings to discuss the matter and present possible solutions have been open to public and non-profit organizations.

One oceanic conservation group, Pacific Environment, suggested requiring ships to travel through the Farallons at a slower pace (15 miles an hour) instead of allowing them to travel at higher speeds (around 30 miles per hour) as they do now. While this is would be easy enough to implement any regulation purposed risks being met with heavy opposition from at least some shipping companies as delivery schedules are tightly controlled and lost time, as with any business, usually equals lost money.

"They all have a very complicated logistics chain, so it's planned very carefully and disruptions of it are problematic," said U.S. Coast Guard Capt. Patrick Maguire. ■

SOURCE: ABCLOCAL.GO.COM

Farallon Islands off California, USA

NOAA

Aspects of Photography

Preparation

Text and photos
by Lawson Wood
www.lawsonwood.com

Now that we have our camera system together and are ready to dive, we also have to be conscious of various things: the location; visibility; is it a close-focus type of critter dive or is it a wide-angle beautiful scenery dive; depth parameters; other similarly clad and outfitted photographers also wanting the same final result; time of day, etc. So, let's look at the positive aspects of underwater photography and a few of the techniques that will help you in your quest in taking easy steps into digital photography.

Be prepared

Get yourself and your equipment together. If you are visiting a new site for the first time, then listen to the dive guides; they know where to get the best results with minimal effort. (Be sure to show your appreciation!) Be sure that your dive buddy also knows where you are going and what you are planning.

Subject: Lesley, Candidasa, Bali, Indonesia. 10mm lens, ISO 100, twin Sea & Sea YS110 flash, 1/100th second at F8

Subject: Snowy, Jackson Reef, northern Red Sea; 10mm lens, ISO 100, twin Sea & Sea YS110 flash, 1/125th second at F8

Preparation

Good buoyancy technique is essential for successful underwater photography. The photographer must be able to approach the subject matter with ease, lack of effort and be totally neutral in buoyancy.

Position of the sun

As you enter the water check the position of the sun, since this can have either a serious detrimental effect on your photography, as it can totally 'blow out' the exposure, or be superbly beneficial in that it can provide a backdrop for a silhouette type of photograph where the subject colour is lost against the lighter background. Sunbursts always look excellent in well-composed photographs, but sadly, digital photography does not have the latitude that film used to have, and it is very difficult to get right.

Careful note of the sun's position as you enter the water may benefit a photograph, whilst the luminosity of the sun obviously blow's out the centre top of the photograph; there is sufficient 'fill-in' flash to illuminate the subject matter of the diver shining a light on the corals, thus negating some of the negative effects of the sun burst. 'Blowing out' of digital photographs is a very real problem and certainly this was never a problem when using film. Steps can be taken through Photoshop and careful camera aiming to minimize the effects of such a strong sunburst, but sometimes the effect is still very effective, no matter how strong the sunburst is.

Technique

Try and stick to only one photographic technique at a time. Do not be disheartened; learn your skill in progressive applications that ultimately push you and your equipment choice to its limit. Perhaps it should be advised here to attend an underwater photography workshop prior to embarking on specific types of photography. Find your aptitude, then exploit it.

Additional light

Lack of colour has always been the problem of underwater photography, and quite often the subject matter itself may be rather drab and colourless. It is better to treat every dive as a potential night dive and take a torch, either strapped onto your flash as a 'pointer' or on a separate arm attached to your underwater camera or housing. This artificial light will allow you to find the critters or fish that have brilliant coloration before you take the photograph. Remember that you lose the colour red in depths under two metres.

Buoyancy

Taking on the mighty challenge of underwater photography should really only be considered after you have had many dives (in all types of conditions) as you have to have sufficient diving skill to be able to undertake this as second nature. What comes with this skill is an appreciation for the medium and how the effects of pressure also affect the buoyancy of your equipment. For the most part, you will have more fun, use less air and be able to 'fly' around your subject if you are neutrally buoyant. Occasionally, I overweight myself if I am working close to the seabed and need to remain anchored in position.

Subject: Lee Evans, Turtle Reef, Grand Cayman Island. 10mm lens, ISO 100, Twin Sea & Sea YS110 flash, 1/125th second at F11

Getting down on the same level as your subject, or even slightly below it gives a much better perspective for viewing the subject.

Pygama nudibranch, Marsa Alam, Red Sea 105mm lens, ISO 100, Sea & Sea YS180 flash, 1/125th second at F16 (below)

Subject: Victoria Kaiser Belport, Wreck—Cayman Mariner, Cayman Brac, Cayman Islands. 20mm lens, ISO 200, Sea & Sea YS180 flash, 1/80th second at F8 (righ)

Buddy challenge or a great model

If you are planning on wide-angle photography and are diving with a buddy—who may be your partner, a fellow photographer, a professional model or just someone who has been assigned to dive with you on an otherwise crowded dive boat—get a plan of action worked out. With a fellow photographer you can each take turns being the model. My wife Lesley now knows instinctively that when I am shooting in this format, she will rise slowly above me to gain a further perspective to the photograph, or will even stay out of my way if I look like I am planning another strategy. This knowledge is vital to me, as a photographer. Dive guides also make great models, as they generally stay back and out of the way of photographers. By encouraging them in closer, you can get some excellent atmospheric photographs, which ultimately set the scene. Dive buddies will also benefit from attending an underwater photography workshop, since modeling, composition and buoyancy are all important factors for their inclusion in a photograph.

At right, dive guide Victoria Belport approaches the bow of a small shipwreck, which is covered with colourful sponges. Note that I gave her a rather old-fashioned mask, which allows greater light to illuminate her face. The position of her arms reflects those of her equipment hoses, and there is a mix of both ambient light and electronic flash.

People invariably set the scene, perspective and scale of the photograph, as this is the only way that we can have any indication of the true size of the subject. For those uninitiated in the variety and size of underwater creatures, some viewers of your photographs may not understand that many of the most colourful of the animals are indeed minute, but that there is also magnificent colour to be found at all depths of the sea. However, as photographers, we have the task of illuminating this artful and difficult subject matter.

Rainbow parrotfish (*Scarus guacamaia*), Theo's Wreck, Grand Bahama Island. 15mm lens, ISO 50, Sea & Sea YS200 flash, 1/80th second at F11

Expect the unexpected

No matter how much pre-planning you do before the dive, you can never anticipate what you will actually come across whilst underwater; the sun may suddenly pass behind a huge cloud bank, almost turning the day into night; the current may be much stronger than realised; and ultimately you must be conscious enough and confident enough to quickly switch tactics and just go with the flow!

This pair of rainbow parrotfish (left) were a sheer fluke! I was researching a Scuba Diving Guide to the Bahamas and as part of the trip, my wife Lesley and I were staying on Grand Bahama Island. We were invited to accompany the staff on a 'Staff Night Dive'. This was to Theo's Wreck, which was considered too deep for tourist divers at night. We had just descended down the shotline to around 21m (70ft) when right before our eyes, this huge 1.5m (5ft) male Rainbow Parrotfish swam in and settled on the deck of the wreck. Seconds later, a second (not quite so large) rainbow parrotfish swam in and settled directly next to the larger one. Thankfully, I was carrying both close-up and wide-angle cameras that night and quickly adapted to this new surprise subject.

Get in close

Most of the underwater photographs that we admire and would wish to emulate are generally taken in clear, clean water. However, we may live in a part of the world that does not have that luxury, or have chosen to visit a dive location noted for its poor underwater visibility but famous for its exotic macro marine life (such as the Lembeh Straits in northern Sulawesi, Indonesia). Because it has such poor visibility, the Lembeh Straits also lack a lot of light. So, to get those clear water photographs you have to get in close; whether it is with a macro lens or very wide-angle lens, both of which allow us to get closer to the subject matter and remove the water element out of the picture taking sequence. This also leads to additional problems with flash position resulting in

Astacilla longicornis on Thiauaria (right) 60mm lens, ISO 100, Sea & Sea YS200flash, 1/60h second at F16

Neoturris pileata, St.Abbs, Scotland (below) 60mm lens, ISO 100, Sea & Sea YS180 flash, 1/125th second at F16

Caribbean Reef Shark (*Carcharhinus perezi*) Grand Bahama Island. 60mm lens, ISO 100, Sea & Sea YS180 flash, 1/125th second at F16 (far right)

Preparation

unwanted back-scatter, but trial and error, perseverance and the ability to edit as you dive soon helps you overcome this situation.

Subject position

Try not to take photographs of any subject below you, as this location just absorbs whatever available light there is. Always try and shoot horizontally, or slightly upwards. We have already mentioned how a strong sun can blow out the photograph, so be careful of how vertical you take aim. Try and find subjects with an uncluttered background. If possible, also try and get the proper context for the subject matter, which may include its habitat, food species, predators or particular behaviour, which could be unique in the animal kingdom. Wrecks should be explored to their full potential and never stall in photographing the subject, or the moment may vanish almost as quickly as the subject.

Baseline

Establishing a baseline for your subject can be quite important, as many good photographs may lack a bit of interest due to the fact that the subject matter may appear suspended on a rather uninteresting background. By showing a baseline, or the bottom starting line of a subject, then you can clearly see what it is you are trying to achieve.

Camouflage

Remember that many of the more sedentary species of marine life may well see you before you see them, due to their excellent camouflage. Camouflage is used in two ways, either as a subtle way to disappear, and so not be seen by any predator, or it is used as a ruse, simply to lure prey within their grasp, or in line with their cavernous mouths. Remember that most fish that do not swim away from you have different forms of defense, such as poisonous spines.

At the direct opposite of that spectrum are the brilliantly coloured creatures that advertise that they are poisonous and are warning would-be predators not to eat them. Either way, these colour forms are much easier to see when you use torchlight as a primary illumination.

Leaf Scorpeonfish (*Taenianotus triacanthus*), Bali, Indonesia. 105mm lens, ISO 100, Sea & Sea YS180 flash, 1/125th second at F16

Danger

As mentioned above, there is always inherent danger when photographing wildlife; not least of all when you are underwater. Those fish that swim away from you when you enter their personal space have little or no dangerous elements to worry about. Those that sit still and ignore you, invariably not only

Green Moray Eel (*Gymnothorax funebris*), Cozumel. Mexico. 60mm lens, ISO 100, Sea & Sea YS200 flash, 1/125th second at F11

use camouflage, they quite literally often have a 'sting in their tail'. Lionfish have poisonous tips to their fins, as do scorpeonfish. A number of snails have lethal spines especially in the cone shell genus and let us not forget jellyfish—in all of their wondrous complexity. Most species, including even those microscopic species that you do not see, pack lethal and often fatal punches. Jellyfish are also related to corals and quite a few species of coral also have nasty surprises in store for unwary divers with bad buoyancy technique. Check out Fire Coral (*Millepora alcicornis*), rather, do NOT check this species out—as the name implies, the sting is akin to a nasty burn, which can easily blister and turn septic.

Microscopic jellyfish are a cousin of the true corals and anemones and like all of them they often pack a powerful sting in the form of a barbed harpoon fired by a strong spring!

I will not demean myself to include sharks in this category, as this is such a maligned creature. The general rules in underwater photography for sharks are this: If it gets too close sit still and tuck your arms in. If it is worth pursuing, then swim after it.

Moray eels are another matter, as their eyesight is terrible. Do not feed the fishes! I have been witness to some terrible accidents (not attacks) when a person feeding a moray eel has had anatomical parts removed because they were just not paying enough attention to this wild creature. However, moray eels are rather timid and sensitive fish and enjoy resting in caverns during the day and only coming out to feed at night. During the day, they are often cleaned of parasites by small shrimps and other fish; this is when they make for great subject matter, as these interesting bahavioural aspects tend to outweigh the incipient bad eyesight of the eel. So, PLEASE TAKE CARE.

Unfortunately, most of what can harm us is microscopic, so when diving in tropical waters (or indeed anywhere underwater) always wear a protective suit that will cover most of the body, only leaving the hands and face free.

Lawson was raised in the Scottish east coast fishing town of Eyemouth and spent his youth exploring the rock pools and shallow seas before learning to scuba dive at the tender age of 11. Now over 44 years later, Lawson has been fortunate to make his passion his career and has authored and co-authored over 45 books mainly on our underwater world. Lawson is a founding member of the Marine Conservation Society; founder of the first Marine Reserve at St. Abbs in Scotland; and made photographic history by becoming the first person to be a Fellow of the Royal Photographic Society and Fellow of the British Institute of Professional Photographers solely for underwater photography. ■

Aquatica Sony NEX-5 Housing

Aquatica has announced the AN-5 Housing for the Sony NEX-5 camera. Photographers looking for a portable and lightweight housing, the AN-5 comes in at 6.5” x 5.5” x 3.3” and weighs in at 2.2lbs. With the recent upgrade of the camera firmware, Sony has enhanced the NEX-5 for underwater imaging, with access to a larger selection of Sony lenses, improved focusing in both still and video, improvement in the aperture priority mode, while video recording and manual focusing has been addressed with an upgraded method.

Special care has been taken to locate every control at the best possible position, with the basic layout of the camera having been reproduced externally to retain the visual comfort of not having to search for a relocated controls. Despite the housing’s compact size, Aquatica has built in a quick access lever to bring the internal flash up and down allowing for quickly alternating between strobe illuminated and ambient light. In addition, a pair of built-in dual optical strobe connectors are provided, assuring a sure fire exposure every time and unlikely to become loose, lost or forgotten like an external adapter.

An innovative approach was taken to secure and release the ports and lenses, all based on a multi-function mechanism. Rotate clockwise to position 1 to release the port, continue rotating to the end for disengaging the gear rack mechanism, and allow the user to easily pull out the tray-mounted camera and lens with the Focus/Zoom gear attached to it, or simply push on the lever to remove the lens without having to remove the camera. To accommodate the Sony Nex-5 lenses, a series of compact ports were designed as well as an adapter that will allow the mounting of Aquatica’s current line of ports. **www.aquatica.ca**

Easyflash iTTL & eTTL compatible strobe

TTL strobe compatibility was a given in the “good old film days”, but in the first few years of digital underwater photography TTL was hard to come by, as the big two manufacturers Nikon and Canon worked to refine their technologies for the digital age. Underwater strobe manufacturers are still catching-up with those refinements. So, is the Easyflash a game changer? Easydive claims that their Easyflash underwater strobe is the first Nikon or Canon compatible flash that works perfectly in both iTTL and eTTL mode. The flash is housed inside an anodized aluminum body with double o-rings. Four Sanyo rechargeable batteries 2.4V NiMh allow at least 200 shots at maximum power, and on the outside, there is a mechanical rotation control (to use only in the iTTL mode), the cap to charge the batteries, a red LED to indicate the flash is ready and a Nikonos cable connector.
www.easydive.eu

UWTripod

Anyone who shoots seriously underwater knows that mastery of buoyancy is critical to great images, but deep down we’ve all thought we might be more effective, occasionally, if we resorted to using a tripod similar to shooting on dry land. Leave it to the innovators at Ultralight Control Systems to invent what we’ve all secretly wanted! With lockable and tilt, extendable legs from 11-18”, non-slip sharp ends for use on rock, and snap on balls for use in sand and muck, this new tripod fulfills the wish that underwater photographers have long dreamed of. The one hand operation and grip similar to other Ultralight products round out this new offering. **www.ulcs.com**

Canon PowerShot A490

Fantasea Line’s FA490/495 Housing, is depth rated to 60 meters/200 feet, is fully functional and provides photographers with access to all camera controls and functions. There are double o-ring seals on all controls, an anti-glare hood over the LCD screen, a removable flash diffuser and a 46mm threaded lens port, designed to be compatible with a wide range of lens accessories. **www.fantasea.com**

Medium Format

Nauticam has taken a bold step into the medium format digital camera space and announced their NA-645DF housing for the high end PhaseOne and Mamiya 645DF cameras with Phase One P+ Digital Backs.

The Phase One 645DF is an open platform medium format SLR camera body with professional grade build quality, which uses Mamiya AFD lenses, while the Phase One P 65+ full frame 645 back feautures a 60.5 mega pixel sensor with12.5 f-stops of dynamic range that produces an astounding level of detail.

The Nauticam NA-645DF Housing is designed with the photographer's in-water experience in mind. Careful design attention results in intuitive, convenient access to key controls (shutter release, f-stop, shutter speed, AE-L and four digital back push buttons) from the housing handles.

Nauticam NA-645DF

Hyperdrive for iPad

Cameratown's Ron Risman has just published his exclusive review of the new Sanho HyperDrive iPad portable hard drive. Ron Risman writes: "Ever since Epson launched their first portable multimedia storage viewer/hard drive about six years ago, I have always wanted to own one. Unfortunately, I could never justify the high price premium, considering their relatively small hard drives and slow transfer performance. Two weeks ago that all changed with the introduction of the new HyperDrive iPad Hard Drive, and in this review, I'll not only explain why I chose this model but will also detail my experiences, both good and bad, with this new product." The HyperDrive iPad not only allows photographers and videographers the ability to backup their media out in the field, it also provides them a way to preview these files on their iPad.

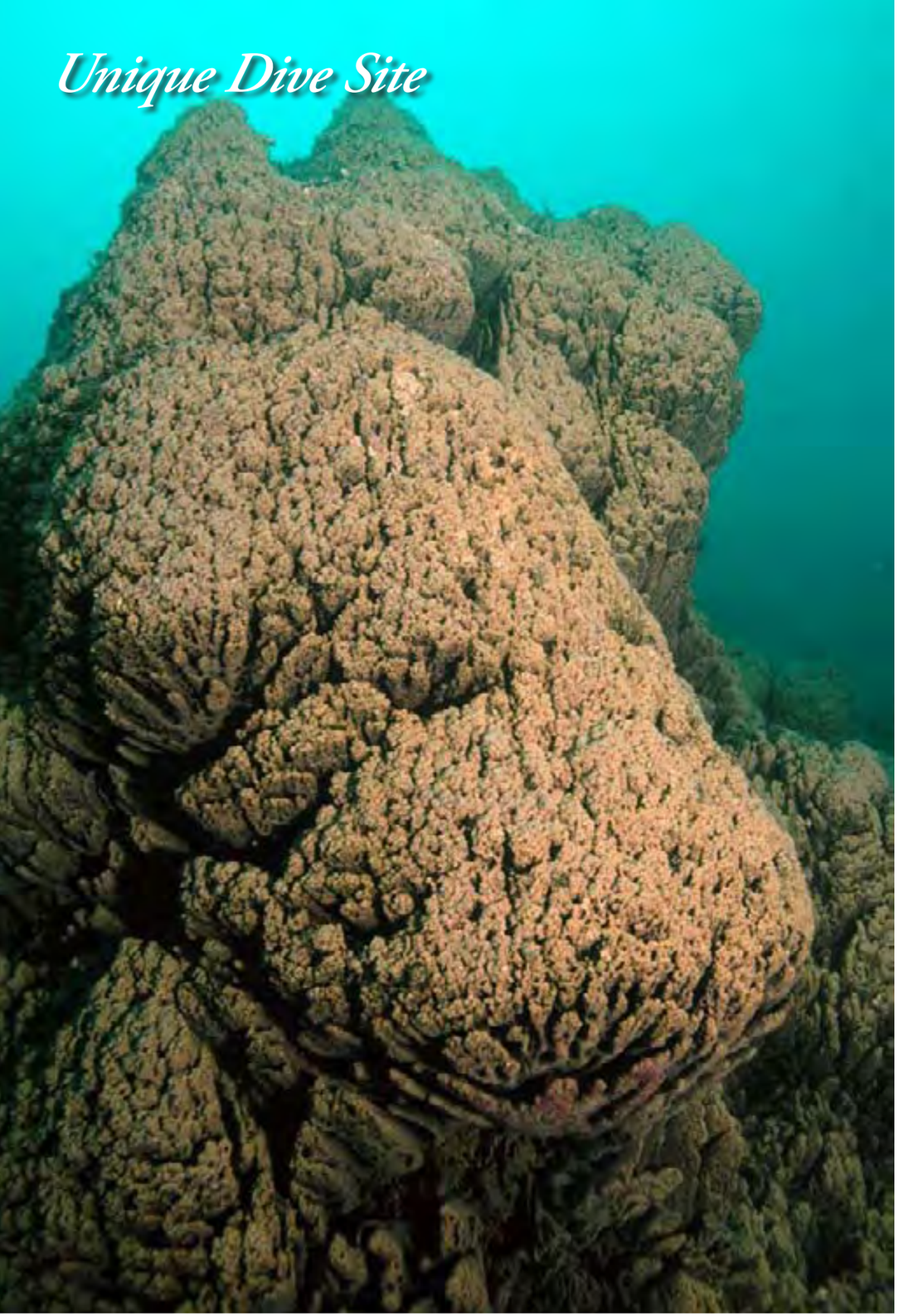
Leo Multi DSLR Housing

Italian manufacturer Easydive have released a new housing that can accommodate a variety of of camera bodies, rather than the traditional approach of dedicated housings that becomes obsolete as the camera is superceded by the latest model. The Easydive Leo housing takes a "one size fits all" approach, thanks to a USB Control Panel, which provides remote access to all major controls and avoids the need to build custom mechanical buttons.

www.easydive.eu

OnOne Perfect Photo version 5.5. The suite's premier product Genuine Fractals has been upgraded and also renamed to Perfect Resize 7, which operates as a stand-alone program or as a plug-in for Adobe PhotoShop and LightRoom. More control is now available for resizing photos up to 800 percent. New presets and batch processing allow for speedier workflows while resizing photos. A brand new plug-in "Perfect Layers" allows Aperture and LightRoom users to combine two or more photographs into a single file, and allows the usage of blending controls, scaling, rotating and opacity of layers.

www.ononesoftware.com



Microbialites at 60 feet in Pavillion Lake (above); View from the shore of the lake (right)

Innerspace research at

Pavillion Lake

British Columbia, Canada

Text and photos by Barb Roy

I first learned about this unusual lake, nestled in Marble Canyon Provincial Park of British Columbia (BC), Canada, when some friends living in Kamloops asked me to join them for a dive at a local, clear freshwater lake. Since it was only a few hours from Vancouver, I decided to take them up on their offer and headed for the interior parts of BC.

I have always wanted to explore this area and was thrilled even more when they told me of the strange coral-type of life living in the lake. Intrigued, I invited a few more friends to join the excursion: my husband and dive buddy, Wayne Grant and Ron Akeson, a marine biologist from Bellingham, Washington, USA. Wayne would record the data, I would document with underwater stills and Ron would video the dive with his HD video camera.

We arrived at a part of the lake used by local divers and assembled our gear. The lake is 4 miles (5.7 kilometers) long and 0.5 miles (0.8 kilometers) wide at an approximate altitude of 2,690 feet (820 meters), with a maximum-recorded depth of 65 meters. Travis Van-mole, who I originally met through Ron, was our host and would also be our under-

Unique Dive

water guide.

"We dive here all the time," said Travis while assembling dive gear. "The ice diving is great here, as well as several other lakes in the area. We have a lake with caves and even know of several more that have the cold-water corals."

According to Ron, the 'cold-water corals' are actually called microbialites, a bacterial type of life that builds a hard carbonate shell or casing. These formations are believed to have begun forming over 10,000 years ago after the retreat of the Cordilleran Ice Sheet.

"There is also a research group of scientists and astronauts from both NASA and the Canadian Space Agency studying the microbialites at the other end of the lake." Travis added.

The water was cool and very clear with a fine silt mixture of substrate. Visibility underwater was an impressive 80 feet (24 meters) and the water temperature was in the low 40's F (4.4°C). Not many fish were found, but plenty of vegetation grew abundant in the shallow depths.

Gear on the shore of Pavillion Lake (left)

Strange shapes

Travis led us down to 60 feet (18 meters) where we saw the first signs of microbialites. These mounds were tall and cone-like in shape, resembling huge termite mounds found on land. They varied from 5-9 feet (1.5-2.7m) in height and 3-4 feet in width at the base, tapering off into peaks at the top, using the rocky slope to build upon. It looked as if the structures were crafted from mud. No visible life was noticed, which none would be expected if made from a bacterial compound.

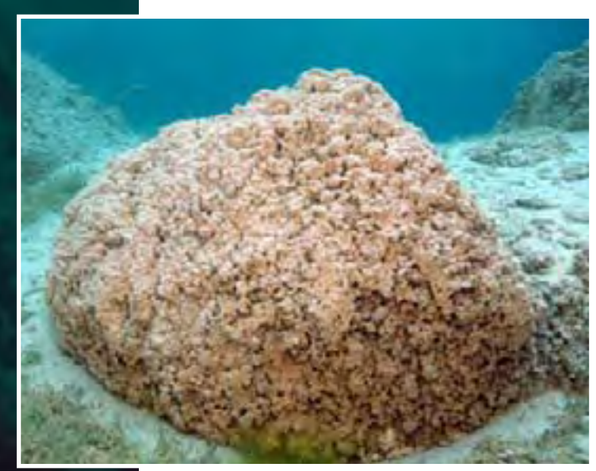
CLOCKWISE FROM ABOVE: Divers exiting the water after a dive in the lake; Diver Wayne Grant checks out the microbialites; Park information sign provides information on the unique microbialite formations under the surface

Unique Dive

CLOCKWISE FROM FAR LEFT: Diver Ron Akeson films at 70 feet underwater in Pavillion Lake; Close-up look at microbialites covering a can; Location of Pavillion Lake on map of North America; Microbialite formations at 70 feet depth; Shallow rock covered with microbialites

Travis took us to 80 feet (24 meters) where we found an open area full of more microbialites structures, but much smaller, only a few feet in height. In another section there was another batch of different shaped structures of similar size and appearance.

Our dive took us around a small island near the entry area, and throughout the dive, the microbialites formations were found in patches, where the formations were all very close in appearance. On the second dive I used a 50mm macro lens on the camera for a closer look at the microbialites.



This proved to be quite interesting, especially when we later studied the video and examined my images on a big screen monitor. The subjects were an aqua green and pink in color and seemed to be very much alive and thriving in Pavilion Lake. In fact, small mud-like formations were growing on logs, boulders and covering fallen trees underwater.

Diver Wayne Grant hovers over a formation of microbialites (left); Cone-shaped microbialites in Pavillion Lake (right)

Second time around

During a later trip in the Spring of 2010 when the three of us took this magazine's editor, Peter Symes, up for a dive in Pavilion Lake, I looked around at the steep rocky cliffs surrounding the lake. Remembering Ron had mentioned a receding glacier, the tall rocky structures on the hillside began to make sense, and it was easy to correlate how they resembled the tall underwater structures.

Peter was equally as fascinated with the microbialite formations as we were. During the dive when we were at the tall structures, one of the mounds had toppled at the top portion, revealing a honeycomb interior.

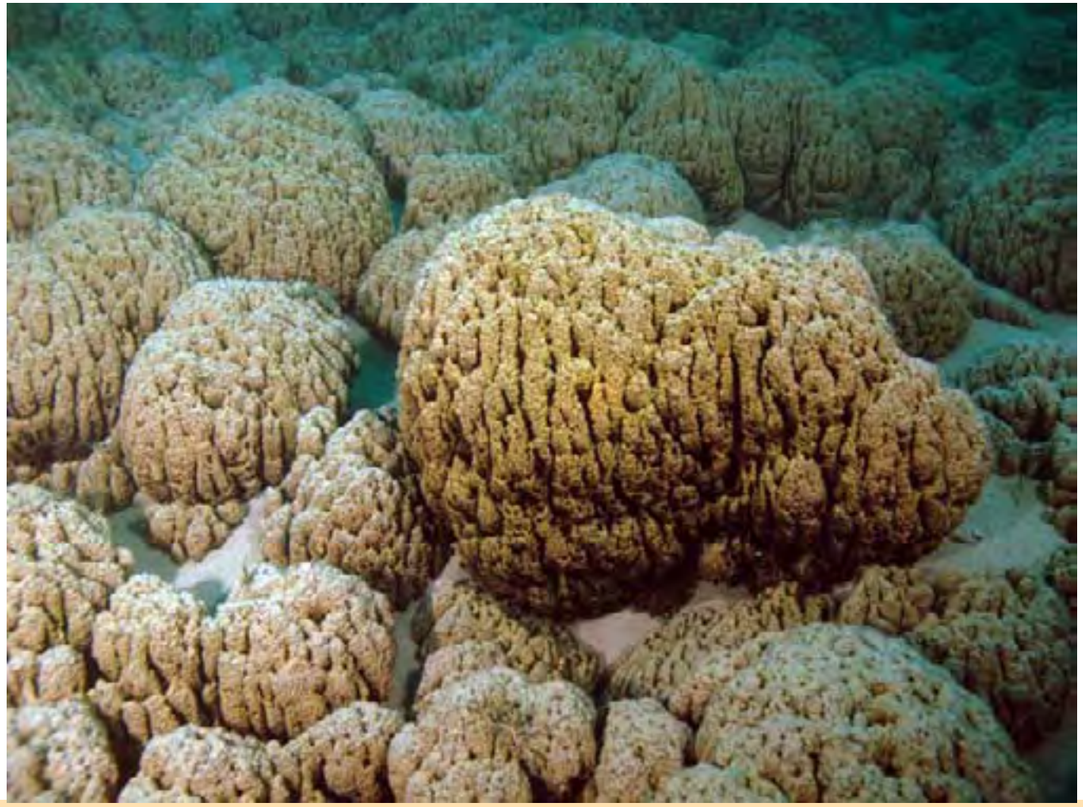
Third time's the charm

During another return trip later in the summer, Ron Akeson and I visited the Pavilion Lake Research Project headquarters where scientists and various experts are trying to learn more about the microbialites and what makes this lake such an unusual environment to host the microbialites in.

According to Dr Allyson Brady, principal investigator for the research project specializing in isotope geochemistry, the microbialites are believed to be formed from biological activity representing some of the earliest remnants of life on Earth—2.5 billion to 540 million years ago.

Experts in photosynthesis, robotics, environmental fluid mechanics, planetary science, geology and a myriad of other fields of study have gathered from around the world to work together to collect data and utilize their joint resources.

One of the things the Pavilion Lake Research team is looking for is bio-signatures that will help explain what ancient microbialites were like and compare them to modern day bio-signatures. Scientists and astrobiologists can then



Rounded microbialites

apply the context information to their studies of the solar system and learn more about the geologic record of the area.

"At Pavilion Lake we are working in an actual hostile environment," said Brady. "Since we are underwater, we're faced with similar challenges as space scientists would be, such as limited communications, being on life support and having things break down. By experiencing these problems firsthand in a field setting, it gives scientists an idea of what might happen during space exploration and solutions to possible problems," she said.

Donnie Reid, a fellow diver and underwater photographer, is the project's logistics and operations manager.

"By 2050, humans are expected to be on Mars. To get there, however, it will take nine months and nine months to return. Because Mars and Earth share a similar geological history, Mars may also have microbialites.

"To work in this semi-controlled environment has given us the opportunity to estimate what we might find or experience and how to deal with it," said Reid.

We were also able to meet and talk with Chris Hadfield, an astronaut for the Canadian Space Agency and scheduled to command the Space Station in 2012.

Hadfield was prepping for a sub run with Bernard Laval, a physical limnologist from the University of British Columbia. These analog missions range in duration from 1-2 hours long, depending on the series of test or samples required.

The submersibles used by the team are from Nuytco Research in North Vancouver, called "Deep Worker". These one-pilot subs provide eight hours of power and eight hours of life support.

AUV's (Autonomous Underwater Vehicles) and ROV's (Remotely Operated Vehicles) are also used as satellite-analogues. They are able to take measurements, provide sonar

CLOCKWISE FROM FAR LEFT: Scenic drive to Pavillion Lake; Canadian astronaut Chris Hadfield in Nuytco sub; Pavillion Lake Project launches sub; Overview of the Project's site; Sub pilots prepare to dive

data, photograph large areas and are used for remote sensing and monitoring.

Currently, the research team is looking into other lakes in the area for 2011. For more information on microbialites and the Pavilion Lake Research Project, check out their website at: www.PavilionLake.com.

Visiting BC

Any trip to British Columbia's interior or coastal destination will provide visitors an unforgettable adventure any time of the year. The people are friendly, and humor abounds. The underwater life, no mater where you go, can be as interesting as the breathtaking scenery above water. When planning a trip to BC, you might want to look into the following websites for more information:

- **www.HelloBC.com**
- **www.DiveIndustryBC.com**
- **www.BCFerries.com** ■

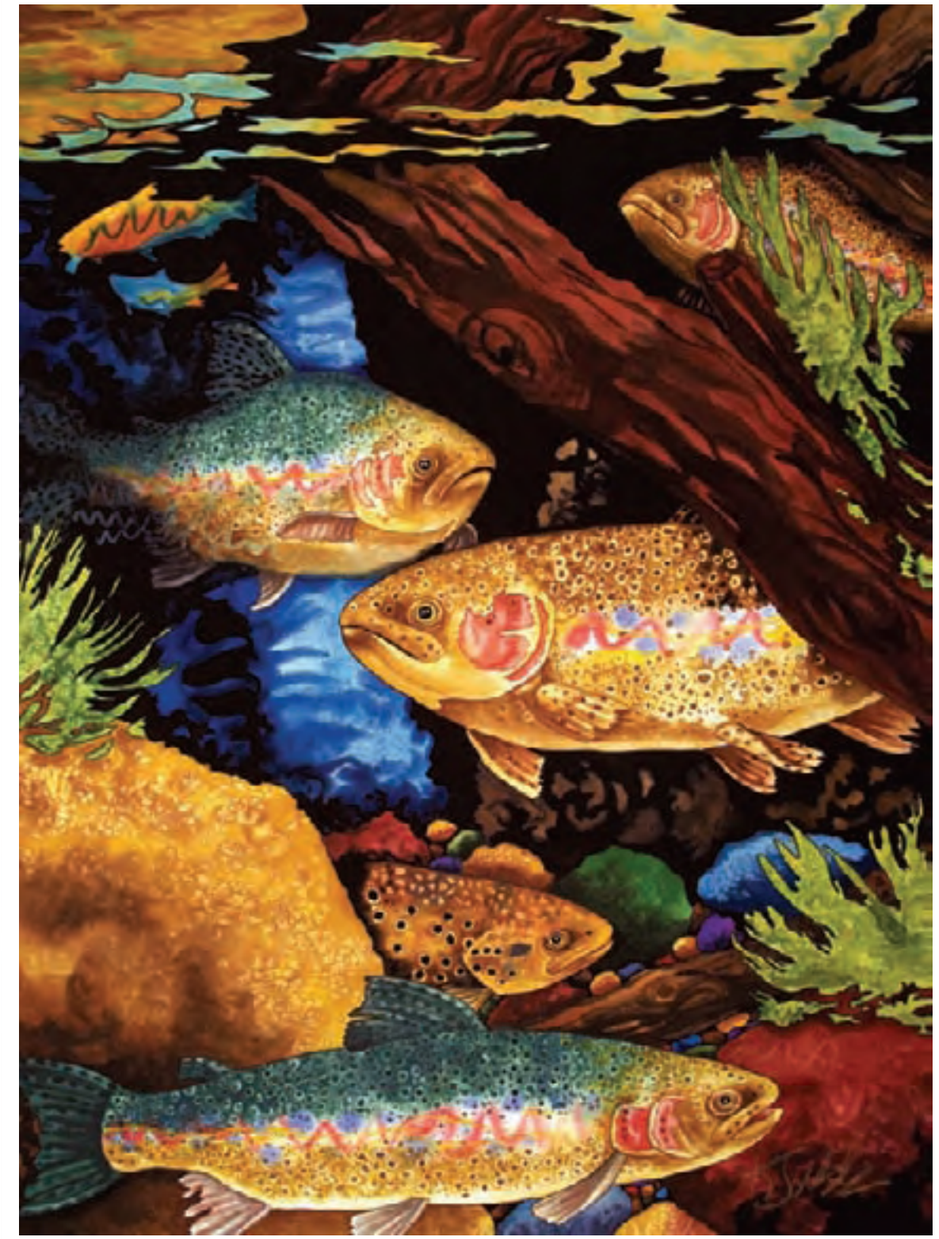
CLOCKWISE FROM ABOVE: Pavillion Lake view; Wildflowers abound around Pavillion Lake; A mountain goat grazes beside the road; A marmot takes refuge among the rocks on the lake shore; View driving towards the coast of British Columbia; Family of ducks on the lake

Kendahl Jan Jubb

P O R T F O L I O

portfolio

Jubb



My artistic motivation has always been the same: to reflect the animal and the natural, to create with patterns and color, revelry in the diversity of form. I wish to elaborate and express the secret depth behind the mundane while I celebrate the garden, forest, river, ocean and desert. I use the natural world to portray human archetypes because of its innocence of expression. The still life is not just a bowl of flowers but expands and contracts with expectations and explosions. All life forms are caught in the same cycles of expansion and contraction, vitality and mortality, revulsion and beautification. The interactive contrast of pattern and content is what fuels my creative fire. — Kendahl Jan Jubb

Edited by Gunild Symes, with Ram Murphy
All images by Kendahl Jan Jubb

American watercolorist, Kendahl Jan Jubb, creates brilliant, colorful works of underwater life. Originally from southern California, she was raised in the Mid-West and studied at an early age with noted St. Louis impressionist, Victor Harles. After a move to Montana in 1978 to study forestry, she changed her focus to art in her first year at the University of Montana.

CLOCKWISE FROM TOP LEFT: *Brilliant Trout; Trout Pool; Rock Creek;* and on PREVIOUS PAGE: *Nine Koi Pool—all* watercolor paintings by Kendahl Jan Jubb

Jubb

LEFT TO RIGHT:
Rattlesnake Trout
Pacific Aquarium I
Pacific Aquarium II
—watercolor paintings by Kendahl Jan Jubb

Since her first successful one-person show at the University in 1980, Jubb's work work has appeared in over 30 galleries across the United States, as well as Mexico and the Virgin Islands, with commissions from corporations such as the Bonneville Power Administration, The Peabody Hotel, The Four Seasons Hotel in Singapore and the Holland America Line. *X-RAY MAG's* Gunild Symes interviewed the artist to find out the inspiration behind her passion.

GS: Tell us about yourself, why you started painting the subject matter and medium you have choosen, and what inspired you to become an artist.

KJJ: I always loved nature as a child. My brothers and I roamed the hills behind Los Angeles and then the woods in our St. Louis neighborhood. I moved to Montana to major in Forestry and discovered Art soon thereafter. I had a wonderful teacher, Mary Warner, who nurtured my love of watercolor. When I sold several paintings out of my first show, I decided to commit to being a lifelong professional.

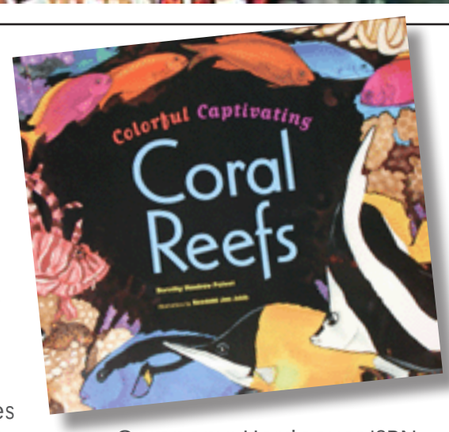
GS: What was your training and education like as an artist and how did you develope your personal style? Do you have any role models, artistic, cultural or political influences?

KJJ: I had an impressionistic art teacher as a child of 12, Victor Harles, whose color palette I still use. After leaving the University, after two years to travel, I worked on my own. I was and am inspired by animals and nature. I love to play with the sensuality of color and contrasting pattern.

GS: Can you describe for us your artistic method... what is your process,

CLOCKWISE FROM BELOW: *Marine Aquarium I* watercolor painting by Kendahl Jan Jubb; Paintings from the children's book, *Colorful, Captivating Coral Reefs* illustrated by the artist

Colorful, Captivating Coral Reefs is a beautifully illustrated educational marine ecology book for children ages 6-10 written by Dorothy Hinshaw Patent and illustrated by Kendahl Jan Jubb (cover pictured right). It's chock full of fun and interesting facts about the sea, the reefs and the ocean's critters, providing descriptions, animal behaviors and both common and scientific names. The book even touches upon conservation issues around the world as well as how scuba divers can help protect the reefs. Published by Walker & Company; Hardcover ISBN 0802788629. Available at: **www.amazon.com**



how do you choose a subject, compose a painting, etc.?

KJJ: Although now I have a backlog of subjects waiting to be painted, I put up a blank sheet of paper and stare at it until the image "projects" itself on the paper. My subjects come from my travels, my garden and the Montana environment. I first choose images (from my husband's photography—we take all the photos I use ourselves) then lightly and generally draw everything out in a line drawing, then paint. Most of my subjects represent human archetypes and emotions.

GS: Are you a scuba diver? Tell us about your experience under the waves... where are your favorite spots and what most inspires you about the underwater world, the oceans and waterways?

KJJ: I have not scuba dived yet, but I love to snorkel, all of which I have done in Hawaii. Most recently off the Big Island. I'm not much of a fisherman either, but I love to watch trout. We have many creeks that are favorites and sometimes feed them grasshoppers to watch their behavior. I have

The artist, Kendahl Jan Jubb

always intended to snorkel at night with a flashlight.

GS: What are your thoughts on art and marine conservation? How do you see them influencing one another, you and your audience?

KJJ: I feel like we all have the respon-sibility to do what we can to leave the world in a better position than when we entered it and do support a local conservation organization that that buys land, especially in riparian zones, trying to preserve open lands. I've designed a license plate (for cars) for a land conservation organization that raises funds for them. I also feel that the more people can experience the magic and beauty of our environment, the more we'll all try to preserve it.

GS: Why art? Why is art important?

KJJ: It's a mystery that feeds the soul. I feel that I share, in the form of self expression, the beauty, delight, sensual enjoyment and even fear of

CLOCKWISE FROM TOP LEFT: *Bitterroot Honey Hole; Betterroot River Riprap;* and *Magnificent Seven Trout*—watercolor paintings by Kendahl Jan Jubb

CLOCKWISE FROM ABOVE: *Koi Pool; Island Koi;* and *Koi Tank*—watercolor paintings by Kendahl Jan Jubb

our natural world. The beautiful fish living in a reef full of dark crevices and then the dark deep mystery of the ocean beyond.

GS: When you teach workshops, what is your focus or mission or point of view you like to share with students?

KJJ: My focus in my workshops is the use of vivid color with watercolor. I have four basic techniques I use over and over, which I teach. I also support the feeling of joy, which comes from the creative process, so my workshops are non-judgmental, focusing on having fun and learning a few skills along the way.

I have a wide range of natural subject matter but ALSO love to do commissions. They put me in direct contact with my collectors.

For more information and images, *visit:* ***www.kendahljanjubb.com*** ■