

*Scuba & Spa on Tioman*

*Ocean Arts: Inspired by the Sea*

*Science of Sound Underwater*



GLOBAL EDITION  
Aug :: Sept 2007  
Number 18

Freediving with  
**Tiger Sharks**  
COVER PHOTO BY ROGER HORROCKS

Fontaine-de-Vaucluse  
**Treasure Cave**

Ecology  
**Manta  
Rays**

USCG Diver  
**The Right Stuff**

Tony White's  
**Great White Shark  
Adventure**

Underwater Sculpture  
**Jason Taylor**

**Socorro**  
Mexico's Islas Revillagigedo



silver



[www.seacam.com](http://www.seacam.com)

# DIRECTORY

X-RAY MAG is published by AquaScope Underwater Photography  
Copenhagen, Denmark - [www.aquascope.biz](http://www.aquascope.biz)  
[www.xray-mag.com](http://www.xray-mag.com)

PUBLISHER  
& EDITOR-IN-CHIEF  
Peter Symes  
[psymes@xray-mag.com](mailto:psymes@xray-mag.com)

MANAGING EDITOR  
& CREATIVE DIRECTOR  
Gunild Pak Symes  
[gsymes@xray-mag.com](mailto:gsymes@xray-mag.com)

ASSOCIATE EDITORS  
& REPRESENTATIVES:  
USA: Millis Keegan  
[Millis@xray-mag.com](mailto:Millis@xray-mag.com)  
Russia: Andrey Bizyukin  
[Andrey@xray-mag.com](mailto:Andrey@xray-mag.com)

South East Asia Rep & editor:  
Catherine GS Lim, Singapore  
[Cat@xray-mag.com](mailto:Cat@xray-mag.com)

ADVERTISING  
International sales rep:  
Kevin Brennan (US/Can & UK)  
[sales-uk@xray-mag.com](mailto:sales-uk@xray-mag.com)

International sales rep:  
Geoff Mellard (Europe)  
[sales-europe@xray-mag.com](mailto:sales-europe@xray-mag.com)

International sales rep:  
Harvey Page (Red Sea & Africa)  
[Harvey@xray-mag.com](mailto:Harvey@xray-mag.com)

International sales rep:  
Arnold Weisz (Business Directory)  
[Arnold@xray-mag.com](mailto:Arnold@xray-mag.com)

SENIOR EDITOR  
Michael Symes  
[science@xray-mag.com](mailto:science@xray-mag.com)

ONLINE EDITOR  
Willy Volk  
[Willy@xray-mag.com](mailto:Willy@xray-mag.com)

TECHNICAL MANAGER  
Søren Reinke  
[Sreinke@xray-mag.com](mailto:Sreinke@xray-mag.com)

MARKETING MANAGER:  
Yann Saint-Yves  
[marketing@xray-mag.com](mailto:marketing@xray-mag.com)

CO- EDITORS (continued)  
Arnold Weisz - News, Features  
Willy Volk - News, Interviews  
Millis Keegan - *Opinions*,  
Brian Keegan - *Equipment*  
Michael Arvedlund - *Ecology*  
Jason Heller - *Photography*  
Dan Beecham - *Videography*  
Michel Tagliati - *Medicine*  
Leigh Cunningham - *Tech*  
Edwin Marcow - *Sharks*

CORRESPONDENTS  
John Collins - Ireland  
Jordi Chias - Spain  
Enrico Cappeletti - Italy  
Tomas Knutsson - Iceland  
Marcelo Mammana - Argentina  
Svetlana Murashkina - Russia  
Amos Nachoum - USA  
Barb Roy - WA, USA  
Robert Aston - CA, USA  
Nonoy Tan - The Philippines

CONTRIBUTORS THIS ISSUE  
Anna Grethe Aaen  
Kurt Amsler  
Robert Aston  
Scott Bennett  
Andrey Bizyukin, PhD  
Linda Bolhuis  
Nyxolyno Cangemi  
David F. Colvard, MD  
Helen Goldberg  
Anita Hochman  
Millis Keegan  
Wolfgang Leander  
Catherine GS Lim  
Edwin Marcow  
Barb Roy  
Gunild Symes  
Michael Symes  
Peter Symes  
Jason Taylor  
Donald Tipton  
Cedric Verdier  
Tony White

Further info see **contacts page:**  
[www.xray-mag.com](http://www.xray-mag.com)

## SUBSCRIPTION

X-RAY MAG International Edition in English is FREE  
To subscribe, go to: [www.xray-mag.com](http://www.xray-mag.com)

COVER PHOTO  
*Tiger Sharks and Diver*, by Wolfgang Leander  
(CONTINUED ON PAGE 4)



*Ocean Arts:  
Inspired by the Sea... page 54*

SEASILKS BY HELLEN GOLDBERG  
AVAILABLE AT [WWW.SEASILKS.COM](http://WWW.SEASILKS.COM)

Underwater sculpture by Jason Taylor. Photo by Jason Taylor. See his portfolio on page 89



**28**  
"THE SOCORRO ISLANDS"  
REVILLAGEGIDOS ARCA.  
BY BARB ROY

**64**  
FREEDIVING  
WITH TIGER SHARKS  
BY WOLFGANG LEANDER

## columns...

**16**  
SCUBA & SPA:  
AYURA SPA ON TIOMAN  
BY GUNILD SYMES

**40**  
GREAT WHITE SHARK  
ADVENTURE  
BY TONY WHITE

**67**  
OCEAN ARTS:  
INSPIRED BY THE SEA  
BY GUNILD SYMES

**63**  
DIVE PSYCH  
NITROGEN NARCOSIS  
BY DAVID COLVARD, MD

**44**  
ECOLOGY:  
MANTA RAYS  
BY ROBERT ASTON

**71**  
FONTAINE-DE-VAUCLUS  
TREASURE CAVE  
BY ANDREY BIZYUKIN, PHD

**69**  
SHARK TALES:  
BITS & BITES  
EDITED BY EDWIN MARCOW

**55**  
THE RIGHT STUFF  
US COAST GUARD DIVER  
BY NYXOLYNO CANGEMI

**88**  
UNDERWATER SCULPTURE  
OF JASON TAYLOR  
BY GUNILD SYMES

**76**  
TECH TALK: SOLO  
REBREATHING DIVER  
BY CEDRIC VERDIER

**60**  
SCIENCE:  
SOUND UNDERWATER  
BY MICHAEL SYMES

**80**  
UNDERWATER  
PHOTO & VIDEO:  
BY KURT AMSLER

**plus...**  
EDITORIAL 3  
NEWS 6  
M.I.D.E. 12  
TIOMAN MEGADIVE 13  
EQUIPMENT 51  
WHALES&DOLPHINS 53  
BUSINESS DIRECTORY 86

Not yet subscribed to  
X-RAY MAG? Sign up now!  
It's FREE! QUICK! EASY!  
[click here...](#)

# ScubaBoard

Because you can't stay underwater forever...

## Join the World's largest Online Diving Community and you will never be without a buddy again.

Imagine a resource that will answer almost every question you ever had about diving: photography, gear, physics, flora, fauna, destinations, wrecks, technical diving, and then imagine this resource is but a click away. What would you call it? Well, we call it **www.ScubaBoard.com**

Join over 75,000 users, including 1200 Scuba Instructors, hundreds of manufacturers and so many dive experts in the World's largest Online Scuba Community and find the answers you

are looking for. It's free, it's huge, it's ultra friendly and we are waiting for you to show up! **ScubaBoard.com** is the ultimate place to begin your research and to find a host of dive buddies all around the world with a common goal: to share our underwater heaven in a safe and friendly atmosphere! See you on the 'Board tonight!



X-RAY MAG is distributed six times per year on the Internet. © 2004-2006 X-RAY MAG. All rights reserved.

Material in this publication may not be reproduced or transferred electronically in any form without written permission from the copyright owner.

Views and information expressed in articles are those of the individual author and are not necessarily representative of views held by X-RAY MAG or its affiliates. Unsolicited manuscripts, photographs and illustrations should be emailed to: **gsymes@xray-mag.com**

X-RAY MAG accepts no responsibility for unsolicited materials sent to its office, nor is it liable for loss or damage to such materials.

X-RAY MAG observes a strict privacy policy. No personal or private information will be shared with a third party without the written permission of the owner.



X-Ray Magazine is a member of Diving Equipment & Marketing Association: [www.dema.org](http://www.dema.org)



Editorial statement regarding News from NAUI in X-RAY MAG:

This issue of X-RAY MAG and others includes news and press releases from NAUI in sections designated by the NAUI logo. While the page design is done by X-RAY MAG as an integrated part of the magazine, these news stories are brought to you by NAUI at NAUI's discretion.

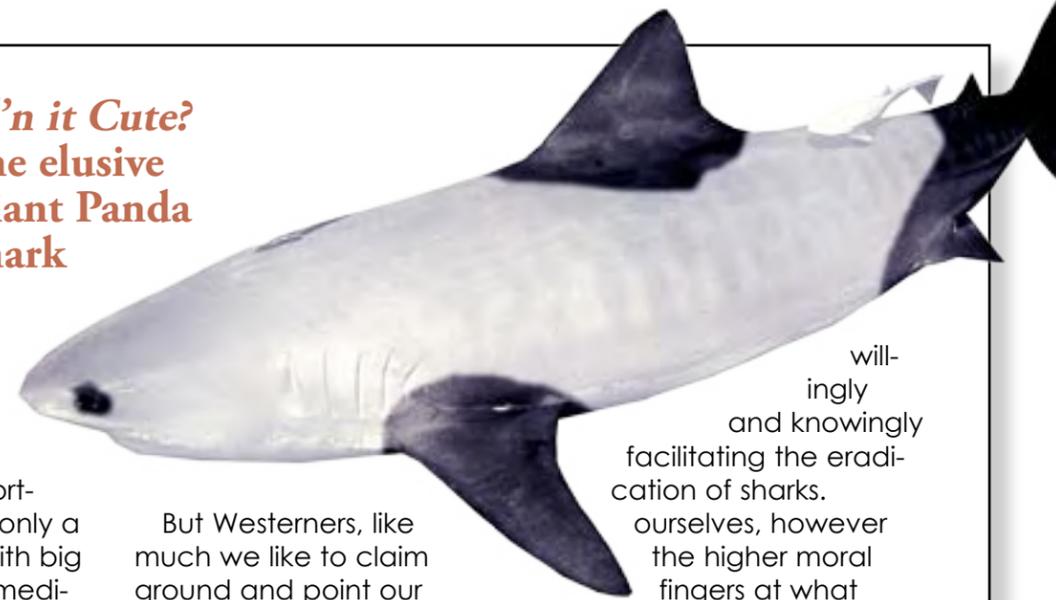
## Driving the message home

In this issue, we have a lot of stories about sharks and rays—magnificent creatures that we are only gradually getting to know and be somewhat comfortable with in the waters. Who would have thought—only a few years back—that you could dive in the open with big sharks like the tiger and the great white and not immediately become lunch. I can't help feeling awed, intrigued and yet wary. Mind you, these are huge apex predators—it takes only one grumpy or psychotic specimen to bite you in half on a bad Tuesday morning. Some dogs we keep as pets bite, too, y'know, and sharks, well, these are wild animals. So, my thoughts on the subject are: Don't try this at home, kids.

With the growing awareness and close encounters with the big sharks and rays, we also have to face the uncomfortable truth that these animals are being slaughtered to extinction as we, who love marine wildlife, can only watch somewhat helplessly while it unfolds before us. The operative word here is *watch...* and helplessly, at that—or are we?

The main culprit for the sharks' plight and the core issue is, of course, the seemingly insatiable appetite among some Asian nations, predominantly China, for shark fin products. Our fellow shark fin campaigners have constantly implored the management behind trading companies like Alibaba.com to stop the shark fin trade taking place on their portal since they are

### Id'n it Cute? The elusive Giant Panda Shark



willingly and knowingly facilitating the eradication of sharks.

But Westerners, like much we like to claim ground and point out we consider a barbaric and culinary custom amongst the Asians, should climb down off the high horse and take a good long look at ourselves, too. How are we indirectly contributing to the problem and what can we do about it?

Yahoo.com owns a substantial stake—40 percent according to some sources—of Alibaba.com. While that is not a controlling share, it is still influential. Yahoo.com has not returned calls from our fellow campaigners either. Then, there is Discovery Channel, which just ran another round of its Shark Week series. Here, at X-RAY MAG, we have been told that the contributed documentaries in this series have been edited—some would say sanitised—removing any references to the shark finning issue and the peril the species are now placed due to it. So much for “documentaries”! Why go the extra lengths to hide the facts, I would like to know. Why don't the corporations seem to care? What if there was the panda who had its paws cut off, dried and sold by thousands on their portals? *Talk about bad press!*

On the following page, you will find an example of what you can do to help. It is an open letter written to the president of Equador by a fellow concerned diver and dive professional, Dominick Macan of Dive Advice. In it, is an appeal to the government of Equador to renew a ban they have recently lifted on shark fishing in Galapagos in order to halt the new boom in shark finning that has found new grounds in this region due to the rich resource of sharks in this once protected area. (See X-RAY MAG Galapagos / Equador issue no. 13).

Add your voice to the plea and let government leaders around the world know where you stand on the issue. Sheer numbers of voices joined on an issue puts pressure on politicians to change policy and renew protections. No one wants a bad rap... let's not let it be the sharks who lose.

—Peter Symes



## Open Letter

Sir Rafael Correa Delgado, PhD  
President of the Republic of Ecuador  
Quito.

Your Excellency,

In recent weeks, I have become increasingly aware of media reports in the world press regarding the Ecuadorian Government's lifting of a ban on the commercial fishing and exportation of shark fins in Galapagos.

My understanding is that there has been a regulation in place since October 2004 (decree 2130) which prohibited the fishing, commercialization and exportation of sharks and any of its parts in Galapagos and mainland Ecuador.

Despite that regulation, a small black market trade in "Shark Finning" continued, but it was illegal and punishable when caught.

The new government regulation, (introduced by the Government of July 30, 2007), totally lifts that ban and allows fishermen free reign to catch as many sharks as they wish, remove their fins and throwing the dying carcasses back into the ocean, without fear of punishment or retribution. In fact, it becomes their most profitable income source as they are allowed to keep the fins and export them, as long as they claim they caught the sharks by "accident".

It seems that in a week, over two tons of shark fins have been seized and then released back to the fishermen. The foreign traffickers of the fins have then exported the fins at immense profits – most of the monies going overseas and not benefiting the fishermen at all.

We understand the Government of Ecuador must play a decisive role in assisting its citizens to make a living and provide them with the means and the tools to do so, but does it not also have a more important obligation to lead them in their everyday struggle by providing them with the infrastructure and laws to make that living sustainable in the long term?

The removal of this ban on "Shark Finning" will possibly do more damage to the future of the fishermen, and the sustainability of Galapagos as a "Golden Egg", for the people of Ecuador than any other single act.

Sharks play a major role in nature's natural balance, and the Galapagos has been renowned for its shark population for many years, which is precisely why the traffickers have identified it as a major resource for fins.

Sharks are REALLY threatened and "Finning" promotes the wild and inhuman hunting of sharks, forcing the fishermen towards an unsustainable future, with short term gains leading to long term poverty. A living shark represents more value than the cost of the fins from a dead one.

You, Mr President, are better equipped than anyone to understand how immensely important this issue is, and with your help, to implement a development plan which gives the fishermen a new economy by profiting from a living ocean in a sustainable manner.

The international community is ready to lend a hand to your actions.

Mr. President... the future survival of sharks in Galapagos is in your hands.

— Dominick Macan / DIVE ADVICE

# EXPLORE

OCT 31 – NOV 3, 2007  
WWW.DEMASHOW.COM

**DEMA Show 2007** is the **ONLY** international trade event for diving, adventure travel and action water sports professionals — creating an exclusive environment focused on addressing every possible need you have as a dive retailer or instructor.

**Business:** Connect with more than 700 companies gathered in one global marketplace — see, demo and buy virtually every product, service and technology your business needs to stay competitive.

**Pleasure:** Have fun while networking with more than 11,500 total attendees during the show and at the industry's biggest social event, the DEMA Awards Party.

**Education:** Participate in on-target, practical training designed to help you stay abreast of changing technology and find new ways to boost your bottom line.

**Diving:** Discover programs that support the growth of the dive industry and your business, including Ships to Reefs and DEMA's Diver Acquisition Project.

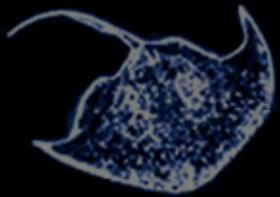


Orange County Convention Center  
Orlando, Florida

INFO@DEMASHOW.COM

+1.703.683.8500

Take advantage of this golden opportunity, make plans to attend or exhibit at DEMA Show 2007.  
Visit [www.demashow.com](http://www.demashow.com) for more information.



X-ray mag

News edited  
by Peter Symes &  
Catherine GS IIm

# NEWS

PETER SYMES



## Fish get emotional too

**Have you ever heard of a fish being undecided? Or thought of them as having emotions? Perhaps not. Well, now it turns out that fish, like humans, process information—and perhaps emotions—on different sides of the brain.**

It has long been established that fish exhibit similar reactions to stress as humans do, such as releasing adrenaline into the bloodstream and other physiological reactions, when under duress. This has been taken as circumstantial evidence that they also

feel at least fear and anxiety.

Now, additional findings lends further credence to the notion that fish do indeed possess emotions and harbour thought processes. It turns out that fish growing up in the wild among predators use their left eye to look at novel objects, while their offspring raised in captivity use the right eye.

Culum Brown, now at Macquarie University in Sydney, Australia and his team caught bishop fish (*Brachyrhaphis episcopi*) from areas with high and low predation rates in Panama. The team bred the fish in the lab and then tested the behaviour of both the wild parents and their offspring. Fish swam towards a slatted bar-

rier through which they could see either a novel object (a yellow cross), nothing or another bishop fish. They could then swim past the barrier either to the left or to the right. Exiting to the left meant the fish had kept its right eye on the barrier, and vice versa.

Neither fish from areas of low predation nor their young showed much of a preference for a left or right exit, suggesting their brains were not very lateralised. However, fish that had to deal with a lot of predators in the wild favoured one eye, as did their lab-born offspring.

This clearly suggests that life experiences can affect which side of the brain fish use and even

## Electric Fish Conduct Electric Duets in Aquatic Courtship

Cornell researchers have discovered that in the battle of the sexes, African electric fish couples not only use specific electrical signals to court but also engage in a sort of dueling "electric duet." The study is the first to compare electrical and behavioral displays in breeding and nonbreeding *Brienomyrus brachyistius*, a type of mormyrid electric fish, which emit weak electric fields from a battery-like organ in their tails to sense their surroundings and communicate their species, sex and social status with other fish. It is also the first study to successfully sort signals in electric fish based on sex. ■

SOURCE: JOURNAL OF EXPERIMENTAL BIOLOGY

*"Especially for animals that have to cope with many predators, it is an advantage if they can use one hemisphere to keep an eye on predators while they use the other hemisphere to do other things."*  
—Culum Brown

that they have emotional mind sets, since different sides of the brain may correspond to a curious or suspicious attitude.

Brain lateralisation has been found in an increasing number of other species in recent years. Humans use their left and right brain lobes differently, the most well-known consequence being handedness. ■

SOURCE: NEW SCIENTIST

## Exploited reef fish recover ...slowly

In the longest running study focusing on how reef fish populations recover from heavy exploitation, researchers from the Wildlife Conservation Society found fish can recover, but sometimes need decades to do so.

The study involved nearly 37 years of continuous data from four marine parks off the coast of Kenya that were closed to fishing at different times. Researchers found commercially important species, such as surgeonfish, can take a quarter of a century to recover.

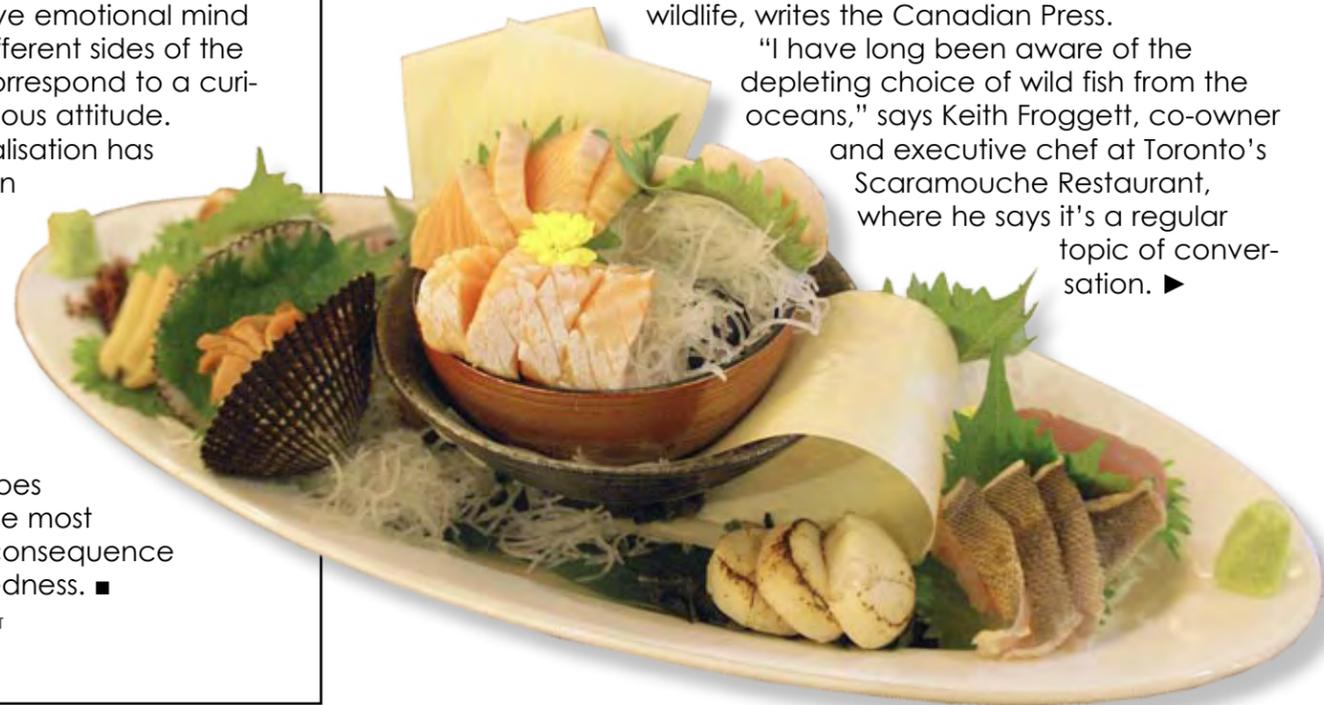
More importantly, researchers said the ecological equilibrium needed for a healthy reef system, which relies on the interplay of many fish, invertebrate and plant species, takes even longer to achieve. ■

SOURCE: ECOLOGICAL APPLICATIONS

## Endangered fish stocks spur Canadian chefs to change menus

The depletion of fish stocks around the world has Canadian top chefs arming themselves with the tools needed to make informed decisions to assure a future with abundant ocean wildlife, writes the Canadian Press.

"I have long been aware of the depleting choice of wild fish from the oceans," says Keith Froggett, co-owner and executive chef at Toronto's Scaramouche Restaurant, where he says it's a regular topic of conversation. ►



# Dive

## Embracing China

CHINA DIVE EXHIBITION 2007

25-27 AUGUST • BEIJING  
CHINA WORLD EXHIBITION HALL



[www.chinadiveexhibition.com](http://www.chinadiveexhibition.com)

Come and join us at CDEX07  
in the coming Olympic City - Beijing,  
and get a feel of the world's largest emerging diving market!

For ticket booking and detailed information,  
please visit [www.chinadiveexhibition.com](http://www.chinadiveexhibition.com).



## Plan to cull cownose rays could backfire

As reported in the previous issue of X-RAY MAG, the depletion of sharks as controlling predators along the US east coast have led to a surge of cownose rays that feed on the commercially important oyster.

Tales of cownose rays ravaging oyster restoration sites, as well as some underwater grass revegetation projects, have become so common that plans are in the works to turn the tables on them—by putting them on the table. By creating a food market for rays—and therefore a fishery—some fishery managers hope to cull the ray population. However, it is controversial, as the rays' slow reproduction makes them particularly vulnerable.

In Virginia, where the rays are most plentiful in the Bay, some consider them to be a more formidable obstacle to oyster restoration than the diseases that plague the shellfish.

Last year, when scientists planted 750,000 oysters on a large reef in the Piankatank River, they thought it might prove to be a model for future large-scale restoration efforts. *Cownose rays, on the other hand, thought of the oysters lying exposed on top of the reef as lunch.* A school of rays descended on the reef and in a matter of days, virtually no oysters were left.

The rays are not only an impediment to restoration, but also to aquaculture

and many oyster growers worry their investment will be wiped out by rays. But Dean Grubbs, program manager of the Shark Ecology Program at the Virginia Institute of Marine Science, called efforts to create a fishery "a really bad idea."

If humans develop a taste for cownose rays, they say, it could result in taking too big of a bite out of the ray populations.

Rays are slow-maturing fish: Females don't reproduce until they are seven or eight years old, and males are typically six or seven. Furthermore, females produce just one live pup per year. That, combined with the late maturity rate, is a recipe for overfishing, says Grubbs. ■

► But as Froggett experienced, even when you think you're doing the right thing, you may still be hurting the environment. Last year, for example, he was using organically raised farmed salmon from the West Coast on his menus.

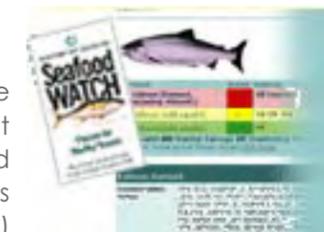
"We got a call from the Monterey Bay Aquarium pointing out that they were having some difficulties with

the impact that these farms were having on the environment," he explains.

The aquarium, based in Monterey, California aims to inspire conservation of the oceans through education and its **Seafood Watch guides**, which pinpoint fish to avoid or that are a better choice.

The chef immediately discontinued using that product, turning instead to a sea cod farm in the Shetland Islands. ■

Read more about Seafood Watch guides here ([link](#))



Edited by Peter Symes



### Coral Reefs Decline Faster Than Anticipated

Coral reefs in the Pacific and Indian oceans are disappearing faster than had previously been thought, a scientific study has shown.

Nearly 1,554 sq km (600 sq miles) of reef have disappeared each year since the 1960s—twice the speed at which rainforest is being lost.

The corals are vanishing at a rate of 1 percent per year, a decline that has begun decades earlier than expected.

Details of the survey appear in the journal Plos One. ■



Scientists, conservationists and many government officials expressed outrage when a proposal to protect precious red corals from international trade was reversed on June 15.

Delegates voted by secret ballot to overturn their initial decision to list

these overfished species under the Convention on International Trade in Endangered Species (CITES), following a massive lobbying effort by the coral industry and some exporting countries. The proposal initially passed, with 62 countries voting in support of the listing.

Scientists have long called for trade protection for red corals. Red corals are among the world's most valuable wildlife commodities, with a finished necklace retailing for up to US\$20,000. But destructive fishing methods and over-harvesting means global red coral catches have plummeted by 90 percent in the past two decades.

The move to reopen the red coral debate on Friday was instigated by

*“Over the past twenty years, overfishing of red coral has put these animals at great risk. A CITES listing would have helped safeguard the species as well as the coral industry.”*

Tunisia and seconded by Algeria and Morocco, all coral exporting countries. A secret ballot was requested and despite the proposal receiving support from the majority of delegates present, it fell short of the required two-thirds majority needed for a CITES listing.

Dr. Andy Bruckner, a NOAA scientist and the author of the U.S. proposal to list *Corallium*, said the outcome was shocking: “Over the past twenty

years, overfishing of red coral has put these animals at great risk. A CITES listing would have helped safeguard the species as well as the coral industry. Effective conservation for red coral now requires cooperation by range states to implement appropriate domestic measures, to ensure the survival of these species.” ■

SOURCE: SCIENCENOW DAILY NEWS

### New Report Finds 80 Percent Loss of Coastal Marine Habitats in Europe

A new study published in the Annual Review of Oceanography and Marine Biology examines the drastic decline of coastal marine habitats across Europe and calls for regulatory changes to improve their protection. “The magnitude of habitat loss is alarming and today, less than 15 percent of coastal European habitats are considered to be in good condition,” said lead author Mike Beck and marine scientist at The Nature Conservancy. ■

Precious coral or red coral is the common name given to *Corallium rubrum* and several related species of marine coral. The distinguishing characteristic of precious corals is their durable and intensely colored red skeleton, which is used for making jewelry.

Red corals grow on rocky seabottom with low sedimentation, typically in dark environments—either in the depths or in dark caverns or crevices. The original species, *C. rubrum*, is found mainly in the Mediterranean Sea. It grows at depths from ten to 300m, although the shallower of these habitats have been largely depleted by harvesting. ■



Red Coral Necklace as displayed on [www.germes-online.com](http://www.germes-online.com)

Where your Ultimate Diving Adventure Begins

Eagle Ray Liveaboard

Maldives Oceanic Dreams  
Book Your Dive Holiday with Us  
[www.maldivesdivingadventure.com](http://www.maldivesdivingadventure.com)  
[info@maldivesdivingadventure.com](mailto:info@maldivesdivingadventure.com)

Maldives Oceanic Dreams

Edited by  
Peter Symes

## Oil clean-up chemicals harmful to corals

The chemicals used to clean up marine oil spills may be much more harmful to the coral than the oil itself, researchers at Israel's National Institute of Oceanography in Haifa have uncovered. The findings suggest that spill-recovery crews should physically try to contain spills that occur near coral reefs, or allow the oil to degrade naturally, rather than dumping cleanup chemicals in their vicinity.

Oil cleanup chemicals known as dispersants work by breaking up oil slicks into tiny droplets. They are sometimes dumped near coral colonies, many of which are located along the world's coastal areas where oil production and transportation activities are conducted. To test the effect of the dispersants on coral, the team exposed nubbins, or small branch clippings to solutions of six commonly used chemical dispersants for 24 hours, and then monitored the nubbins' health for seven days.

The experiments produced dramatic results: Nearly all of the coral nubbins died after exposure to mixtures of dispersants and oil. Dispersants alone killed up to two-thirds of the coral clippings, whereas oil alone produced no abnormal mortality. ■

SOURCE: ENVIRONMENTAL SCIENCE & TECHNOLOGY

## China Criticizes Japan for Planting Coral Around Tiny Pacific Reef in Spat Over Territory

China has criticized the Japanese government for planting coral around the uninhabited Pacific atoll of Okinotori—an uninhabited reef some 1,740 km south of Tokyo.

"This action does not accord with recognized international conventions and affects the interests of other countries," said spokesman for the Chinese Foreign Ministry, Qin Gang. According to the United Nations Convention on the Law of the Sea, Okinotori does not have an exclusive economic zone or continental shelf, said Qin. "Okinotori is not an island but a reef which is submerged at high tides,"

Japanese officials said they had begun planting coral on Okinotori in a four-million-dollar project to defend its territory. ■ SOURCE: XINHUA



## 300 year old coral found off Japanese coast

A huge coral mound thought to be about 300 years old has been found off the coast of Azuchi-Oshima Island near Hirado at a depth of about ten meters. The *Stylocoeniella guentheri* coral mound is 3.8 meters long, 3 meters wide and 1.3 meters tall.

Satoshi Nojima, an associate professor in Kyushu University's Amakusa Marine Biological Laboratory who is familiar with corals, said the mound was probably one of the largest in Japan. The coral grows only about five millimeters per year. The biggest previously known specimen found off the coast of Amakusa, Kumamoto Prefecture, measured about 50 centimeters. *Stylocoeniella guentheri* coral is found around Japan and places such as the Philippines and Taiwan. It grows into a round shape with parts of the coral forming branches or rods. ■

## Coral 'shuffle' helps reefs survive global warming

Corals on Australia's Great Barrier Reef might be able to survive warming sea temperatures, geneticists the Australian Institute of Marine Science have found. The scientists have found that many corals store several types of algae, which can improve their capacity to cope with warmer water as some coral algae are more heat tolerant.

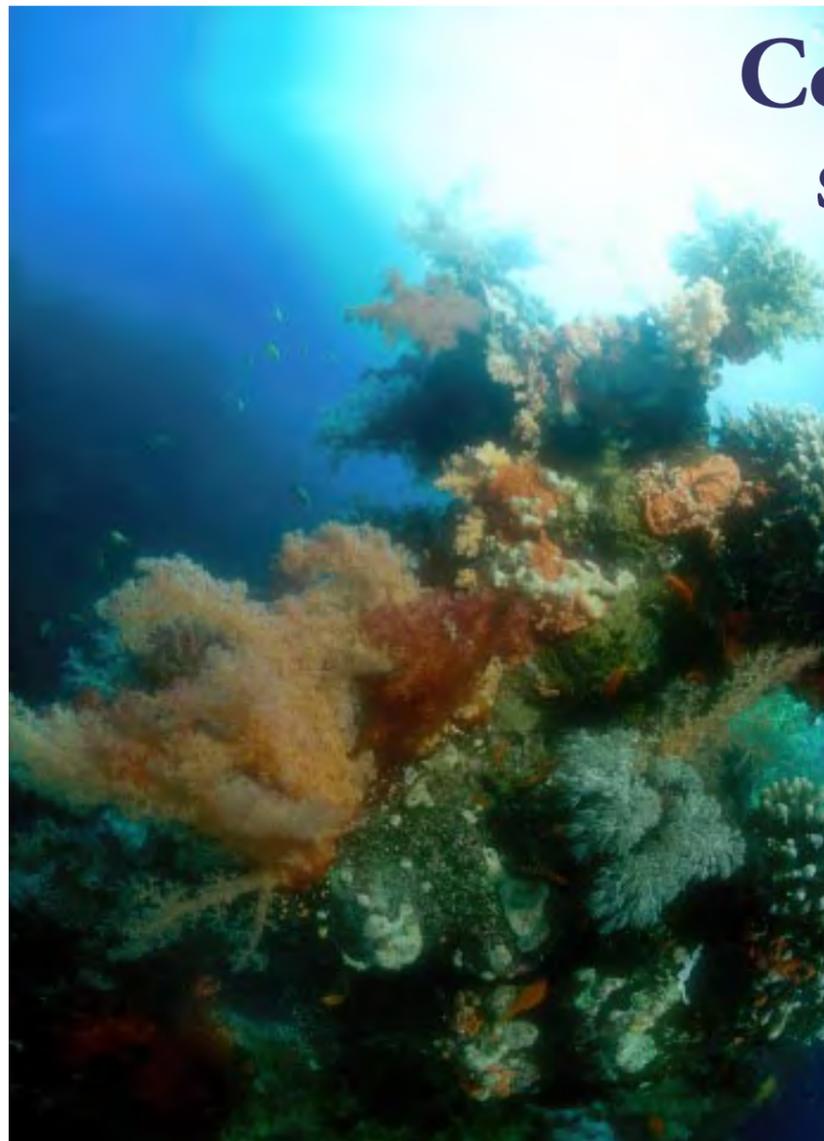
"This work shatters the popular view that only a small percentage of corals have the potential to respond to warmer conditions by shuffling live-in algal partners," said institute marine scientist Madeleine van Oppen. "Simply, when conditions warm the more heat-tolerant algae provide back-up, become more abundant. Some algal types impart greater resistance to environmental extremes".

The Australian scientists said their study had found that coral has the ability to "shuffle" the algae, maximising nutrients depending on water temperature. This ability may also explain why coral reefs have been able to survive for thousands of years during various climate changes.

The Australian scientists discovered heat-resistant algae by examining the DNA of different types of coral.

They said their study had found that coral has the ability to "shuffle" the algae, maximising nutrients depending on water temperature.

But many marine scientists have argued that "back-up" algae were infrequent because of the small number of corals that were shown to host several types of algae. ■



Undersea Explorer World class diving is just the beginning.....

Join the ultimate Great Barrier Reef & Osprey Reef Experience

6 day/22dive expeditions Sat-Fri  
Check our schedule [www.undersea.com.au](http://www.undersea.com.au)  
P 1800 648 877 E [info@undersea.com.au](mailto:info@undersea.com.au)

the shark & whale experts

## Bug is killing Britain's rare coral

The cause of a mystery disease that is killing off rare pink sea fans on the south-west coast of Britain has been identified by marine biologists from the University of Plymouth. A species of bacteria known as *Vibrio splendidus* is killing the cold-water corals by producing enzymes that attack their tissue. Some scientists suspect that the disease may be linked to higher water temperatures which stress the corals and reduce their natural resistance, or help harmful bacteria to thrive. ■



Pink sea fan. This specimen was photographed in the Gulf of Alaska by NOAA



## Firm Wants to Fertilise Ocean with Iron to Counter Global Warming

The US based company Planktos believes "ocean fertilisation" may be a way to mitigate the climate changes driven by human-produced greenhouse gases. It plans to deposit iron particles in the sea in the hope CO<sub>2</sub>-absorbing plankton blooms will form.

Research shows that seeding the oceans with iron can create favourable nutrient conditions for plankton.

But the proposal by California-based Planktos to deposit 100 tonnes of iron ore powder in a 100 square kilometer area of ocean hundreds of kilometres west of the Galapagos Islands has drawn concern from the US government and some environmentalists. The

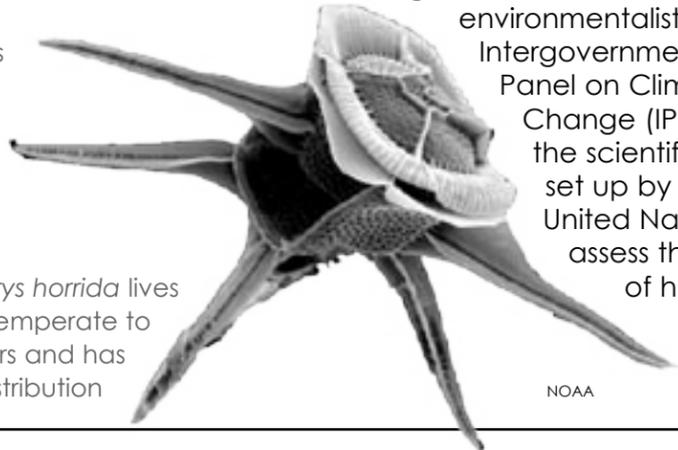
induced climate change, says it regards the process as "unproven".

In its Working Group Three report, released this year, it said: "Geo-engineering options, such as ocean fertilisation to remove CO<sub>2</sub> directly from the atmosphere, or blocking sunlight by bringing material into the upper atmosphere, remain largely speculative and unproven, and with the risk of unknown side-effects."

Russ George, president and chief executive of Planktos counters: "This is work that must be done if we are to reverse the apocalyptic collapse of the ocean ecosystem as well as the climate crisis it is helping to accelerate. We are the first responders to a planetary medical emergency." ■

Intergovernmental Panel on Climate Change (IPCC), the scientific body set up by the United Nations to assess the risk of human-

Algae blooms as seen from a satellite



Ceratocorys horrida lives in warm temperate to tropical waters and has worldwide distribution

NOAA

## The Clearest Ocean Waters on Earth is Found in the Pacific

As clear as the clearest lakes on the planet, salty as ocean waters, and roughly the size of the Mediterranean—this, say researchers, is the clearest and most lifeless patch of ocean in the world. And it is in the middle of the Pacific.

"Satellite images that track the amount of chlorophyll in ocean waters suggested that this was one of the most life-poor systems on Earth," explains Patrick Raimbault of the University of the Mediterranean, in Marseille, France.

In October 2004, Raimbault and colleagues set out to study the remarkable patch of ocean water on a three month cruise—called

BIOCOPE—that left from Tahiti in French Polynesia, passed by Easter Island and ended on the Chilean coast. Along the way, they sampled the water's chemistry, physics and biology.

Marc Tedetti, also from the University of the Mediterranean, was on the expedition to investigate the water's clarity. He was struck by the colour of the water, which he describes as closer to violet than to blue. ■

SOURCE: NEW SCIENTIST



# News from NAUI

Are you living the "JUST DIVE®" lifestyle... full of diving adventure and exploration?

## Photo Competition—last call for entries

As part of our "JUST DIVE® 2007" promotion, NAUI is still accepting photo entries from photographers of all ages, skill levels and backgrounds for its "JUST DIVE®" photo contest.

NAUI wants to see you in action. Show us your favorite diving spot, underwater moment or diving adventure and you could win. If your photo wins, it will be featured on the cover of NAUI's Sources Magazine! You can also win other great prizes such as:

- Four tickets to dive in Walt Disney World® Resorts "The Seas" attraction at EPCOT® during the 2007 industry trade show in Orlando
- Free stay at a tropical destination and diving
- Free scuba course
- Free scuba equipment

### Deadline

Photo contest submission deadline is September 10, 2007—you still have time to start diving and show us your "JUST DIVE®" "moments to win!"

Click here for contest guidelines [www.naui.org/justdive.php](http://www.naui.org/justdive.php). For questions please email [justdivephotocontest@naui.org](mailto:justdivephotocontest@naui.org).



FILE PHOTO: NIKON

## NAUI Europe becomes CE and ISO certified

During the recent meetings at the Europeans Underwater Federation's (E.U.F.) meeting at PADI Internationals HQ in Bristol, UK, NAUI received the ISO and CE certifications on all levels.

Mark Caney, president of the EUF and president of PADI International proudly presented the official certificate to Dick Lucas, CEO of NAUI Europe. This step forward will help the dive industry in professionalizing and serve the dive industry on a higher level. ■



Peter Jonas Ö.N.

Dick Lucas CEO, NAUI Europe

Peter Caney PADI



Edited by  
Peter Symes



## Michael Portelly has died

We have lost a great friend of the ocean and very good colleague. When the news arrived that Michael Portelly passed away on July 5, it was as if the sky clouded over and birds stopped singing. He was only 55.

Michael Portelly was a true gentleman and a pioneer underwater filmmaker. Almost three decades ago, he produced the groundbreaking *Ocean's Daughter*, which even in this digital day and age is astounding to watch. In my humble opinion, it was for underwater cinematography what Kubrick's *2001: A Space Odyssey* was for science fiction. It was a masterpiece that has held its own against time and led the way for following generations.

Michael Portelly was a visionary in more than one sense. About the movie, he said that he tried to add a voice to the growing calls to protect our planetary future. "It was a film that tried to express the sacredness of life and the magical beauty of nature and the fact that we, as humans, were in danger of destroying ourselves, before we had the chance to evolve into mature adulthood as a species."

This was three decades before global warming and coral bleaching became household words. At the underwater festival in Antibes five years ago, he voiced an idea to marine architect Jacques Rougerie and Andre Laban, the famous diving legend of Coust-

Michael Portelly will be remembered mostly for *The Ocean's Daughter*, his 1980 elegy to the beauty of the sea

eau fame—an idea that could really make a difference. It was called the Blu Revolution and is designed to breath life back into the oceans, create new habitats and revitalize fishing communities around the globe in an attempt to preserve our ocean heritage and restore it as a source of food to feed the hungry.

He envisaged persuading the United Nations—guided by a scientific council—to initiate a global program to restore life to the oceans, to construct artificial reefs in suitable materials that could provide work for idle fishing fleets and create a new global industry designed to reverse the destruction as well as provide a haven for wildlife to flourish.

Being diagnosed with incurable cancer in 2001, he relentlessly fought for the idea and outlived his prognosis by years. At the time of his death, he was also planning another film tilted strongly toward conservation issues, while serving as an editor on several dive publications including this one, *Ocean Realm* and *Diver* in UK. He is survived by two sisters and two brothers. Michael Portelly will be missed by many. ■



## It Really is the Year of the Sequel...

### NAUI Dives Disney II

When you have the unparalleled event of the show... do it again!

Join us at Epcot's<sup>®</sup> Dive Quest.

Exclusively with NAUI Worldwide.

Limited dives are available, to purchase your tickets visit us on the web at [www.naui.org](http://www.naui.org).



*It would be tragic indeed, if future generations were forced to live under inhospitable planetary conditions and never witness the wonders of nature we have experienced, except by watching the films from our era. They would be like the visual fossil record of what once was but is forever gone.*

— Michael Portelly





## 2nd Malaysia International Dive Expo (MIDE)

# Pretty good, actually



Text and photos by Peter Symes

Kuala Lumpur, Malaysia – MIDE was a pleasant surprise. To be honest, at first I didn't feel like going at all. Perhaps I was suffering a bit from dive expo-itis, an occupational hazard being a dive mag editor after attending

tired European shows. The local audience is also clearly younger than its western counterparts while seemingly not lagging behind when it comes to disposable income. Also, the audience seems a lot more polite and genuinely interested in what's on offer than the grumpy-sceptic Europeans. The show venue was okay, too. Not great, but fine for the job, and located conveniently in downtown KL with easy access both by public transportation and by car (are you listening ADEX organisers?). Also, the adjacent hotels were just a great value for the money—five star quality for around €60/\$80 a night is not bad and the food was splendid. MIDE seemed to be well marketed, too. I saw several posters hanging around in the cityscape and along the freeways leading into town, and the fact that it had

weren't many equipment manufacturers or distributors there, but lots of resorts. So, if you are coming from overseas, it would be a bit much to go to KL for the show's sake. But, if you are in the city anyway—on a layover or passing through—it is definitely worthwhile to visit, especially next year when they say that there will be more entertainment.

For manufacturers of dive equipment, I suspect it would definitely be worthwhile a go, since MIDE clearly has a substantial audience to offer. As for ourselves, would we return next year? Definitely! ■

free admission surely didn't hurt either. Where the expo was somewhat lacking, was in the department of seminars, presentations, movies and the like. It was virtually non-existent this year, but the organisers informed me that they will include such activities next year. So, whom is this show good for? Definitely local divers keen on assimilating some info. There



a long series of dive shows recently, and they were not always that exciting. There, now I said it. So, my expectations were quite modest when I arrived in Kuala Lumpur. But my mood was soon to change. I've got to hand it to the organisers for putting on a surprisingly good show. Granted, there were still a few teething problems, but to be fair—as the show is only in its second year—it was very well organised and surprisingly well visited. In fact, the aisles were soon packed with an inquisitive audience eager to suck up information about diving, which made it so much more energetic and vibrant than many of the often quite





## Tioman Megadive

# Too much Disco Too little Diving

Text by Peter Symes  
Photos by Gunilld and Peter Symes

There is something dreamy about Tioman. It's lush appearance and slopes of dense jungle strutting right out of the South China sea encircled by bounty land beaches is easy to associate with Hollywood, perhaps not a coincidence since the movie classic Bali Hai was shot here. When I think back it is with mixed emotions and hazy memories too. I am tempted to say, the best moments were all the great massages to which I treated myself while at the resort.

I am afraid that I picked up an expensive habit there but getting all those hard marbles kneaded out of my aching back and shoulders was priceless. More on that later...

Tioman was the final leg on our mini-trip to Malaysia that also took us to Kuala Lumpur and the successful MIDE expo there. We have arrived to look over the Tioman Megadive event. It was set to be the biggest annual gathering of diving enthusiasts in the Asia Pacific region and was given

plenty of marketing as such.

It was a four day diving festival for divers from all over the world and was packed with events and activities. One of the main highlights was the treasure hunt where participating divers were dared to locate ten treasure chests hidden somewhere among the dive spots of Tioman. The lucky finders would then win prizes—various diving equipment—dictated by numbers hidden in the chests. The event also hosted an underwater photography contest and underwater wedding held in "traditional Malay" style at the marine park. There was a Crown-of-Thorns eradication program in which visiting divers could partake. A photo-workshop with author Mathieu Meur was also on the agenda, which was rounded off by a big beach party at the end.

MATHIEU MEUR



The underwater wedding ceremony was held in traditional Malay style

Obviously, a lot of admirable good intentions and lots of planning had gone into staging an event of this size. But that only makes it all the more painful to report that the implementation was, in large parts, woefully inadequate. Too many things didn't work as planned or didn't happen at all. For example, the one-couple wedding arrangement was almost cancelled, and when it did happen, it was confusing and marred by terrible visibility, which clouded the ceremonial scene for most of the attending photographers.

Single events such as having

to attend the opening of the Crown-of-Thorns campaign bothered me, too. We had to sit on plastic chairs on a lawn under the scorching sun to listen to a series of long-winded speeches by some officials who were, incidentally, comfortably seated in sofas in the shadow. That they also kept us waiting for half an hour frying in the sun first did little to ease the sense of aggravation. I wanted to go check out the diving, and my time was both limited and precious.

As to the diving, I came with certain expectations since the island was marketed as hav-



Edited by  
Peter Symes

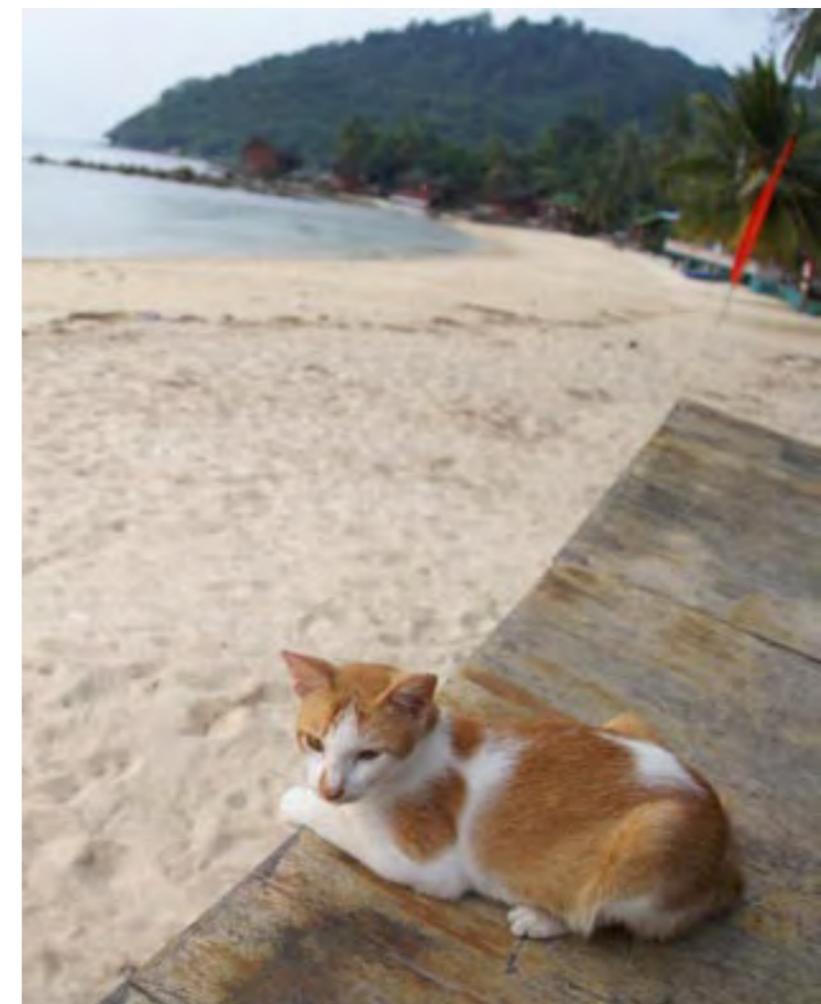


Endless beach parties stretch on and on into the night on Tioman

down, with faded paint and no bath tub but a shower with plastic handles, cracked floor tiles and a water heater you must switch on manually. What was all that about? According to the room plans on their website every single room, regardless of standard and booking class, should have a bath tub. I have a problem with that. At home, I can live with a shower, but on my holiday, I want to soak in a tub. There was no internet access in the room either, which we were promised.

In our room, I felt more like I was staying at a two to three star hotel. Which can be fine, if that is what you expect and pay for. I have been in primitive lodges deep in the jungle and felt positively surprised and pleased. This was the opposite experience.

With the beach right outside our door and a great combined swimming pool with water slides and other toys, it appeared, however, to me to be a superb place for families with kids. The kids have a great place and can run free without getting in harm's way,



A local enjoys a moment of repose on the beach at Tioman



ABOVE TOP: Gorgeous sunset at Berjaya Tioman Beach, Golf & Spa Resort. BOTTOM: Malaysia's national troupe of dancers entertain the audience at Tioman Mega Dive

ing crystal clear water. So, I was looking forward to getting a little wet as a highlight of the trip. But the visibility was plainly horrible and anything but crystal clear— "soup" came to mind. I hardly saw any fish, and for possibly the first time ever, I came out of the water with film to spare. To be fair, Mathieu Meur later relayed to me that the visibility was usually quite good, and that this was the worst he had seen it on the many occasions he had come here. So, take his word for it, not mine.

The accommodation was decent but oversold when compared to how it was presented on the resort's website, which I checked out prior to trip. On the website, it all looked very appealing. The Berjaya resort holds five stars, and to me that denotes the best of standards, absolute luxury and attention to detail. Y'know... big fancy bathrooms and such. But I found our room pretty run



Tropical flowers float in a basket of greenery on the steps of the Ayura Spa at Berjaya Tioman Beach, Golf and Spa Resort



**SALANG BEACH PARTY TONIGHT!**  
@ 9.00 PM  
12 JULY 07  
S&J DIVE CENTRE

A wild monkey inspects the resort grounds

so the parents can relax—a gift sent from the gods. For the slightly older kids, there is also a big arcade games room that can keep them busy for hours on end. The restaurants all open up towards the sea or sit on the beach facing the sunset. The beach is also good, not for diving perhaps, but the cove is sheltered and shallow and the bottom sandy. It is great for swimming and for playing water games. ■



Local fishermen enjoy a moment of leisure on the deck of their boat



A performer with the national troupe of dancers wows the crowd on Tioman. The group represents Malaysia by bringing the Malaysian spirit through dance to the rest of the world



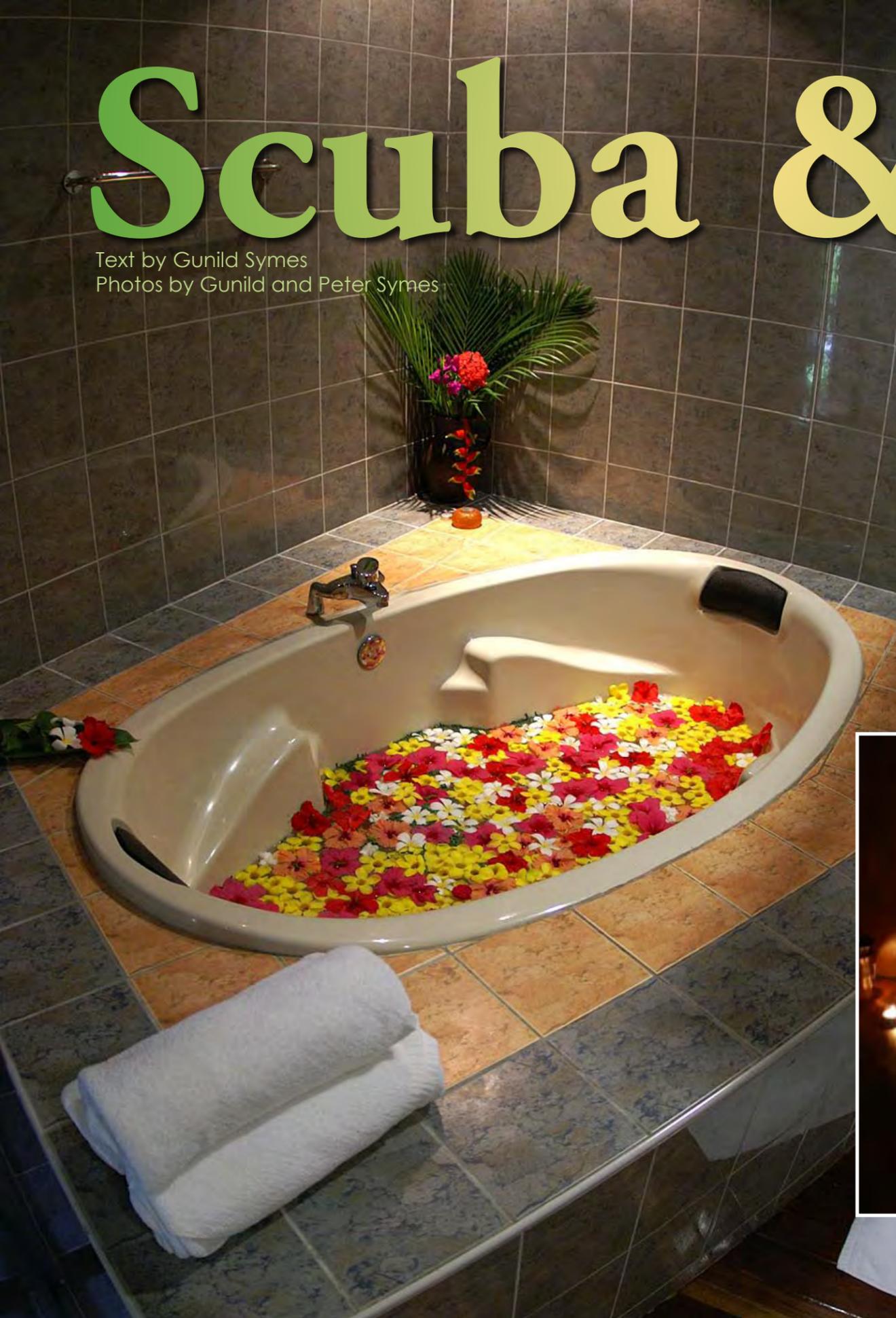
Tioman

Beach parties... beach parties... and more beach parties...



# Scuba & Spa

Text by Gunild Symes  
Photos by Gunild and Peter Symes



**Lifting tanks and hefting dive gear in and out of the water can lead to tired, weary, stressed-out muscles and fatigue. Diving itself can strain muscle groups not necessarily used in the same way up on land. What better way to pass the time between dives, than enjoying a full body massage? It's the answer to an aching back and sore muscles, and gets you ready for your next day of diving.**

Traveling divers often suffer from jet lag and are exposed to all sorts of toxic fumes from jet fuel on poorly maintained airplanes to noxious diesel smoke from dive boat engines, all of which add to the total toxic load accumulating in our bodies. Not to mention, divers' skin and hair take a beating under the sun, wind and sea. Salt encrusted and dehydrated skin can crack and burn more easily. The good news is that divers who are environmentalists as well as fitness and health enthusiasts can enjoy a great array of natural, organic, traditional and medicinal body treatments, massages, wraps and facial treatments that detoxify and rejuvenate the body, mind and soul, re-hydrate cells and bring life back into tired skin and muscles.

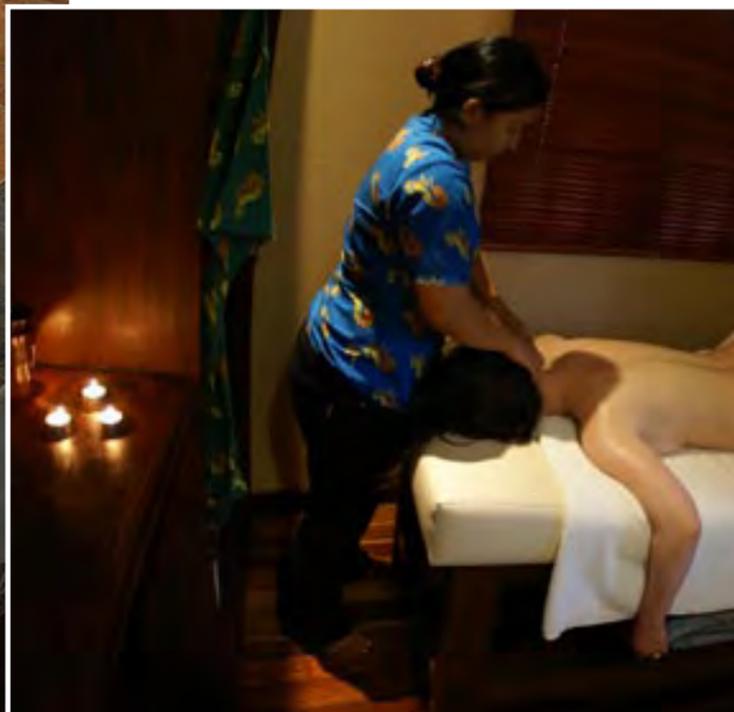
Athletic types who need a more macho excuse for a physical workup can refer to the sports massage as an important and effective tool toward peak performance of the athlete underwater. It works well for world-class footballers and other peak performance athletes on land, so why not divers underwater?

There are many kinds of massage techniques today, developed from traditional sources to sports medicine. Every country around the world has its own

style. Asia is well-known to carry a number of popular massage techniques. Traditional Malaysian massage, com-

plete with its own secret handmade recipes for massage oils, facial masks and aromatherapy, is a form of massage that is new to most Westerners. In Malaysia, it is only offered at the luxurious Ayura Spa of the Berjaya Tioman Beach, Golf & Spa Resort on Tioman Island. The resort has only just introduced the special Malaysian form of massage recently to accompany other more commonly known massage techniques available such as Japanese Shiatsu, Thai and Indonesian massage.

The traditional Malaysian preparations for body oils, facial masks, cleansers and moisturizers are all natural recipes using soothing and deep cleansing lemon grass, ginger and jasmine. Traditional Malaysian massage techniques are passed down through the generations from grandmother to daughter to granddaughter and employ several different techniques for various effects including deep tissue massage with acupressure as well as rhythmic circular motions to reach the sorest areas and induce healthy circulation to wash out toxins that build up with exertion and exercise.



LEFT: Floating tropical flowers fill an aromatherapy tub. INSET: An Indonesian masseuse works out the knots with expert hands



LEFT TO RIGHT: Outdoor jacuzzi and inner sanctum of Ayura Spa; Chilled, fresh ginger tea served on deck; Preparing the massage table for the next client

## Scuba & Spa

to drink lots of fluids in order to wash out the toxins and also to wait an hour before taking a shower. According to the masseuse, one's blood circulation

needed that amount of time to return to harmony before being exposed to cooler temperatures.

A word of warning, the full body massage is exactly that, so women who are squeamish about having their mammary glands handled better speak up before the massage. Then the masseuse will know to skip the pectoral region.

Secondly, not all massage therapists are alike. If you find one you like, be sure to request her or him for your next session. If you ask for a lighter touch, and there is no change, stop the massage or you may end up with a bad headache.

Although most Malaysians are fluent in English, many Indonesians are not so fluent, so be aware of the communication gap and ask for assistance from the spa manager. Headaches may also result from

a sensitivity to ingredients in aromatherapy products. Ask your doctor for advice.

In addition to full body massages, the Ayura Spa offers body wraps including a ginger sea salt scrub for detoxification and improved blood circulation; a coffee and cocoa scrub made from local coffee beans and cocoa, which exfoliates skin—awakening senses and invigorating

spirit with its rich aroma; heated algae seaweed wraps detoxify, tone and purify beyond the deep layers of the skin; a boreh wrap of spices and yoghurt helps reduce water retention, muscle pain and poor circulation; and a tropical fruit wrap made of fresh papaya exfoliates and whitens skin as well as moisturizes with anti-oxidants such as vitamin A and C.

Facials are provided for all skin types from oily to dry—60 to 90 minute treatments include mask preparations made from cucumber, yoghurt and clay, banana and honey, jojoba and sweet almond oil. Treatments will purify congested skin with green clay and essential oils. For hands and feet, there are 45 to 60 minute manicures, pedicures, foot soaks, sea salt scrubs and mini massages. To spend a whole day at the spa, packages of treatments of two to four hours are available and offer a menu of body massages, facials and scrubs from which to choose.

### Social responsibility

So, next time you are wondering what to do with yourself between dives, do your body and your buddy a favor... get a massage. It will help to improve your diving performance and assist the healthy balance of your body's fitness. Your mind will be clearer for the next dive, which can only be an added plus for your buddy who depends on your attentiveness in emergencies. In addition, you will be helping the local economy and the creation of jobs for the indigenous people of the region, especially women, who work hard to give you and the other

guests of the resort the warm hospitality for which Asia is renowned. ■



body working deep into tense muscles, especially my knotted calf muscles, rolling marbles out of my shoulders and in between my shoulder blades, neck and lower spine.

After the deep tissue massage and an Ayura Spa special facial, which included stress relieving micro-massage around the jaw, forehead and eyes, several layers and applications of natural gels and oils, an exfoliating mask, steam mist and a finishing moisturizer, the heavy lead-like feeling of fatigue was washed away, my mind was clear and void of worry, and my previously aching joints felt joyously painless.

After the treatment, the staff served us a fragrant chilled floral ginger tea in traditional clay pottery by the pool. We were advised

### Ayura Spa

The Ayura Spa, managed by a warm and welcoming Malaysian matron, offers 60 to 90-minute massages including heated poultices of aromatic herbs and spices placed upon meridian points along the body to ease joint pains and invigorate sore muscles. Blood circulation is enhanced and stiffness and tension is relieved in the one-hour long deep tissue massage which makes jet lag literally vanish over-night. Relaxing, airy, mystical music of flute, chimes and ocean waves is piped into the comfortable candle lit massage rooms filled with the sweet fragrances of tropical flowers and spices.

After your massage, you can lounge by the outdoor pool located in the sculptural Asian garden of the spa or soak in the pool's bubbling jacuzzi under rustling bamboo trees and gently swaying palms.

Best of all, the price of each massage at the Ayura Spa is a steal compared to the regular rates of luxury spas at other resorts. For just 160 ringgits, that's just 52 USD or 45 EUR, you can get a full body deep tissue massage for 60 minutes. The price is so economical that some guests come to the resort just for the treatments. Many guests will reserve ten packages

of massages, wraps and facials over a period of ten days. When one looks at the inflated costs of health care today, it is certainly a tempting if unorthodox alternative to consider. It cannot replace conventional care, but it might add to good living. I would much rather spend a couple thousand dollars at a spa of a resort that also had diving and snorkeling, delicious local cuisine and treks into the rainforest, than sit under fluorescent lights in a clinic's office and pay out the nose for treatments that either don't work, or offer very little lasting benefit and pain relief, and contribute absolutely no joy to the spirit whatsoever.

### The Massage

A year's worth of corporate stress-induced frown lines were erased from my face after two hours on the table under the careful and expert hands of my masseuse from Indonesia—a member of the local community of developing Tioman Island. The treatment she gave me was a full body deep tissue massage with natural aromatic oils. She used rhythmic and circular palm movements over muscles with gentle firm finger pressure on acupuncture points throughout the



Edited by  
Willy Volk

Flint scrapers from the hunting stone age between 8,000 and 13,000 years ago. These scrapers are from Denmark



PETER SYMES

## Stone Age Settlement Found Under English Channel

Erosion on the floor of the English Channel is revealing the remains of a busy Stone Age settlement from a time when Europe and Britain were still linked by land, a team of archaeologists says.

At 8,000 years old, the settlement found just off the Isle of Wight is the only underwater Mesolithic site in Britain, though it is probably part of a much larger area of occupation yet to be uncovered.

"This is the only site of its kind in the United Kingdom. It is important because this is the period when modern people were blossoming, just coming out of the end of the Ice Age, living more like we do today in the valleys and lowlands," Garry Momber, director of the Hampshire and Wight Trust for Maritime Archaeology, which led the recent excavations told LiveScience in an interview.

As the climate began to warm up near the end of the Ice Age about 10,000 years ago, people were moving into Northern Europe and settling down in the many river valleys left behind by melting glaciers, not long before the meltwater eventually also filled in the Channel and drove the settlement's last occupants north to higher ground.

There is unequivocal evidence of human activity at the site. Burnt

wood fragments gouged with cut marks and a layer of wood chip-pings were found lying under 35 feet of water during the latest dig.

Divers brought the material to the surface still embedded in slabs of the sea floor that were carried up in specially-designed boxes, which were then pieced back together and examined and dated in the lab.

### Underwater sites better preserved

Despite the logistical problems of underwater archaeology, the Isle of Wight site and others like it are usually better preserved than their counterparts on land. When

the floodwater rose slowly in the English Channel, it deposited layers of silt atop the settlement, encasing it in an oxygen-free environment that preserves even organic materials such as wood and food.

The trade-off is an environment that can carry away the precious remains at any time—a real concern at the Isle of Wight settlement.

"The erosion of this site would be a loss of information to humanity, not just the washing away of a bit of material," Momber said. "There is the potential to find so much more there and so much to learn."



From the excavation of the site

HAMPSHIRE AND WIGHT TRUST FOR MARITIME ARCHAEOLOGY

# Oceans of adventure!

**SPOILSPORT = DIVE FREEDOM!**  
The 'Open Deck' policy provides the freedom to dive as much or as little as you want. Solo divers are catered for, Nitrox diving is encouraged.

**FLY DIVE = SPECTACULAR FLIGHT!**  
The Great Barrier Reef flight is exclusive to Mike Ball Dive Expeditions and our 'Fly Dive' itineraries. No other company flies this close to the reef or above your dive sites... only 180 meters!

**SPOILSPORT = 5 STAR SERVICE!**  
Spoilsport is Australia's most awarded liveboard, purpose built for divers by divers.

Geoff Murphy Photograph

Martyn Heyri Photograph

**Mike Ball Dive Expeditions AUSTRALIA**  
t: +61 7 4053 0500  
e: resv@mikeball.com  
**2004 Inductee International Scuba Diving Hall of Fame**

# DIVE with the best!

**Explore the pristine Great Barrier Reef, Ribbon Reefs and remote Coral Sea.**  
Witness close-up shark action with silver-tip sharks, grey reef sharks and the occasional hammerhead. Glide along plummeting walls where schooling pelagics cruise in packs. Experience the world famous Cod Hole where you'll dive with diver size potato cod. Dives are exclusively at the best Great Barrier Reef and Coral Sea sites where the visibility is best. 3, 4 & 7 night itineraries available.

# www.mikeball.com



2006

## DAN Medical Center Annual Diving Report

Fatalities and serious diving injuries are rare and often seem to be associated with unsafe behaviors or hazardous conditions, but they can occur without apparent cause.

Understanding the contributing factors could lead to safer diving. The primary goal of DAN's Annual Report on Decompression Illness, Diving Fatalities and Project Dive Exploration is to further this understanding. ■

Download here:  
[www.diversalertnetwork.org](http://www.diversalertnetwork.org)

## United States, pressrelease: FBI Issues Scuba Industry Alert Over Requests for Specialized Training, "Nefarious Activity"

The purpose of the advisory is to provide situational awareness to the scuba industry regarding behavior that may indicate an individual(s) is involved in nefarious activity.

The following threat indicators, taken in isolation, generally reflect legitimate recreational and commercial activities. In combination with other information, they can indicate possible links to criminal behavior. Please note, the below indicators are not an all inclusive list; these indicators represent a baseline that could possibly indicate suspicious behavior.

### Training Indicators

Requests for specialty training, including odd inquiries that are inconsistent with recreational diving. These may include:

- Requests to dive in murky water or sewer pipes
- Inquiries about procedures such as diver towing

Requests to learn advanced skills associated with combat swimming, including:

- Use of re-breathers and diver propulsion vehicles (DPVs)
- Deep diving
- Conducting kick counts
- Receiving extra navigation training

Requests for advanced diver training by applicants from countries where diving is not a common recreational activity. Similarly, training sponsored by groups or agencies such as religious organizations, cults, associations or charitable agencies not normally associated with diving.

### Potentially Suspicious Equipment Purchases or Rentals

Volume purchasing inquiries related to Swimmer Delivery Vehicles (SDVs) and Diver Propulsion Vehicles (DPVs): SDVs are very expensive vehicles normally used for specialized military purposes, and usually are not available to recreational divers. Efforts to purchase DPVs, the more commonly available civilian counterpart to SDVs, could be associated with extending the range or payload capacity or a combat swimmer team.

### Other Indicators:

- Paying cash for diving instruction
- Refusal or reluctance to provide personal information

Recipients are requested to report suspicious or criminal activity to their local FBI Office. ■

'Nefarious'—what kind of word is that anyway?

### ne far i ous

Pronunciation[ni-fair-ee-uhs]  
-adjective

extremely wicked or villainous; iniquitous: a nefarious plot. [Origin: 1595-1605; < L nefārius wicked, vile, equiv. to nefās offense against divine or moral law (ne- negative prefix + fās law, right) + -ius -ious, with intervocalic s > r]

SOURCE: DICTIONARY.COM



This new website and the work done by TheRebreatherDIR team will prove that it's also possible to do with CCRs. Proper training, thorough planning, equipment selection and adaptation can help the rebreather diver to be a DIR diver. Standardization should help to make simpler and safer dives, avoiding confusion and improving team work and communication, especially when problems occur.

All RebreatherDIR Active members and Instructors work on CCR gear and procedures standardization. Based on some extensive cave and wreck explorations, and physiological studies, they try to adapt the most current thoughts in decompression into Rebreather diving. It is also a goal to help rebreather divers to improve their personal skills and techniques through articles, DVDs, manuals and specific Workshops.

*RebreatherDIR is not a training agency.* TheRebreatherDIR team is made of experienced and active Rebreather explorers and instructors who share the same goal: implementing the DIR Philosophy into Rebreather diving.

If you want to fully understand what it is about, download: "10 questions about DIRrebreather"

To support or join, please visit the **Membership page** Or contact **by email** (link) ■

### DIR

The Doing It Right (DIR) philosophy can apply to a lot of things. In diving, it means having:

- \* The right Mindset
- \* The right Equipment
- \* The right Procedures
- ... and the right Team!

By applying this set of rules and techniques, divers have explored caves, wrecks and reefs in various environment all over the world, with impressive safety records.

### Why Diving DIR ?

How many times did you see rebreather divers with poor diving skills, bad propulsion techniques and unefficient buoyancy control?

Their rebreather is far from streamlined and their gear configuration can easily be improved.

The procedures they follow are complex and different for each diver, even within the same team.

And everything becomes even more difficult in case of emergency or rescue...

An impressive work has already been done by the WKPP members and GUE Instructors in order to adapt the DIR Philosophy to the Halcyon RB80 Semi-Closed Rebreather. But many people think that Closed-Circuit Rebreathers "can't be DIR".

"DIR Diving with a Closed-Circuit Rebreather? Impossible!"

Not so! ■



Mares 2007 Collection.  
The most wanted.  
[www.mares.com](http://www.mares.com)

**mares**  
just  
add  
water



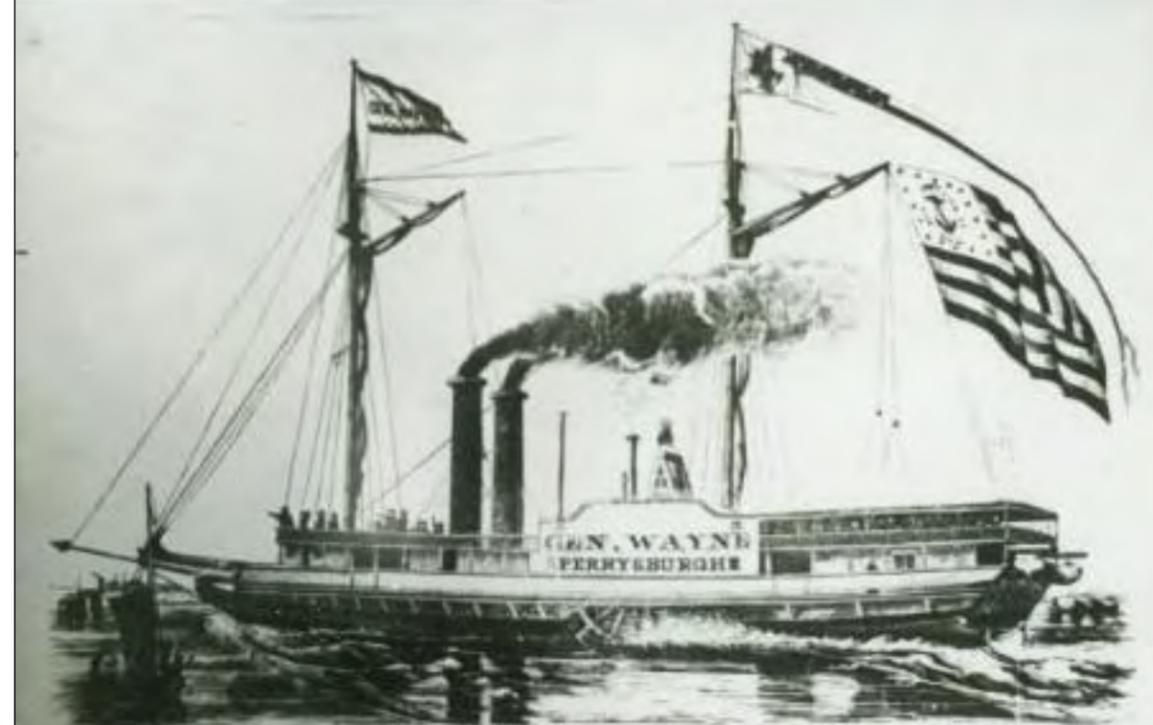
For more information on the wrecks, visit:  
[www.clueshipwrecks.org/Anthony-Wayne.html](http://www.clueshipwrecks.org/Anthony-Wayne.html)  
[www.inlandseas.org/press.html](http://www.inlandseas.org/press.html)

The 156-foot steamship *Anthony Wayne* had 93 people aboard, as well as live stock and barrels of wine. It is believed that 38 people were killed because the boilers exploded and the ship sank. The vessel was built in 1837 and rebuilt in 1849. The ship had left Sandusky heading for Cleveland in the early morning of April 27th, 1850

## The Anthony Wayne, Lake Erie

# THE GHOST SHIPS OF THE GREAT LAKES

GREAT LAKES HISTORICAL SOCIETY



The stormy waters of the Great Lakes have been feared among sailors since times immemorable. Many are the ships that have foundered here never to be found again. The tales about the Great Lakes lost ships tells stories about ghost ships sailing the

waters, looking for salvation and as years went by reported sightings kept the myth about the phantom ships alive. And once in a while one of them is actually found.

Text by Millis Keegan. Images: Tom Kowalczyk

Not too long ago, one of the lost ships of the Great Lakes was found. Tom Kowalczyk of Cleveland Underwater Explorers (CLUE), recently located the shipwreck of the *Anthony Wayne* in Lake Erie.

He got the first indication of the find in September 2006, during a sonar search in an area where the ship most likely had sunk according to historic records. When the monitor suddenly showed a shadow indicating something that might be

the ship, he was very excited, but had to wait until after the winter to dive. It must have been a long winter, which he confirms:

"Yes, waiting eight months to dive is kinda like preparing for a baby," he grins, "especially when it appears to be such a significant find. I looked at the sonar images so many times I had the actual wreck layout memorized. When I first dove, it was 'yep, this is the shaft I saw in the image'. Like I had already

been there."

Waiting for spring, Tom and other members of CLUE contacted the Cleveland Group and the Great Lakes Historical Society and did more research. The *Anthony Wayne* is believed to be the oldest steamboat wreck in the lake, and the first dives confirmed that the wreck was indeed a side wheel passenger steamboat. Several parts of the ship matched the historical description of the *General Anthony Wayne*.

The remains of the steamboat lies in 50 feet of water about eight miles off shore, but the diving conditions are a bit harsh:

"Visibility was still only about three to five feet, far from ideal conditions."

### Confirmation

I asked Kowalczyk if it had been confirmed that the wreck is the *Wayne*, and he replied:

"The most compelling evi-

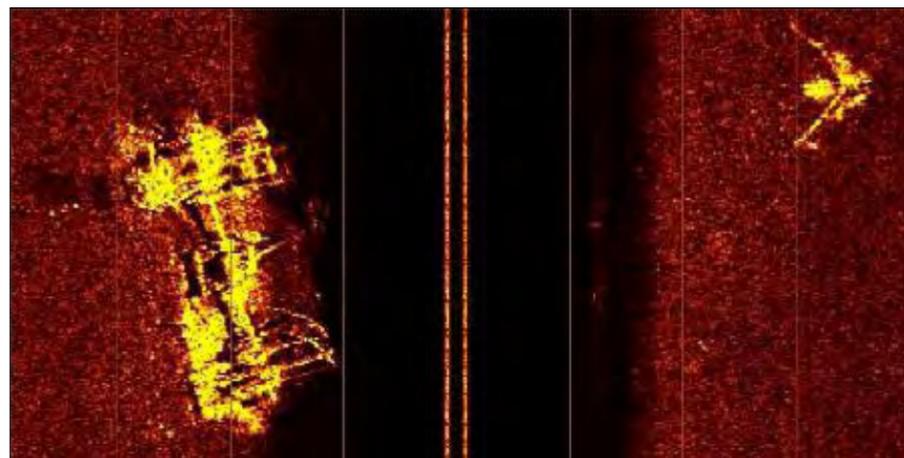
dence for identification is the dimensional confirmations of the vessel beam and the size of the paddle wheels. These are consistent with the known dimension of the *Wayne*. Other items, layout and length all reinforce the finding. Since the *Anthony Wayne* was the *only* side wheeler sunk in this location, and nothing found contradicts the facts, we are as certain as anyone could be without absolute evidence."

Kowalczyk also tells us that they, during the most recent dives, have located the bow of this wreck, which is of a very unusual construction.

"Being one of the oldest side wheel steamboats sunk in Lake Erie, this has been a very historic discovery. We think there is much to learn from this shipwreck concerning early design and construction of Great Lakes steamboats." ■



The bow is of a very unusual construction, and will possibly help with the identification of *Anthony Wayne*



# wreck rap



Straits of Mackinac is located right at the junction of the US Great Lakes



The *Sandusky* was a schooner rig



## Popular wrecks in the Mackinac Shipwreck Preserve

If cool water doesn't bother you and you are keen on wrecks, you are in for a treat if you are heading to the US Great Lakes. Between Lake Michigan and Lake Huron, you will find the Straits of Mackinac Underwater Preserve, an underwater wreck park with impressive variety of wreckages dating back centuries.

Text by Millis Keegan  
Photos by Cliff Roberts

Most of the wrecks in the preserve sank during the 19th century and offer a great look into maritime history from that era. Some can be reached from the shore, others require a boat. The visibility ranges from two to 70 feet, and there is often a current. All major dive sites are bouyed, and on the buoys is posted information about the wreck below. On the webpage, GPS coordinates for a number of wrecks in the area are listed. There is also excellent shore diving in the harbor of St Ignace where all sorts of artifacts have been tossed in the water throughout history.

Larry Sanders with the Mackinac Shipwreck Preserve Association said: "If I had to choose, I recommend the *William Young*, a

virgin wreck just discovered five or six years ago. The *Sandusky*, is a schooner rig, which is rare on the lakes, sports a figurehead, which is also rare, and is the oldest known wreck in the preserve. The *Cedarville* is a 660-foot steel freighter lost in a fog collision in 1965—the third largest on the lakes (after the *Fitz* and *Carl D. Bradley*) and the only one within recreational limits (60 to 120 feet)—and the *Eber Ward*, a very well preserved wood freighter lost to ice in April 1909. It has an uncommon mushroom anchor.

"There are a few deeper wrecks that go beyond recreational limits. Diving the *Ward*, for example, pushes the recreational limits. The local dive charter will not take divers, even tech ones, there." ■



### The *William H. Barnum*

An early season storm sank this wreck, and it went down with a load of grain during the first trip of the season in 1894. The wreck rests in about 68 feet of water.

### The *Sandusky*

The oldest shipwreck found in the strait. Built in Ohio, This 110-foot sailing vessel stands upright on the bottom, about 90 feet down, and is in very good condition. Divers will find two masts and a square stern, and a few other things that will make the dive interesting.

### The *C.H. Johnson*

An easy shore dive, the wreck rests in up to 15 feet of water and is in a good location when the weather is a bit up and down. The schooner *C.H. Johnson* ran aground in 1895 in a storm. The cargo was large sandstone blocks, and those can be found on the dive site along with a number of small artefacts. An interesting dive when the visibility cooperates. ■

SOURCE: WWW.MICHIGANPRESERVES.ORG

## Straits of Mackinac Shipwreck Preserve

# THE GHOST SHIPS OF THE GREAT LAKES

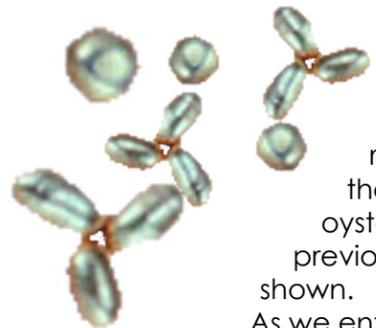
# Pearls

## Thousands of pearls found off the Keys

Text and photos by Millis Keegan

**It was just laying there, on the bottom of the sea—a rather plain little lead box, which could have been easy to miss had the circumstances been different. It was found during the excavation of the *Santa Margarita* wreck site from the 1622 galleon fleet, the fleet that the more well known treasure ship, *Atocha*, belonged to.**

The very unpretentious little box held an amazing treasure—thousands and thousands of pearls in all sizes. The smaller ones no bigger than three millimeters in diameter, the largest almost two centimeters. What surprised everyone is that they were in extremely good shape. Pearls don't han-



dle salt water very well, once they are removed from their protective oyster shell, which previous finds have shown.

As we entered the busy room, back stage at Mel Fisher's museum, we could sense the excitement. Duncan Mathewson, marine archeologist, sat bent over his desk, sizing pearls. The desk was covered with pearls. He had come a long way, but there were still hundreds if not thousands left on the table to sort. He stretched and looked at us with a slightly bewildered who-the-hell-are-you expression on his face. We could tell that he was well into his task.

I introduced myself: "Millis Keegan, X-RAY MAG... so, you are counting pearls today? How's your back doing? Must

be tough sitting like that for hours."

A nod, and then introductions all around, and we got a chance to get up close to the pearls. They came in all sizes and colors, some of them seemed no bigger than a grain of sand. They were beautiful! Today, was the day for which the counting of the pearls was scheduled, hence, the excitement and, at the same time, the tedious and most likely boring job of sorting them by size and color.

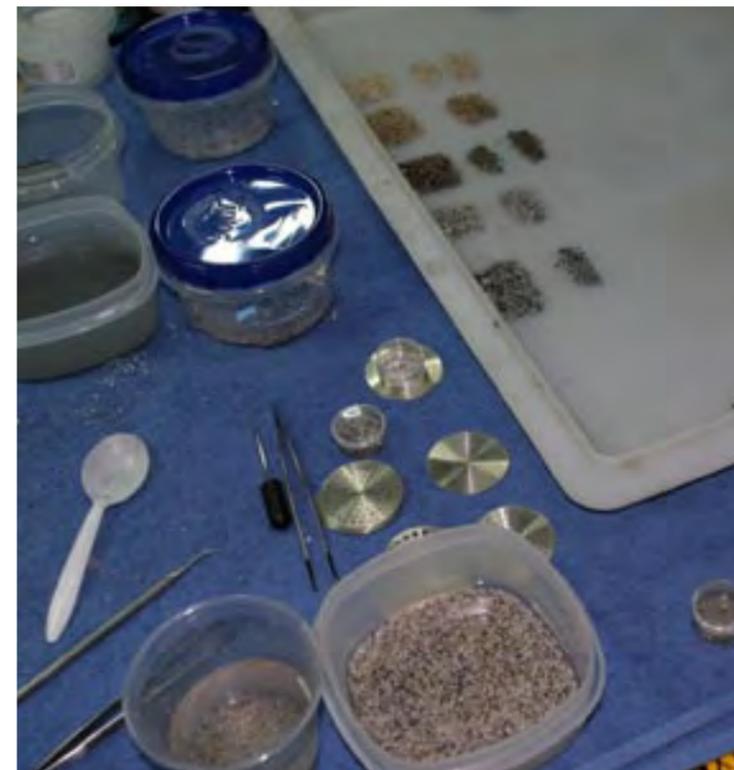
This is a rare find. The pearls are antique, and they are in good shape. The reason for that is the little lead box and that silt had made it into the box. That protected them all the way from 1622 until 2007. The shine is incredible, as they lay there on the white plate on the desk. A curious mind wonders, what they're worth?

There is no way we will know the value until they have been preserved" says Mathewson, "but there is no question, these pearls are worth a fortune." Then the curious mind wonders, what happens next?

After the sorting, they will be registered, preserved and photographed right here on the premises in the archeology laboratory. ■



Duncan Mathewson shows us the big pearl. It still has luster after all those years in salt water. It is a truly amazing find



Some of the pearls was small as a grain. On the table you can see the disc tools used for sizing the pearls.

## Odyssey Marine Exploration and Spain at loggerheads

Following our report on Odyssey Marine Exploration's recovery of artifacts from a wreck named the "Black Swan" the Spanish authorities detained the ship in the Spanish port of Algeciras. According to a press release by Odyssey the search and detention was apparently conducted as a result of a court order to look for evidence that Odyssey's recent "Black Swan" discovery was made in Spanish waters. Odyssey has repeatedly stated that the "Black Swan" recovery was conducted in the Atlantic Ocean outside of any country's territorial waters or contiguous zone.

Odyssey Marine Exploration, Inc.'s survey vessel, the *Ocean Alert*, was cleared for departure by the Spanish Guardia Civil on Saturday, July 14th.

Later, Odyssey Marine Exploration filed complaints in the Admiralty arrest cases seeking compensation for losses sustained through Spain's recent actions obstructing Odyssey's ability to conduct operations. Odyssey is seeking not only relief in the form of a set-off of any award Spain may ultimately receive on any shipwreck, but also affirmative relief for damages caused by Spain's interference with Odyssey's rights to all three sites.

The Motions for Protective Order were filed to keep the preliminary site assessments under court seal to protect the security of the sites and to protect Odyssey's proprietary sources and methods from competitors. ■

### Mexico

Wooden items shaped as lightning bolts were found by diving archaeologists in Mexico. The wooden lightning bolts are believed to be offerings, made 500 years ago, in rites performed by Aztecs priests to bring rain. They were found in a lake in an extinct volcano, Nevadade Toluca. ■



## wreck rap



Kormoran



HMAS Sydney



## Has the HMAS Sydney finally been found?

The HMAS Sydney was lost November 1941 after a battle against the German raider *Kormoran* off the coast of Western Australia. The engagement resulted in the loss of the Sydney's entire crew of 645. The wreck has never been found. But now, a team of amateur researchers claim to have located it in 150 metres of water off Dirk Hartog Island near Carnarvon. Former deputy prime minister Tim Fischer, a patron of the Finding Sydney Foundation, says, despite a number of false leads in the past, this one seems to have substance.

### Experts doubt HMAS 'Sydney' found

Defence Minister Brendan Nelson says while the results so far are encouraging, no one can be certain until the Navy has conducted a survey of the wreck.

Reports about steam pipes on the deck has cast doubt on the identity of the wreck. Sydney would not have had any steam pipes anywhere near the deck, a merchant ship could, to work its hoisting gear, but not a warship. The group who found the vessel says if it is not the Sydney, then it is probably the German ship that sank it, the *Kormoran*.

Archaeology curator of the WA Maritime Museum, Dr Mike McCarthy, says the find is still cause for congratulations.

### Other clues

The *Kormoran's* Commanding Officer, Theodor Detmers, recorded his account of the battle in an encoded message in a dictionary.

Retired Captain Peter Hore has deciphered the code and says it will lead searchers to the site of the *Kormoran*. "Once we've es-

tablished a datum by finding the wreck of the *Kormoran*, then from there we can go south and go and search for Sydney."

### Looters

Meanwhile there is concern for international privateers and relic hunters who will seek to profit from the wreck of the warship HMAS Sydney. Former Western Australian MP, Philip Pental, chaired a select committee into shipwrecks off the WA coast and says that the federal government must move to authenticate and protect the site.

"We've seen an appalling list of cases in the past 50 years where the finders of important shipwrecks have been treated badly, and I don't think we have to have that repeated," he said. ■

SOURCES: ABC, AUSTRALIAN MINISTRY OF DEFENCE

## NEW! OMS® Ultra Bright Head Lamp

## and VEGA®



The Ultra Bright 3 W LED Head Lamp and the VEGA® flashlight introduced by OMS® are two of the brightest 3W LED luminaries in the world with over 80 lumens output! Both have a burn time of 3 hours (using CR-123A batteries) and incorporate redundant O-Rings for a depth rating to 100 meters. The headlamp can be mounted on a helmet (helmet and hardware not supplied) placed on your Hood (band supplied) on your head (band supplied), used as a Goodman light (strap supplied) or even mounted to your chest strap (band supplied). Best of all both are competitively priced. Visit your local authorized OMS® dealer for a demonstration.



L191 3W LED VEGA Flashlight



## Ocean Management Systems

P.O. Box 146 Montgomery, NY 12549

Phone 845.692.3600 ~ Fax 845.692.3623 ~ [www.omsdive.com](http://www.omsdive.com)



Edited by Peter & Gunild Symes



## Sad Times in Galapagos and Ecuador

# Chaos ensues as Galápagos National Park shuts out dive operators —while ban on shark finning is lifted

Valid permits held only by *Aggressor I and II, Sky Dancer* liveaboards. All other operators on stand-by pending a review.

On Tuesday, July 10, 2007, the director of the Galapagos National Park (GNP) began the first in a series of stringent enforcement efforts by suspending dive trips operated by tour companies not in possession of the appropriate permits according to a statement issued by the GNP. The Galapagos National Park is enforcing current legislation which requires that tour operators have a specific diving permit to run dive charters inside the Galapagos Marine Reserve (GMR) and Park. Previously, many operators have carried out dive tourism with only a land tour permit.

In essence, this has closed down all the dive operations there but those of the *Aggressor* and *Sky Dancer* liveaboards. Consequently, tour operators and travel agents had to issue a massive amount of cancellations on trips that were already booked.

### Cupos and Patentes

The issue at hand seems to be that there is no such thing as a formal dive permit. It doesn't exist. Operators need two sets of documents: A *cupo* is a document that gives the owner the right to operate a tourist yacht in Galapagos. This is tied to the owner not the actual yacht and can be transferred to a new yacht. It is said that only 80

cupos exist, and no new ones have been issued since the 1970s.

A *patente* certifies that a yacht is safe to operate and must be renewed annually. It requires a *cupo* to get a *patente*. The *patentes* also list the itinerary the yacht is allowed to operate without asking for additional permission from the GNP. This includes land activities but diving, as such, is not included on any *patente*.

Why does there seem to be an exception in regards to the *Sky Dancer* and the *Aggressors* who run dive trips on their *patentes*? They don't have any land visits. Their standard itinerary includes the islands of Darwin and Wolf where no one is ever allowed to go to shore.

### Shark finning

News is seeping in from Ecuador that a campaign is under way to save the shark population of Galapagos and Ecuador, now seriously threatened by recent lifting of a government ban on "Shark Finning", which allows fishermen to export shark fins as long as the shark was caught by accident.

The Galapagos' species-rich waters are an easy target for fisheries. As anyone who has ever dived these waters will tell you, they have the largest population of sharks of

almost any place on Earth. Shark fishing is still banned in Galapagos, but they have little or no power to stop the mainland fishing fleets from sailing to Darwin and Wolf—the most isolated and northerly islands, where there are no patrols, no rangers and now only three dive boats that can keep an eye on these fragile waters.

The first week after the lifting of the ban, the authorities seized more than two tons of shark fins, but because of the new law, they were forced to release the perpetrators and their catch—which was soon on its way out of Ecuador to lucrative markets all over the world, where each fin can fetch US\$100 or more.

Half of the 29 species of sharks that call these waters home are considered threatened. It is estimated that 80 percent of Ecuador's shark fins come from the islands. The government recently lifted the ban, announcing it would allow export fins from sharks that were "accidentally" caught in the process of fishing for other species. They have now written that into law, basically declaring "open season" on sharks. ■



FILEPHOTO: JASON HELLER

Galápagos and Niokolo-Koba National Park inscribed on UNESCO's List of World Heritage in Danger

Dominic Macan of Dive Advice contributed to this report. Information was current as of the time we went to press. Please note that the circumstances around the Galapagos may change on short notice



Filephoto from www.thorfinn.net

## SS Thorfinn goes down on Pohnpei's Reef

### Liability issues and bad weather hampered salvage operation

On June 8, the renowned live-aboard *SS Thorfinn* struck the outer reef next to the Main Passage in PNI harbor in Saipan as it was exiting. *Thorfinn* was designed as an icebreaking whaler for operations in the Arctic. Despite the extremely heavy construction for those duties, the reef tore a hole in the wall of the engine room and the ship began taking on water.

Captain Higgs said that he then had no other options than to ground the *Thorfinn* on the reef to avoid sinking in the channel and causing a worse problem than currently existed. Considering its load of over 80,000 gallons of waste oil that is essentially the consistency of diesel fuel, which it uses to fire its boilers, it's a significant problem indeed.

As this issue went to press, there was no mention of the event on www.thorfinn.net nor have we been successful in obtaining a comment from *Thorfinn's* operators. ■

**LOOKING FOR A LIVE-ABOARD?** 

VISIT [www.LIVEABOARDList.com](http://www.LIVEABOARDList.com)



• Dozens of destinations •  
• Hundreds of boat sailings •  
• Find your ideal trip! •

Live-aboards in EGYPT, SUDAN, THAILAND, SEYHELLES, MALDIVES, BAHAMAS, KENYA.



[www.liveaboardList.com](http://www.liveaboardList.com)  
T: 020 8398 0505 (UK)



Edited by  
Peter Symes

## 15 years of diving with Emperor Divers

To celebrate 15 years as one of the Red Sea's leading dive centres and liveaboard operators, Emperor Divers will be offering guests 15th Anniversary Special Offers from this October and throughout 2008.

With an environmentally focused vision to the next 15 years, the company has recently joined in a unique partnership with the conservation group, ReefCI, to provide valuable research and conservation projects to help protect the Red Sea's marine eco-system.

Throughout the 15th Anniversary year, promotions and special giveaways are planned along with a fabulous chance to win a luxurious liveaboard holiday at the NEC Dive Show (in Birmingham, UK). ■



## Turkey's getting into attracting divers

### Species numbers increasing at Gökçeada Underwater Park

After designating the three-mile area as a protected sea zone in Gökçeada ten years ago, a hunting and fishing ban was put into force. Fish species have since increased from the previous 60 to over 100, and numbers are expected to increase further. Dolphins, seals and whales now visit the area, too. There are over 100 species of algae as well.

Gökçeada Park is the first pro-

TECTED sea zone in Turkey, and the success is aiding the preparations for proclaiming the areas of Foça and Bozyazı as protected sea zones as well. Increasing protection would continue and focus would be directed to the habitats of Mediterranean seals. ■

### Take a virtual underwater tour in Bodrum [\(click here\)](#)

One of the notable underwater museums of the world, the Bodrum Museum of Underwater Archaeology can now be **visited via the Internet.**

**MALUKU DIVERS**  
Dive the final frontier  
AMBON • SAPARUA • NUSA LAUT • PULAU TIGA

[www.divingmaluku.com](http://www.divingmaluku.com)      [info@divingmaluku.com](mailto:info@divingmaluku.com)

Via Press Release

## Underwater Spa in the Maldives



Looks nice, huh? Promotional photo from [huvafenfushi.com](http://huvafenfushi.com)

Huvafen Fushi takes the world's first underwater treatment rooms to new depths.

The ground-breaking underwater spa treatment rooms at Huvafen Fushi, the most spectacular island-chic resort in the Maldives, have undergone an innovative transformation that takes cutting-edge cool to another level.

Masterminded by the award-winning British designer and architect Richard Hywel Evans, the two underwater

treatment areas have been completely reinvented, with the addition of a separate relaxation pod where post-treatment guests can relax on an oversized day bed and enjoy the sublime surroundings.

"We wanted to create an interior that was in keeping with the spa's position at the bottom of the sea! The underwater spa has always been a sensational concept and the new interior was designed

to reflect and amplify this extraordinary environment; one of our main challenges was dividing the space into three separate areas using room dividers that could disappear, unifying the space so that it could be used for a variety of functions including 'underwater' wedding ceremonies. The underwater spa is now truly the world's most unique spa experience," says Hywel Evans. ■

## Diving the Caspian Sea coming up next?

Turkmenistan announced plans to spend €1.3 billion and seek additional foreign investment to build a major tourist resort on the Caspian Sea.

The Caspian Sea holds great numbers of sturgeon, which yield eggs that are processed into caviar. In recent years overfishing has threatened the sturgeon population to the point that environmentalists advocate banning sturgeon fishing completely until the population recovers.

There are several species of fish endemic to the Caspian sea, including Kutum (also known as Caspian White Fish), Caspian Roach, Bream, and a species of salmon. Caspian Salmon is critically endangered. Also, the Caspian Seal is endemic to the Caspian Sea, It is one of very few seal species living in inland waters. ■



JACQUES DESCLOITRES, MODIS LAND RAPID RESPONSE TEAM, NASA/GSFC

# The invasion of the Jellyfish

## What to do?



### Use them for cosmetics, foods or drugs

Akiko Masuda of the Institute of Physical and Chemical Research in Saitama and colleagues have extracted a previously unknown glycoprotein—a repeating sequence of amino acids with sugars attached—from jellyfish. The compound is a type of mucin, a gelatinous, moisture-retaining substance secreted by animals (it's a main component of human saliva and mucus, for instance), and it could find uses in cosmetics as a food additive or in drug manufacturing. Since jellyfish mucin has a simpler structure than some other mucins, it may be usable as a building block for creating custom-tailored mucins with antibiotic or other specific properties.

The researchers, who reported their findings in *The Journal of Natural Products*, extracted the mucin from several species including the moon jellyfish (*Aurelia aurita*, one of the most abundant in the world) and *Nemopilema nomurai*, one of the biggest, at up to six feet in diameter and 450 pounds. They found that the mucin made up as much as three percent of the dry weight of jellyfish. So, there is an awful lot of mucin in the world as well.

**Booming jellyfish populations have become a real nuisance in many parts of the world as masses of the gooey creature are infesting waters, clogging ports and washing up on beaches in the Mediterranean, Japan and Australia. So what to do about it? As several groups of researchers have found, perhaps we can use them—for food or cosmetics. To weird? Think again...**



### ... or eat them

According to one of Brisbane's famous chefs, Lien Yeomans, there are several great dishes based on cooked jellyfish coming out of the Vietnamese kitchen.

The two species of jellyfish that are used for eating are the Sua ro - Bizen Karuga (*Rhopilema esculenta*) and the Sua sen (*Aurelia aurita*). Usually, only the top part of the jellyfish is used, and it is sold dried and salted. It is then soaked in cold water and cut into little strips. When put into boiling water, they curl up, and then you make a salad dish to go with it.

#### Vietnamese Jellyfish Salad (nom sua or goi sua).

Serves four

- 200g salted jellyfish
  - 1 green cucumber
  - 1 large carrot
  - ¼ cup sugar
  - 50ml fish sauce
  - 50ml lemon juice
  - 1 tspn finely chopped hot chilli
  - 2tbspn crushed roasted peanuts
  - 2tbspns crushed roasted sesame seed
  - 100g chicken breast
  - 100g pork butt
  - 2 eggs beaten
  - 2tbspns chopped coriander leaves
1. Wash, soak and



rinse jelly fish in cold water. Drain well, roll up into a tight roll and cut into thin strips. Blanch in boiling water for 15 seconds (until the jellyfish strips curl up). Leave aside.

2. Wash cucumber, cut into quarters lengthwise, seeded and cut into very thin diagonal strips, sprinkled with ½ sugar. Leave until sugar dissolves then squeeze dry.
3. Peel and shred carrot, sprinkle with the rest of the sugar. Leave until sugar dissolves, then squeeze dry.
4. Cut chicken and pork into thin slices, shallow fry; then cut into thin strips.
5. Grease a non-stick pan; make a thin omelette with beaten eggs. Let cool then roll up and cut into thin strips.
6. Mix prepared jellyfish, cucumber and carrot with fish sauce, lemon juice, chilli, crushed sesame seed and peanut and arrange the mixture on a platter and top with strips of chicken, pork, omelette and coriander leaves.
7. Mix well before serving. Adjust taste to achieve a balance of sweet, sour, salty, spicy and nutty.

*"It's a very popular dish in spring and summer. It's delicious and most people would like it if they didn't know what it was!"*

#### Marinated jellyfish with green apple dressing

Serves four

- 400g salted jellyfish
  - 1tbspn chilli oil
  - 1 tspn toasted sesame seeds
  - 1 tspn sea salt
  - Juice of 2 green apples
  - Juice of 1 lime
  - 1 tspn sugar
  - 1 red Spanish onion, cut into thin slices
  - 100g snow peas cut into thin strips diagonally
  - Coriander leaves, chopped
1. Wash, soak and rinse salted jellyfish. Drain well. Mix jellyfish with chilli oil, salt and sesame seed.
  2. Mix apple juice, sugar and lime juice.
  3. Mix snow peas and red onions; arrange this on a plate and top with jellyfish and coriander. Dress with apple and limejuice.

A little more Googlin' also brought to light the following recipe, which has to be credited to a Kim McFarland: [\(link to website\)](#)

Bon Appétit! ■

SOURCE: ABC BRISBANE

## Security and Comfort

Now you can have BOTH!

NEW HI-FLOW MODEL NOW AVAILABLE



SeaCure™ Custom Mouthpiece is moldable and remoldable.

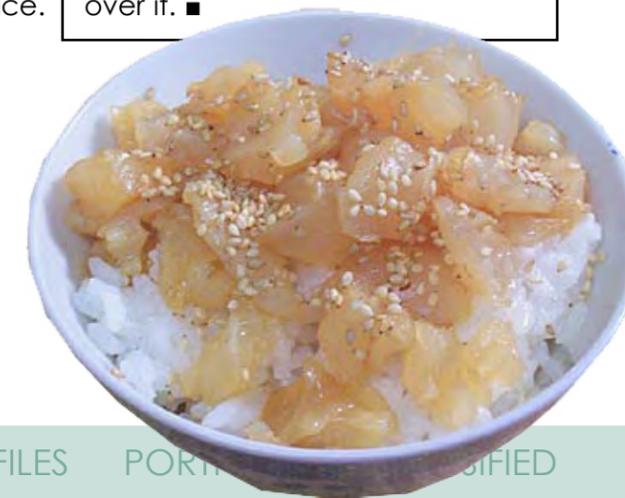
Created by an orthodontist, SeaCure is designed to fit your mouth, teeth, and gums . . . PERFECTLY.

Available at your local dive center.



#### Sesame Jellyfish Donburi

Soak the jellyfish in cold water for three hours, changing the water at half-hour intervals, to diffuse the salt out. Then soak it in hot water for 5 minutes and cool in cold water immediately. Tear the jellyfish into bite-sized pieces. Mix 2 teaspoons of soy sauce, 3 tablespoons of sesame oil, 2 teaspoons of rice vinegar, and 2 teaspoons of sugar. Soak the jellyfish in this for a half hour, then serve it over hot rice and shake sesame seeds over it. ■



Edited by Peter Symes



JAMES GATHANY, CDC

Larvae of Culex Mosquitoes. As seen on the picture, larvae make dense groups in standing water

# Tilapia combats Malaria

**Kenyan researchers have found that the humble tilapia, a fish commonly seen on the Kenyan dinner tables is highly effective in combating malarial mosquitos in stagnant waters.**

In a study published in BMC Public Health, an open access journal, tilapia was introduced into aban-

doned fish ponds at an altitude of 1,880m and the effect measured over six months on the numbers of mosquito immatures.

By consuming mosquito larvae the fish managed to reduce numbers of two of the main malarial mosquitoes by more than 94 percnt. Nile tilapia's taste for mosquitos has been known since 1917, but this is the first time field data has been published detail-

ing their use in mosquito control. The BMC Public Health study noted the fish could prove critical as mosquitoes are becoming resistant to pesticides.

The authors suggested that for Kenyans, the fish could prove a win-win investment. In addition to limiting mosquito populations, they could also be used for food, and even generate income, too. There should be no problem with acceptance of this malaria control method, since the local communities already farm this fish species.

This species, already a popular food fish in western Kenya, is an apparently sustainable mosquito control tool, which also offers a source of protein and income to people in rural areas.

Joanne Greenfield, malaria

advisor for the World Health Organization in Kenya, was, according to BBC news, more circumspect, while describing the findings as "positive".

"This method may well work in a defined area of water, but mosquitoes spread in all sorts of places—including small pools in the mud and puddles—where you obviously can't introduce fish," she said. "It just wouldn't work for many areas."

But she added: "We recommend a spectrum of methods to combat malaria, and this could certainly be a useful tool." ■

SOURCES: BIOMED CENTRAL, BBC

## SEA EXPLORERS PHILIPPINES

### 1 DIVE COMPANY, 6 TOP SPOTS!

- ALONA BEACH • CABILAO ISLAND • DAUIN-DUMAGUETE •
- MALAPASCUA ISLAND • SIQUIJOR ISLAND - MOALBOAL •





TRY OUR FAMOUS ISLAND HOPPING. EXPLORE IN SMALL GROUPS THE AMAZING UNDERWATER WORLD. FROM MANTA TO MANDARIN FISH, FROM THRESHER SHARK TO THORNY SEAHORSE!





YOUR GATEWAY TO GREAT DIVING:

**Sea Explorers Head Office**  
 #36 Archbishop Reyes Avenue, Knights of Columbus Square,  
 Cebu City 6000, Philippines  
 Tel. No: +63 (32) 234 0248, Tel/Fax No: +63 (32) 234 0245  
 cebu@sea-explorers.com www.sea-explorers.com  
 Member of Quality Divers www.quality-divers.com



PETER SYMES

# “The Socorro Islands”

## *Mexico’s Revillagigedos Archipelago*

Text and photos by Barb Roy

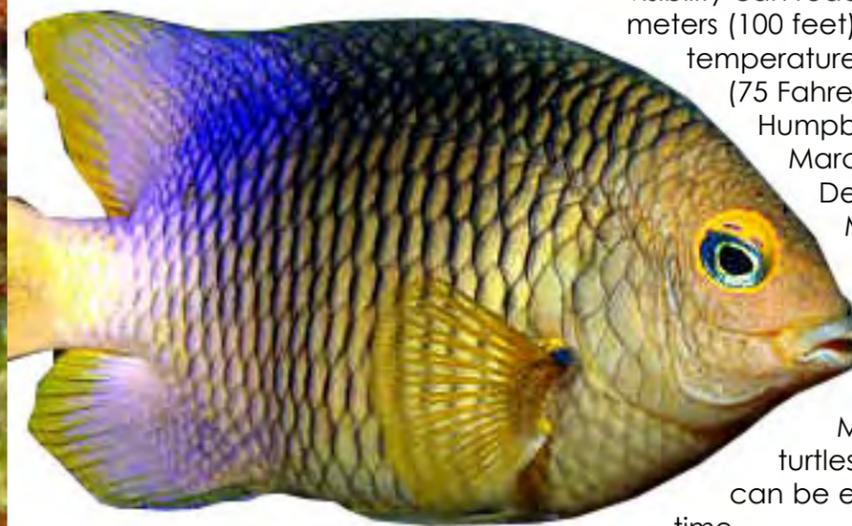
Located 386km (250 miles) southwest of the tip of Baja California and over 720km (446 miles) west of Manzanillo, the Revillagigedos are one of three Mexican island groups in the Pacific Ocean. All four islands that make up the Revillagigedos Archipelago are remote, volcanic in origin and offer some of the most unpredictable, wild diving in the world. Isla Socorro is the largest of the Revillagigedos islands. Over the years, visitors have adopted the name—“The Socorro Islands”—when referring to this group. Depending on the time of year and which island you visit, a diver might encounter the graceful splendor of a humpback whale and her calf or be able to swim alongside a gargantuan whale shark. These wondrous creatures are all in addition to the archipelago’s regular residents: giant Pacific mantas, hammerhead sharks, yellowfin tuna, sea turtles, over five other species of sharks and countless other large pelagics who utilize this offshore area.





CLOCKWISE FROM FAR LEFT: Brilliant coloured gorgonians grace the reef at Socorro Island; Slipper lobster; Octopus; Neon coloured reef fish. PREVIOUS PAGE: *Nautilus Explorer* liveaboard heads toward a dive site at Roca Partida in the Revillagigedos Archipelago

Topside, the islands are completely different in appearance and are home to many endemic plant and animal species. Overall, the area is recognized as a distinct terrestrial eco-region, which is part of the Neotropic ecozone (tropical and subtropical



dry broadleaf forests). Below the azure blue coloured water, ancient volcanic

activity has created a rugged terrain of reefs, overhangs, walls and unusual topography.

Diving at the Revillagigedos is done from November through early May when the water is generally calm and visibility can reach an impressive 30 meters (100 feet) plus! Cooler water temperatures of 23 degrees Celsius (75 Fahrenheit) seem to attract Humpbacks in February and March, while November, December and late April-May appear to be good for whale sharks. Pods of bottlenose dolphins are commonly seen from January through March. Mantas, sharks, turtles and schools of Jacks can be enjoyed almost any-time.

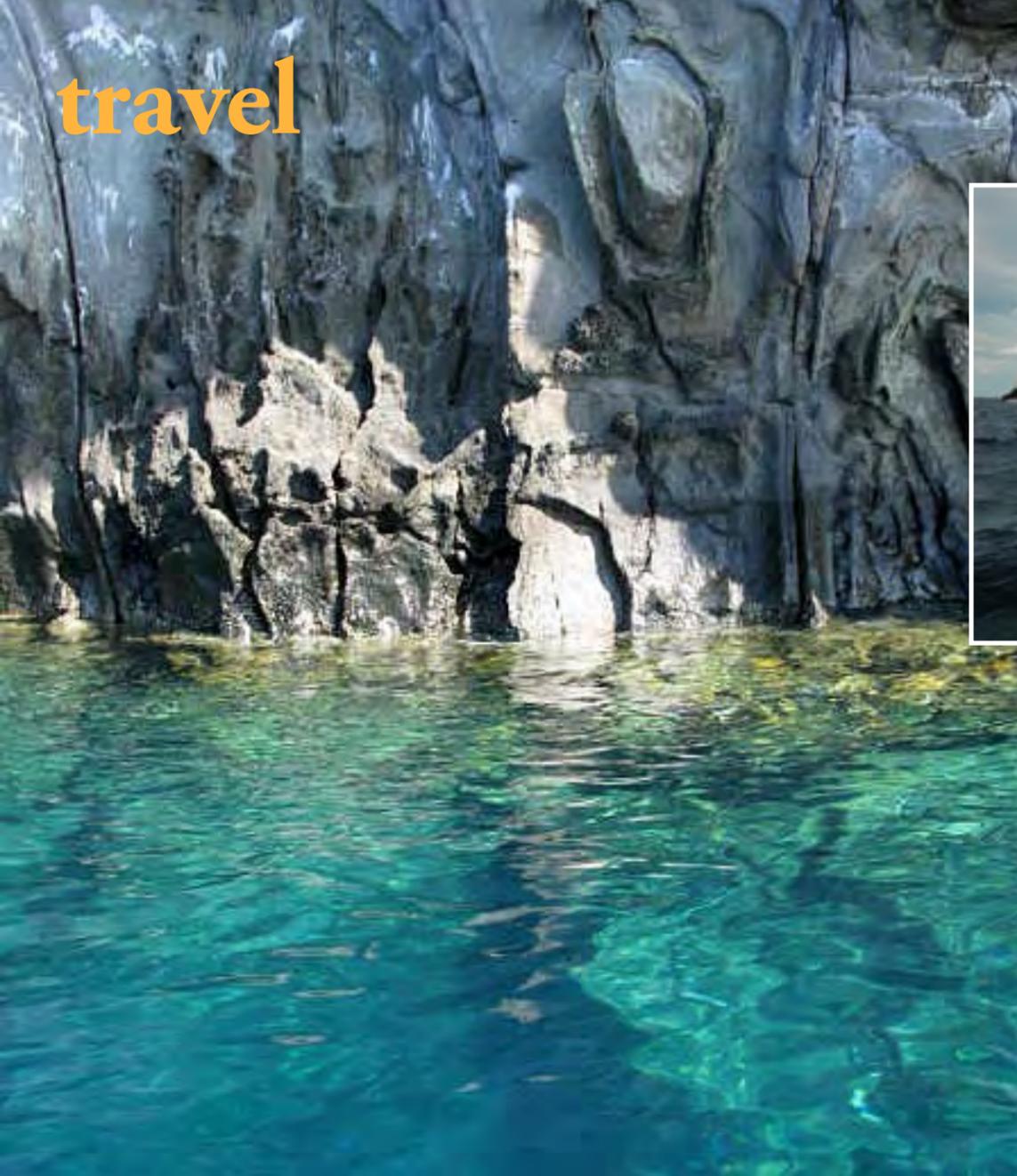
At one point, the region's natural marine resources were drastically depleted and some species com-

pletely wiped out, due to an over abundance of unregulated commercial fishing. Realizing the necessity for supervision and protection, the Mexican government established the Revillagigedos as a Protected Biosphere in 1994. No fishing of any kind is allowed within a 12 mile radius of each island. Although dive charter boats who frequent these islands have reported a steady increase in resident marine life populations, remoteness still hinders proper policing and monitoring efforts.

Today, the Revillagigedos welcomes adventurous divers from around the world for spectacular underwater photography opportunities and those who love to swim with big marine pelagics!



## Socorro Islands



ABOVE: Rock face of Socorro Island meets turquoise sea. THIS PAGE: Scenes from a dive with *Nautilus Explorer* at Roca Partida in the Revillagigedos Archipelago

Currently, there are two liveaboard dive charter operators who offer scheduled 8-11 night excursions—the *Solmar V* and the *Nautilus Explorer*. Both vessels are luxurious in every way, offering three gourmet meals per day, comfortable accommodations, 3-4 dives per day and a knowledgeable, professional crew. With the capability of making fresh water, their outdoor on-deck showers, rinse tanks and state-room showers are unlikely to ever run out. Both operations depart from Cabo San Lucas, taking approximately 24

hours to make the initial crossing to San Benedicto, the first island in a triangular journey. Only three of the four islands are visited, with the fourth, Clarion, being an additional 314km (195 miles) west of Socorro. The larger "mother-ship" is usually anchored in a protected area, with most of the diving taking place from two smaller boats, holding 8-10 divers each. Traveling from one island to the next is usually done at night.

Both operations supply aluminum 80 cu ft tanks which can accommodate

DIN or yoke-style regulators. Nitrox is available to use for the entire trip as an option for an additional fee. Weights are also provided.

### Isla San Benedicto

Isla San Benedicto is the third largest of the island group with two prominent peaks (Barcena and Herrera) and one very wide volcanic crater. The last recorded eruption was in 1952 leaving behind massive vertical ridges created by volcanic ash. As they solidified over the years, San Benedicto has



Socorro Islands

CLOCKWISE FROM LEFT: Whitetip sharks at Roca Partida; starfish; lobster at Socorro Island; goby at Roca Partida

taken on a gray-coloured glacial look. Very little life grows upon these ridges however, leaving scant quantities of green vegetation to be found on the northern half of the island. Both dive boats like to anchor on the more protected "ash" side of this island, using the smaller boats for quick access to trickier sites requiring maneuverability.

Stretching outward to the sea are the jagged remains of a lava flow—its violent epic forever frozen in time. Brown-footed boobies are one of the several sea birds utilizing the cliffs. From high above, they peer down with goofy expressions when the smaller boats motor over for closer looks. These noisy birds have even been known to land on visiting boats and be coaxed onto a human arm or head!

Underwater the lava flow continues to stretch out even more, offering a deep platform for divers to sit and wait for passing sharks and other large pelagics. Closer to shore, divers will

find a multitude of colourful fish and hard corals on a stair-stepping terrain.

During a recent visit in January and February of 2007, I was able to dive this location at a place called the "Canyon". Like all of the other divers who jumped into the water for their first dive of the trip, I eagerly followed the dive guide over to a fingering reef and headed out towards open ocean.

As the depth increased, the water grew cooler. Sounds from the reef below and passing fish became more evident. At 27 meters (90 feet), I could clearly see the other divers and everything another 9 meters (30 feet) below me.

Expecting to see hammerhead, silky and Galapagos sharks, I came

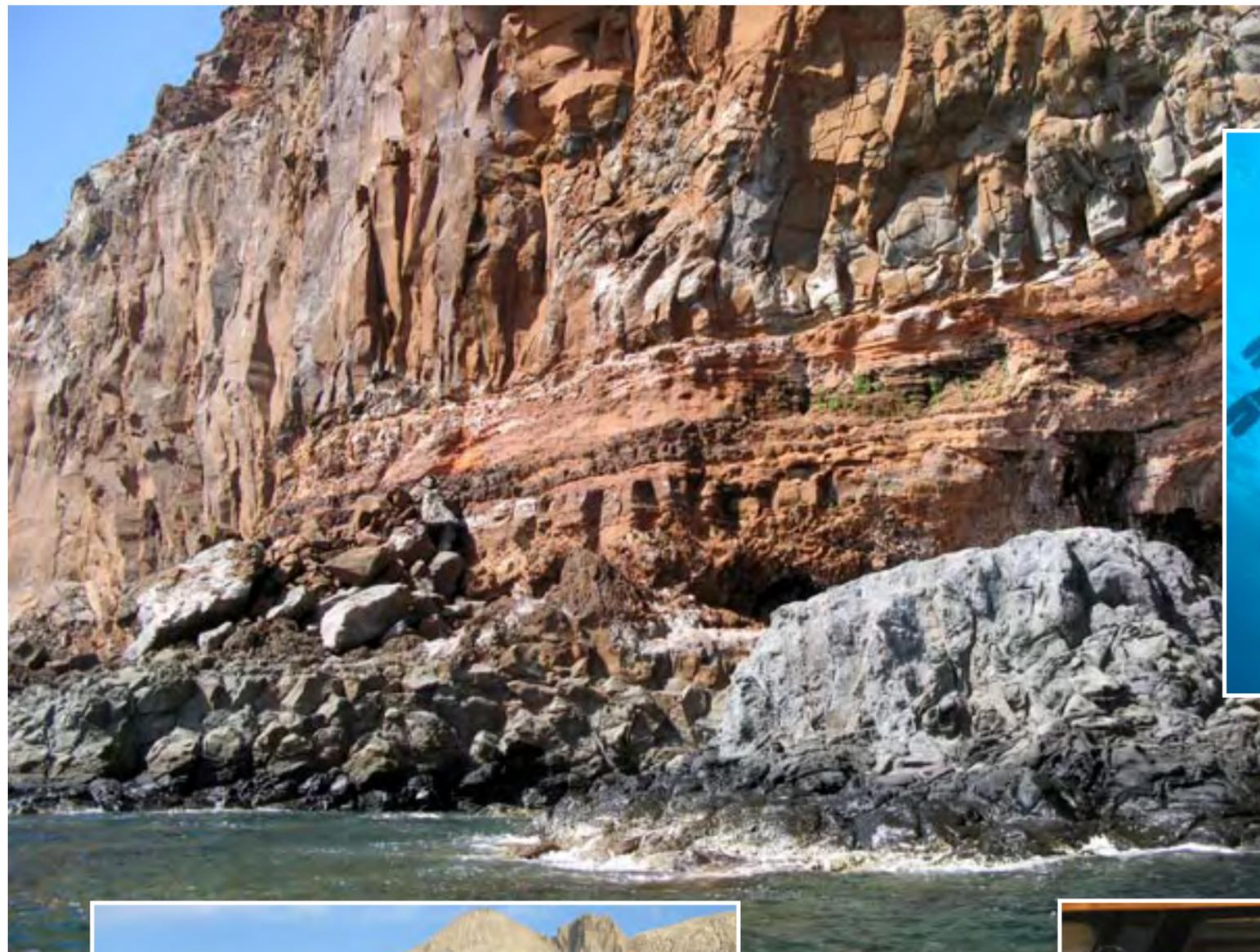
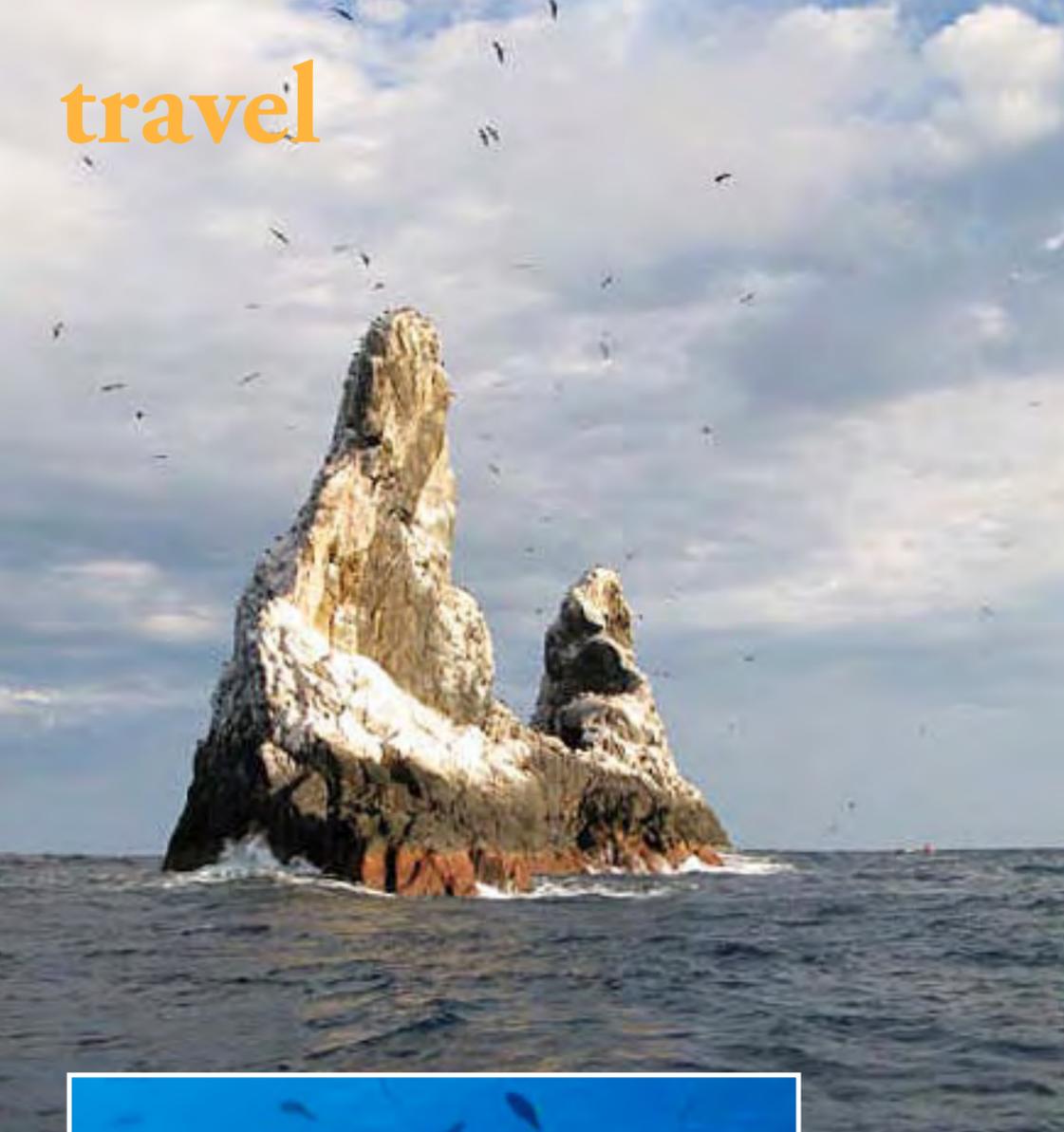
equipped with a wide angle lens for my digital underwater camera system. For a while we all sat like spectators, patiently waiting for something to pass by. The blue abyss was the only thing I could see.

A large school of yellow fish with blue stripes formed a tight circle and hovered near the reef to one side of us. Thinking nothing of this I turned to see what I could find on the reef behind us. Several others also became curious and began exploring the reef.

Several small Socorro lobsters under a rocky ledge peered out, but did not seem afraid. To the left of the lobsters, a small brown and black mottled octopus stood stretched up on its legs, as if trying to

see what it was the divers were watching





THIS PAGE: Scenes from a dive with *Solmar V* off the rocky islands of the Revillagigedos Archipelago

FAR LEFT INSET: Hammerhead shark



I was in the middle of the encounter photographing these sleek swimming machines.

About this time, the other divers, who stayed loyal to their watch, were rewarded by a large school of hammerheads in the distance! What an awesome experience it was, especially if this was one's first visit to the Revillagigedos.

for. Behind these smaller critters I noticed several big silver-tip sharks and a huge manta! Realizing my wide angle lens was of little use for this octopus, I scurried off to join my companions who had already abandoned their posts. Within seconds,

same site, once again with my wide angle lens on, we saw more schooling hammerheads, but too far to photograph. A tiger shark however, came a bit too close, causing everyone to "hug"



the reef, including the fish! Once the excitement was over, we swam with mantas and more sharks on our way back in.

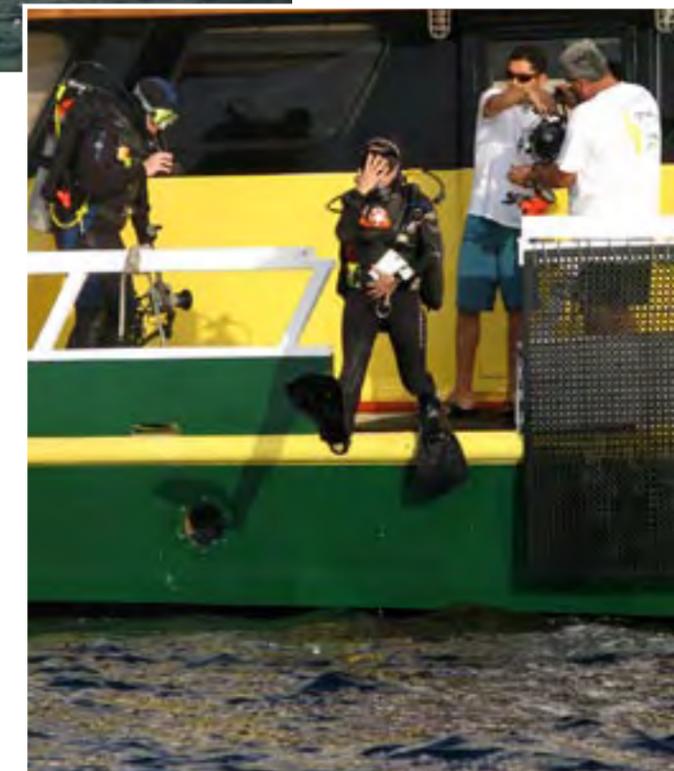
Once the novelty of the big animals at the site wore off, I put my 50mm lens on and stayed in the 18 meter (60 foot) range photographing an array of smaller

critters.

During the evening, when we all relaxed and showed our day's work, I was accused of teleporting to another reef! My fellow dive companions had no idea octopus, sea stars, sea cucumbers, sponge and smaller fish could be found on the reef. My

presentation was also full of turtles, green morays, yellow guineafowl puffers, and aggressive pairs of damselfish.

Another site commonly visited, and well worth the wait if weather is uncooperative, is a place called "The Boiler". Coming within meters of the surface, a block-shaped pinnacle causes surface





water to boil in turmoil when conditions are rough. Similar actions beneath the surface occur, requiring caution to be heeded when swimming close to the rock. This harsh surge movement will also create a challenge for photographers attempting close-up shots.

In conditions like this, it is recommend that divers

simply move away from the structure and redirect their focus to the mantas. For some unknown reason, this is one of the "hot-spots" where manta sightings are almost guaranteed! Huge mantabirostris, the largest of all the rays, seem to be attracted to the divers. With grace and poise they appear to fly through the water from one diver to the next, curiously looking each small bubble-blowing creature over carefully.

**Mantas**

Mantas can grow to a weight of 2000kg (4,400lbs) and have a wingspan of over 6.7 meters (22 feet). They are believed to give birth to just one pup, every 2-3 years. A manta's diet usually consists of small schooling fish and zooplankton. Their cephalic fins on each side of their mouth are rolled up when not guiding water and food into their mouth, giving them a "horned" appearance.

These pelagic giants are normally found all over the world in warm water near oceanic islands and submarine ridges with nutrient rich upwellings. Both charter operators have adopted a no touch and no

THIS PAGE: Wildlife abounds in the archipelago, above and below the surface of the sea



Be entertained! Be enthralled! Be inspired!  
**6th Celebrate the Sea Festival**

21-23 Sep, Philippines 2007



Award winners from the World Underwater Pictures Festival: International Photographic & Video competitions: WOW Digital Shoot Out competition : Photographic workshops and seminars with David Doubilet, Michael AW, Scott Tuason, Mathieu Meur and many more.

[www.CelebratetheSea.com](http://www.CelebratetheSea.com)  
 Asia Pacific's Biggest Event of the Sea

Principal Sponsors



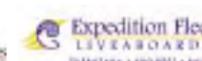
Official Magazines



Calling all Underwater Image Makers

If you have captured a piece of our ocean's splendor, don't let your images be like the trees that fall in the woods with no one to hear them. Send your entries now. Our invitation remains open until 21 August 2007, for you to be part of this prominent event by entering the prestigious international competitions. There are over \$50 000 worth of prizes up for grabs. Exceptional quality prizes from sponsors like Rolex, PADI, SEACAM, Dive Silver, the Department of Tourism Philippines and more. There are special dive package holidays for this festival from MV Odyssea 1, Aniloa Outrigger Resort, Atlantis Divers, Asia Divers, Expedition Fleets, Bahura Resort, Minahasa Lagoon to name but a few. Book Now!

Awards for in each category are: OUTSTANDING ACHIEVEMENT: MERIT OF EXCELLENCE: HONOR OF DISTINCTION: HIGH COMMENDATION. The Best Image Maker of the Festival (US\$2000 cash prize): The 'President Grand Award for Highest Achievement' Entry at [www.celebratethesea.com](http://www.celebratethesea.com)



Official host hotel  
 SOFITEL PHILIPPINE PLAZA  
 MANILA



THIS PAGE: Scenes from a close encounter with a manta ray



riding policy so not to cause any stress in these magnificent animals, in hopes that they will continue to freely visit the sites.

A manta photo identification system is supplied with regular images taken by the dive charter clients from both boats and crew in an effort to learn more about the individual mantas who frequent this and other island groups around the world.

The program was started and is maintained by Dr Bob Rubin and Karey Kumli of the Pacific Manta Research Group ([manta-research.org](http://manta-research.org)), a division of the Department of Biology at the Santa Rosa Junior College in Santa Rosa California. This identification system has allowed the research group to catalog over 130 individuals over the past three years and record numerous re-sightings in the Revillagigedos alone. Information on population size, the health, behavior and travel habits will also provide important data for other scientific research

groups.

Aside from the mantas, on the occasional calm day when surface action is minimal, a diver can easily swim around the "boiler" and several small deeper pinnacles. If water conditions permit, photographers will be delighted with intermittent clusters of yellow gorgonian sea fans, numerous species of moray eels and more colourful fish than you can keep track of. Lobsters huddling together under ledges, small family groups of longnose butterflyfish and several species of angelfish all make great photo subjects at this location.

**Isla Socorro**

The largest of the Revillagigedos islands, Isla Socorro, can be found 48 km (30 miles) south of San Benedicto. A rich vegetation of sage, grass and cactus cover most of the island, giving it a rich green appearance from the water. Brown, red and tan-coloured stone, highlighted by oval surface patterns,

Socorro Islands

**SOLMAR V**  
Cabo San Lucas, Mexico  
Luxury Live-Aboard Diving

**SOCORRO ISLANDS**  
**SEA OF CORTEZ**  
**GUADALUPE**

Win A FREE TRIP  
And More In Our  
**TRADING CARD TREASURE HUNT**

Join the  
YouTube.com  
Video Contest  
& Solmar V  
Photo Contest

[www.SolmarV.com](http://www.SolmarV.com)  
**866-591-4906**  
ask@solmarv.com 310-455-3600



## Socorro Islands

nice blend of volcanic topography. There are several excellent sites around the island to explore, with "Aquarium" and "Cabo Pearce" being the most popular.

Before any diving is permitted, a dive boat must check in with the Navy base. Quite often the soldiers like to board the vessels, perhaps

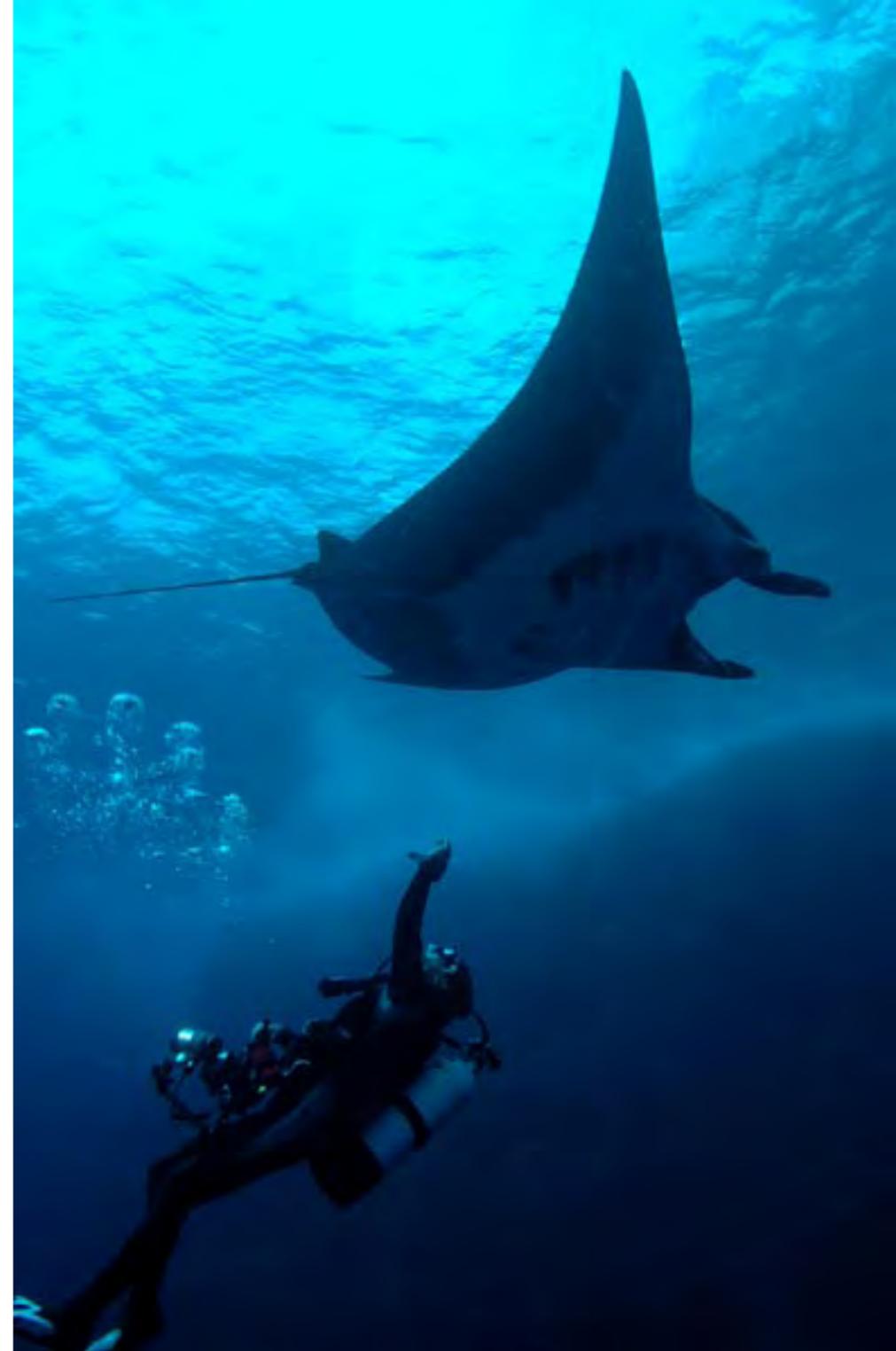
because there is little else to do and a few home-made cookies and freshly brewed coffee is always a treat!

At Cabo Pearce we began our dive near a wall and headed off the point to deeper water. In the middle of our path lay a large boulder where current visibly flowed around it. Tired of fighting the current, I headed for the lee side to rest and see what was giving the boulder a yellow stripe. There must have been over a hundred butterflyfish, all with the same idea as myself, to escape the current. I could have spent my whole dive here. The small invertebrates and fish were incredible!

Continuing on, we headed deeper in hopes of finding more sharks, whales or mantas. Instead, we found multitudes of redbill triggerfish, large Pacific burrfish, parrotfish and both male and female Mexican hogfish.

During the entire dive, I could hear the ghostly calls of humpback whales as they communicated with one another. The frequency and close proximity of their songs kept me constantly looking around, expecting one to show up. Although we did not see any on this dive, they have been known to just appear and allow divers to stay with them for hours, even when they are with calves.

On several additional shallower dives at Socorro, I wandered away from the group while exploring a sheltered cove, in pursuit of two octopuses! They paid little attention to me and probably didn't realize I was even following them. After acquiring numerous shots of them, I became distracted with an electric ray, Moorish idols, spotted boxfish and more pairs of damselfish. The Clarion damselfish was exceptionally photogenic, as was the Clarion



create a textured look on surrounding cliffs. In 1957, the Mexican Navy established a naval base on Socorro, today housing a population of 250 staff members and their families. Mount Evermann (1130 meters/3706 feet) is located at the island's center, with the last eruption recorded in 1993.

A recent push by conservation organizations has been to remove unwanted flocks of wild sheep, introduced in 1869. Several endemic plant and animal species are currently threatened or facing extinction due to the over-populated sheep.

Underwater the land is as diverse in its marine residents, with a



THIS PAGE:  
Landscapes  
and sea-  
scapes of  
Socorro Island;  
RIGHT: Manta  
ray soars over  
underwater  
photographer

angelfish.

When I finally found the two octopuses again, it seemed they were busily involved in a mating ritual.

In addition to diving at the "Aquarium" site, I was able to explore two other locations around Socorro. The first was next to a tiny lava-rock islet on the far side of the island. Both water and weather conditions must be just right to safely dive this site. Depth starts off about 12-15 meters (40-50 feet) and gradually gets deeper as we head away from the islet. Tall rock stacks are everywhere, resembling pieces of a stone wall left standing from an ancient

to grow up to 46cm (18in). This one was clearly 61cm (24in), if not more!

### Roca Partida

Located west of Socorro and San Benedicto, Roca Partida (meaning splintered rock) is perhaps the most spectacular, isolated site on this mesmerizing trip. Above water, you see a harsh weather-beaten rocky surface 34.5 meters (115 feet) high and about 90 meters (300 feet) from end to end, mostly covered in white bird guano. Frigatebirds, brown-footed boobies, masked boobies and gulls are just a few of the avian fauna creating the mess.

The length of time the dive boats will spend at Roca Partida strictly depends on the weather. If conditions are good, you can expect to anchor 2-3 days. Unlike some areas of the world, current direction, speed and duration are hard to predict here.

Underwater sheer steep walls drop to hundreds of feet all the way around the island, making good buoyancy control a necessity. But buoyancy control isn't all the operators are worried about. Roca Partida is another manta "hot spot", creating a frenzy of interaction when several mantas show up at once!

Their enticing dance seems to draw divers away from the island causing them to "go blue", as the dive guides call it. Most divers forget that the mantas originally came to them, and if they just keep the island in sight, the mantas will always return, sooner or later.

When not dancing with the mantas, I joined the sharks next to the island at 21 meters (70 feet). About 15 sharks, all bigger than me, were enthralled in a swimming game using different current flows to move really fast in one direction, change depth in another and circle back around for another go at it. I simply perched myself next to a rocky ledge to photograph this unusual behavior.

At times, I would move directly into their path for better angles. They came straight at me or from behind and simply went around me at the last second! It was a thrilling experience to be among these large predators. I guess it hit me later how dangerous it could have been, especially watching the feeding sharks at night swarm off the back deck. Then, on the other hand, during their game, I was not afraid and



Manta ray and diver meet under the sea in the Revillagigedos Archipelago, Mexico

castle. My guess is that the stacks may have once been steam vents. Each stack housed a collection of tiny fish, coral heads and branches of small gorgonian fans at the top. Other invertebrates could also be found with a sharp eye. At about 27 meters (90 feet), the group was led to an underwater cave, leading in about 6 meters

(20 feet), the size of a one-car garage. More invertebrates were found living on the ceiling of the cave.

On the way out, we spotted a half dozen small reef sharks passing by.

The other site was equally as interesting. We entered a calm sea in the late afternoon. As soon as we submerged, a large silky shark appeared

and began circling us. The shark came so close I was able to tell it was a very healthy female! Her long sleek silvery grey body moved with ease as she slowly went to check out each diver. When one of the divers timidly reached out to touch her, she slightly changed her direction and was always out of range.

On the reef below, I found more Clarion angelfish, grunts and a few king angelfish. Probably the most interesting creature was a giant slipper lobster! If it were not for its orange-tan carapace, I might have missed it entirely as it climbed down a coral structure. Later, when I returned to the boat, I read that slipper lobsters are only reported

COUNTER-CLOCKWISE FROM LEFT: Divers prepare for a leap into the sea in the archipelago; Sea life under San Benedicto; Whitetip shark at Socorro Island; Sunset from the deck of *Nautilus Explorer* at Socorro Island;



Visibility was better and healthy large schools of different fish species flourished. With my 50mm lens, I was able to photograph giant hawkfish, adult and juvenile leather bass (juveniles found hiding in sea urchins) and Panamic fanged blennies.

With my wide angle lens, I captured groups of young white-tipped reef sharks resting in soft groves around the island and colourful groups of orange

Clarion soldierfish. showed no fear, therefore, that might have eased my acceptance into their activity. My dive buddy tells me it's the aggressive photographic nature photographers possess that the sharks are sensing.

Macro and close-up life on Roca Partida was perhaps the most spectacular and plentiful of all the islands.

Clarion soldierfish.

Away from the island, opportunities were endless to film and photograph the pelagics. Huge silver bigeye jacks, barracuda, bait-balls and so many different kinds of sharks were everywhere!

At one point, when I was trying to get a good portrayal of the dramatic scenery, I turned to discover a loan hammer-

head shark swimming back and forth behind me! With each pass it came closer and closer until it had enough of my flashing strobes and swam away. Several of my dive companions commented later that they had observed similar scenes with me on two occasions when mantas became interested in what I was doing. Needless to say, I was oblivious to their curiosity.

Once again, the mantas were interactive and fun to be around. Anyone with a camera or video came away happy with full memory cards and personal experiences to cherish throughout the year! This is the type of dive trip a diver can easily return to year after year and expect to see something different on every dive. Since the mantas are the only identified creature with regular sightings, some moving from island to island, it is safe to say they will be waiting for you upon your return journey to this underwater realm of these enchanted islands.

### Isla Clarion

The last of the island group is Isla Clarion, the second largest and outer-most island at 314km (195 miles) west of Socorro. Although mostly uninhabited, a small Navel garrison of about nine men resides there. Of the three prominent peaks on Clarion, Mount Gallegos is the highest at 335 meters (208 feet). Due to the island's remoteness, little is known about the diving here. Those I have talked with who have been diving here, say it is pristine!

### Dive operators

As previously stated, both dive operations are professional in every way. Their crews are very skilled in the art of provid-



### Solmar V

The *Solmar V* is a 33.6 meter (112 foot) long vessel who has offered dive trips to the Revillagigedos since 1992. The vessel is owned by Jose Luis and Leslie Lee Sanchez, pioneers of introducing diving in Cabo area and the Sea of Cortez.

The dive crew (all speak fluent English) is supplied by Amigos del Mar, a dive shop in Cabo San Lucas who also pro-



## Socorro Islands

ing dive service and keeping everyone safe and happy. In observance of both crews, I have seen them go out of their way to make sure the dive and accommodation experience is unforgettable.





in British Columbia, Canada, and to Alaska. The dive crew is hand picked by Mike himself.

Two executive suites and nine staterooms will accommodate 20-24 guests. Transfers can be arranged from the airport, with a hospitality suite located at the Posada Real Hotel. Onboard voltage is 120V / 60Hz. Port fees are extra (\$65 US cash, payable at the end of your trip). The *Nautilus* offers 30 different microbrews and an extensive wine list.

In an effort to help prevent illegal fishing around the Revillagigedos and other protected sanctuaries, Mike Lever is planning on supplying a Twin-engine Piper Aerostar for an estimated 80-90 patrol flights per year. Locations of illegal fishing boats will be reported to the Mexican Navy for enforcement action. The plane will be based in Cabo San Lucas with the capability of handling a pilot and three passengers for speeds of up to (378 kilometers (235mph), and a range of 1610 kilometers (1000 miles). Mike will also provide the administration and operation

of the new program. Optional use of the plane will be available to conservation groups for a nominal fee to cover operational costs.

Both charter boats have been actively involved with the sport fishing industry, the local rotary club and Pronatura to protect the natural beauty and splendor of these islands.

## Socorro Islands

### Travel Information

When visiting the Revillagigedos, one must fly into the Los Cabos Airport (SJD airport code). Airlines who fly into SJD include: American, Continental, Delta, America West, Mexicana, Alaska, United and US Airways. There is no departure tax. As of January 2007, all US citizens are required to have a passport for travel in and out of Mexico. Upon landing in Mexico, visitors will be issued a temporary visa for entry



into Mexico and collected upon leaving. Additional items to bring include: sun block, a refillable water bottle, sun glasses, swim suit, sun hat, a light coat or sweater and casual clothing.

### Diving Information

Divers are required to show a dive certification card upon arrival at the boat. Dive medical insurance is recommend anytime you travel. Water temperature ranges from 22-26 degrees Celsius (72-80 degrees Fahrenheit). A full one or two-piece 3-5mm wetsuit is advised. Although no gloves are needed, a thin neoprene skull cap, additional vest and boots will keep you extra warm. Additional gear to bring would be a camera, video or camcorder, small light, spare-parts kit, basic dive gear. Gratuities should depend on the level of service you receive, generally ranging US\$200-\$350 or more if exceptional. ■



CLOCKWISE FROM FAR LEFT: Octopus in purple drag; Dive master outlines the dive; *Solmar V* anchored off Socorro Island; Fanged Blenny at Roca Partida; *Nautilus Explorer*; Dive guide provides thorough information and diagrams for a dive in the archipelago



vides local dive charters.

The boat will accommodate 20-22 guests. Transfers are provided from the airport by Cape Travel to a hospitality room at Solmar Suites. Onboard voltage is 110AC (used in the US). Port fees, fuel surcharges, park fees, beer and wine are all included with the trip. The *Solmar V* operation believes that wilderness is the ultimate luxury.

### *Nautilus Explorer*

The *Nautilus Explorer* is a 35-meter (116-foot) long vessel which has provided trips to the Revillagigedos since 2004. Mike Lever is the captain of the *Nautilus Explorer* and a pioneer in liveaboard diving



# fact file



## Mexico



**History** An ancient land of advanced Amerindian civilizations, Mexico succumbed to Spanish rule for 300 years before gaining independence in the early part of the 19th century. Mexico was thrown into economic turmoil after a devaluation of the peso hit the country in late 1994. It triggered the worst recession in over 50 years. But the country continues to make leaps in its recovery while economic and social concerns continue to challenge the nation, including underemployment for large numbers of citizens, low real wages, unequal income distribution, and few opportunities for advancement for Amerindian individuals in the poor southern states. In 2000, election results marked the first time since the Mexican Revolution in 1910 that the opposing party defeated the incumbent party in government, the Institutional Revolutionary Party (PRI). In December of that year, Vicente FOX of the National Action Party (PAN) became the first chief executive elected in free and fair elections. Government: federal republic. Capital: Mexico (Distrito Federal)

**Geography** Mexico is located in central or middle America, bordering the Caribbean Sea and the Gulf of Mexico, between the US and Belize and bordering the North Pacific Ocean, between

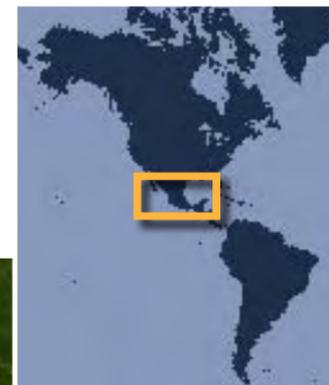
Guatemala and the US. The country's terrain is filled with high, rugged mountains and plateaus, low coastal plains and desert. Lowest point: Laguna Salada -10 m; Highest point: Volcan Pico de Orizaba 5,700 m. Coastline: 9,330 km.

**Climate** varies from desert to tropical. Natural hazards: hurricanes on the Pacific, Gulf of Mexico, and Caribbean coasts, tsunamis along the Pacific coast, volcanoes and destructive earthquakes in the center and south.

**Environmental issues** include a lack of proper hazardous waste disposal facilities and natural fresh water resources with pollution marred the northern reservoirs, poor quality or inaccessible sources in the rest of the nation; industrial pollution and raw sewage affect rivers in urban areas; rural populations are moving to urban areas, widespread erosion; desertification; deforestation; deteriorating agricultural lands; serious water and air pollution in the nation's capital and urban centers along US-Mexico border; groundwater depletion causing subsidence in Valley of Mexico. Note: Lack of clean water and deforestation are now considered national security issues by the government. Mexico has entered some international agreements including Biodiversity, Climate Change, Climate Change-Kyoto



RIGHT: Western Hemisphere map showing Mexico.  
BELOW: Satellite map of Mexico showing the location of Mexico's Revillagigedos Archipelago



Protocol, Desertification, Endangered Species, Hazardous Wastes, Law of the Sea, Marine Dumping, Marine Life Conservation, Ozone Layer Protection, Ship Pollution, Wetlands, Whaling.

**Economic** Mexico's free market economy has recently entered the trillion dollar class. A blend of modern and outmoded industry and agriculture is increasingly dominated by the private sector. The government has expanded competition in seaports, railroads, telecommunications, electricity generation, natural gas distribution and airports. Per capita income is one-fourth that of the US. NAFTA has tripled trade with the US and Canada since 1994. Ninety percent of Mexican trade is under free trade agreements with over 40 countries including, Guatemala, Honduras, El Salvador, the European Free Trade Area, and Japan. Current administration is mired by congressional opposition against measures to im-

prove infrastructure, modernization of the tax system and labor laws, and allowing private investment in the energy sector. Challenges also include boosting economic growth, improving Mexico's international competitiveness, and reducing poverty. Natural resources: petroleum, silver, copper, gold, lead, zinc, natural gas, timber. Agriculture: corn, wheat, soybeans, rice, beans, cotton, coffee, fruit, tomatoes; beef, poultry, dairy products; wood products. Industry: food and beverages, tobacco, chemicals, iron and steel, petroleum, mining, textiles, clothing, motor vehicles, consumer durables, tourism. Note: Corn (maize) is thought to have originated in Mexico. It is one of the world's major grain crops.

**Currency** Mexican peso (MXN). Exchange rates: 1EUR=14.14 MXN, 1USD=10.95 MXN, 1GBP=21.47 MXN

**Population** 107,449,525 (July 2006 est.) Ethnic groups: mestizo

**Languages** Spanish, various Mayan, Nahuatl and other regional indigenous languages.

### Deco Chambers

CABO SAN LUCAS  
Baja California Sur  
Multiplace Chamber  
Clinica de Especialidades  
Av. Lopez Mateos  
Cabo San Lucas, BCS  
Ph. +52 (624) 143 3666  
e-mail: baja@sssnetwork.com

### Web sites

Mexico Tourism Board  
[www.visitmexico.com](http://www.visitmexico.com)

(Amerindian-Spanish) 60%, Amerindian or predominantly Amerindian 30%, white 9%, other 1%. Religions: nominally Roman Catholic 89%, Protestant 6%, other groups 5%.

## Socorro

LIVE-A-BOARD DIVE OPERATIONS  
Solmar V  
1-866-591-4906 or 310-455-3600  
[www.solmarv.com](http://www.solmarv.com)  
Nautilus Explorer  
1-888-434-8322 or 604-657-7614  
[www.nautilusexplorer.com](http://www.nautilusexplorer.com)

### HOTELS

Best Western Quinta del Sol  
624-144-4500  
Solmar Suites  
1-800-344-3349 or 310-459-9861  
[www.solmarsuites.com](http://www.solmarsuites.com)  
Playa Grande Resort  
1-800-344-3349  
[www.playagranderesort.com](http://www.playagranderesort.com)  
Los Patios Hotel  
1-888-582-8442 (USA)  
1-866-799-6238 (Canada)  
[www.lospatioshotel.com](http://www.lospatioshotel.com)

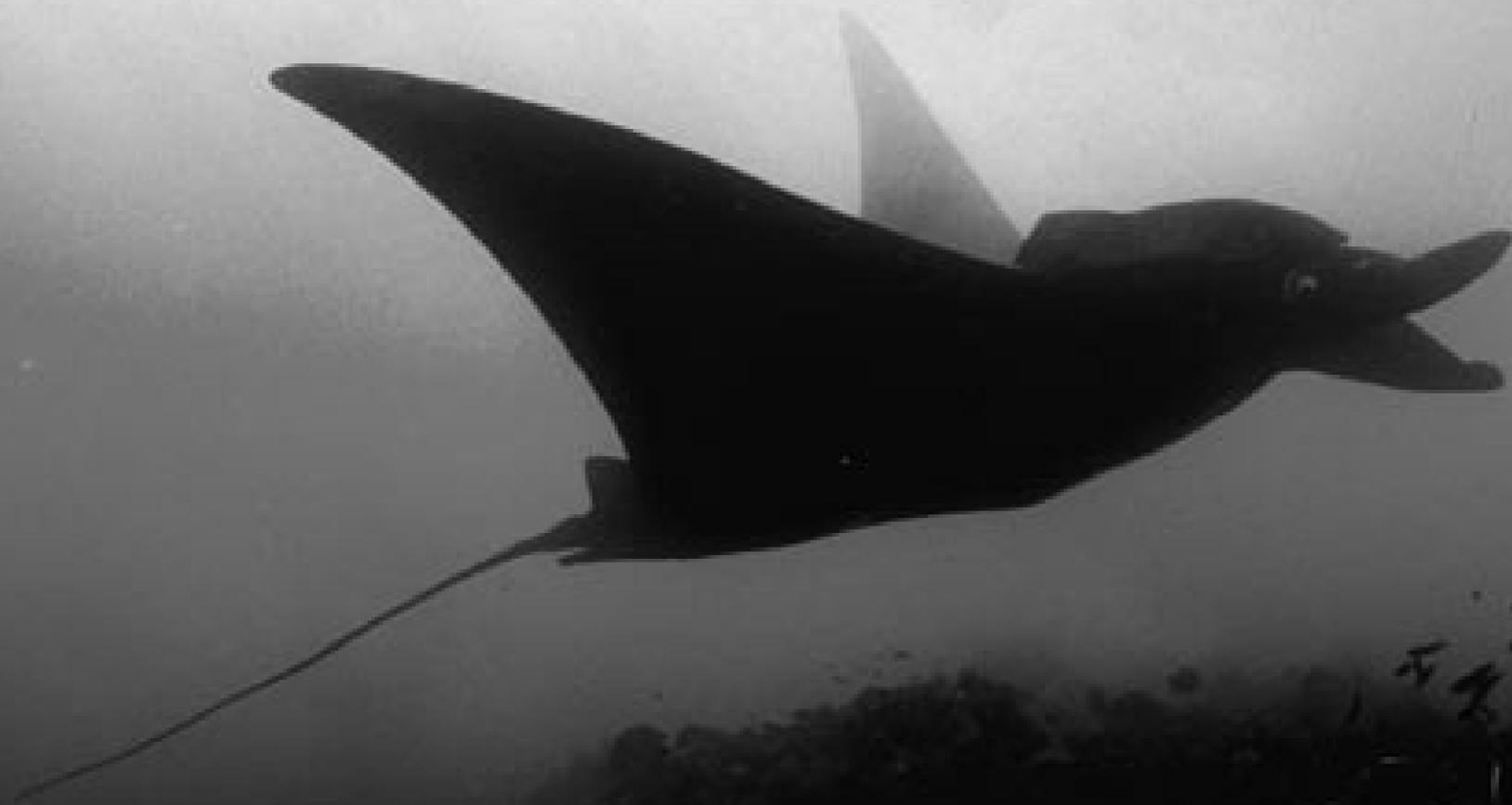
CONSERVATION ORGANIZATIONS  
The Manta Network

**DIVER'S INK LOG-BOOK STAMPS**

[www.diversink.co.uk](http://www.diversink.co.uk)

# Ecology

“Save the manatee? Save the stingray? Save the what?”



Text by Robert Aston  
Photos by Donald Tipton, Mark Harding, Guy Stevens, Felipe Vallejo

# Save the Manta Rays



The shark fin trade affects the rays too

world. In the Pacific Ocean, they have been documented as far south as New Zealand and as far north as Hawaii.

Even though they can be observed far from shore, they are mainly seen in small groups around the islands of Micronesia, French Polynesia and Indonesia. In the Indian Ocean, the population around a single atoll in the Maldives may number in the thousands. Off the coast of eastern Africa there is anecdotal evidence of the world's largest manta rays. We do not know why they live only in certain areas. We suspect their habitat preferences may be tied to certain periods of their lifecycle with open water migration only occurring for the more mature individuals within a given population.

Manta rays are slow to reproduce with one or two pups per year, slow growth rates and late age of first reproduction. Information on maturity and their



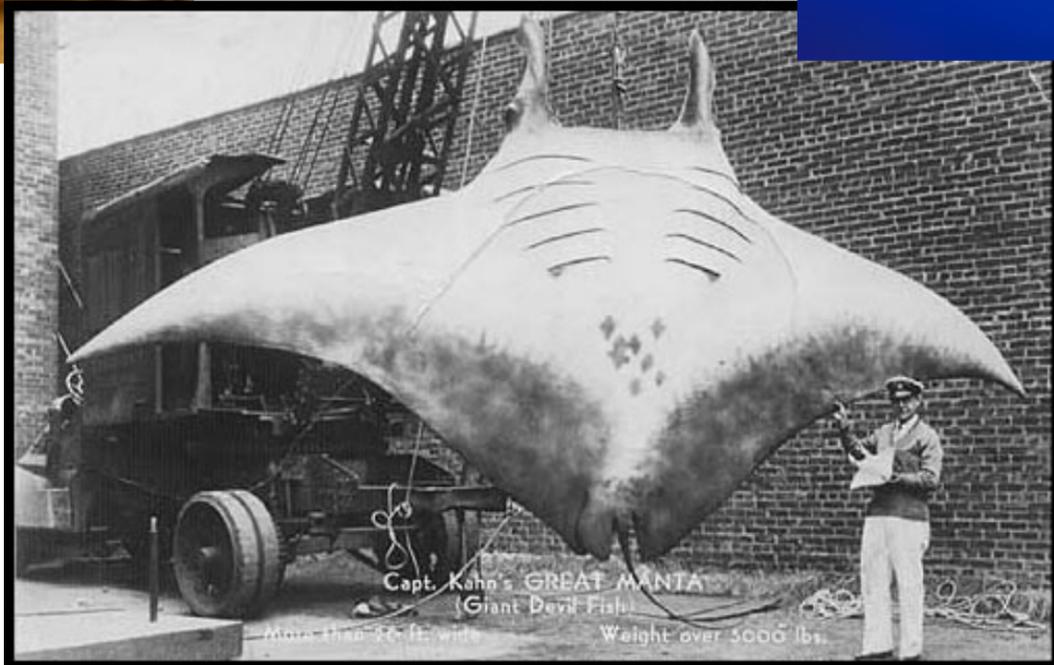
DONALD TIPTON

*The name "manta" comes from the Portuguese word for blanket.*

**“Save the manatee?  
Save the stingray?  
Save the what?”**

If you ask a group of people what is a manta, nine out of ten will think of stingrays or those large things that swim in the rivers of Florida. Even through the manta ray is the largest winged creature on the planet and has a wingspan wider than a condor, few people even know they exist.

The width of a manta ray can exceed 22 feet. They are part of the shark family but hold no danger to humans as they eat only tiny zooplankton. They are found throughout tropical and subtropical regions of the



Public domain, ca.1933. Caption states the ray weighed over 5000 lbs.

presumed long generation time of more than fifty years has not been fully documented. A

recorded instance of small population size with minimal exchange between areas indicates an enhanced risk for local extinction.

Manta rays are not well-known for several reasons. Being solitary animals, humans have had little contact with them. Until recently, not much was known about them so they were feared and called “devil rays” due to the two fins on their heads that resemble horns. The name “manta” comes from the Portuguese

word for blanket. They were thought to have attacked and capsized small fishing boats. Many fishermen and islanders considered them monsters from the sea.

Featured in the 1945 movie “Fish From Hell”, fishermen in the Sea of Cortez feared that the giant manta would eat all their fish. This could not be further from the truth as mantas and mobula rays are plankton eaters and hold no threat to fish, let alone humans.

Fifty years later, I found myself heading south of Cabo San Lucas, Mexico bound for a remote area of the Eastern Pacific and home to a rich assortment of marine pelagic life. I was on an assignment for a popular dive magazine but little did I know what would be in store for me as I covered the diving surrounding Socorro and San Benedicto Islands. (see preceeding article in this issue).

The manta ray is such a magnificent and highly intelligent creature that every encounter leaves you affected

From my first encounter with a 16-foot wide manta ray, I was entranced. Day after day we played, often with several rays at arm's reach. At times they passed overhead blanketing the sun's rays. On our last day we were treated to a full day of frolic in the mantas' playground.

Dive after dive I was joined by four large mantas that circled in the warm, clear waters just off the seamount. As I recounted in my 1995 article, Socorro Islands-- The Manta Playground, “I waited motionless, two mantas glided



## Why are more people not trying to save mantas?

The first answer to that question is that little, none or bad press exists surrounding mantas. The second reason is the lack of data from fisheries, scientific and international trade sources.

Occasionally, mantas are included in some sensational press coverage such as the 1997 newspaper article "Everything Killed in the Trap Net Fishery". Highly illegal fishing practices known as "Trap Nets" were installed in 1996 by a Taiwanese fishing fleet in a pelagic migratory channel at Manado, Indonesia.

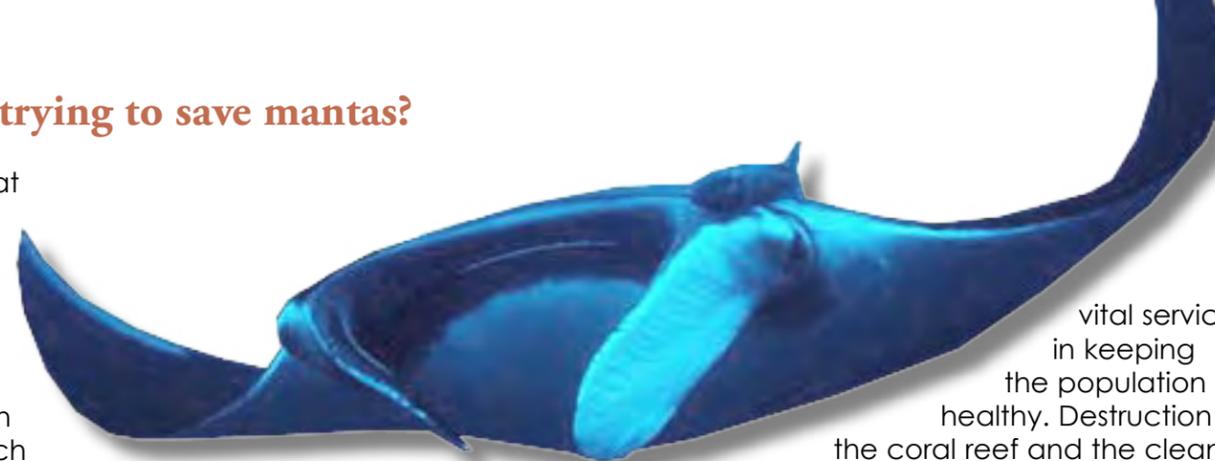
This article states: "Between 27 March 1996 and 12 February 1997 the catches included some 1,424 manta rays, 18 whale sharks, 312 other sharks, 4 minke whales, 326 dolphins, 577 pilot whales, 789 marlin, 84 turtles, and 9 dugong." The fishermen reported all of these as "by-catch" (non-intended species) but most of the animals were frozen and sent to market.

### Consumption

Little is known about the world consumption of mantas due to inaccurate or non-existent reporting. Manta ray catches are generally grouped with other rays in by-catch reports making them of little conservation value. CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora) is an international organization that was formed by a treaty with 172 member states to monitor and regulate international trade. Mantas and mobula rays have yet to be added to the list requiring fishery monitoring.

An obscure record of exit declarations by Chilean micro exporters to South Korea in 2005 reported that manta rays yielded nearly three times more revenue than

corrugated paper exports, some US \$106,000. This was slightly up from the previous year and nearly twice that of eel exports.



vital service in keeping the population healthy. Destruction of the coral reef and the cleaning stations render the mantas in jeopardy of contracting skin diseases which compromises their health.

In May of 2002, while doing work with WWF in the remote Alor region of eastern Indonesia, Dr. Heidi Dewar found that a single village had converted its previous local consumption of mantas into a commercial venture. Mantas were hunted and their skin sent to Jakarta where it is used in the production of shoes and wallets. The dried manta gill plates are sent to Hong Kong where they are used in traditional medicines. Dr. Dewar estimated that the total take over an average season was in excess of 1,500 mantas. She feared that this number could not be sustained and with villagers now buying motorboats with longer ranges, other areas would be affected, especially the nearby Komodo Marine Sanctuary.

In another part of the world off the coast of Tanzania, local fishermen are dynamiting the reef as this makes it easier to catch a diminishing fish supply. Manta rays, as well as most marine animals, rely on smaller fish to perform parasite removal from their skin. Manta cleaning stations perform a

Finned manta ray. The fins are cut of and the rest of the body just discarded



above and two below. Without fear, one large manta with two white spots on its back circled ever closer. As she came to rest four inches from my face, our eyes met again. We were both motionless as we each contemplated the other's being. None of us that played with the mantas that day will ever be the same again." At that time I had no idea that for the rest of my life I would be on a quest to save the world's mantas.

While on that trip, I learned that in early 1994 two Mexican fishing boats had violated the marine sanctuary, killing two large manta rays as part of their normal netting operation. This deadly deed was recorded on video by passing sport divers. The fishermen even allowed the videographer on board to record the full impact of the event. The fishermen had not realized that the videotape would quickly be conveyed to

the Mexican officials in Cabo San Lucas where it would get immediate media attention. Fortunately, this led to even stricter government permits, regulations and a step up in the monitoring and inspections.

A year later, I formed an alliance with Dr. Bob Rubin, a foremost authority on *Manta birostris*. After my second trip to research the Socorro mantas, we decided that a global manta conservation organization was needed. It took a while to organize and The Manta Network was granted non-profit status in the fall of 2004.



DONALD TIPTON

## The Manta Network is involved in:

### Research

- Manta Field Research Affiliates
- Global Manta Database
- Manta Migration Study
- Continuous Monitoring Program
- Manta Research Expeditions

### Education

- On-Line Manta Community
- Manta Resource Guide
- Mantas-in-the-Classroom
- Community Outreach

### Conservation

- Adopt-A-Manta
- Tens Rules of Encounters
- Eco-Tourism Programs
- Telepresence Network

### Protection

- Manta Documentary
- In-Country Partnerships
- CITES Endangered Species

tection. Studies have indicated that protection of mantas are not only good for the mantas but also for manta tourism which has contributed more than \$2.5 million a year to the local economy.

In the last two years, several more organizations have been formed, some for research and others for conservation. (See "Mantas From Around the World") Most of these have small budgets, are staffed by volunteers and focus only on local populations and issues. As part of the shark family, mantas

have been included in some of the programs headed by global conservation organizations.

The Manta Network is the only global organization dedicated solely on manta and mobula rays. It is working to create programs to protect and conserve mantas. Its mission is to create a knowledge base to educate fishing and tourism industries, government organizations, conservation groups and the public on the importance of protecting

and conserving these magnificent creatures.

The Manta Network's efforts are focused into scientific research, education, conservation and protection. Studies are conducted in conjunction with leading manta researchers. It strives to make available accurate information about areas where manta populations are threatened that helps to increase industry, government and public awareness about the critical issues.

**Affiliates in more than twenty Countries**

Australia	Hawaii, USA	Marshall Islands	Solomon Islands
Bora Bora	Honduras	Mexico	South Africa
Brazil	Madagascar	Mozambique	Tanzania
Ecuador	Malaysia	New Zealand	Thailand
Fiji	Maldives	Philippines	Yap, Micronesia

**MantaCam™**



The Manta Network combines scientific research with education and community to foster conservation and protection. The organization serves as a central repository for manta information and a resource for any organization or individual seeking to further their work.

A network of volunteers has been created to provide research on manta behavior and habit preferences. The manta advisory board consists of many leading manta biologists. They work with other researchers, sport scuba divers, photographers, dive and tour operators and concerned individuals in more than twenty countries around the globe.



Working with affiliates, scientists and other conservation organizations, a global database is being built. Photographic identification techniques are being employed to collect data on individuals. Work has begun on the development of an automated ID process that will help to build the database more quickly and accurately. This data is being used to help scientists understand manta behavior, population dynamics, habitat preferences and migration behavior.

Research goals include obtaining and funding critical manta projects that take scientists into the field and allow concerned individuals to participate through research expeditions. When possible, funding supports organizations undertaking important local research.

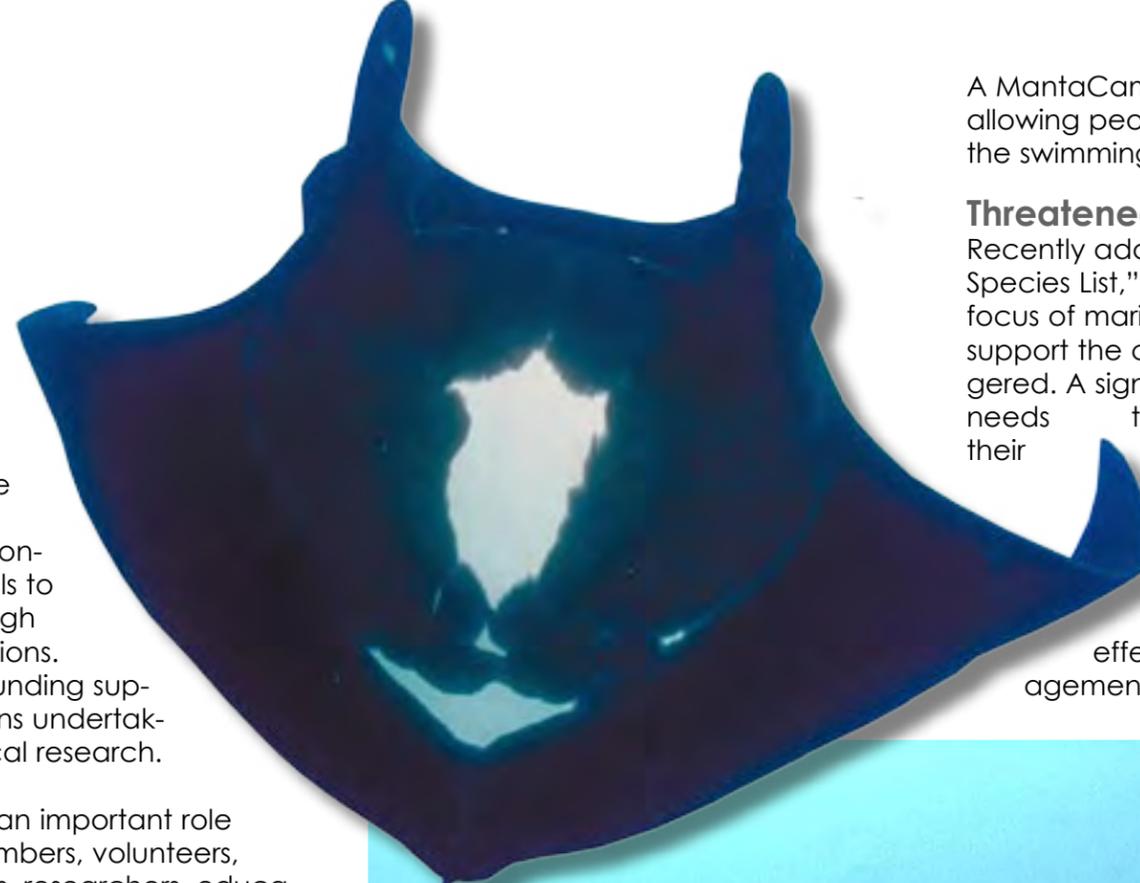
Education plays an important role and involves members, volunteers, research affiliates, researchers, educators, schools and supporters. The website employs innovative, state-of-the-art custom software to create a "global virtual community."

One innovative program involves the creation of an Internet-based network of live underwater video cameras. Situated at high-profile manta cleaning stations and feeding areas around the world, live camera feeds of mantas will be made available to classrooms around the world. Oceanario Aquarium in Lisbon, Portugal is one of only three aquariums in the world that house live manta rays.

A MantaCam is soon to be operational allowing people and classrooms to view the swimming manta on a daily basis.

### Threatened

Recently added to the "Threatened Species List," *Manta birostris* is now the focus of marine research intended to support the claim that they are endangered. A significant amount of data needs to be collected to establish their importance within the ocean's ecosystem. Information on fisheries, by-catch, poaching and international trade is crucial to their protection and effective conservation management.





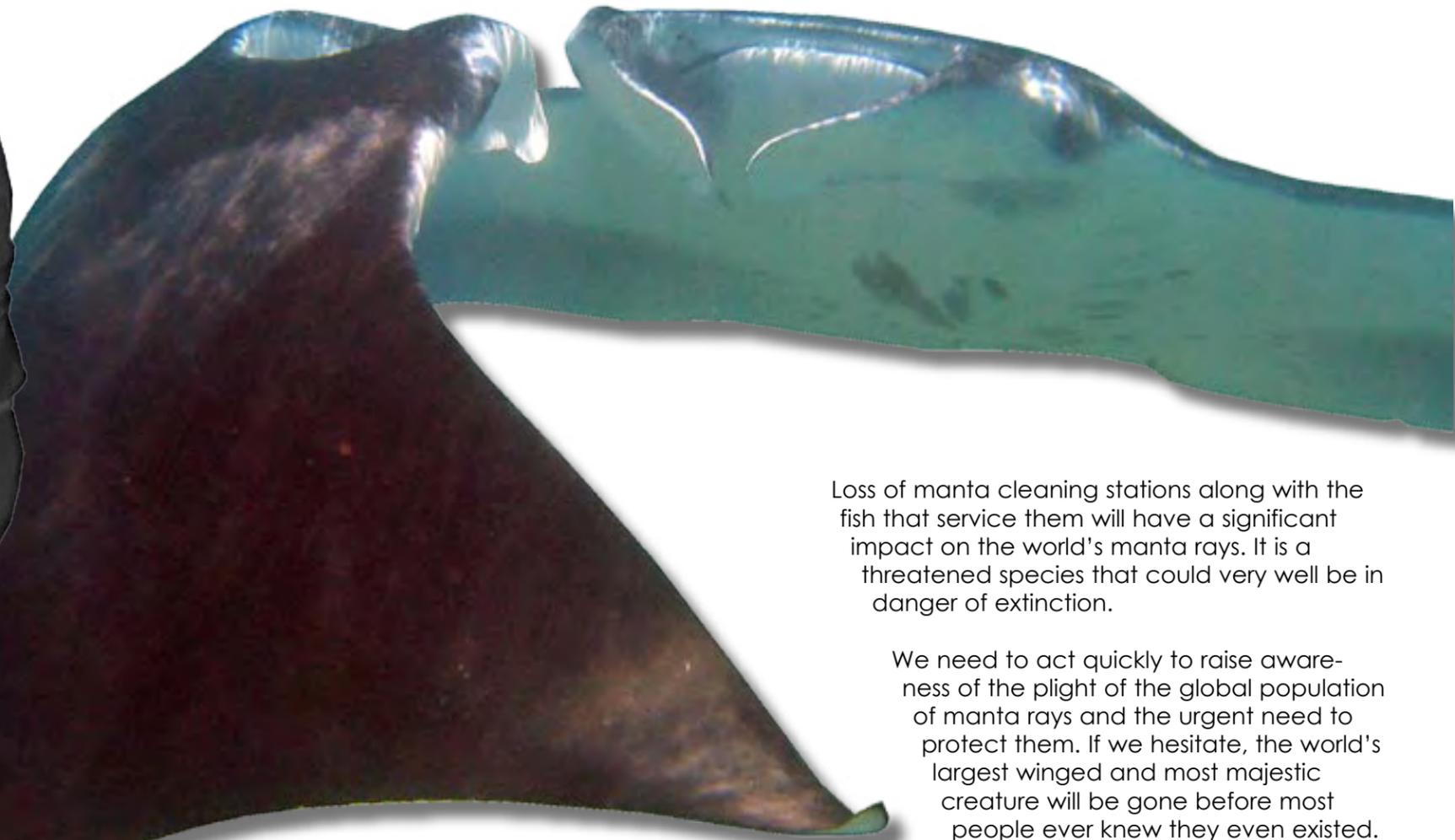
## A testimony

working in the ocean daily provides me with the opportunity to have many manta encounters. These encounters do not just allow me to be in the presence of majestic creatures, but also permit me to assist in the identification of newly sighted individuals. New individuals are identified by photographing mantas from several different angles, especially the ventral and dorsal sides. These photographs are then compared with previous photographs on file to discover if the manta is a new individual, or an individual that has already been identified. If the manta is unidentified, I send the pictures to the Manta Pacific Research Foundation. The MPRC contributes to

the Manta Network, which is an organization that works towards, "advancing knowledge of mantas." Their goal is to accomplish this through population studies, environmental education, environmental assessment studies, and public awareness initiatives. It is an exuberant feeling to contribute towards educating people about mantas. I have personally identified 7 new individuals that I have been following for the past 3 years. They usually appear at the same dive site during the summer months. All of the mantas are still alive, which keeps me happy. Most commonly they are about 10 to 12 feet in wing span and are very white ventrally and greyish dorsally. However, the mantas that I have spotted lately are quite large with an

estimated wing span of 12 to 15 feet. These mantas have been located at Reef's End inside Moluccana Crater off the coast of Maui, Hawai'i. The largest we have seen was estimated to have a 17 foot wing span. Although we do not yet know where the mantas from Maui go during the winter months. The Manta Network is researching their migratory habits. For me, contributing towards manta education is not just through the organization, but also by sharing what I know about mantas with fellow divers, as well as teaching them how to respect these noble ocean gliders. Happy diving to all.

Aloha,  
Benja Iglesis  
[www.benjaiglesis.com](http://www.benjaiglesis.com)



Susceptibility to increased predation, loss of habitat and accidental by-catch is increasing the risk of extinction. This vulnerability is affecting several documented local populations. Some scientists conclude that the pressure on the local populations will lead to local extinction and may result in long-term reduction or extinction of the global population.

Several reports conclude that more than 90% of the world's pelagic fish have disappeared due to excessive harvesting and illegal fishing practices. These include shark finning for shark fin soup which is a Chinese delicacy, even though the fins have no taste. Scientific circles fear that global warming will dramatically affect coral reefs and along with them the manta cleaning stations, destroying in a few years what took millions of years to create.

Loss of manta cleaning stations along with the fish that service them will have a significant impact on the world's manta rays. It is a threatened species that could very well be in danger of extinction.

We need to act quickly to raise awareness of the plight of the global population of manta rays and the urgent need to protect them. If we hesitate, the world's largest winged and most majestic creature will be gone before most people ever knew they even existed.



## Manta Ray Studies in Brazil

Dr. Otto Bismarck Fazzano Gadig

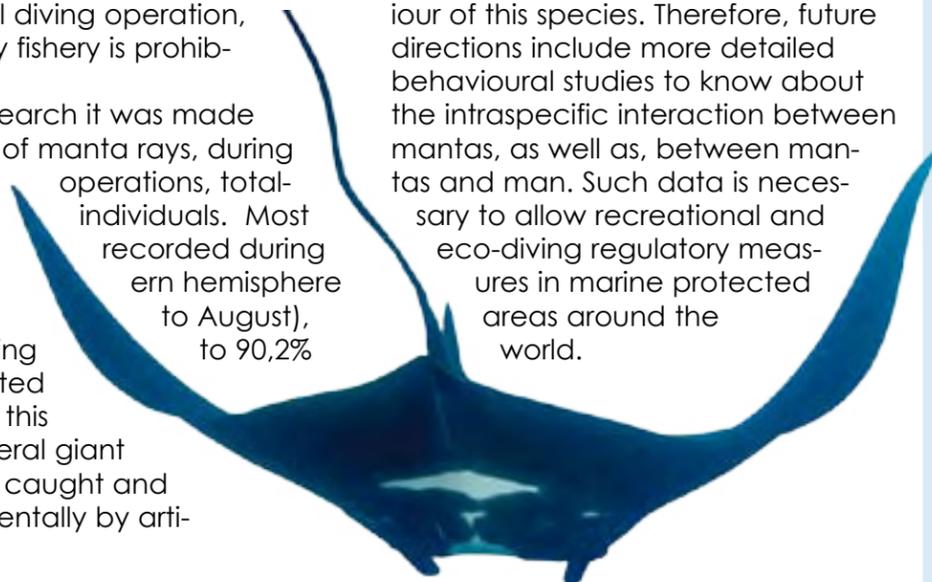
SÃO PAULO STATE UNIVERSITY, UNESP - SÃO VICENTE, BRAZIL

Manta rays are reported off the entire Brazilian coast, but there are no studies on its biology, distribution and other important biological aspects. The only study, at present, was carried out in Southern Brazil in a Marine Protected Area named Laje de Santos Marine State Park, located about 21 nautical miles off São Paulo, Brazil comprising 5 square km sea portion adjacent to a 500 m long and 100 m high rock (24° 00'S- 43° 23'W). This area is massively utilized for recreational diving operation, and the any fishery is prohibited.

In this research it was made 34 sightings of manta rays, during 244 diving operations, totalizing 40 individuals. Most rays were recorded during the southern hemisphere winter (July to August), corresponding to 90,2% of total sighted rays. During this season, several giant mantas are caught and killed accidentally by arti-

sanal gillnets in Southern Brazil (Figure Attached, by F. S. Motta, Projeto Caçã). Females comprised 32,1% and males 67,8% of sexed individuals. All specimens were adults, judging by its size, which varied from 3 to 5,5 m wide and by the characteristic stuffed pelvic in males area, suggesting that the seminal vesicle was filled with semen. The presence of adults of both sexes during the winter period at the Park may be related to a reproductive behaviour.

The Laje de Santos State Marine Park is a highly visited place by divers, most of them touching the mantas, what can affect the natural behaviour of this species. Therefore, future directions include more detailed behavioural studies to know about the intraspecific interaction between mantas, as well as, between mantas and man. Such data is necessary to allow recreational and eco-diving regulatory measures in marine protected areas around the world.



Manta rays unique identification pattern

## Maldivian Manta Ray Project

The Maldivian Manta Ray Project is a non-profit research and conservation organization based at the Four Seasons Resorts in the Maldives.

Manta rays are listed as 'near threatened' by the World Conservation Union (IUCN) and much scientific research is still needed to properly assess their status worldwide. Almost nothing is known about their population ecology, use of critical habitat, movements or reproduction, all of which are important if we are to accurately assess the state of the species.

One of the best ways to begin understanding the population of manta rays in the Maldives is to establish a method of recognising and recording individuals. Using photographic and video identification we are building a comprehensive database of the individual mantas throughout the Atolls. This highlights trends in their behaviour, allow for an estimation of the population size and their movements both spatially and temporally.

We are also using satellite and acoustic tagging programs to identify the migration routes and daily activities of these amazing animals. For more information on the projects work please visit our website at [www.maldivianmantas.com](http://www.maldivianmantas.com)



# Discover the many wonders of Asia Pacific

## A different view of Asia Pacific.

Discover Asia Pacific's other amazing wonders in the underwater realm.

Dive into Asia Pacific and begin your adventure!

Visit a PADI Dive Centre or Resort. Visit [padi.com](http://padi.com).

The Way the World Learns to Dive®



**PADI**  
[padi.com](http://padi.com)

The liveaboard adventure dive boat **Undersea Explorer** has teamed up with James Cook University's Honours student Owen O'Shea for our latest manta research project. His research is centred at a manta cleaning station on Osprey Reef, a pinnacle in the Coral Sea, 69 nautical miles east of the Australian continent. Mantas are commonly seen there during our regularly scheduled dives, but Owen wanted more data. He used a remote underwater video camera to record action at the cleaning station from dawn until dusk, each day Undersea visited Osprey Reef (usually 2-3 days per week). He is now analysing the data to investigate the interactions between the cleaner fish and their clients, which typically include not only mantas, but also a broad spectrum of sharks, including grey reef whalers, hammerhead sharks, and the occasional oceanic black tip. Owen has identified at least 25 different individual manta rays that have visited the site, with several repeat guests!

Undersea Explorer marine biologists also continue to gather information for our nature diary on the exciting creatures (including mantas) that we see at our sites. We have kept a record of environmental variables and biological sightings for the past decade, which allows us to better understand the behaviour and distribution of key indicator and charismatic species.



THE FACTS AND VIEWPOINTS IN THIS SECTION ARE NOT NECESSARILY THE VIEWS OF X-RAY MAG. EQUIPMENT PRESENTED IN THIS SECTION HAVE NOT BEEN TESTED BY X-RAY MAG STAFF, NOR ARE THE ITEMS WARRANTED. INFORMATION PROVIDED IS CONDENSED FROM MANUFACTURERS' DESCRIPTIONS. TEXTS ARE USUALLY EDITED FOR LENGTH, CLARITY AND STYLE. LINKS ARE ACTIVE AT THE TIME OF PUBLICATION

POINT & CLICK  
ON BOLD LINKS



Edited by  
Millis Keegan  
& Peter Symes

# Equipment *Got mojo*

## A classic revisited

Oldtimers know all about the pedigree of the new Digital 330m dive timer from Scubapro. This updated version will display depth to 330m, calculate the average depth during the dive and displays the ascent rate in metres per minute. Those features might attract any diver with control issues, as well as the technical diver. The design is simple, made to be visible while diving, and the log book will record the latest 19 dives.



[www.scubapro.co.uk](http://www.scubapro.co.uk)



## Velocity XP

Compared to conventional fins, says Aeris, the XP is up to 30 percent faster and more efficient. Semi-rigid battens and rubber flex channels within the blade precisely control the shape of the blade during the fin stroke to optimize power and reduce drag. Oversized side rails add rigidity to the oversized blades for increased lift power and efficiency.  
[www.diveaeris.com](http://www.diveaeris.com)

## Mares also to "split up"

(VIA DIVENEWSWIRE)

Mares is adding the spit to their fin family. Raptor is the name of their new innovation and true to themselves, the split fin is designed with performance in mind, and a combination of materials. Thrust and efficiency are the key words. RAPTOR will be available in four colors and three sizes.

[www.mares.com](http://www.mares.com)



## Texting underwater

Who needs an u/w phone, who can talk under water anyway!?! Never heard of texting? Imagine seeing a whale shark while diving or snorkeling. Whip up your phone, snap a pix of the whale shark and send an MMS to your friends. But don't get too excited. So far, this gadget only makes it to about 1 foot / 3 meters and is only available in the East. But you can safely listen to music while snorkeling and make calls in the pool without worries with the FOMA F704i from Fujitsu.  
[www.akihabaraneews.com](http://www.akihabaraneews.com)

## Draco Drysuit

The Scandinavians know the importance of a proper drysuit for safe and enjoyable diving. Waterproof has 20 years experience in providing suits for cold water divers, and their designers put a great effort into comfort. Their latest suit, the Draco drysuit, is made with 3.5mm Special Hi-Dense neoprene with SD Toughtex lining. The cuff system is zippered for flexibility and ability to use dry-glove ring system. The Waterproof adjustable warm neck design is improved with a drain valve. The separated hood fits nicely under the neck collar, and has a venting system to avoid that annoying gas buildup in the hood. Another comfort feature of the Draco: there are no seams in the under arm area or in the crotch area, where wrinkling can otherwise cause wearing.  
[www.waterproof.se](http://www.waterproof.se)





## Deep Inspection

Documenting and inspecting the deep

Deep requires a tad more technology than your

average u/w camera equipment. Remote Ocean Systems subsea cameras have just

that little extra. The new INSPECTOR HD

Video Camera is a high-definition color video camera with the ability to do still

images. Standard depth rates at 3000 meters with the help of a titanium house with a 6000

meter option. Lightweight and small in size, the body is about 8 inches/20 cm long and 4

inches/10 cm wide. It comes with a stabilized 18:1 optical zoom, with a digital 12x digital

perfect for up-close inspection.

[rosys.com](http://rosys.com)



## Bored during deco?

Waterproof UNO might be something for the tech diver performing their long and sometimes tedious stops while heading

to the surface. The cards come from Mattels, and if you can't find them in a store near you, check your local Amazon shop on-line. Look for Uno H2O Waterproof Clear Cards.

## 3-in-1

The OMS 3 in 1 Oxygen regulator is so revolutionary that it can be taken almost anywhere. With multiple gas inlets to choose from and multiple gas outlets to supply Demand or non-rebreather masks you can administer to a diver in distress at almost any place or anytime. It provides divers with the necessary equipment to safely perform accelerated "off gassing" or oxygen therapy and resuscitation on the boat or on land. [www.omsdive.com](http://www.omsdive.com)



## Warm, warmer, warmest

An insulating underwear system based on 100 percent Merino wool is what Poseidon offers

drysuit divers with their Flexi Base underwear. Insulation is key for

comfort while diving in cold water, wool has the capacity to keep you warm

even when wet, so it is a good choice, but it is still important to transport the

excess moisture away from the skin. They suggest that you use multiple layers when

needed, a well known strategy to conserve heat. With this line of underwear, it is

easier to do that. The material is flexible and can vent your body moisture, and it

is machine washable.

[poseidon.se](http://poseidon.se)



## Compact and bright

Ikelites new sub strobe DS-125 works with both the newest digital cameras, as well as TTL film cameras for those who have not yet

converted to digital. This is possible thanks to special electronic circuitry, and the strobe will also work with

the Nikonos system, and with normal or pre-flash camera systems. The DS-125 operates TTL when

connected with a sync cord or Ikelites wireless TTL Slave Sensor. The strobe's compact size and

weight of less than three pounds makes traveling easier. The interchangeable NiMH battery pack

allows 250 flashes on one charge. [ikelite.com](http://ikelite.com)

*mini Review* by Millis Keegan

## Hanging Air

Is this a must for the avid diver? The product promises to reduce the drying time up to 70 percent, and that the days of smelly old wetsuits are gone. Living in Florida, I mostly dive with a skin, which dries fine without any extra help, but then comes winter with water temperatures that require a wetsuit, and my problem begins. It is humid in Florida, and yes, it takes forever to dry the wetsuits. And yes, it does smell. The Hangair is a big help, plus I can keep it hanging and drying in the garage instead of using the air conditioned living area. Without the Hangair, that would mean that the suit would have smelled like a rotten, forgotten towel in no time. Now, the inside of the apartment looks a lot tidier. A win-win, on all accounts.

### How it works:

A high powered fan mounted in



the hanger pushes air into the suit, forcing the water out of the suit through arms and legs while drying the material. Even though the drying time was a bit longer than the results Hangair's own test panel presents, it was acceptable. We do live in Florida after all, where humidity easily reaches 80 percent.

Then we tested the Hangair on our drysuits. That did not work out as well. We have membrane style nylon drysuits with rubber boots, and we were not as lucky as Hangair's test panel who managed to dry a crushed neoprene drysuit in two steps. All the water was collected in the boots, and for a completely dry suit, we had to take the suit off the hanger and empty the water out a couple of times, an annoying process. But on the other hand, a membrane

drysuit rarely gets that wet inside, and the material dries quickly. In fact, during the test, the suit that dried without the Hangair, dried faster—possibly because the water was not pushed down and collected in the boots.

### In conclusion:

Yes, this is an Okay product. A bit on the pricy side maybe, but overall we give the Hangair a thumbs up. [hangairs.com](http://hangairs.com) ■





Grand photos  
by Don Tipton

The boat's four occupants were spear fishing for Yellowtail. As Mark began to ask the skipper questions, one of the spear fisherman suddenly appeared to be walking on the water shouting "White, White! Get me out of the water now!"

Mark nonchalantly looked at us and said, "Well, we have found them boys. Let's go diving!!"

Text and photos by Tony White

captions

# In search of the Great White Shark

# Great White



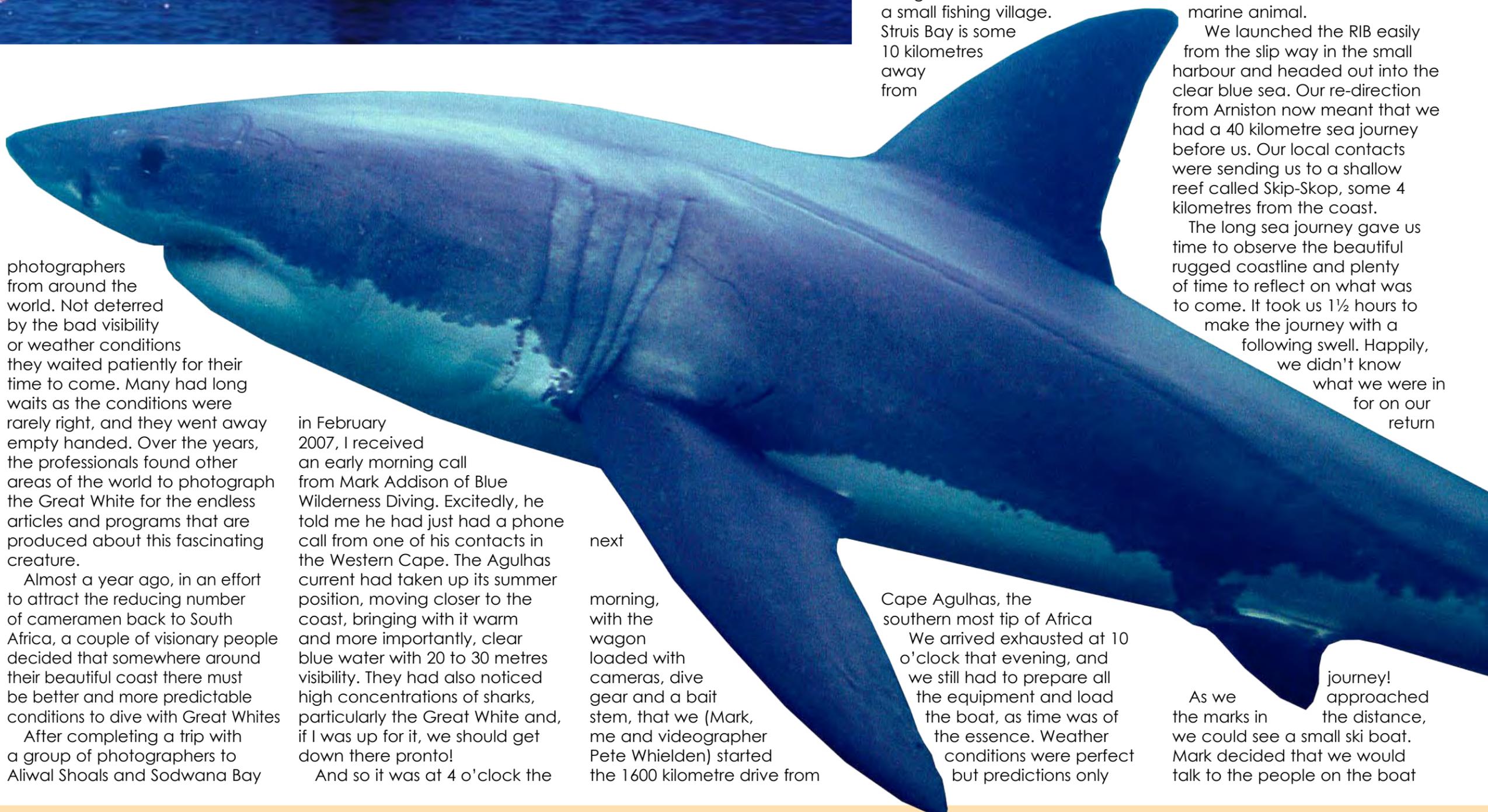
It was a beautiful clear blue day as we approached the ski boat, 4km off Cape Agulhas in South Africa.

Two of *Carcharodon Carcharias*, more commonly known as the Great White Shark, are found around the globe. But undoubtedly, the global capital for this magnificent apex predator is the Western Cape, South Africa.

Traditionally during the winter months of May to October, thousands of tourists flock to the local cage diving operators in both Gansbaai and False Bay. From the relative safety of a cage, the tourists watch these marine giants as they feed on one of their favourite dishes, the seals of Dyer and Seal Islands.

During the summer months, the numbers of sharks around these two areas drops significantly. Although the Great White is a migratory animal, up until now, nobody has really known where they disappeared to. When asked, people in the know became very vague and said, "They have gone hunting fish somewhere nearer the coast" or they joke that "It is tourist hunting season".

It wasn't just tourists who flocked to these two areas but also cameramen and



photographers from around the world. Not deterred by the bad visibility or weather conditions they waited patiently for their time to come. Many had long waits as the conditions were rarely right, and they went away empty handed. Over the years, the professionals found other areas of the world to photograph the Great White for the endless articles and programs that are produced about this fascinating creature.

Almost a year ago, in an effort to attract the reducing number of cameramen back to South Africa, a couple of visionary people decided that somewhere around their beautiful coast there must be better and more predictable conditions to dive with Great Whites

After completing a trip with a group of photographers to Aliwal Shoals and Sodwana Bay

in February 2007, I received an early morning call from Mark Addison of Blue Wilderness Diving. Excitedly, he told me he had just had a phone call from one of his contacts in the Western Cape. The Agulhas current had taken up its summer position, moving closer to the coast, bringing with it warm and more importantly, clear blue water with 20 to 30 metres visibility. They had also noticed high concentrations of sharks, particularly the Great White and, if I was up for it, we should get down there pronto!

And so it was at 4 o'clock the

next

morning, with the wagon loaded with cameras, dive gear and a bait stem, that we (Mark, me and videographer Pete Whielden) started the 1600 kilometre drive from

Durban to Arniston in the Western Cape.

The journey was long and hot, with Mark and me taking turns to drive and stopping only three times to eat and top up on gas. En route, it became obvious that we would not be able to launch the RIB from Arniston as the launch conditions were too dangerous, and we re-directed to a small fishing village. Struis Bay is some 10 kilometres away from

gave us two working days before the weather was predicted to break, with a strong south westerly stopping us dead in our tracks.

The next morning, we were up at the break of day. Adrenaline was pumping, and the weariness of the previous day was forgotten as we anticipated the day and the strong possibility of getting into the water with this awesome marine animal.

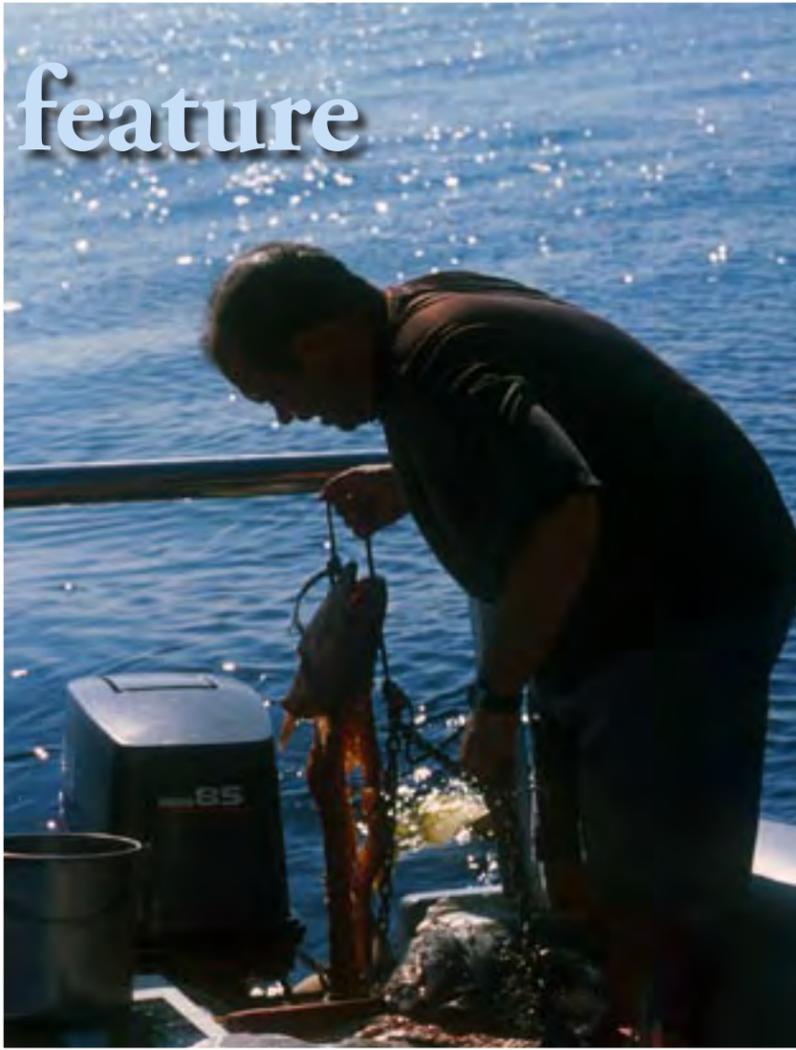
We launched the RIB easily from the slip way in the small harbour and headed out into the clear blue sea. Our re-direction from Arniston now meant that we had a 40 kilometre sea journey before us. Our local contacts were sending us to a shallow reef called Skip-Skop, some 4 kilometres from the coast.

The long sea journey gave us time to observe the beautiful rugged coastline and plenty of time to reflect on what was to come. It took us 1½ hours to make the journey with a following swell. Happily, we didn't know what we were in for on our return

Cape Agulhas, the southern most tip of Africa

We arrived exhausted at 10 o'clock that evening, and we still had to prepare all the equipment and load the boat, as time was of the essence. Weather conditions were perfect but predictions only

As we approached the marks in the distance, we could see a small ski boat. Mark decided that we would talk to the people on the boat



Preparing the bait

to see what they had seen and take it from there. On approaching the boat, we could see two men fishing with lines and another two neoprene-clad spear fishermen in the water. We had just started to talk to them when one of the men nearly took off vertically from the water, weight belt and all, shouting "White! White! Get me out of the water!" This prompted Mark Addison's now famous comment, "Well, we have found them boys. Let's go diving!"

By now, all I could see was two men almost walking on the surface of the water trying to get out of it and into their boat... and we were starting to kit up to get into the water! My mind told me that this was not the way it should be. I had figured on sitting around in the sun while Mark baited the water and after a couple



of hours to get used to the idea, I thought we would gently join the sharks as they lazily swam around us.

**Not so!** Kitted within minutes, Pete and I slid into the sea to find visibility of at least 25 metres. Nervously,

we edged towards where the last reported position of the White Shark had been.

### Cages?

Oh, I forgot to mention that there were no cages involved in this!

Suddenly, out of the blue, approximately two metres below the surface, appeared a four metre Great White Shark. We have dived with Tiger Sharks many times in the past, so we were used to being in the water with big sharks without cages, but this shark was enormous! I definitely thought that it was eyeing us up with a view to assessing our meal potential. Luckily, Pete and I are pretty crunchy and to be fair, human beings in any form are not on any sharks' normal menu.

I have been asked many times since that moment if I was afraid and very honestly, I have to say that for a brief time, yes, I was. My fear turned to apprehension and soon I was completely at ease with the creature that was nervously circling us. It

Cape Agulhas Coastline

## Great White

*Well, we have found them boys. Let's go diving!"*

continued to circle us for some two hours, never coming any closer than 4-5 metres from us.

All this time, Mark took up position above us on snorkel and with an empty spear gun. If the shark approached us too closely, he planned to dive down and push it off, but this was never necessary.

Eventually, the spear fishermen who had exited the water so dramatically came back into the water with us, and without their spear guns. One of them was heard to say that with these lunatics in the water, it reduced his chances of being eaten.

The ease with which we had found the White Shark and the whole encounter, was the ultimate experience in my underwater career. For two hours, we enjoyed this





## Great White



"We have dived with Tiger Sharks many times in the past, so we were used to being in the water with big sharks without cages, but this shark was enormous! I definitely thought that it was eyeing us up with a view to assessing our meal potential."

majestic creature's company until we finally we ran out of air and had to return to the RIB. We then realised the enormity of the task ahead as without the following sea, it took us nearly two and a half hours to pound our way, teeth rattling, back to base at Struis Bay.

It had taken Mark Addison over a year of never ending searching, up and down the coast to experience this day. In the past, it had been either bad weather and poor visibility or no sharks. Today, all his hard work and the relentless pursuit of his dream had come together.

### Day 2

The following day we launched again at dawn. We made our way to the same reef, with the intention of dropping a bait stem to the seabed to see if we could attract the shark to the bottom, and capture rare images of White Shark against the reef instead of the predictable White-Shark-

biting-cage-bars shot.

We anchored in the middle of Skip Skop with a depth varying from 12 to 16 metres and dropped the bait stem over the side. The wait seemed endless, but after an hour or so, Mark yelled, "White approaching!" We could see the dark shape of a huge shark some 100 metres from the boat. After falling over each other to get kitted, we dropped into the water. Pete was in front and heading for the bottom, followed by the shark and last of all, me. As we got in, Mark had said that today's shark was not as big as yesterday's!! Following that shark, I could swear it was twice the size of yesterday's and a female to boot.

Pete and I took up position back to back

(obviously), by the bait stem and waited. This time, the shark only came back once and buzzed us from some 10 metres away. That was the last we saw of her before our computers told us it was time to leave the bottom. Again our return to base was exhilarating as we tried not to lose our teeth, and talked about our experiences of the last two days.

True to predictions, the weather

broke the following day, and we were unable to go out again. So, we reluctantly packed up our kit and made our way home. These two days had proved that it was possible to dive safely with Great White Sharks, without cages in warm (24C) clear water in South Africa.

This experience was a real privilege for me, and I can't wait for next season to arrive. I know that when it arrives and the conditions are right, I will not be waiting at home for a phone call. I will already be in Struis Bay, diving with Great White Sharks.

During the summer months, when the Agulhas current moves closer to shore, large numbers of White Sharks can be found



feeding on the huge shoals of Yellowtail that frequent this part of the coast. We have a very real opportunity and the expertise for underwater photographers/ videographers to come to South Africa to capture footage of the Great White Shark without the restraints and limitations of the cages in Gansbaai and False Bay. ■

*Tony White is a full time professional underwater photographer now based in Cape Town, South Africa. He frequently runs specialised tours in South Africa and across the world. More information can be found at [www.seaofdreams.co.uk](http://www.seaofdreams.co.uk)*

# whales & dolphins



Edited by  
Peter & Gunild Symes

## And about time, too! US Naval sonar silenced by whale fears

The arguments of campaigners who claim that the use of mid-frequency sonar equipment harmed mammals off the coast of California were accepted by a federal judge. The US Navy has been ordered not to use such equipment during training exercises until the end of 2009.

It was claimed that whales were disoriented by sonar, causing them to become stranded on beaches. In fact, the Inter-Agency Committee on Marine Science and Technology identified 13 cases of cetacean strandings on beaches that appeared to be linked to noise. Most of these involved naval vessels.

A senior lawyer for the National Resources Defence Council said that the court's order confirms that during sonar testing and training, the navy can and must protect whales and other marine life in the rich waters off the southern Californian coast. ■

No more  
sonar tests!

## Software recognises different dolphin species by their whistles

Scientists at the Scripps Institution of Oceanography in San Diego, California, have developed a new software that identifies different dolphin species by their whistles.

According to a new study by the Acoustical Society of America (ASA), identifying different species of dolphins by their whistles could help improve the accuracy of surveys. These are normally done by observing the animals from boats. However, as many dolphins spend a lot of time underwater, this does not always provide a clear perspective. And to make matters worse, some species are shy of boats.

The ASA said it has turned to acoustics in the hope of providing more accurate data on dolphin activity in heavily fished areas where the mammals are at greater risk of being harmed.

The marine-life research group trailed a microphone from a survey boat and then fed the sound they picked up from dolphins to an on-board computer. Here, specially developed software was then able to identify eight types of dolphin with up to 80 percent accuracy. It found in tests that dolphins make a variety of sounds that include species-specific whistles made up of frequencies between two and 30 kilohertz.

Dolphins make a range of sound, including different types of clicks and species-specific whistles, mostly of frequencies between 2 and 30 kilohertz, with each species combining the frequencies in their own way. ■

SOURCE: JOURNAL OF THE ACOUSTICAL SOCIETY OF AMERICA



Bowhead. K.W. For Meinhalds Wandbilder for use in schools. Ca. 1900

## Weapon fragment from 1800s found in 117-year old whale

Biologists, long stumped at figuring out how old whales are, were presented with an uncontroversial piece of evidence from a 50-ton bowhead caught off Alaska. Fragments of a 19th century harpoon—a lance bomb—were found lodged in a shoulder bone.

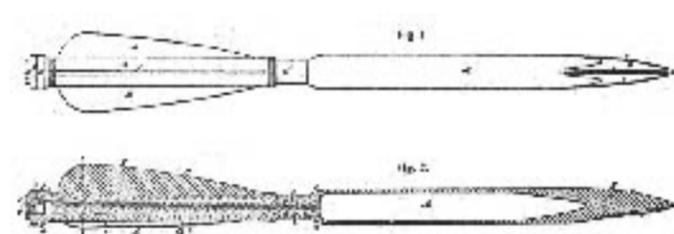
The weapon was used more than a century ago by whalers from New Bedford, Massachusetts, USA, enabling researchers to estimate that the whale was at least 115 years old and providing

more evidence for their long-held belief that the bowhead whale is one of the longest-living mammals on earth, surviving for up to 200 years.

"It's pretty rare that you get the chance to date the age of a whale," said John Bockstoce, the whaling historian at the New Bedford Whaling Museum who analyzed the fragments.

Anthropologists have analyzed hunting devices found in whales before. It was often difficult, however, to narrow down when the weapon was fired. But because the bomb lance was patented and stocks were used up quickly, Bockstoce and his colleagues identified a narrow window in which they believe the whale was shot, sometime between 1885 and 1895. ■

Lance bombs



## Study helps maintain balance between bowhead whales and Eskimos

At a recent meeting in International Whaling Commission, 76 member nations voted to renew the subsistence hunt quota for the next five years.

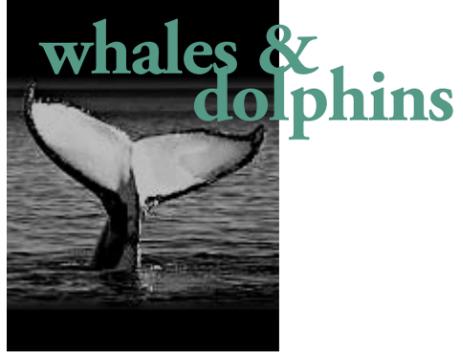
The bowhead whale, devastated in the 19th and early 20th centuries by commercial whaling fleets, has been a food staple for Eskimos and other indigenous Arctic peoples dating to prehistoric times.

Research by Purdue University on the bowhead whale has helped in maintaining an ecological balance between the marine mammals and the Eskimos, who hunt the animals for food. To prevent their extinction, the International Whaling Commission had allowed Eskimos to harvest 56 whales per year. The quota had expired, and now after the study, the commission has allowed the same quota.



"Eskimos have been whaling for more than 2,000 years and have never endangered the bowhead whale," said Purdue University professor John Bickham, who conducted the study. He said the bowhead's population increased by three percent a year, even while being harvested by subsistence hunters. ■

SOURCE: MOLECULAR ECOLOGY.



## Warming Oceans Put More Stress on Whales

Climate change is making life more difficult for whales, dolphins and porpoises that must adapt to shrinking sea ice and decline in their prey species. Climate change impacts are greatest in the Arctic and the Antarctic, and cetaceans such as belugas, narwhals and bowhead whales that rely on icy polar waters for habitat and food are likely to suffer most from the reduction in sea ice. ■

## Yangtze river dolphin now considered extinct

An extensive six-week survey of the Yangtze River dolphins' habitat has failed to find any sign of the baiji as they are called locally. The freshwater dolphin found only in China is now "likely to be extinct", the team of scientists concluded. If confirmed, it would be the first extinction of a large vertebrate for over 50 years.

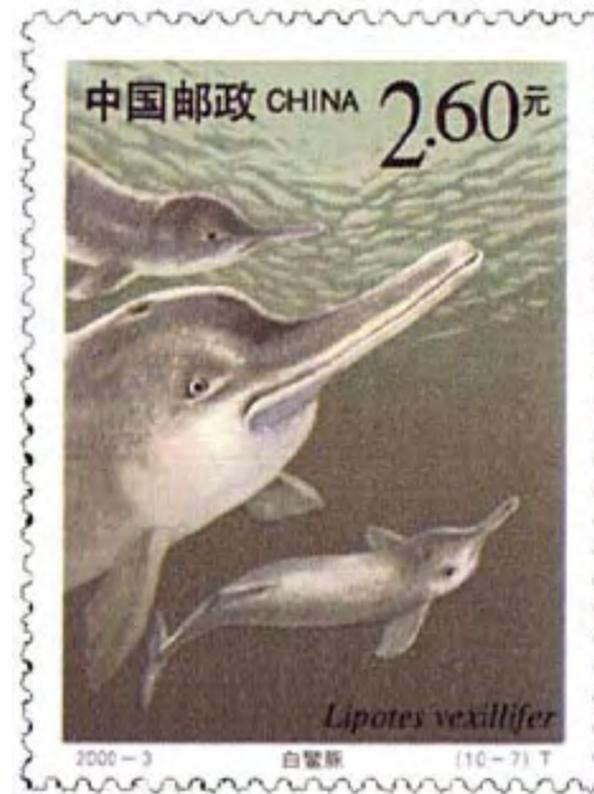
Sam Turvey of the Zoological Society of London (ZSL), one of the paper's co-authors, described the findings as a "shocking tragedy". The Yangtze River dolphin was a remarkable mammal that separated from all other species over 20 million years ago," Dr Turvey explained to BBC News.

"This extinction represents the disappearance of a complete branch of the evolutionary tree of life and emphasizes that we have yet to take full responsibility in our role as guardians of the planet.

The species (*Lipotes vexillifer*) was the only remaining member of the Lipotidae, an ancient mammal family that is understood to have separated from other marine mammals, including whales, dolphins and porpoises, about 40-20 million years ago.

"While it is conceivable that a couple of surviving individuals were missed by the survey teams," the team wrote, "our inability to detect any baiji despite this intensive search effort indicates that the prospect of finding and translocating them to a reserve has all but vanished." ■

SOURCE: BBC



## Why Russian Whales are Stinky

Since the early 1990's, aboriginal whale hunters in Russia's northeastern Chukotka province have reported that about one-tenth of the whales they killed for food smelled so putrid that they were inedible.

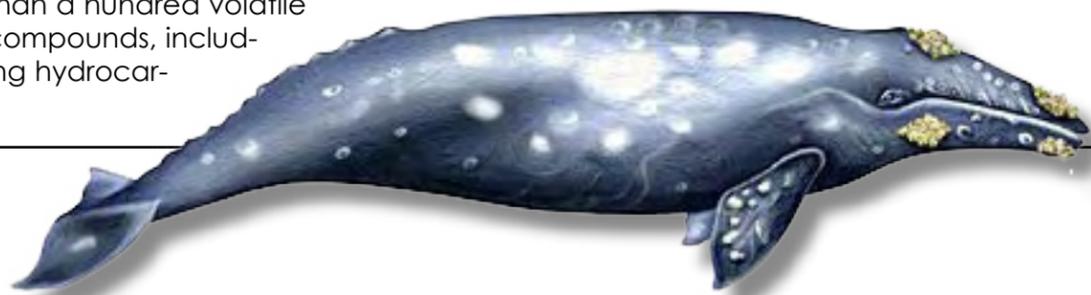
People who ate the stinky meat reported numbness, a rash or stomach ache. The origin of the odor—which has also affected seals, walrus and cod—has baffled scientists, and in 2003, U.S. and Russian toxicologists began testing tissue samples of stinky whales.

They looked for traces of heavy metals and other harmful compounds, such as organochlorines and polyaromatic hydrocarbons, which are products of industrial processes. They detected more than a hundred volatile compounds, including hydrocar-

bons, sulfur and nitrogen compounds and various odorants.

But it's not clear whether these come from human pollution. As hunters have noted that the stomachs of stinky whales are packed with seaweed. Some researchers have suggested that the whales, faced with climate-related food shortages, have resorted to eating seaweed that causes a pollutant-producing biochemical reaction inside them. Others suggest that the whales are feeding in areas rich in toxin-emitting fungi and bacteria.

But the report adds that the stink could also be caused by an unidentified biotoxin. ■



GREENPEACE

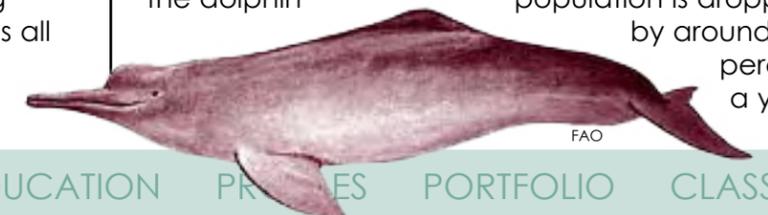


## Extinction also looms for Amazonian pink dolphin

Fears for the future of the Amazonian pink river dolphin are rising after a surge in their indiscriminate killing and the launch of a government plan to build several hydro-electric dams in the region. Until recently, the freshwater

could face the same fate as the Yangtze River dolphin. The boto is still widespread compared to other river dolphins. Since 2000, however, Brazilian scientists have registered a sharp drop in their number.

In the Mamiraua ecological reserve 330 miles from Manaus, which has one of the highest concentrations of botos, researchers believe the population is dropping by around 10 percent a year. ■



FAO





Text and photos by  
Petty Officer 1st Class NyxoLyno Cangemi  
Eighth Coast Guard District External Affairs



*Students meet challenges to become military scuba divers*

# US Coast Guard Diver

The surface of the 12-foot pool bubbles like a hot tub while instructors below signal to a group of dive students using a series of hand signals on how to inflate their vest. One by one, each student slowly starts floating to the surface. The instructor signals the students to deflate the vest and again, one by one, they return to the bottom. Lined up along the

bottom of the pool each student takes his turn floating up, then sinking down. The entire exercise from start to finish looks more like a wave at a football game set at super slow motion than a dive class.

ABOVE: Students prepare to dive in a 12-foot pool for scuba training  
RIGHT: Two scuba students swim to the surface of a 12-foot dive pool after performing an emergency-preparedness exercise





Six students at the Naval Diving and Salvage Training Center in Panama City, Florida, surface after participating in a training exercise in the center's 12-foot pool. Personnel at the training center offer several underwater diving courses to all branches of the military, with the exception of the Navy SEALs and the Green Berets

### The right stuff

As a volunteer program for the Coast Guard, any member who meets the center's eligibility requirements can enroll; however, attendance is not a guarantee of success. Enrollment into the dive program can be a physically and mentally challenging endeavor, requiring a large commitment from the students.

"On average, about a third of the people who enroll in the course don't make it through," Roy said. "We lose students primarily because of academics and inability to perform. We purposely take people out of their comfort zone while they're here and push them to their limit, so when they're in the field, if something was to happen, they won't quit."

The training is tough, and everyone is held to the same standard. Enlisted, officer, male, female, Navy, Coast



A bath of cleaning solution is used to sterilize scuba regulators used by diving students at the Naval Diving and Salvage Training Center here. The regulators are cleaned after each diving exercise at the center

Instructors at the Naval Diving and Salvage Center in Panama City, Florida, maintain a serious attitude about the training they conduct in turning military men and women, into certified scuba divers. Physical dive exercises can be physically demanding, and classroom instruction often mirrors that of a college-level chemistry course.

"Coming here is like getting your masters degree in diving," said Coast Guard Lt. Alan Fitzgerald, a student enrolled in the Marine Engineering Dive Officer Course at the dive center. "The academics alone are pretty tough, because you get into all aspects of diving including physics and medicine. As far as physical fitness, they train you to be strong, so you can handle yourself under the surface."

With courses ranging from the scuba certification course to the BDO course,

members from all of the United States military branches (with the exception of the Navy SEALs and the Green Berets) come here to see if they have what it takes to become a military certified scuba diver.

Prior to 9-11, Coast Guard divers took to the water to perform such functions as hull-integrity inspections, buoy repair and ice research. With the formation of the Maritime Safety and Security Teams located throughout the country, the Coast Guard has increased its efforts to train and certify more of its own members to perform homeland security missions.

"Today, the Coast Guard has 112 billets as certified divers, and we train 40-50 Coast Guard members each year to sustain that number," said Chief Petty Officer Philip Roy of the Coast Guard Liaison Office at the training center.



U.S. Coast Guard Ensign Thomas Brittingham does a push-up during a physical fitness exercise at the Naval Diving and Salvage Training Center here. Brittingham is one of seven Coast Guard members enrolled in the center's joint-service, scuba-certification course

RIGHT: Coast Guard Ensign Mark Unpingco adjusts a strap on an oxygen tank while Petty Officer 3rd Class Shawn Price assists

## USCG Diver



Two instructors at the Naval Diving and Salvage Training Center here test a student's ability to stay calm during a confidence training exercise Wednesday, Dec. 6, 2006. The exercise is designed to better prepare scuba students at the training center for real-world emergencies

Guard—it doesn't matter. Everyone here is an equal and is expected to live up to the same physical fitness standards set forth by the training center.

Prior to the start of class, candidates must be able to successfully complete the minimum fitness standards, including a timed fitness course.

All aspects of training are taken very seriously. When underwater, if an emergency occurs, a diver must go through the proper decompression before reaching the surface or he could suffer grave consequences, yet despite the inherent dangers associated with underwater diving, the atmosphere remains positive.

"Being a volunteer program, the students who are here, want to be here," said

Roy. "They want to get through this program, and being surrounded by that level of energy is inspiring."

As with any type of military training, the US Coast Guard trains its divers from ground zero. Regardless if students arrive at the school with a recreational dive certification, they must still complete the course. Previous dive experience is not a requirement for school, nor will it ensure a student's success.

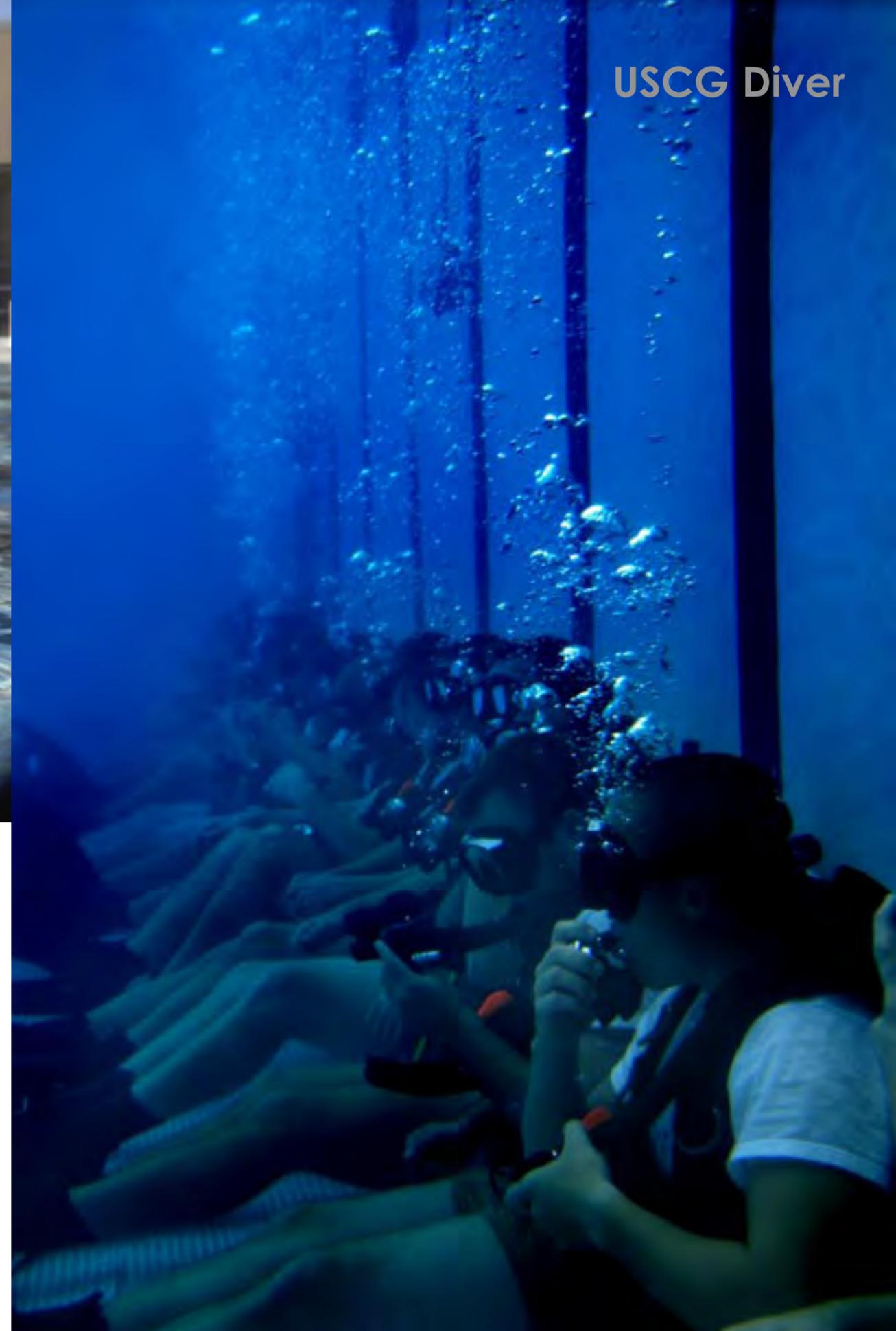
"The level of training the students receive is comparable to what a recreational diver would," said Roy. "But because our student's are training to become military divers, they have much more dive time and exposure to the water than one would receive recreationally. You really



U.S. Coast Guard Chief Petty Officer Philip Roy leads a class of 25 scuba students on a run Thursday, Dec. 7, 2006, near the Naval Diving and Salvage Training Center here. Roy is a certified, military scuba diver and works at the training center to assist students in obtaining their scuba certification. U.S.

can't draw too many parallels between civilian and military training."

Lt. j.g. Rachel Beckmann recently completed the basic scuba course and is now enrolled in the Marine Engineering Dive Officer Course. "The goal of the five-week scuba course is to basically take someone with no diving experience and train them to be a certified diver. The whole course was really intense, but it felt very rewarding to complete it," she said.



U.S. Navy Petty Officer 3rd Class Clifton Dillehay awaits instruction to begin a diving exercise in a 12-foot dive pool at the Naval Diving and Salvage Training center. Dillehay is one of 25 students at the training center enrolled in the scuba course

**On the job**

Upon completion of the course, students move on to perform certain job functions most people only read about—diving under polar ice in the Arctic, sweeping for explosives in the nation's ports and locating sunken buoys in a field of coral off the coast of Hawaii.

Assignments to dive units are rate specific, and a certified diver can be assigned to any of the US Coast Guard's MSSTs, any of the service's polar-class icebreakers and fourteenth district buoy tenders.

While stationed aboard buoy tenders,

dive teams can work independently from the ship, reducing response time and cost, Roy said. The teams can perform all of the same functions as the tender crew can and are often flown to remote Pacific island locations to repair and replace navigational aids damaged by typhoons or listed in discrepancy reports.

**Compensation**

Certification as a Coast Guard scuba diver also carries with it the added benefit of a pay increase. Because of the nature of the job, divers receive an incentive pay ranging anywhere from

US\$150 to \$240 each month while stationed at an operational dive unit.

The challenge for anyone wishing to become a military certified scuba diver is great, but with successful completion, a career as a US Coast Guard diver can be a rewarding one.

Those strong enough to complete the course walk away with a sense of pride and accomplishment and will forever be known as a member of the elite corps of US Coast Guard divers. ■

Scuba Students await instructions on how to inflate their vest at the bottom of a 12-foot pool



Students at the Naval Diving and Salvage Training Center here gather and wait for a briefing on their next dive exercise. Twenty-five students are enrolled in the training center's scuba course, and if they successfully complete the course, they will re-enter the fleet as military-certified scuba divers

## Do you have what it takes to be a US Coast Guard Diver?

To enroll in the Coast Guard dive program, you must:

- Be an active-duty member and volunteer to participate in the program
- Be under 35 years old
- Have an ASVAB score of AR+WK=104 and MC=50
- Have no marks less than four within the last six months
- Be in any rate other than aviation
- Be able to complete a physical fitness course as outlined:

- 500 yard swim (side or breast stroke) within 14 minutes
- 10 minute rest
- 42 push-ups
- 2 minute rest
- 50 sit-ups
- 2 minute rest
- 6 pull-ups
- 10 minute rest
- 1.5 mile run within 12 minutes, 45 seconds

Eligible candidates undergo an interview process, medical exam, physical screening and pressure tolerance test. Lastly, a command endorsement completes your application package. For more information on the program, please contact the US Coast Guard Liaison Office at (850) 235-5244.

# THE GOLD STANDARD

## EVOLVED



**SIMPLE ENOUGH TO BE YOUR FIRST DIVE COMPUTER**

**SOPHISTICATED ENOUGH TO DIVE FOREVER**

The Gold Standard of sport dive computers, the Cochran Captain has been re-invented as the Cochran EMC-14. The EMC-14 is packed with all the features you need to feel safe and confident on any dive. And when you're ready for more advanced environments the EMC-14 is there with constant FO<sub>2</sub> and NITROX handling.

And that's only the beginning. The EMC-14 has expanded memory, maximum depth alarm and like all dive computers in the EMC family, takes many environmental factors into consideration when calculating decompression data using Cochran's EMC decompression model. Add to that a direct interface with your PC using the powerful Analyst 4.01 software.

All this, plus much more at an entry-level price.

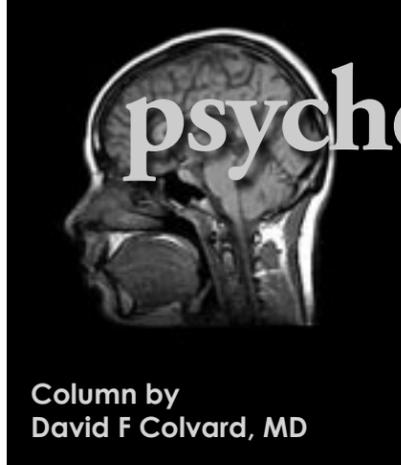
**Cochran**  
UNDERSEA TECHNOLOGY  
800.856.3483  
divecochran.com

**Analyst 4.01 Software**  
Cochran Analyst 4.01 is the perfect companion to your Cochran Dive Computer. This advanced dive tracking and educational software helps you to be a safer diver!

- Use the built in Dive Simulator function to determine your response to different diving situations.
- Download dive profile information from your Cochran Dive Computer and chart it.
- Send detailed dive profile information directly to DAN with the click of a mouse!

Visit [www.divecochran.com](http://www.divecochran.com) for a FREE demo.





Column by David F Colvard, MD

# Nitrogen Narcosis



IMAGES THIS PAGE COURTESY OF DIVERPSYCH.COM

**Nitrogen narcosis, or “rapture of the deep,” is one of those things that some divers like to joke about but really is no laughing matter. (Pun intended) While a recreational diver is far more likely to experience nitrogen narcosis than decompression illness, we know much less about the exact physiological mechanism of nitrogen narcosis than that of DCI. Unfortunately, both can result in a diver fatality, the first from being bubbly drunk and foolish and the second from being bubbled up.**

So, when we were on Bonaire a few years ago on Father's Day and my daughter, Stacy, gave me a T-shirt that read, “I've got nitrogen narcosis. What's your excuse?” I was not quite sure how to take the message. I assumed it might have been a critique of my fanatical diving. Surely, she could not have been referring to my charming personality. That is one of the big problems with nitrogen narcosis. You probably don't even know you have it at the time.

In 1935, Behnke et al found that even at just 66 feet (3 ATM), breathing compressed air produced “euphoria, retardation of the higher mental processes and impaired neuromuscular coordination.” At 100 feet (4 ATM) he found even more impairment in divers. What is especially scary is that it occurred from the very

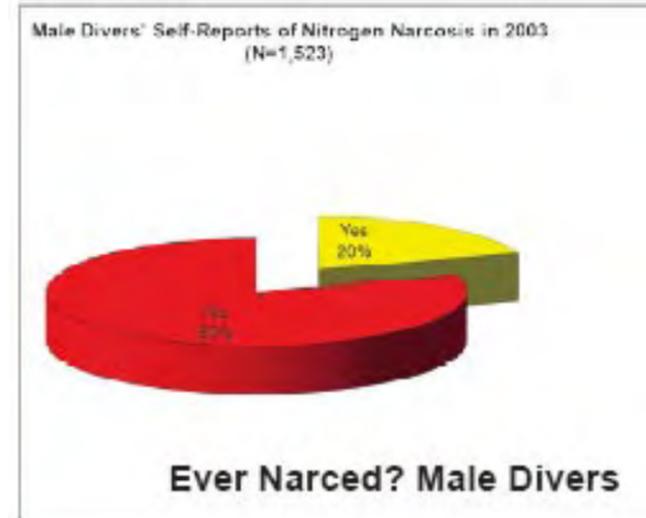
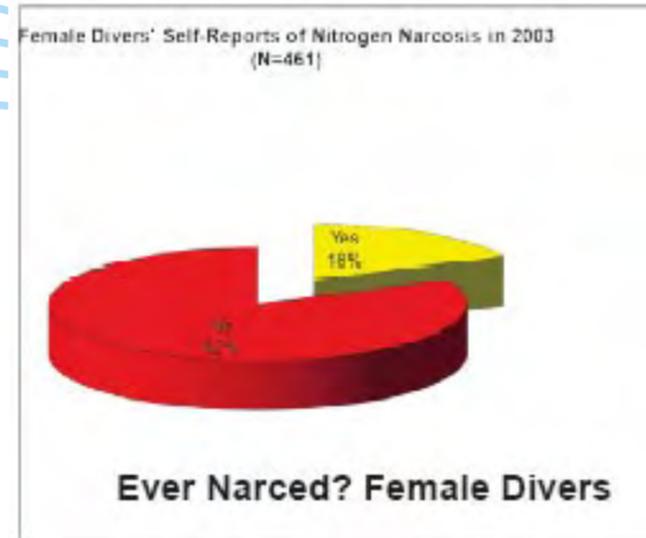
beginning of exposure to compressed air and did not change with time at depth. In other words, breathing compressed air at depth makes you stupid and slow and clumsy, not exactly worthy goals.

In the winter of 2004, I conducted a poll of 1,984 divers and asked, “In 2003, did you experience nitrogen narcosis on any dive? (light-headedness, euphoria, elation, laughter, poor coordination, slowed thinking, poor judgment, or reckless behavior)” and at what depth they began to experience it. Only 20% of males (n=1,523) and 18% of females (n=461) admitted to having any signs or symptoms of nitrogen narcosis while diving in 2003 and most of those reported that it began when they were deeper than 90 feet.

Is it possible that all the other divers stayed above 60 feet on all their dives in 2003? Not likely. It is far more likely that they under-reported their symptoms, either because they either failed to recognize them or to remember them. There can be wide individual susceptibility to nitrogen narcosis. That is another good reason to dive with a reliable buddy so you can check on each other. Just make sure he/she is less susceptible than you. Fortunately, the impairment from nitrogen narcosis resolves rapidly with decompression. Of course, this assumes you have not already gotten yourself into trouble thinking you are invincible.

### Recognizing the signs

According to my poll in 2004, over 80% of scuba divers fail to recognize or remember having any signs or symptoms of nitrogen narcosis. So, what can you do? Well,



you can risk diving stupidly and slowly and clumsily at more than 60 feet (3 ATM). Or, you can dive relatively safely at less than 60 feet all the time. And last but not least, you can dive with a dive buddy who will check on you. Whoa, I knew there had to be a reason for the buddy system. This assumes your dive buddy is

less susceptible to nitrogen narcosis or “stupidity of the deep” than you.

For starters, remember the “Martini Rule” that states that the symptoms of nitrogen narcosis are similar to being inebriated and that every 50 feet of depth is like having one martini. Therefore, the first thing you want to avoid is a dive buddy who starts out the dive day with a couple of 50 foot alcoholic drinks or who is still hung over from a night of heavy drinking. Just like there is no such thing as having “one for the road” when driving, there is no such thing as having “one for the dive.”

Antihistamines, antiseasickness drugs and patches, sleeping pills and some other medications can multiply the sedative-hypnotic-like effect of nitrogen narcosis, so watch out for those, too. Marijuana also emphasizes the anesthetic-like action of high pressure nitrogen at depth. It is best to avoid it and divers who use it if you want to dive safely.

Back in 2000, when I started doing research in scuba diving, a retired internationally renowned diving scientist told

If you want to kiss a jellyfish, you are narced for sure

me he stopped diving on the West Coast because he no longer felt safe in the water with so many “high” divers. I hope he was exaggerating the extent of the problem.

Professional tech diver Bret Gilliam, who made a record dive to 452 feet on air in 1989, developed a simple low tech test for nitrogen narcosis: Every few minutes, hold up a number of fingers to your buddy (say, three fingers). He has to respond with the same number plus one (four fingers). “If you really wanted to screw a guy up,” writes Gilliam in his book *Deep Diving*, “you gave him all five fingers and then he had to use both hands to come up with a six-finger response.” So, if you want to check on your dive buddy's state of nitrogen narcosis, then ask him or her to give you more than one finger.

David F. Colvard, M.D., is a private psychiatrist and clinical investigator in Raleigh NC, and a divemaster. He hosts [www.DivePsych.com](http://www.DivePsych.com) which provides evidence-based information for divers on psychological and stress factors in scuba divers. ■



Edited by  
Michael Symes

*...the ability of water to transmit sound waves is of great importance for marine organisms enabling them not only to investigate their immediate environments but also to communicate.*

Text by Michael Symes



detect movement; this includes both plants and fishes (see Xray-mag.com #10 for the detection of movement by fish). All these forms mostly function over short distances of the order of centimetres, although chemical signals, such as blood can also be detected over relatively large distances, tens of metres, by sharks, for example.

Water, as we have previously seen in this magazine, has many properties that have been utilised by terrestrial organisms. One of them, the ability of water to transmit sound waves, is of great importance for marine organisms enabling them not only to investigate their immediate environments but also to communicate.

### Noise

Standing on the seashore one would never know the amazing amount of noise to be found below the

surface of even an apparently quiescent sea. Noise is created by the surf and winds, of course, but a large amount is created by humans with their boats such as the big oil tankers. In a minor way, countless divers going about their professions or hobbies also create noise. It is not generally appreciated, though, that fish, whales, and even crustaceans, create an amazing amount of noise underwater.

However, when we speak of noise we must be careful to distinguish between what we generally call noise, which is just what it says, an indiscriminate inharmonious muddle of sound, and a useful sound signal, which can be used for communication.

For those animals living above water, it is the sense of sight and,

to a lesser degree, hearing, that functions over great distances. Vision can be unlimited in its reach (we can see to the edge of the universe) while sound can be detected over several thousand kilometres after volcano explosions. And so it is with aquatic creatures, although vision can often be limited to a few metres by conditions in the water. Thus, it is mostly the sense of hearing that functions as a means of long distance communication under the surface of the oceans, whales appearing to be able to communicate using sound over distances of thousands of kilometres.

The aquatic organisms that use sound for communication, in its broadest sense, are the fishes and the aquatic mammals. These, however, emit, detect and use sound in fundamentally different ways. So, this article will only discuss the use of sound by the aquatic mammals leaving other marine creatures to be discussed in a subsequent article. However, before describing these ways, we must first look at what is meant by sound in water.

### Sound transmission in the Ocean

Sound, as most people will know, consists of varying longitudinal pressure waves transmitted by a medium. Sound can be described by four parameters:

c - Speed	unit
λ - Wavelength	ms <sup>-1</sup>
v - Frequency	m
I - Intensity	Hz
	Wm <sup>-2</sup> .

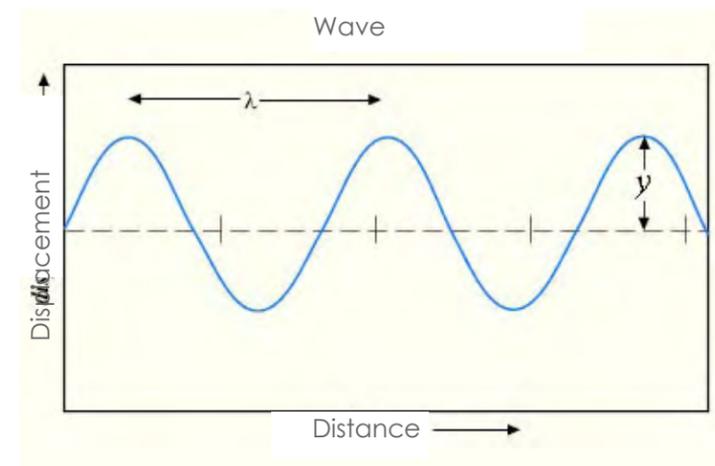
1 Hz is one cycle per second. The relationship between c, v and λ is given by the simple relationship:

$$c = v \lambda \text{ ms}^{-1}.$$

**Loudness**, a subjective perception, is a function of the wave intensity, which itself is a function of (amplitude)<sup>2</sup>, (frequency)<sup>2</sup> and speed, and the sensitivity of the hearer to the given frequency.

The speed of sound depends on the medium through which the waves propagate. For example, the speed of sound in air at 18°C is about 331 ms<sup>-1</sup>, and about 1524 ms<sup>-1</sup> in sea water at the same temperature i.e. about five times faster.

Due to the wave energy being converted into random energy in the molecules of an imperfectly elastic medium, the sound becomes attenuated. Attenuation is much less for water



λ = wavelength  
y = amplitude

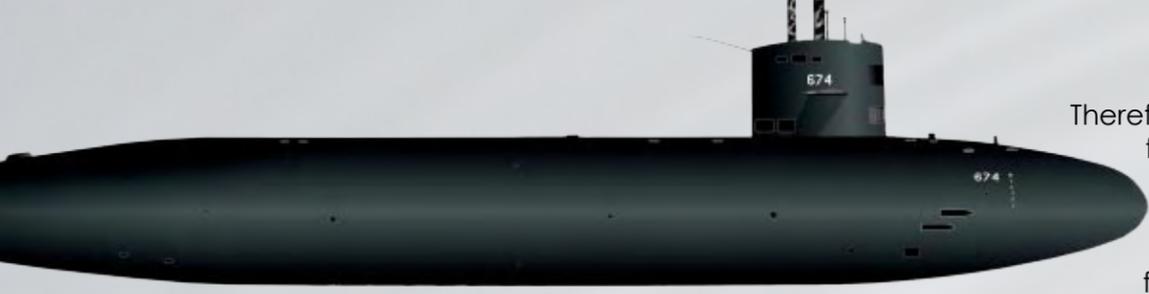
**Aquatic animals, like their land-based relatives, can communicate in a number of ways. For example, in one form of communication, organisms can emit and detect certain organic molecules which can function as the pheromones of land based creatures. This is a sexual communication.**

Electrical fields can also play a part in communication; and most aquatic creatures can also

# SOUND

## Cetacean communication & the Harmonious Humpback





than air making water an efficient transmitter of sound. This makes it very useful as a tool for marine creatures.

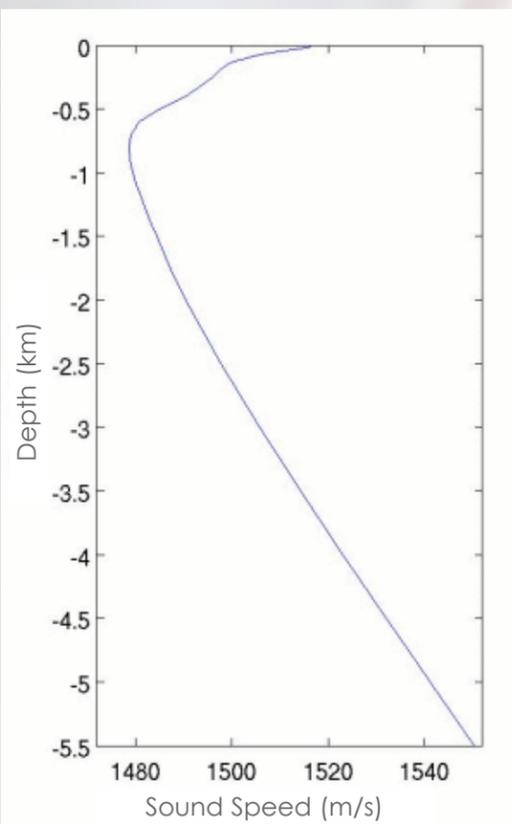
Humans can detect frequencies between about 20 Hz and 20000 Hz, with the maximum sensitivity being at about 1000 Hz, which is about two octaves above middle C on the piano. A frequency of 1000 Hz corresponds to a wavelength of about 33 cm in air and 1.5 metres in water.

The speed of sound in water, like that in air, is determined by a number of factors, such as temperature and pressure. As the temperature decreases so does the speed of sound in water. The propagation of sound in sea water can be affected by its salinity and also by particulate matter that can scatter or absorb the waves.

As pressure and temperature change with depth in the oceans so does the speed of sound. A temperature gradient exists when the temperature of the water decreases with increasing depth, called a thermocline. However, at a depth of about 750 metres the water temperature becomes essentially constant so that the speed of sound becomes more a function of changes in pressure due to depth. This can give rise to special effects when specific combinations of temperature, pressure and salinity occur. Among these are the formation of the SOFAR channel.

### The SOFAR Channel

Because the transmission speed of sound is proportional to pressure, the speed of sound increases with depth, which is opposite to the effect of the thermocline. Therefore, at the interface of the thermocline and the depth at which the temperature becomes constant, a region exists at which the speed of sound is a minimum. From the equation  $c = v\lambda$  it can be seen that for a constant wavelength  $\lambda$  the frequency  $v$  is proportional to the speed  $c$ .



Sound speed as a function of depth derived from the 2005 World Ocean Atlas. The SOFAR channel axis is at ca. 750 m depth

Therefore, at lower speeds the frequency is lower. A channel is thus created within the oceans, which permits the transmission of low-frequency sound over thousands of kilometres. This channel allows long distance sound fixing and ranging (SOFAR) and was discovered in 1943 by both the Americans and the Russians.

Being a function of the depth and of the extent of the thermocline the SOFAR channels are closer to the surface in the colder northern waters. Due to the shape of the

SOFAR channels sound waves can become trapped in them and, as they are travelling at minimum velocity, lose little energy as they progress. This permits them to travel distances of up to 25,000 kilometres. It is claimed that some whales utilise the SOFAR channels for mating calls over great distances (see figure).

As stated above, sound has been employed as a very useful tool by many aquatic creatures. However, it is the marine mammals that have made the great-



- (i) the **cetacea** i.e. the whales, dolphins and porpoises
- (ii) the **pinnipeds** i.e. the seals, sea lions and walruses
- (iii) the **sirenia** i.e. the dugongs, manatees and sea cows

All of these mammals produce sound signals, with the seals and sea lions producing great growls and roars. However, it is perhaps the cetacea that are of the greatest interest when discussing sound and communication beneath the waves as they can produce echolocation clicks, beeps and even songs.

est and most sophisticated use of sound as a means of communication.

### Marine Mammals

There are three orders of mammals that have evolved independently and adapted to life in the sea.

### The cetacea

There are over 80 species of cetacea which can be divided into two subgroups, those of the

In the past, the tree of life was constructed on the basis of similarity of morphological features. The more similar two species looked, the more closely they were thought to be. But looks can be deceptive. This became abundantly clear more than a decade ago, when molecular biologists began comparing small numbers of genes from various organisms and found that many species were not what they appeared. Hippos, for example, were once thought to be the kissing cousins of pigs, but genetic evidence revealed their closest relatives to be the cetaceans (whales, dolphins and porpoises).

NEWSSCIENTIST, 16 JUNE 2007, PAGE 48

suborder *mysticeti* (the Baleen whales), a group of 12 species containing the great Blue whale, the Right whale and the Humpback whale; and the suborder *odontoceta* (the toothed whales), a group of about 70 species containing the Bottle-nosed dolphin, the Sperm whale and the Killer whale.

All of these aquatic mammals produce sound. For example, the Blue whales produce very low frequency sound in bursts of 10 to 15 seconds of about 40 Hz i.e. they are bass singers. On the other hand, the Beluga whale is known as the sea canary, having a much greater singing range from 1.5 kHz to 60 kHz. It could perhaps be considered the soprano of the aquatic world except for the fact that it is only the males who sing. Other aquatic mammals have different frequency ranges and melodies. For example, the Bottlenose dolphin uses a large range of frequencies between 7 and 15 kHz to emit clicks and whistles. And among the pinnipeds, the



vocalisations of the Weddell seal have a frequency range from 100 Hz to more than 70 kHz, emitting a large number of warbles, trills and chirpings.

It is the male Humpback whale, though, that is the most prolific singer of them all.

### The Humpback whales

The male humpback whales sing the longest, loudest and most complex songs, with repeating themes, and they can last for more than half an hour. They are the most musical of the whales with a frequency range of from 20 Hz to 8000 Hz. These songs can be heard thousands of kilometres away, especially if a SOFAR channel is used.

The songs can be very different, depending on location, although they are only heard on the breeding grounds. For example, the whales of the North Pacific sing quite differently from those of the North Atlantic. And even within a given area, there can be dialect differences. The songs also change over time and are therefore different from year to year.

### The production and perception of sound by Baleen whales

This is still an ongoing area of research. With regard to the

location of the source of the sounds, it is known that the nasal plug and nasal sac system move when sound is produced. Baleen whales do have a larynx but it lacks vocal chords, and furthermore, unlike humans, whales do not have to exhale to produce sound. However, the mechanisms of sound production are still unclear.

Like terrestrial mammals, whales have an outer ear, but this tiny opening closes underwater. However, there is a very sensitive reception of vibrations through the bones of the head. The perception of these vibrations is via the bone structure of the middle and inner ears. This structure is a modification of that of the terrestrial mammals, which of course the whales once were millions of years ago.

### Other sounds

Not only do these whales use their "voices" to make sounds, they can also signal

by slapping their flukes and flippers on the surface of the water. It seems that this is also a form of communication between Humpback whales.

Otherwise, if you would like to hear some of the whale songs for yourself then *Songs of the Humpback Whale* is recommended. This is an audio CD available at Amazon.co.uk, costing GB£9.98. This has had excellent reviews. **Direct link**

### What is this signalling used for?

It is reasonable to ask what is the use of this communication, if it is such. Seen from the point of view of evolution, it must obviously be an advantage.

As mentioned above, the songs are heard only on the breeding grounds, generally during breeding times, and it therefore seems to be safe to conclude that they are connected with breeding behaviour. The songs are apparently used to court females and to frighten off male rivals. As the oceans are so big, perhaps the songs are used to attract suitable females from afar; or perhaps, like the songs of birds in the Spring, they are to stake out a territory.

Interestingly, it has been observed that there is a clear resemblance between whale songs and, for example, some of the sounds produced by elephants. Obviously, we are still in great ignorance about the "languages" of animals and how they communicate.

### Echolocation

When sound from a whale is reflected back from a solid object, an echo is created, which can be perceived by the

It is interesting to note that even aquatic mammals display the same right handedness as humans, of whom some 90 percent are right handed. To quote from a recent book, *Right Hand, Left Hand*, by Chris McManus, on the origins of asymmetry in brains, bodies, atoms and culture: "Humpback whales like to slap one of their two flippers on the surface of the sea, and for three-quarters of them it is the right one that they choose."

whale. The sound is emitted as a series of clicks, and the whale listens for the reflected echoes. The time it takes for the echoes to return tells the whale how far away the object is. Whales are able to resolve the sound down to 0.1 m/s which, at a speed of sound of 1500 m/s, corresponds to a distance of 15 cm. It is a useful

tool for when visibility is reduced in turbid waters.

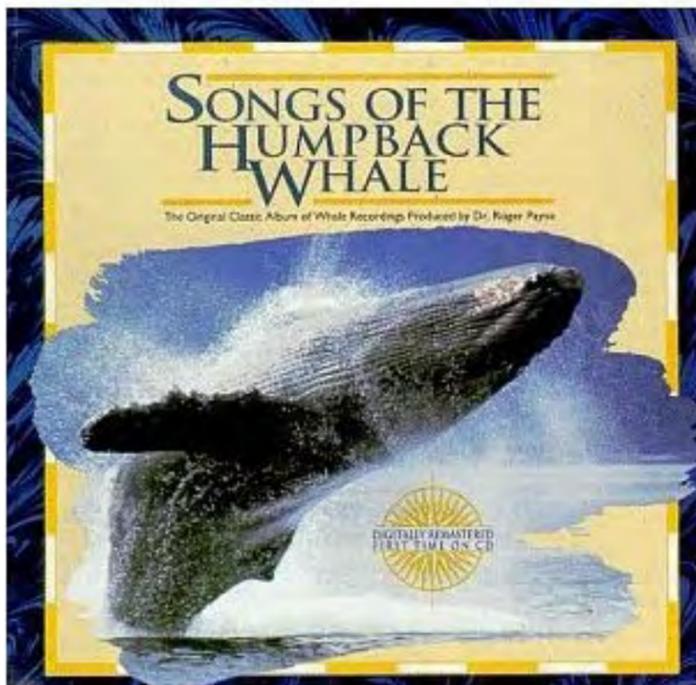
Some whales, the odontocetes, hunt prey using echolocation, with some species showing the ability to herd and capture their prey.

### Effects of human actions on the underwater environment

It has been established that large noises in the oceans can seriously effect the health of the aquatic mammals. Just as very loud noises can affect humans and can cause not only pain but also disorientation, so also can the aquatic mammals be affected. Ship and submarine noises together with marine seismic surveys seem to be affecting the populations of the different whale species.

### Has the Humpback whale a future?

Prior to their commercial exploitation, the population of the Humpback whale is estimated to have been about 115,000. Today, there appear to be no more than about 10,000 remaining, and they are now considered as an endangered species. It is horrifying to think that these fantastic creatures, due to their being hunted by egoistic humans, are rapidly moving towards extinction and the silencing of their songs. ■



Numerous CD's are available with whale songs

Links to Wav files with whale songs. If you have a computer with a sound card and speakers or headset, just click on the links

- Whale Song #1** (WAV) 324K
- Whale Song #2** (WAV) 345K
- Whale Song #3** (WAV) 259K
- Whale Song #4** (WAV) 291K

dive in.  
explore.  
discover.



Tailgating the lone dugong, KAT, on Cocos (Keeling) Islands. Photographed by Karen Willshaw ~ underwater.com.au member





## focus

Just their name, their size, and their menacing looks can evoke feelings of terror, fear and instinctive rejection. However, if you have the privilege to be able to dive with big tiger sharks, as I have, you might fall in love with them, at least you will bond with them in a mysterious way. They are certainly not as “cute” as marine mammals or anthropomorphized clown fish, but they will have an impact on you that could change your perception of sharks, and marine life, forever.

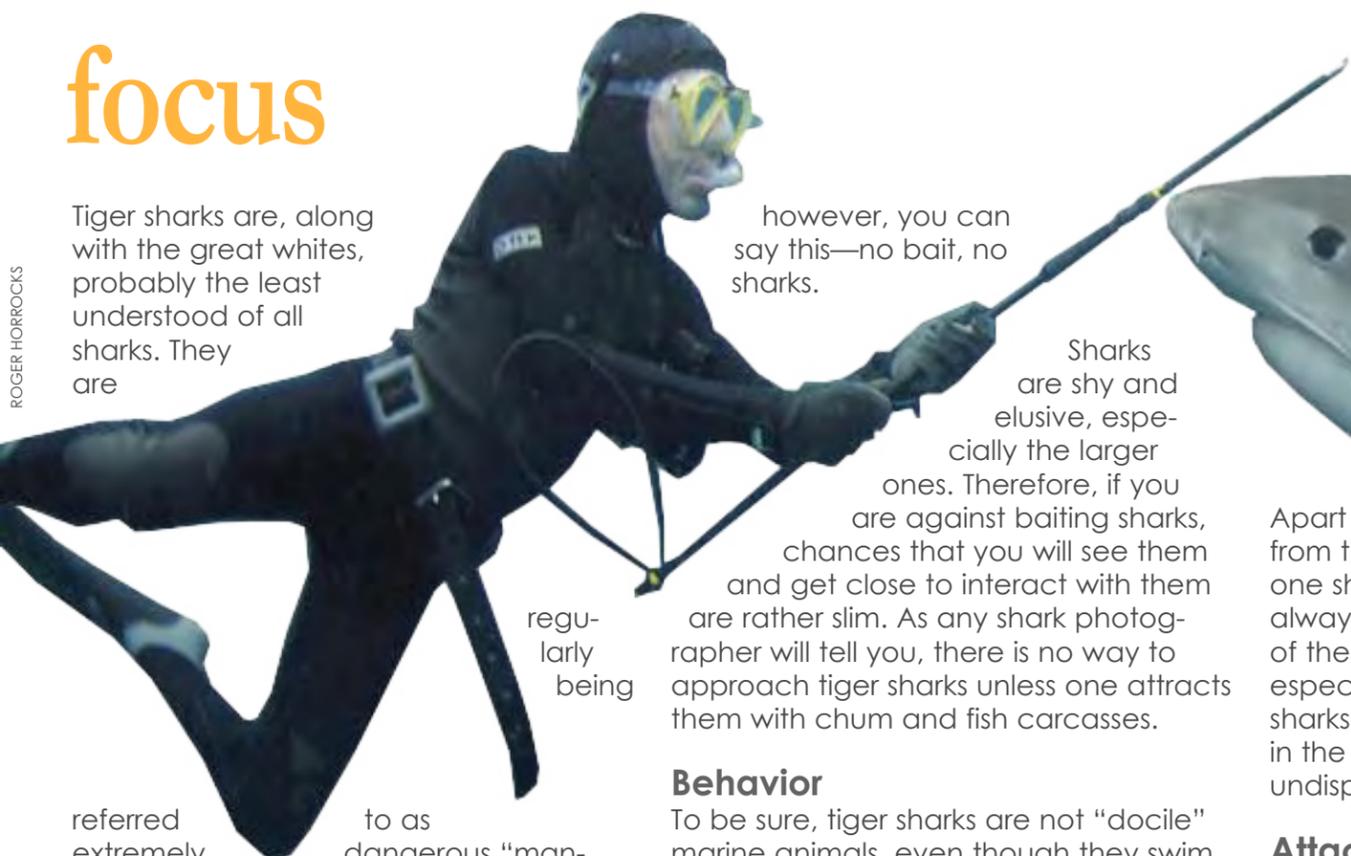


# Freediving with Tiger Sharks How safe is it?

Text by Wolfgang Leander  
Photos by Wolfgang Leander,  
Roger Horrocks and Sijmon de Waal



ROGER HORROCKS



Wolfgang blessing a large female tiger shark appropriately baptized "Dances with Wolf"

## Tiger Sharks

Tiger sharks are, along with the great whites, probably the least understood of all sharks. They are

however, you can say this—no bait, no sharks.

Sharks are shy and elusive, especially the larger ones. Therefore, if you are against baiting sharks, chances that you will see them and get close to interact with them are rather slim. As any shark photographer will tell you, there is no way to approach tiger sharks unless one attracts them with chum and fish carcasses.

Apart from that one should always be aware of the fact that sharks, especially the "requiem" sharks, have no serious adversaries in the oceans, which makes them the undisputed lords of their habitat.

### Behavior

To be sure, tiger sharks are not "docile" marine animals, even though they swim slowly compared to other more nervy sharks and, thus, appear to be "cool". They are formidable and highly developed predators capable of hunting other sharks and biting through the shells of sea turtles. Not understanding and correctly interpreting their body language is probably the highest potential risk factor while encountering them in their environment.

### Attacks

So, what about so-called shark attacks? I would venture to say that not more than five to ten tiger shark related accidents happen each year worldwide, of which perhaps one or two may result in fatalities. According to the Princeton-based Shark Research Institute (SRI), between 2000 and 2006 some 35 incidents involved tiger sharks; only eight of

degree of corporal mobility, which in my opinion only apnea diving will allow you. But then again, this is my choice. Most other people will feel more comfortable diving with tanks—being relaxed underwater is really what recreational diving should be all about.

I began freediving 52 years ago in southern France, and to this day I can still fully relive the overwhelming sensation I felt

then being able to enter into another Cousteau's weightlessly

referred to as extremely dangerous "man-eaters", which, as many enlightened divers and experienced "sharkmen" know by now, is not the case; Tiger sharks are neither "extremely dangerous" nor do they eat men (or women).

"Dangerous" can be circumstances and wrong attitudes like harassing or provoking them, or else disregarding other basic safety rules such as not spear-fishing in their presence. Being with tiger sharks in a feeding situation where they might view you as an intruder or a competitor could incite them to display dominance, which, if not recognized and respected, could possibly trigger a bite.

### Chumming

Typically, shark operators will bait tiger sharks with chum or fish parts in a perforated plastic drum, which has proven to be a safe method to attract them. Some people are opposed to baiting sharks—they allege that baiting sharks alters their attitude toward divers, as they will associate humans with food. Unfortunately, ignorance fuels fears. There is absolutely no evidence that baiting conditions sharks to attack people. As a rule,



ROGER HORROCKS

these were recorded as fatal. The SRI lists the shark species in their shark attack files when they are 99-100 percent certain about it. Surfers, swimmers, and spear-fishermen appear to be at a higher risk of being bitten by a tiger shark than snorkelers and scuba divers.

These findings, although not complete as not every incident is being reported, simply confirm that tiger sharks—or any sharks for that matter—are not at all what ignorant and sensationalistic media people still call the "monsters of the deep" or "mindless killing machines".

That said, diving with sharks, even with fully grown tiger sharks, should not be regarded as a "hazardous" activity or an "extreme" sport. If you want to dive with tiger sharks, and assuming that you have some experience diving with other sharks, the question should not be: Is it safe or not? Rather, the question is whether to freedive or scuba dive with the sharks.

### To freedive or not to freedive...

I prefer freediving for two very basic reasons. First, as a mammal, I find it unnatural to breathe underwater, and second, interacting with sharks requires a high

silent world—and swim in it.

Freediving with tiger sharks for the first time in my life and just four months ago in the Bahamas in a place called Tiger Beach, left me just as breathless, literally, as I was back in 1955. To swim with tigers spoiled me completely. I have to admit that all other sharks I have seen and



WOLFGANG LEANDER

Large but graceful as a prima ballerina

"Up close and personal"—this is what shark operators call tiger shark encounters





Freediver, Roger Horrocks, photographing "Dances with Wolf"

## Tiger Sharks

### Close encounters

As a freediver, I have had my close encounters of the "striped" kind mostly at the surface where the tigers look their best, photographically speaking. Nothing beats the sight of a tiger shark that comes up to the surface to check you out. Once the tigers feel good about you and move in perhaps a bit too close for your taste, don't panic—just place your hand on their heads and push them down very gently.

Never, never hit a shark on its nose as some "experts" advise. Handling sharks roughly is asking for trouble. Sharks are sensitive and responsive. They can tell a klutz from a tactful person.

### Location

Which place is "better"—Tiger Beach or Aliwal Shoal? This is a tough question, which I have been asked many times after I returned from South Africa. Both spots are great. To my knowledge, these locations are the only ones in the world where you are (almost) guaranteed to see tiger sharks on every dive.

Tiger Beach in the Bahamas is what you'd expect from first class tropical diving in pristine waters—the visibility is superb, and the sandy bottom as background makes for "clean" photographs and videos. The diving is easy, and as you can get there only on a live-aboard (Jim Abernethy of



LWolfgang interacting with one of his tiger girls

swum with—even large specimens—pale in comparison.

No other sharks have a stronger expression of character than tiger sharks—the square head, the wide, blunt front, the comparatively huge mouth—often tightly shut when they get very close—and those inquisitive, intelligently looking black eyes.

When I saw the first tiger shark swimming out of the blue mist of the Bahamian sea—which struck me as the quintessential shark—I felt reborn, miraculously invigorated by the spell of a perfect animal that has already been

around long before the dinosaurs roamed our planet.

A few weeks after my first encounter with tiger sharks in the Bahamas, I flew to South Africa to freedive with the tiger sharks of Aliwal Shoal. Here, I was able to experience the most incredible interaction with big tiger "girls". Swimming up very close to these gentle creatures was what I would call the climax of a lifelong love affair with the ocean and its sharks.





Scuba Adventures and Scottie Smith of the Dolphin Dream Team are the guys to go with), you have unlimited dives while anchored at Tiger Beach.

Aliwal Shoal, in contrast, is for the hard core shark divers—darker waters, usually less clear than in the Bahamas, at times rough launches from the beach as the skippers have to get past the surf.

However, if what you are looking for is close and intense interaction with tiger sharks, I'd recommend that you go all the way to Umkomaas, about 25 miles south of Durban, and book at least 7-10 dives with the operator I consider the most experienced, and whose team members are all excellent, enthusiastic shark divers, with or without tanks—Blue Wilderness.

Mark Addison of the Blue Wilderness team pioneered tiger shark diving in South Africa and is the guy people like David Doubilet and Doug Perrine go with if they want to photograph the tigers or dive the by now famous Sardine Run. Perrine shot his award winning image of the copper shark coming out of a cloud of sardines there.

### What's next...

My next diving plans? In December 2007, I will be back at Tiger Beach, with the Dolphin Dream Team, and in March 2008, you'll find me with my son Felix in South Africa where we have some great friends waiting for us—Roger Horrocks ([www.rogerhorrocks.com](http://www.rogerhorrocks.com)), the Blue Wilderness team, and, of course, "my" girls, of which one I will take out for a dance to renew our special relationship...

I am hopelessly hooked on tiger sharks. I love them. They are to me the paradigmatic sharks—the sharks of sharks. If somebody would ask me what I feel for them, for all sharks, this is what I would state:

We have stripped them of their dignity, we have vilified them throughout the ages, we feared them irrationally out of ignorance, and now we persecute them mercilessly, exploit them as if they were a commodity. We have likened their innocence to the worst of human traits,



not wanting to admit that the darker side of our nature is not bestial but human. We have refused to realize in our hubris that our God is the God that also created them, not a lesser god, a god of sharks—peace to them, finally. ■

*Editor's note: The opinions expressed by Wolfgang Leander in this article reflect his own assessment of diving with sharks. While we believe that diving with them is relatively secure if and when generally accepted safety rules are observed, it should be stressed that sharks are wild animals and accidents could happen*





Edited by  
Gunild Symes

THE FACTS AND VIEW POINTS IN THIS SECTION ARE NOT NECESSARILY THE VIEWS OF X-RAY MAG. ITEMS PRESENTED IN THIS SECTION HAVE NOT BEEN TESTED BY X-RAY MAG STAFF, NOR ARE THE ITEMS WARRANTED. INFORMATION PROVIDED IS CONDENSED FROM MANUFACTURERS' DESCRIPTIONS. TEXTS ARE USUALLY EDITED FOR LENGTH, CLARITY AND STYLE. LINKS ACTIVE AT THE TIME OF PUBLICATION

**POINT & CLICK  
ON BOLD LINKS**



# Art of the Sea

*Arts & crafts inspired by the ocean & the underwater world*

All photos are courtesy of the individual artists

## Waterscapes

Linda Bolhuis is an art glass and graphic designer who works with watercolor or dye on silk and pastels. She creates images on silk that capture the moment when light hits water or "the shifting qualities of light found within the intimacy of a water garden." She believes in the healing power of art and strives to incorporate it into her work. [lindabolhuis.com](http://lindabolhuis.com)



*Silk Stream* by Linda Bolhuis, dye on silk, 40 x 28 inches. Available as a giclee print, 27 x 19 inches, US\$375



*Baja Storm* by Linda Bolhuis, dye on silk, 19 x 11 inches



Detail of *Octo* by Helen Goldberg  
dye on silk, 34 x 34 inches, private collection



*Seascape* by Helen Goldberg, dye on silk, 34 x 34 inches, US\$550.00

## Seasilks

Modern dance professor and diver Helen Goldberg combines her fine art skills with her scuba diving experiences to create colourful paintings on china silk, or silk habotai. These silks are hand painted using Dupont silk dyes. The artist uses various layers of dye and gutta, which corals the dye, as well as various wax, salt and application techniques which ensure minimal fading or running of colors. [seasilks.com](http://seasilks.com)



CATE LARKIN



**OCEAN ARTS  
GALLERY & EMPORIUM**

WHERE A PERCENT OF ALL SALES  
GOES TO OCEAN CONSERVATION  
[WWW.OCEANARTSGALLERY.COM](http://WWW.OCEANARTSGALLERY.COM)





# ocean arts

*The Sea in Abstraction*

## Call of the Open Ocean

Anita Hochman is an Australian artist living near Byron Bay, who creates evocative sky and waterscapes that have a sweeping sense of space. Her fascination with luminosity and movement can be seen in her richly layered semi abstract paintings of landscapes in flux.

[www.anitahochman.com](http://www.anitahochman.com)



## Simplicity & Spontaneity

Anna Grethe Aaen creates oil paintings and neo-pastels, many of which are exhibited in Greenland and Denmark. Most of her paintings come from her

memory "of a piece of nature" or from an experience of nature. She seeks out the simple expression that forces her to reflect. "The power of telling a small part

is greater than telling all. In my paintings, I deal with reality, but they are not about me. Perhaps one can read some states of mind, but I'm not interested in pouring

out my soul. What is interesting is the image and what is happening on the surface, in the structure, the shapes and the colors." [www.annagretheaaen.dk](http://www.annagretheaaen.dk)



*Stormy Weather*, by Anna Grethe Aaen  
oil on canvas, 100 x 100 cm



*Hekla As A Neighbour*, by Anna Grethe Aaen  
oil on canvas, 100 x 100 cm



*Iceberg and Orange Stripe* by Anna Grethe Aaen  
oil on canvas, 100 x 100 cm





Edited by  
Edwin Marcow

## Music to Watch Girls Go By

Love songs for sharks! Songs by Lionel Ritchie and Diana Ross to get you in the mood for making whoopee!

This is not for some star-struck lovers in their twenties, but for the sharks housed at the ten Sea Life aquariums across Germany. Why? Because the centre's staff fear that not enough offspring have been produced throughout the country's aquariums. "We tried everything else, and it didn't work, so we are taking a new approach. It has been tried with pandas and primates and we have nothing to lose by trying the music."

If the sharks do get into the swing of things the public will be treated to a special experience. The mating ritual of sharks, with the male biting the female's fins as he pursues her is quite something to witness.

As Andy's Williams sang... "Eye to eye, music to watch girls go bye." ■

## The Plight of the Whale Shark

A twelve year study at the World famous Ningaloo Reef Western Australia has shown a decline in Whale Shark population numbers. Originated about 60 million years ago, and attaining a length of 20 metres and weighing in up to 30 tonnes, these gentle giants migrate 12 thousand kilometres around South East Asia, and the Indian Ocean.

Within the Pacific Rim, for the exception of Taiwan and Australian waters, these gentle giants do not enjoy the protection they need. Over harvesting, coupled with a slow growth rate and infrequent reproduction leaves this leviathan vulnerable to exploitation.

In the Far East, in particular Taiwan, Whale sharks are considered a delicacy known as the "tofu shark" locally because its delicate meat is said to taste like tofu.



—In 2001 in Australia, the Whale shark was listed as nationally threatened under the Environment Protection and

Biodiversity and Conservation Act 1999. Taiwan legislators have now implemented a ban starting next year that will make it illegal to catch or sell the meat of Whale sharks. Across the Globe in Atlanta Georgia, the Georgia Aquarium, a 500,000 square foot vessel housing more than 100,000 fish including several Whale Sharks brought in from Taiwan, has lost two more Whale Sharks. The sharks, Norton and Ralph mentioned in Sharktales, were brought in from Taiwan in 2005.

Sadly Norton and Ralph died recently most likely from pesticide poisoning. This pesticide was introduced into their tanks to treat parasitic leeches. The aquarium has had its detractors and has come in for criticism for trying to be the first aquarium outside Asia to successfully display and house a Whale Shark, a feat yet to be attained.

Criticism from the Captive Animals Protection Society labelling the display as dangerous, and the Shark Research Institute on the aquarium's decision to exhibit these gentle giants, has been offset notably by the world-renowned Oceanographer, Dr Sylvia Earle. "Sharks that are at the aquarium in Georgia today would be dead if they hadn't been transported and lovingly cared for, and given a home for the rest of their natural lives with people looking out for their every need." ■

## Man – Will We Ever Learn?

*"There are none so blind as those who do not want to see."*

Local populations of Thresher, Mak and Blue Sharks have dropped by more than 80 percent in the waters of Montauk, a small fishing village on the East coast of the United States. Australia has less than 500 grey nurse reef sharks remaining in the waters on New South Wales. These countries, continents apart, are joined by the indifference they share to the plight of the shark populations in their waters.

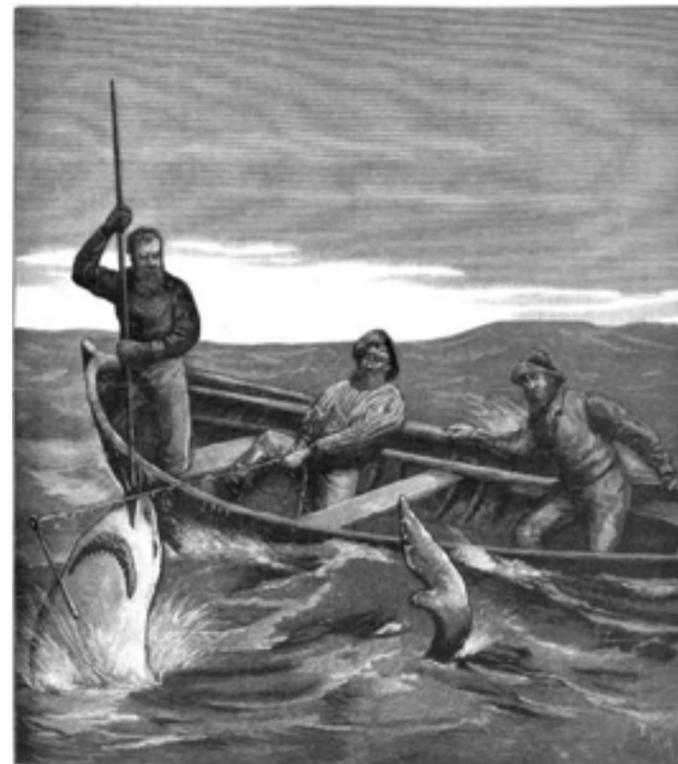
If not stopped, this indifference, fuelled by the greed of various entrepreneurs and commercial fishing companies, will prove to be the downfall for the sharks. In their rush to make a profit today, tomorrow's profit and effective husbandry of the marine environment has been overlooked.

Seventy million plus sharks are killed annually worldwide. Shark fishing competitions further compound this decimation of shark numbers.

The Shark Fishing Tournament organised by Sam Gershowitz, owner of the Star Island Yacht Club, has promised prize monies of more than US\$400,000 for the winner.

"Fishing has been an important part of Long Island's heritage and economy," he said. Note how Mr Gershowitz has stressed the importance of this fishing event to the heritage and local economy of this small fishing hamlet, but no mention of the sharks or the environment.

"This isn't about sport, it's about big money and big suffering of endangered animals," said John Grandy of the Humane Society. "This is recreational slaughter done



'Fight with a shark in Geelong Bay.' Engraving by Julian Rossi Ashton (1851-1942),

for cash prizes."

Mr Gershowitz expects 35 sharks big enough to be caught to be killed in this year's competition. Local character and shark fisherman Frank Mundus, 81, believes it. Mundus, who has written a recently published book said that he was the inspiration for Quint in the first *Jaws* film. He said, "Twenty years ago they would have brought in 100 sharks."

With a further ten percent drop in numbers due to fishing nets in the last five years and already listed as endangered, the future of the grey nurse reef shark in

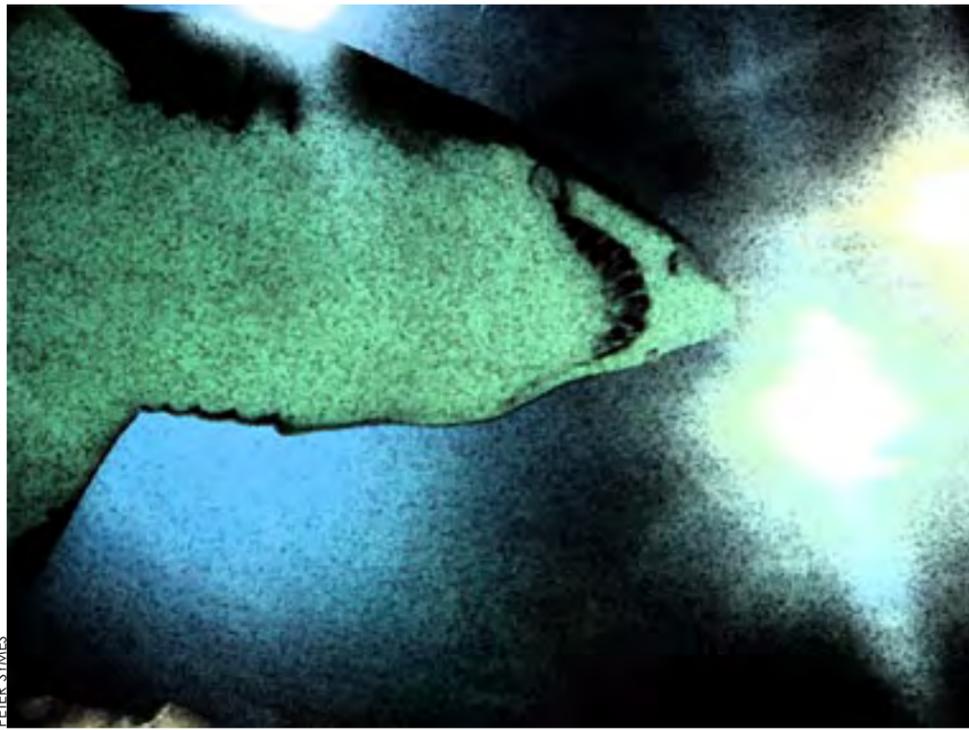
New South Wales (NSW) waters looks desperate. With only a pitiful 500 remaining in these waters, the Nature Conservation Council (NCC) of NSW resumed legal action, requesting 18 no fishing zones to be brought in along the NSW coast.

The NCC has petitioned the Appeals Tribunal to order the Federal NSW Government to legislate these 18 sanctuaries notably in and around Sydney.

The NCC has also petitioned the tribunal to overturn an earlier decision made last year to sanction a large commercial fishery to operate in grey nurse shark habitats along the NSW coast.

The Department of Primary Industries (DPI) estimates that as many as 50 grey nurse reef sharks have been killed by fishing hooks, spears and nets in the last five years. Some believe that this figure of 50 may only be a quarter of the grey nurse reef sharks that

have been killed in this period. The NCC believes with all the available evidence that failure to establish no-take zones would bring the grey nurse reef shark population to extinction within a lifetime. With the pressures of business, big monies have not only blighted the marine environment from Australia to the United States, but will rob our children of a healthy marine environment. What will big businesses and Sam Gershowitz do when there are no sharks to fish for and kill? ■



PETER SYMES

## Opposites Attract!

Shark Defence is the trade name for a series of highly unusual and successful family of chemical repellents identified, isolated and synthesised by the Oak Ridge Shark Lab, founded by Eric and Jean Stroud in September 2001.

Working closely with Dr Samuel Gruber and the Bimini Biological Field Station, the team has come up with some very exciting research.

Their goal is to keep sharks away from both fisheries and bathing beaches without frightening the fish or harming the sharks. After years of disappointing research into a viable shark repellent, utilising materials like decayed shark tissues, the team discovered that most species of shark are repelled by electromagnetic fields created by rare earth magnets.

These magnets are not practical to fit in to your BCD or attach

to your surfboard, though these magnets could be lined up on the sea floor to create an effective shark-free zone. The miles of netting used to protect beaches could become a thing of the past, as well as the indiscriminate killing of sharks, dolphins, turtles, etc., which could be saved from dying a senseless death.

The rare earth magnets, Neodymium and Samarium-cobalt (Neodymium being the most widely used, cheapest and strongest rare earth magnet used today), are commonly used in computer hard drives, audio speakers and even bicycle dynamos, have been found to be very effective in repelling sharks. All species of sharks have demonstrated the unique ability to identify weak electrical fields known as electroreception—see box..

Sharks have further demonstrated the ability to detect the Earth's magnetic fields. ■

## Magnetoreception via Electromagnetic Induction

Elasmobranch fish have demonstrated the ability to detect the earth's magnetic field.

The most widely held view is that when a shark passes through the Earth's magnetic field, a natural phenomena of electromagnetic induction generates an electric field as charged particles move through this field thus creating an electric field around the shark.

Differences in the Earth's magnetic field at different locations result in minute changes in the induced individual electrical fields, which are likely detected by the shark's electroreceptors.

Research by Shark Defence has discovered that rare earth magnets in particular Neodymium, Iron Boride, and Barium Ferrite magnets correspond or match very closely with the detection range of the sharks.

### Ampullae of Lorenzini

By choosing a magnet with the matching specifications of the sharks' sensitivity range, and further hypothesising this magnet to over stimulate the sharks' Ampullae of Lorenzini, one has an effective repellent.

Magnetoreception via electromagnetic induction is the widely accepted view of how sharks detect and navigate the open oceans.

One wonders if these rare earth magnets work similarly to the Shark pod to create an electrical field, which hampers the shark's electroreception ability thus scaring it off. ■



## No Male Required

In the last edition of Sharktales, we ran an article on Parthenogenesis or asexual reproduction—the incredible phenomena when, in the absence of males, female sharks can switch from a sexual to non-sexual mode of reproduction. Well, there were no male Blacktip Reef Sharks in the Virginia Aquarium and Marine Science Centre and no cross breeding between the

different shark species. Imagine the shock when veterinarian Bob George dissected Tidbit, a female Blacktip Reef Shark after she suddenly died at the Aquarium in Virginia Beach, USA, to find a perfectly formed pup ready to be born! How did she get pregnant?

### Could Tidbit's pup be a hybrid?

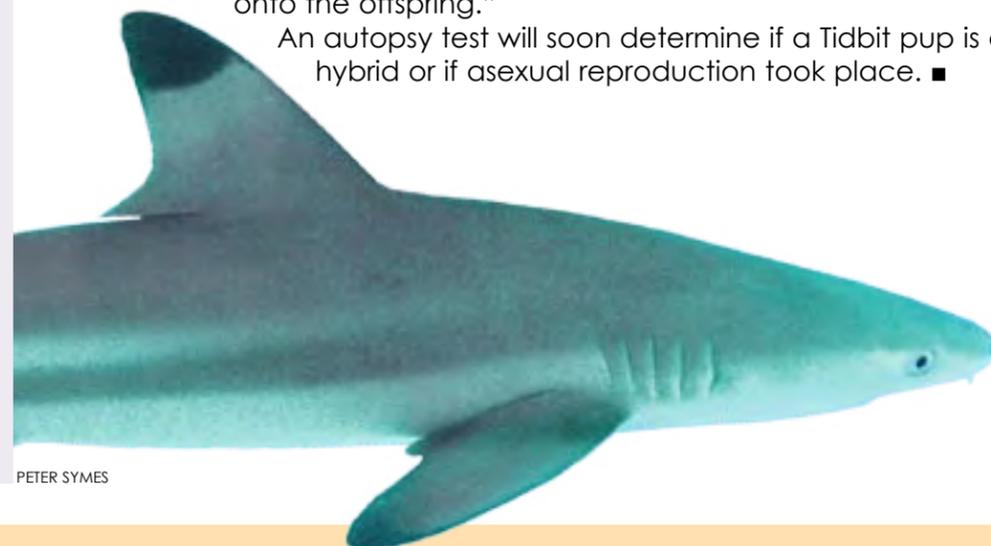
A recent study has confirmed the first case of asexual reproduction or parthenogenesis among sharks at the Nebraska Zoo in the US.

In normal reproduction, an egg is fertilised by sperm producing an embryo that contains a set of chromosomes. Half the chromosomes come from the mother, and half of the chromosomes come from the father. In asexual reproduction, the egg splits in two. DNA contributed from the mother doubles so each egg has a full complement of chromosomes from the female. The eggs then fuse producing a single embryo with no DNA from a father, hence, no male required. Asexual reproduction, though common in some insect species and seen in some reptiles and fish, has never been documented in sharks till now.

Asexual reproduction in sharks is more likely to happen in captivity than the open ocean, though this discovery does raise concerns. As shark populations drop, will female sharks turn to asexual reproduction which in-turn raises questions on the reproductive and genetic health of the offspring produced?

Head of Shark Research at the Pew Institute for Ocean Science, Dr Chapman added: "Not only does it experience reduced genetic diversity because it has no father, but around half of the genetic variation present in the mother is not passed onto the offspring."

An autopsy test will soon determine if a Tidbit pup is a hybrid or if asexual reproduction took place. ■



PETER SYMES



## Shark Trust Tenth Anniversary Gala Ball

Featuring Sharks in Focus gallery exhibition

Date: Saturday 17th Nov.2007

Venue: Crown Moran Hotel, Cricklewood, UK

Download a programme and ticket reservation form

The Tenth Anniversary Gala Ball is the focal point of the Shark Trust's tenth anniversary celebrations. Generously supported by the Crown Moran Hotel, London, the Gala Ball presents an opportunity for the Trust to acknowledge its achievements, celebrate the magnificence of sharks and raise awareness as to their ongoing plight.

The fundraising evening boasts a packed agenda with talks, awards and activities as well as dinner and dancing to a live band.

A feature of the evening will be the Shark Trust and Diver Magazine Sharks in Focus Gallery and the auctioning of bespoke items of jewellery crafted specifically for the evening by Reef Jewelry.

Each guest will receive a ball programme which will include a limited edition shark print by Marc Dando. ■



*The Fontaine-de-Vaucluse*  
**Treasure Cave**





Text by Andrey Bizyukin, PhD  
 Photos by Andrey Bizyukin, Alexander  
 Andrianov & Etienne Champelovier

*“There is something in a treasure that fastens upon a man’s mind. He will pray and blaspheme and still preserve, and will curse the day he heard of it, and will let last hours come upon him unawares, still believing that he missed it only by a foot. He will see it every time he closes eyes. He will never forget it until he is dead and there is no way of getting away from a treasure once it fastens itself upon yours mind.” — Joseph Conrad*



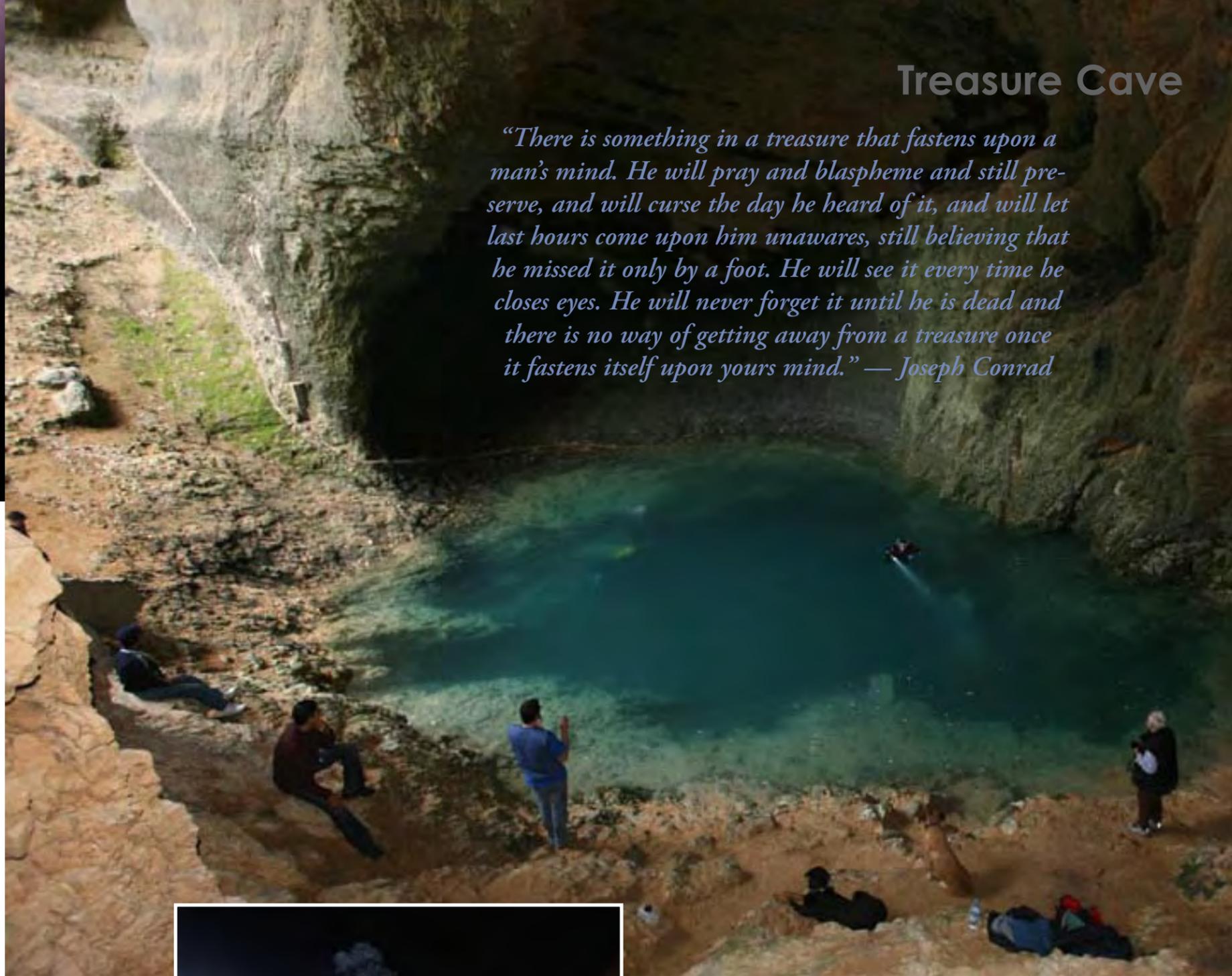
The central square of Fontaine-de-Vaucluse. Everyone passes here to get to Treasure Cave. PREVIOUS PAGE: Gold coins from the 3rd or 4th centuries A.D. discovered in Fontaine-de-Vaucluse by Roland Pastor and Tomas Soulard

This amazing tale begins with the selection of a group of divers who were asked to participate in a technically complex dive expedition—to explore one of the deepest caves in Europe. Soon enough, we, the divers, found ourselves in a frenzy of activity and planning. There were so many preparations to make and things to consider—equipment for deep water photography, CNS and OUT values, which gas blends to use, how to put together a support team, management of the group and the quantity and size of the biggest cylinders and what not. But one can only plan for so much, then fate, as it would turn out, ended up giving us a surprising adventure for which no technical dive planning could have prepared us.

A jump on an Air France jet saw us off to Paris. Here, the more modest blue Fiat of our French patron, Joel Enndewell, almost squatting under the load of a roof of cylinders and weighy equipment, somehow managed to slalom itself out through the insanely busy Parisian traffic and onto the A6 heading out towards Lyon. To avoid congestion, we took the scenic route steering clear of any bigger cities. The tranquil French countryside was full of aromatic smells from the forests and fields we passed, as we journeyed through the landscape of wine and cheese. Wonderful places.

Our destination was the village of Chateauneuf du Pape, a city—famous for the making of the Pope’s wine over the centuries—that lies very close to the deepest underwater cave in Europe, the Fontaine-de-Vaucluse.

Diving in the cave is very prohibited. Both the city council and the county have imposed a prohibition of diving into the



Magic lake of Fontaine-de-Vaucluse cave

cave. It is so strict that trespassers will surely be thrown in the slammer. What is the reason behind all these strict measures? Well, we heard that, basically, the French divers wanted the place to themselves and keep foreign divers out. Grilling one of our hosts, Yves Billaud, on the issue he looked at us with astonishment and gave us a mischievous smile. Yves is one of France’s most famous cave divers—it is what he does for a living. He is an acknowledged scientist and expert from DRASSM (Departement de recherches archeologiques subaquatiques et sous-marines-Anancy),

Archeologist Yves Billaud maps the location of the coins



Members of the speleological society, Societe Speleologique De Fontaine de Vaucluse (S.S.F.V.), explore the deepest cave of the Europe

which searches for underwater historical artefacts in karstic areas of the country.

"There are two versions of the answer to your question," was his enigmatic reply. "There is the official version and an un-official one. Which one do you want to hear?" he asked while pouring the first aperitif of the evening. "Is it possible to hear both versions?" we wanted to know.

"Well, as every secret some time becomes obvious, I will explain everything," he said. Yves explained: "The official explanation behind the ban on diving into Vaucluse is that drinking water is drawn from the cave river, and they want to preserve the purity of the water. But the real reason behind the prohibition of diving into Vaucluse has something to do with a centuries-old secret..."

Vaucluse was a place of worship for Gallic tribes who lived here during antiquity, more than two thousand years ago, when Provence was a Roman province. Astonishing evidence came to light, when in 2001, two divers—Roland Pastor and Tomas Soulard—from the speleological society Societe Speleologique De Fontaine de Vaucluse (S.S.F.V.), dived into Vaucluse and at the depth of just 22 meters and had their attention drawn to some flickering reflections on the cave walls. There was a boat wreck down there—the *D'Otonelli*, and once they moved closer, the divers realized that all those small green spots reflecting the light from their lamps were hundreds of coins lying in the cracks of the wall. "We immediately realized that we had made a significant discovery," Roland Pastor later explained.

### Historical information

The first dive into Vaucluse was done by Nello Ottonelli at 1878. The diver wearing the heavy hard hat diving

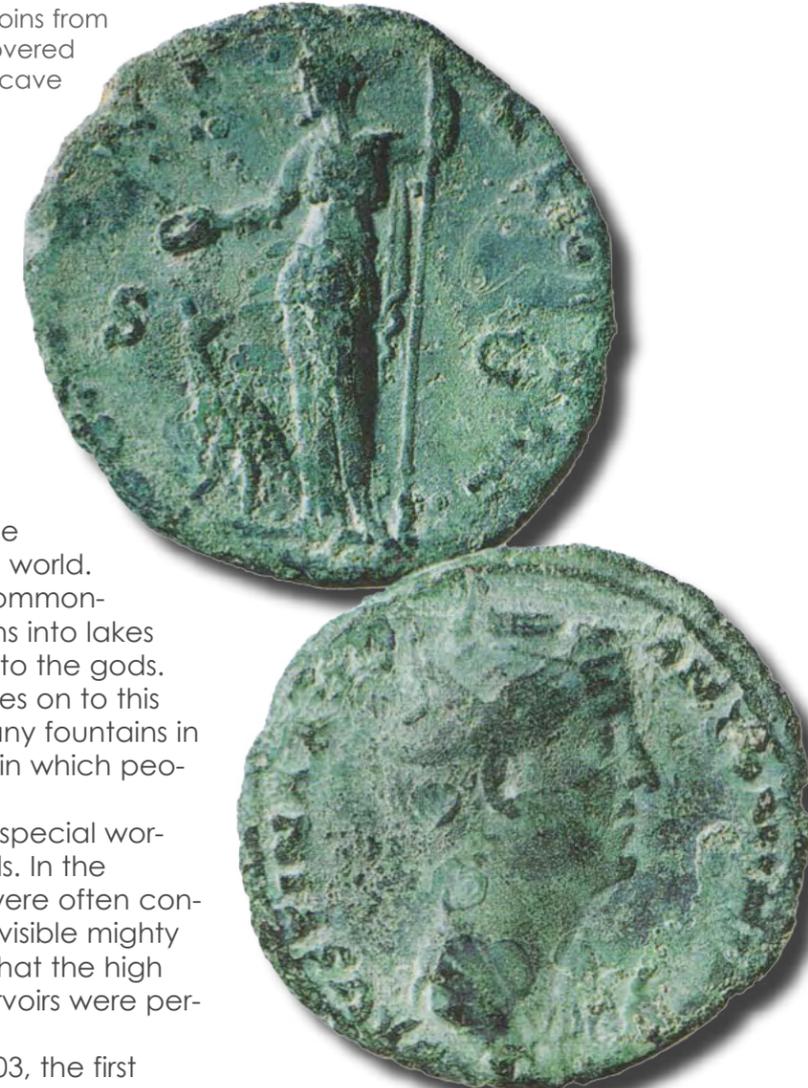
Bronze coins from 138-161 A.D. were discovered in Fontaine-de-Vaucluse cave

equipment of the day reached the depth of 23 meters. Then a small diving boat that was providing the surface tendering also wrecked in the lake in the cave. The small vessel came to rest on the bottom at 24 meters becoming an unique shipwreck and the oldest cave wreck in the world.

In antiquity, it was a commonplace ritual to throw coins into lakes and rivers as an offering to the gods. It is a tradition that still lives on to this day—just think of the many fountains in cities around the planet in which people throw coins.

Caves were places of special worship for the ancient Gauls. In the ancient cultures caves were often considered the abodes of invisible mighty divine entities. It is likely that the high waters and filling of reservoirs were perceived as act of gods.

In August 2002 and 2003, the first underwater excavations took place in the cave under the direction of underwater archeologist, Yves Billaud, and under the auspices of DRASSM in support of the regional archeological service, the PACA region and city council of Fontaine-de-Vaucluse. The expeditions, which took place during these two seasons, brought to light 1624 coins, iron nails, bronze bracelets and antique hairpins for a dress. Most of the coins were found in cracks of the vertical cave wall at a depth of 25 meters. It was quite straight for-



ward just to collect them from the cracks and crevices in which they were lodged, number and pack them.



Joel Enndewell, the famous French cave diver and the leader of our team, after an exciting dive



A subsequent analysis showed, that, despite poorly mineralized water, only 40 percent of coins were in a good state of preservation. Paul-Andre Becombes, an expert on Roman coins, dated the oldest of them to 70-30 B.C., and youngest to the fifth century AD. These findings have provided very valuable information on the periods when there was worship at the cave, the migration of populations and the circulation of coins in the Roman Empire.

A part of the coins obviously had cult value, not monetary, meaning that they had been produced not with trade in mind, but especially as gifts to the gods. Portraits of emperors, images of military fights and scenes of hunting on the back side of the coins have made it possible, with a fair deal of certainty, to tie them to specific historical events.

The gold coins from the third and fourth centuries AD shows that Fontaine-de-Vaucluse in this period was visited by the elite of the society who came here to offer gifts to the gods. By the same token, the abun-

dance of the much less valuable bronze coins show that also the poorer inhabitants of the province paid visits to the cave for long periods. It is surprising, however, that no coins from the Middle Ages have been found, indicating that the interest in this wonderful cave suddenly evaporated, to be forgotten for many long centuries.

Yves' story-telling captivated us. It completely made us forget all about diving and the often mindless technical discussions surrounding the dives. We were struck by the sobering realization that this cave was really an historical monument with ancient artifacts, and that this was why the French ministry of culture did not want uncontrolled amateur diving there. We began to appreciate how valuable and rare our special permit to dive this cave really was.

### The treasure cave

The cave Fontaine-de-Vaucluse is located close to the town of the same name. On the central square, a roman column stands, and as we

French scientists and members of S.S.F.V. club collect the unique cave coins

head for the cave by foot, we pass the café, The Petrarca and Laura, where we held several briefings and debriefings. At the time of our visit, we found the idyllic provincial landscape draped in autumn colours, with fallen leaves blowing around the trunks of the trees contrasted by the deep green colour of the stream coming out of the ground. It is an intimate place for romantic couples, while on a noisy Sunday, there can be tourists picnicking on the bank.

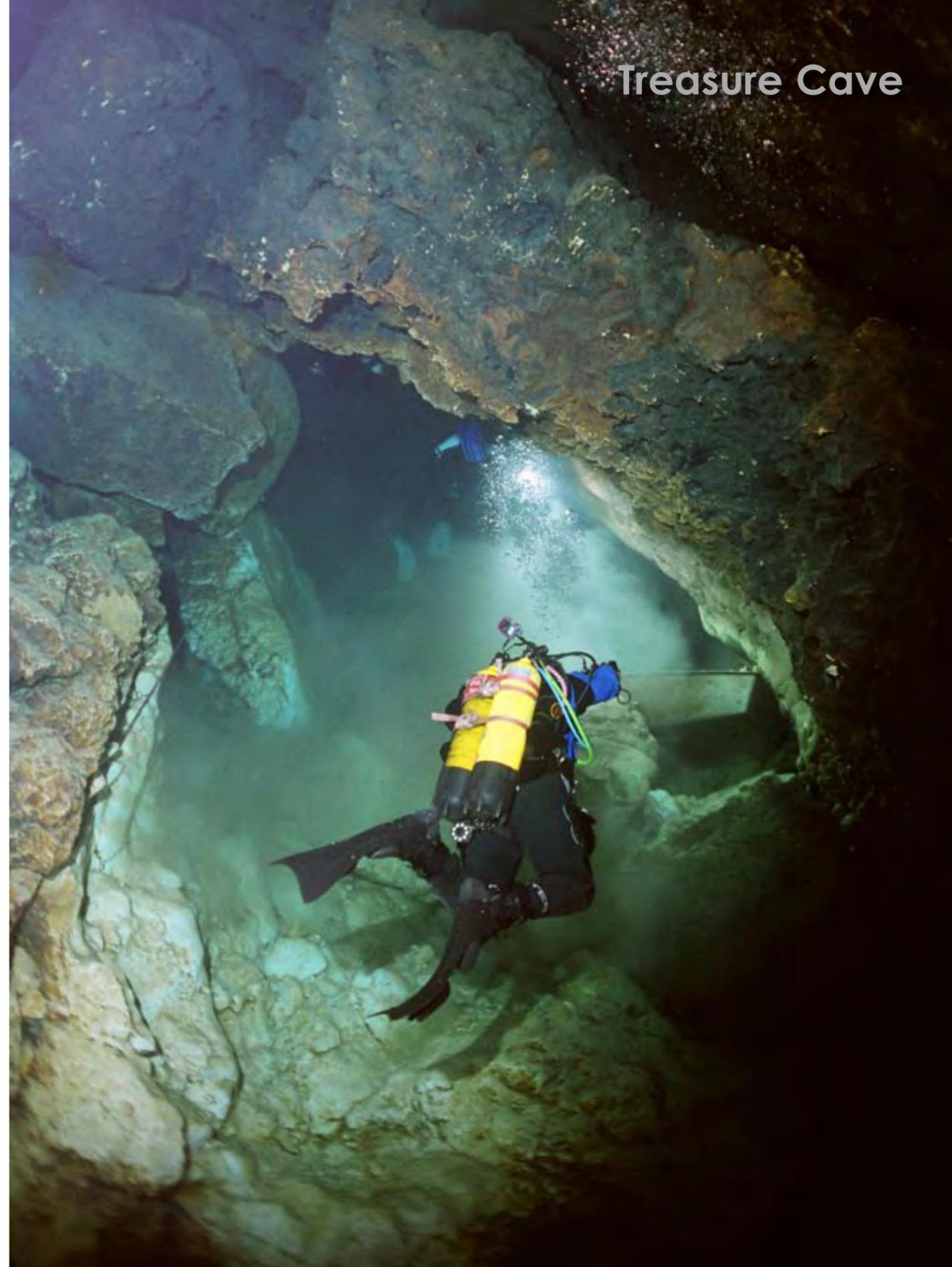
More than a million tourists visit Vaucluse each year, but only the rare cave diver can venture down into this secluded place. For this reason, we were met with rather surprised expression from the other visitors when we were hauling cylinders and heavy equipment uphill to the site on an early Sunday morning.

The entrance to the cave is a huge grotto in which there is a small, approximately 25-meter wide, lake. It is precisely this lake that attracts tourists here. For centuries, its deceptively still oval surface has beckoned visitors to take a cool dip on a hot day. On a rainy autumn day when the muddy stream can discharge a powerful 22 cubic meters of water per second, it is a little less enticing. In spring, it turns into a roaring waterfall drawing admiring spectators from afar. Among geologists across the globe, *vaucluse* has now become a term for a large karstic source with big variations in water discharge.

The Fontaine-de-Vaucluse represents an output of the huge underground river collecting water from a watershed approximately 1100 square kilometers in size between the hills of Ventoux and Lure in the north and the Vaucluse Mountains to the south. The huge limestone pit was considered bottomless for a long time, because no diver had ever measured its depth until recently.

The brave divers who had dove here, told, that they literally felt like

## Treasure Cave



The place in the cave where the largest number of the coins were discovered



falling into a black infinite void inside of the cave. It was only in August 1989, that an ROV (a remotely operated vehicle), the *Spelenaute*, operated via a cable from surface, finally landed on the sandy bottom of the Fountain-de-Vaucluse at a depth of 308 meters.

## The expedition

We were a mixed group of Swiss-Russian-French lucky beggars who together with the teams from the speleological society of the Fountain-de-Vaucluse (S.S.F.V.) started preparing our first dive at the cave. Roland Pastor gave the last instructions: "The top part of the cave is full of loose boulders which have fallen down during recent tectonic movements. Some of these, which weigh several tons, appear to have come to rest in unstable positions. Be very careful around these. If you touch them, you might cause a rock to tumble down—and if worse comes to worst—the rock will take divers and coins with it in the fall."

All this being said, we were lucky. The conditions were excellent, with crystal clear water. It was imperative, however, that we didn't touch the walls that were

covered by a limey layer of particles that could be easily kicked up by a careless fin stroke clouding the visibility.

The head of S.S.F.V club wished us good luck as he saw us off. With all our rebreathers, cylinders, heavy photo equipment and other technical complexities to bear, we needed luck, too, as we descended into the netherworld in search of more treasures in Vaucluse.

In the cave, the water clarity is so good, that one can see the trees growing in the hills outside the cave from underwater. At the entrance, the walls are cracked, there is a stone talus at the bottom, and a huge rock separates the entrance from the rest of the cave.

It requires delicate maneuvering not to touch the walls as we squeeze ourselves under the block to plunge into the eternal darkness below. We can only rely on our bright lights to extinguish the blackness. Our beams fall across the wreck on the *D'Ottonelli*, which has come to rest on a ledge to the left of the entrance. On the right there is a big opening leading further down. We hover directly in the center of the body of water enjoying the sense of weightlessness. Directly

below us is another ledge and a slope of clay. It is a new shaft.

It was funny to recollect that, on past speleological explorations, I have been in similar caves that also had 300-meter pits with shelves, vertical slopes and huge vertical shafts. But these were dry vertical caves, not water-filled, as was the Vaucluse cave I was in now.

In the past, when I was a regular dry cave explorer, I would, in such places, put the safety rope on tightly and clasp onto to the walls to survive. I would have to hammer hooks and anchors into the walls, one behind the other, to attach the ropes, and I would progress to the next ledge in this manner. It would demand a lot of effort and time, but cave explorers always fancy the wide, deep wells for the sake of access to the bottom. It is interesting to compare the almost opposite sensation of exploring caves in air as opposed to underwater. Underwater, we, like fishes, simply hover in the emptiness above the mouth of a well, and we can float from ledge to ledge. This unforgettable sensation of controllable flight leaves no one untouched. Vaucluse, being so deep, fascinates and entices us.

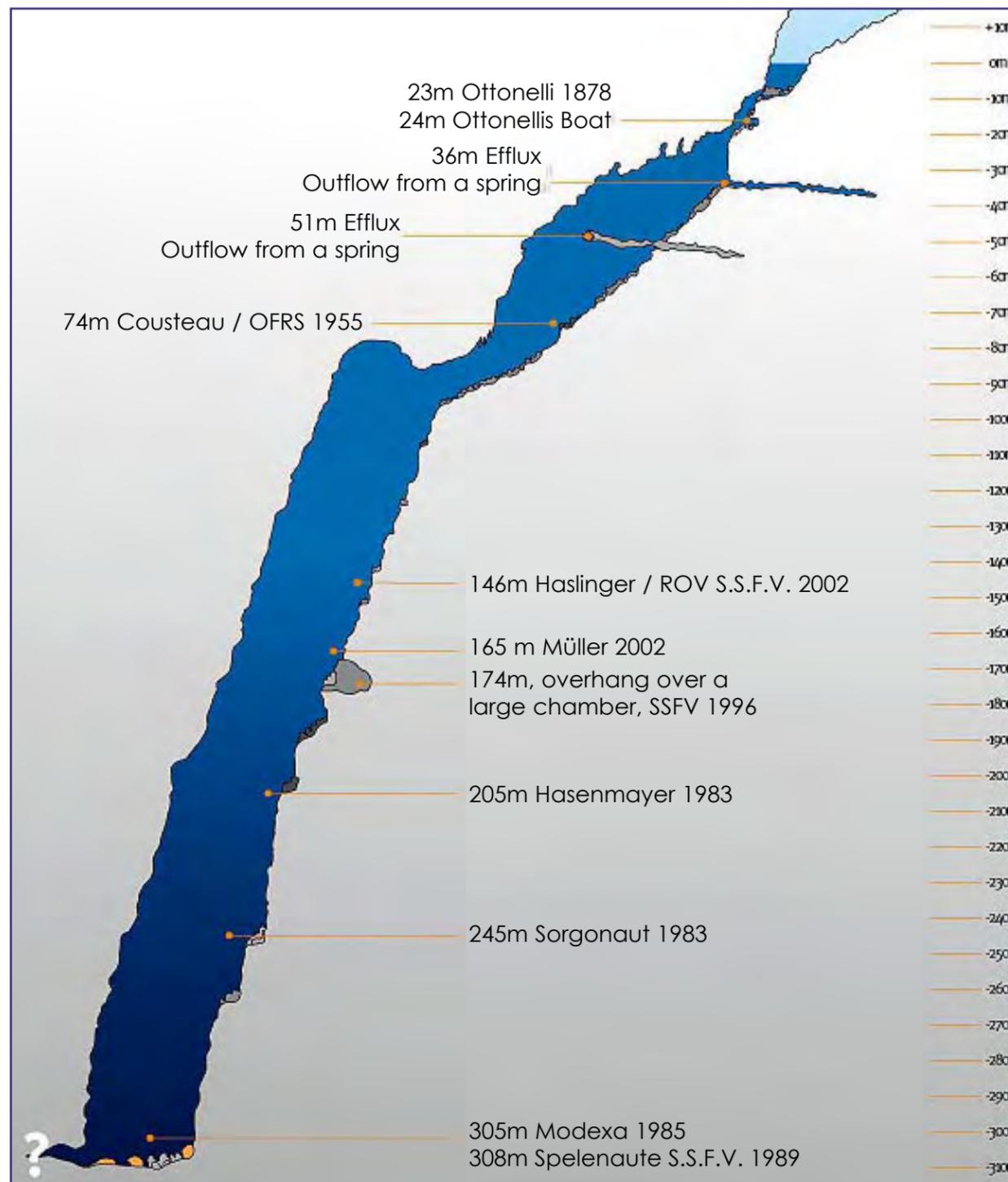
The only known cave wreck in the world (24 meters depth)

## Treasure Cave

Somewhere in depth of our brains, natural instincts prompt us divers to realize that it is time to stop. Already weary from carrying too many big cylinders, we hover above the black opening of the next bottomless well. We ponder and admire the mighty cave full of treasures, for a few last moments. It has been a

long day already. Vivat Fountane-de-Vaucluse!

*The author would like to give special thanks to the three great French cave divers: Joel Enndewell, Roland Pastor and Yves Billaud. Without their help and expertise this article could not have been written. —Andrey Bizyukin ■*



Map of Fontaine-de-Vaucluse, the Treasure Cave





# technical matters

Column by Cedric Verdier

So, what's wrong about bringing a Rubik's cube along on a dive?



*Say that you dive on your own with a rebreather and wait for the reactions. You'll hear some nasty comments about you being an accident waiting to happen*

**Discussions about diving are very often boring—always the same stories about numerous sharks dangerously close, strong current ripping a mask off or friendly dolphins playing during a deco stop. We heard them so many times.**

So, if you want to have some fun, simply say that you dive on your own with a rebreather and wait for the reactions. You'll hear some nasty comments about you being an accident waiting to happen, and some people will clearly show you their opinion about your mental health.

**Why?** Because everybody knows that CCR Solo diving is the most stupid thing to do on Earth after driving a motorbike eyes closed in Bangkok or throwing sand on Mike Tyson's face during his nap. We all know that.

Even the stats show that most of the rebreather fatalities that occurred in the past few years involved CCR divers diving on their own.

Unfortunately, a poll amongst the rebreather diver community shown that only less than eight percent of the rebreather divers who participated in the poll

never did a solo dive. The other 92 percent have done at least a few solo dives, with 33 percent doing mostly solo diving.

Of course, a poll only represents the opinion of a few individuals who want to answer the questions. It cannot be considered as the "big picture" of the entire rebreather diver community. Nevertheless, it shows that some rebreather divers keep on diving solo, even if the perceived risk is so high...

### Why people don't dive solo with a rebreather?

Simply because that's one of the most basic rules one learns during the Open Water Diver course: "Never dive alone". It's so famous that it's almost a dogma. And it sounds so logical?

#### 1. Diving with a buddy is safer.

In case of a problem, the buddy is very close, ready to help the rebreather diver by providing him or her with either additional open circuit gas in case of loop flooding or gas depletion, some advice about navigation, some help in finding out a leak in the loop or the gas supply, etc... A buddy is also a good way to survive in case of unconsciousness (hypoxia, hypercapnia, Oxtox convulsions). The team mate will bring

the unconscious rebreather diver back to the surface where one can safely breathe, speak, laugh and pay taxes.

#### 2. Diving with a buddy is more convenient.



The first example that comes to mind for a rebreather diver is the bubble check: any safe rebreather diver wants to be sure that there's no leak anywhere in their rig at the beginning of the dive, and a team mate

Text and photos by Cedric Verdier  
Additional b/w photos by Peter Symes

# How to make solo rebreather diving safer



is obviously very convenient to do that. He or she is also very handy when one needs to move a sling tank improperly clipped or remove a fishing line entangled with a tank valve.

### 3. Diving with a buddy is much more fun.

Being able to share some experiences, to plan a dive together, to take pictures of each other, to play stupid games during the long deco stops... there are so many examples showing why the buddy system has some clear benefits. And some people simply don't like to be alone... or are afraid to meet a shark, a snake or Lord Voldemort's Death Eaters.

### So why diving solo with a rebreather?

If there still are some solo rebreather divers despite all the warnings you can read in most of the rebreather manuals, websites and forums, there should be some strong reasons for that. Some people think that buddies are not essential for a safe rebreather dive. A recent discussion on an Internet forum gives us

some clues, as most of the rebreather divers who participated in the discussion don't want to be buddied up with OC divers or incompetent buddies. And a few others simply dive in places where a buddy is useless.

Let's have a look at the different factors.

1. *Is diving with a buddy much more fun?* It's clearly a matter of personal preference:

#### - The Open Circuit buddy

One of the problems a lot of rebreather divers have to face on a daily basis is the lack of rebreather buddies available. If you are the only rebreather diver on a boat, chances are that you'll be buddied up with an Open Circuit diver. And that means short bottom time and a lot of noise all dive long. To be able to cope with your long bottom time, the Open Circuit diver will have to carry so many tanks that they will swim slower and will never be able to go through the restrictions as gracefully as you!

Going alone?

*Unfortunately very often, you see buddies that are incompatible, or spending their dives looking for each other.*

#### - The annoying buddy

CCR or OC diver, your buddy could really be a pain in the neck. You may be one of those people who simply likes to be on their own. You like to go where you want, do what you want or change the dive plan the way you want without endless communication on the bottom. Being alone in the ocean surrounded by its creatures, exploring a fresh water cave or looking for artefacts in the silted-out room of a wreck.

2. *Is diving with a buddy much more convenient?*

Most of the things that are easier to do with a buddy can also be done on your own. It's very often a matter of preparation:

- If you want to zip your dry suit alone, simply use a front entry zip.
- If gearing up your rebreather is a nightmare, use a bench at the right height, ask a member of the boat crew to help you or simply gear up at the surface if there is no current.
- How to check for bubbles in your back? You can use a small mirror or do a bubble check in a water tank or at the surface before you're actually geared up.
- Even complex tasks like surveying a cave can be done by divers on their own. It's just a little bit more time-consuming.

3. *Is diving with a buddy much safer?*

According to Bob Halstead, "Looking at some accidents and fatalities, it looks like buddies sometimes increase the risk

*Just being together is not enough.*

of a dive, either directly through unpredictable or unreliable actions, or indirectly, through an unfounded belief that security is enhanced by numbers alone, regardless of the training or state of mind of the buddy."

I saw CCR divers going much deeper than their level of experience would allow them, just because they felt safer with someone else with the same lack of experience and the same inability to react appropriately in case of emergency. The same persons diving solo would have been scared and would have been much more reasonable.

Sometimes, the buddy can even affect the safety of the dive by improper decision or behaviour, unsafe practice or lack of experience, excessive stress or panic. Unfortunately very often, you see buddies that are incompatible, or spending their dives looking for each other. Some divers, who claim to be a team on the boat, ignore each other in the water. Others are over-dependant on their



**ITDA Group International**  
International Technical Diving Agency

**Technical Diver Training**  
**Sports Diver Training**  
**Medical & First Aid Training**

[www.itdagroup.com](http://www.itdagroup.com)

**The ITDA Group offer a very different option.**

**Higher Standards**  
**Safer Diving**  
**More Choice**

**Low cost Crossovers**  
**Low Cost Renewals**

**World wide Training and Certification Agency.**

Mail: [admin@itda.net](mailto:admin@itda.net)  
[www.itdagroup.com](http://www.itdagroup.com)

...or with a buddy?





VR  
dive computers

## Advanced Computers for Advanced Divers



VR computers are designed to meet the exacting demands of the most experienced divers in the world and as such they are the perfect choice for advanced divers like you who want sophisticated technology with a simple user interface which will continue to meet your needs as you progress.



You may not be diving the Britannic, doing extended penetrations in Italian caves or following photographer Norbert Wu under the Antarctic ice just yet, but you might find it reassuring to know that your VR computer has already been there and performed perfectly.

buddies or may fight in case of emergency; or don't even recognize distress in their team mate. Stats are also full of divers left alone when a problem occurs, most of the time because their buddy simply panicked. Just being together is not enough.

Divers have to be able to recognize a problem and do something about it. Will an Open Circuit diver be able to recognize signs of hypoxia in their team mate and efficiently assist them by injecting some safe gas in the loop? Or to understand that a rebreather diver having trouble to slow down his breathing pattern maybe needs something else than simply stopping to swim?

Therefore, the buddy system works better if both members of the team are competent rebreather divers with similar experience, interest and equipment.

### How to make solo CCR diving safer?

Theoretically, the buddy acts as a kind of safety factor. They are not essential, but have the purpose of preventing problems by recognizing them and stopping their development or performing a rescue. Therefore, being alone does not affect the risks of the dive (DCS, current, contaminated breathing loop, etc). You just don't have the additional safety factor that a proper buddy could give you. However, don't forget that an improper buddy might actually be an additional risk factor.

If you're one of the rebreather divers who consider that in most instances, a competent solo rebreather diver is safer than the average buddy dive, is there any way to improve your safety?

## 1. Training

All rebreather divers should be trained primarily as self-sufficient divers during their basic rebreather course. But that's often not enough to become a competent solo diver. So far, some training agencies designed specific courses for solo Open Circuit diving. There is no such thing for rebreather divers. And even if some other continuing education rebreather courses deal with that to a certain extent, none of them publicly endorse solo rebreather diving. A proper training course could help in really becoming self-sufficient by providing the student with more opportunities to practice some worst-case scenarios in a controlled environment and by adding more techniques to deal with any kind of emergencies.

Some basic techniques are worth being mentioned here:

- Avoid potential entanglement and entrapment situations.
- Avoid task loading (so no video unless conditions are perfect, no line laying, no Rubik's Cube in a low visibility and high flow cave, etc).
- Run the dive well inside CNS limits possibly dropping the setpoint on deeper dives (it also gives more time to react to solenoid issues should they occur).
- At the surface have someone to double check equipment and dive plan.
- Take more time in the depth range 6-10m to make a final check on the rebreather and the bail-out and very carefully "listen to

the body feelings". After 2-4 min, if all checks okay, then go deeper.

- And remember that if something doesn't seem right, go to OC.

## 2. Experience

Obviously, a lot of experience is required to properly start to dive on your own. Two things will come with experience: The ability to evaluate the risk of a specific dive, and the ability to solve the problems with a lower level of stress. When one has dived in many different environments, it becomes easier to understand

*Theoretically, the buddy acts as a kind of safety factor. They are not essential, but have the purpose of preventing problems by recognizing them and stopping their development or performing a rescue.*

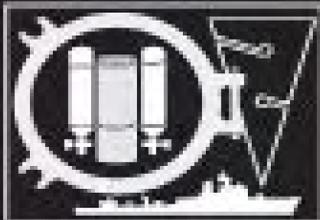
what could go wrong and to anticipate the potential problems. An experienced rebreather diver will also be able to stay calm while dealing with one of those problems, staying away from stress and panic, keeping their breathing rate quite normal.

Always stay on the safe side and be concerned about physical injury, collapses, pinches in closing doors or falling rocks, cramps and entanglement.

For complex dives either in ways of cave navigation, wreck penetration or deco and gas schedules, plan for a brain failure. Write down everything and double check all parameters before making any decision.



See [www.vr3.co.uk](http://www.vr3.co.uk) for further information and to find a VR dealer near you.



Author Cedric Verdier preparing to dive the Japanese battleship Yamashiro



### 3. Equipment

Obviously, being able to come back to the surface in case of complete rebreather failure is necessary. Therefore, a bail-out option has to be thoroughly planned according to the dive parameters (depth, time, decompression obligation, current, etc). The Open Circuit (OC) option is still the most popular way. Unfortunately depending on the dive, the gas requirements soon become huge and the perfect bail-out rebreather has still to be designed. For the time being, only a handful of homebuilt rebreathers are available on the market, mainly used by cave rebreather divers.

The minimum equipment to be carried by a solo rebreather diver could be:

- Enough OC bailout (usually 150 percent of what is calculated need)
- A mirror/blank CD to check own gear if need be
- Two cutting devices at least, accessible with both hands
- A spare mask
- A spare reel and SMB (agree on colours prior to dive to indicate trouble)
- A spare computer and/or 2 sets of tables
- A back-up light (two in an overhead environment)
- A slate and an SMB to send up for communication with the surface support

Becoming unconscious, and the associated risk of drowning, is also a big concern in the rebreather diving community. It looks like more and more rebreather divers use Full Face Masks or neck straps to make sure that they will not lose their mouthpiece. Adding a Bail-Out Valve (OC/DSV) is also a way to quickly react to some situations like severe hypercapnia while avoiding (or delaying) the unnecessary stress to close the DSV and switch to another regulator.

But we still have the case of the unconscious rebreather diver, on the bottom, in a wreck or a cave, with the airway well protected by a FFM. This diver is still safe as long as he/she's breathing and has some gas to breathe. But he/she could remain there, unnoticed, for quite a while before anybody at the surface starts to look for him/her, as it's well known that rebreather divers have huge bottom times.

**So what's the solution to avoid this situation?** Here are some ideas about procedures to increase the chance to have a rescue team looking for the solo rebreather diver early enough:

#### ► For cave or shore dives:

- Have a bubble watcher (there are always bubbles released during the ascent, even with a CCR!), give them a reasonable schedule for the dive and limit the dive to the planned time
- If no bubble watcher, leave a written, dated and timed plan with someone or on the car. Have someone expecting a phone call at the end of the dive.

#### ► For Boat dive:

- Have a maximum dive time after which the surface team moves to rescue mode.
- All divers can agree to be back at the shot by a precise time. Failure to meet up or a strobe left on the line would force a search.
- Always have one crew member in a diving suit ready to splash
- Take tagged clips to attach to the bottom of the line after descent, then to be removed when on the way to the surface. If someone doesn't make the line by the maximum time allowed per the plan, divers can start the search rather than delaying until after ascent and then realizing that someone is late.
- Always deploy lift bag/SMB when ascending. It makes the skipper's life easier when it comes to follow each rebreather diver from the surface.
- If the wrong colour SMB surfaces, then the surface support splashes to see what is going on.

**Have different coloured spare SMB. Prior to the dive agree on which colour indicate trouble**

Having a rescue team quickly looking for you is a good thing, but it's clearly better to be found quickly enough to be rescued. So, how to increase the chance for the missing diver to be quickly spotted and rescued by the other divers?

- Have easy-to-spot equipment. White is the best seen underwater. White stage Tanks. A white slate (outside at the tie-off point on a guideline in a wreck or a cave). White or yellow rebreather. Pink dry-suit ;-)
- Have a strobe attached to the back of the unit.
- Lay a line on the wreck and tag the line to minimize the search area.
- The rescue team should use a scooter for optimal coverage.
- Everyone has to be trained to rescue a rebreather diver (basic knowledge about procedures and rebreathers and first aid).
- Always have a dive light on when diving in low visibility, in a wreck or a cave.

Emergency situations are maybe the most important issues to be addressed in order to make solo rebreather diving safer.

And even if you don't want or don't like solo diving, as soon as you dive in a tight cave, a low visibility quarry or inside a deep wreck, your buddy cannot do a lot to help you in case of emergency. You're pretty much already a solo rebreather diver... ■

And remember, no Rubik's Cube in a low visibility and high flow cave





Edited by  
Peter Symes

# Photo & Videography



By Kurt Amsler

**Getting an underwater camera is really only half the solution. Without a proper light source the possibilities will be very limited. Having one or more strobes are essential, but how to chose the right unit?**

In order to make the most of your strobes underwater, there are a few important issues to consider:

First of all, the strobes—or flash units—need to be both neutrally buoyant and in balance. It is no good if one end is positively buoyant and the other negative. A neutral and bal-

anced strobe ensures that the photographer can work in any position or situation and not get exhausted from supporting or directing the strobes even after the typical ten minute hover to get that elusive shot.

Needless to say, the cameras, too, need to be perfectly buoyant and balanced, and they



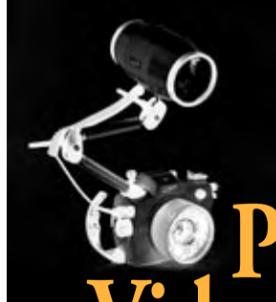
usually are. But it is to no avail if fitting the strobe to the camera doesn't balance either.

Another feature to consider is the size of the unit. Yes, size does matter but here the rule is: The smaller, the better. When shooting wide-angle, it is customary to position two strobes on each side on long extension arms.

Carrying bulky units in this position can cause a lot of drag pushing them through the water and any current will soon enough turn a swim with that setup into a fitness exercise. Many divers put too much emphasis on power and output (as defined by a guide number). But with mixed-light wideangle photography a strobe with a modest guide number of eight will actually suffice. And for extreme close-up macro-photography, space is often limited unless the subject sits right out in the open. While macro often requires plen-



# Strobe Photography



# Photo & Videography

ty of power, this can be achieved with two smaller units—it actually enables you to obtain a better colour reproduction.

## TTL or manual exposure?

It would be silly not to use automatic strobe exposure control (TTL) for macro, close-up or with lenses covering angles up to 60°. For wider angles, especially

with super wide-angle lenses, strobe exposure is influenced by a number of factors, and TTL exposure would not be appropriate. This is easily understood when looking at the way automatic strobe exposure control works. Light emitted by the strobe is reflected by the subject and measured either in volume or speed, depending on the TTL system built into the camera electronics. This enables the camera to control the strobe for accurately exposure. This works well when our subject is well defined in space and distance as is usually the case when working at close to medium range. However, when working with a wide-angle lens, we have a different situation. Other than our main subject, there will be



*“Amsler’s Formula”:  
AS + EA  
(aperture as per strobe + exposure time as per available light)*

a heck of a lot of other stuff in the frame. The exposure program can't tell whether the light it measures is being reflected off what's important or off a part in the frame that's unimportant but closer to the camera. Also, most the time, an open water backdrop surrounds our subjects as well. So, if the subject does not fill more than 70 percent of the frame, there will not be sufficient reflection for proper metering. Exposure errors are quite common when not bearing this in mind. For wide-angle photography, it is therefore advisable to use manual exposure taking into consideration existing light.

### Mixed light photography

Often photographers forget that—thanks to the great big diving light in the sky—

Verly slightly underexposure the background to saturate the colour and give depth

The strobe dictates the aperture. To find the matching shutterspeed, measure the background light by pointing your meter upward at an angle of about 30 degrees

they have daylight at their disposal as well. We use it to show more in our pictures than the strobe can illuminate. For optimum effect, we mix the two sources of light highlighting elements in the foreground and emphasizing their colours by flash, while ambient light generates depth in the background where the strobe light can't reach.

### Amsler's Formula

To achieve consistent results apply “Amsler's Formula”: AS + EA (aperture as per strobe + exposure time as per available light). Any strobe, whether of the dry or wet variety, dictates a specific



aperture setting. With the aperture given, we are then left to control exposure of the background by varying shutter speed. Consequently, the photographer has to measure the ambient light first to find out which shutter speed matches the aperture setting dictated by the strobe unit for a correct exposure of the background. This is easy using the camera's built-in light meter. Some cameras and housings even allow the photographer to switch from spot metering to integral or matrix metering! Spot metering

often gives you better information and an impression of the lighting conditions simply by pointing the measuring spot around and taking measurements. To enhance colour contrast, we are aiming at having our backgrounds reproduced slightly on the dark side. So, we don't point the camera directly at the main subject while we measure the light. Instead, we aim high—approximately in a 30° angle up towards the surface. This metering might, just for as an example, indicate that a shutter speed of 1/30

will match the set aperture of f8 (as dictated by the strobe) so that is where you put the camera's setting. The slow shutter speed will allow for sufficient available light to expose parts of the film representing the background and gives us the rich, dark, blue water background we are after. The strobe that illuminates the foreground



isn't affected by the shutter speed as the flash goes off much faster—it is only controlled by the aperture.

After some practice with a light meter, the photographer will soon develop the ability to "read" the ambient light. (S)he is then capable of working out the correct mixed light exposure time from experience for any depth or situation.

## 10 Tips

1. Most important, the strobe needs to be buoyant and perfectly balanced so you are able to work in any position. A buoyant strobe can be easily aimed at the subject because it can be moved in any direction without releasing the joints of the strobe arms.
2. Remember that in wide-angle photography the position of the strobe is very important to avoid backscatter and to gain an uniform illumination of the subject. You have to



Touché See how beautiful a perfectly balanced exposure can render the motif

**SEACAM**  
silver



cinema of dreams



[www.seacam.com](http://www.seacam.com)





# photography news

Stobes can also be used remotely

take into account that the larger the picture angle, the further the stobes have to be positioned away from the lens!

- Analogue, I-TTL or E-TTL are great inventions, but you have to know how to use them. In macro and close-up photography, problems rarely occur. Using TTL in wide-angle photography, on the other hand, is often tricky, any foreground or a incorrect strobe position can result in under or over-exposed pictures. I recommend using manual flash mode for wide-angle.
- Due to refraction, all subjects underwater appears to be closer than they really are. Consequently never aim your strobe at the apparent distance in which case too much light will hit the foreground and illuminate the water between camera and subjects. The results are diffuse pictures, overexposed foregrounds and backscatter. Aim the strobe always over the subject, or next to it, if using two stobes. The best option is to have a focusing light inbuilt or fixed on each strobe.
- Take good care of your strobe connectors. Unplug them after a day of diving and clean the tiny O-rings. Be



Invest in a spare sync cable



careful when you unplug them so no saltwater or grease get in contact with the pins. Clean the pins regularly with alcohol.

- Going on diving holidays... always bring a spare sync-cable with you. Modern stobes are powered with regular batteries. I recommend using rechargeable batteries of 1500 ma as they recharge the strobe capacitor much faster. As a back-up, in case of electrical problems on a dive boat or other unforeseen events, always bring a pack of regular batteries with you.
- Using full power strobe in murky water has the same effect as using long



Use rechargeable batteries (left) but bring normal batteries (right) as backup

lights when driving in a fog. You just illuminate particles. Serious photographers, therefore, power the strobe power down in response to reduced visibility—the murkier, the less power.

Reducing power is only possible in manual mode, by switching to 1/2 or 1/4 power.

- Perhaps you were wondering about the white diffuser cap most manufactures deliver with the strobe unit. It has the effect of making the light softer, warmer and reduces the light output by one f-stop. Use it in murky water to gain less backscatter and also if you take pictures of people in indoor pools



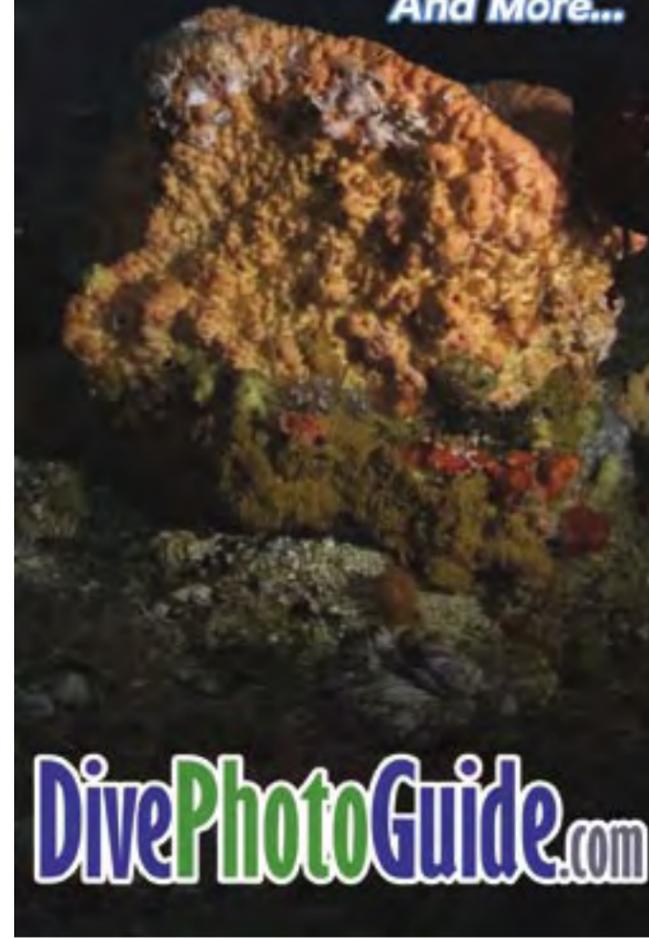
or at close distances in general. It renders skin tones warmer, and therefore, more appealing in the picture.

- Never forget to consider the ambient light besides that of your strobe! Mixing the two light sources will change the "common" black background in macro as a matter of choice, but it is a must in wide-angle to show more in the pictures as the strobe can illuminate. Use "Amsler's Formula": AS + EA as it is explained in the main text.
- Due to the distance the light has to travel through water, the colour temperature of the strobe plays a big role if your subject will appear in their original colours in the picture. Macro stobes have 5600° Kelvin and cannot be used for wide-angle because the light is too cold (blue tint). Wide-angle stobes have 4900° to 5200° Kelvin and are therefore too warm (reddish) for macro. To modify your wide-angle strobe for macro photography, you can add a light blue foil on the strobe. It is a compromise, but better than having yellow anemones reproduced as orange. ■

## DivePhotoGuide.com



Breaking News  
Reviews  
Articles  
Competitions  
Photo Galleries  
And More...



## DivePhotoGuide.com



## 10 megapixel from Sea & Sea: The DX-1G

A few key features: Depth rating of 55m / 180ft; Macro mode that enables you to bring the lens as close as 1cm / 0.4 inches to the subject; 10 million effective pixels, which offers superior resolution and the ability to vividly record every detail of your precious moments (the maximum recordable number of pixels is 3648x2736); CCD shift-method vibration correction function, which is exceptionally effective in stabilizing images when the shutter is pressed; 2.5-inch, 230,000-pixel LCD monitor. ■

## From the Rumour Factory: New dSLRs

Rumors are running rampant about a forthcoming high-end DSLR from **Nikon, the D3**, allegedly with 18.7-megapixels, a nearly full frame sensor and excellent abilities to cope with low-light conditions.

It also looks like the much rumoured and long-awaited **Canon 40D** DSLR camera, successor to the popular EOS 30D model may finally be arriving. Camera & Imaging Products Association (CIPA), which Canon is a member of, has listed the Canon 40D but with no specs or pictures.

On the other hand pictures of a new, **yet un-named, Sony Alpha** DSLR has been released (right). According to PhotoClub-Alpha.com, a range of new Sony lenses will be full-frame, leading to the belief that Sony will release a full-frame DSLR sometime in 2008. ■



## 34th World Festival of Underwater Pictures to be held at Marineland in Antibes

The 34th World Festival of Underwater Pictures will be held in Antibes, France, at the marine mammal park MARINELAND from October 24-28. All festival-goers and participants can attend the shows offered by Marineland As 2007 is also Aqua Lung's 60th birthday. The 34th edition of the Festival will take part in the celebration of this jubilee.

The opening-ceremony will be held round the orcas' basin with more than 4.000 seats. This evening will include an Orca show and the screening of a film chosen among the films in competition. A cocktail will close the evening.

In the new spaces placed at our disposal by the marine theme park MARINELAND, the Festival will spread over another dimension.

During the Festival, the competitors' films, slides and slideshow will be screened into two rooms (1.000 and 300 seats). Three restaurants will receive the festival participants inside the MARINELAND Park. Last but not least, we will have a dedicated space at our disposal for our festive evenings.

The prize ceremony will be held round the Orcas' basin. During the ceremony, all the Festival participants will be able to attend the showing of the awarded films in the two viewing rooms. ■

# ULTRALIGHT

CONTROL SYSTEMS

TRAYS, PIVOTS, AND ARMS FOR CAMERAS, HOUSINGS, STROBES, AND LIGHTS

The original arm with o-rings in the balls for ease of use. Accept no imitations.

Your quest for the best arm system is over, once you have an Ultralight arm you will never need to upgrade.

Visit our website: [www.ulcs.com](http://www.ulcs.com) for product info & to locate a dealer near you. Unable to find a dealer? E-mail: [info@ulcs.com](mailto:info@ulcs.com)

Via Press Release (edited)

## PADI Asia Pacific Partners With Olympus

Olympus and PADI has announced that they have partnered in support of the PADI Digital Underwater Photographer Specialty Course in Asia Pacific, including Singapore, Malaysia, Thailand and Indonesia.

During the course, participants learn to use the PADI SEA (Shoot, Examine and Adjust) method, which takes full advantage of digital technology to achieve good underwater photos faster. They not only learn the three primary principles on how to take good photos underwater, but also how to edit and share them with their friends via email or printing, optimizing their work

with their computer, storage and more. They are also taught how to choose and use modern digital cameras and underwater housings.

To sign up for the course, participants must be PADI Open Water Divers or Junior Open Water Divers (or have a qualifying certification from another training organisation).



"We welcome the opportunity to partner Olympus in growing this exciting segment of the dive market—Underwater Photography—one which is growing at a rapid rate. Olympus' brand recognition, market position, reach within Asia Pacific and reputation for providing a consistent quality of service is the reason why we have selected Olympus as our partner. We strongly believe there are multiple synergies in this partnership for both parties. We are already working with Olympus in Europe and as such, it was only natural for us to expand the partnership to the Asia Pacific region," said Mr Shahram Saber, Marketing Manager of PADI Asia Pacific. ■

# 818.535.3251

Gates

Light & Motion

Amphibico

Aquatica

Sea & Sea

Seatool

Inon

Ikelite

and more!

UNDERWATER IMAGING HEADQUARTERS

[H2OPHOTOPROS.COM](http://H2OPHOTOPROS.COM)



## The Coolest Corrections

We all know of how wide-angle lenses can give bulging reproductions and barrel distortions. And high contrast images like those taken against a big light source can produce very murky shadows. Enter the the powerful image processing software from DxO Optics PRO, and hey, presto, miracles are almost per-

formed in resurrecting deadish images back to to life.

Noise reduction, exposure and colour correction, coupled with the ability to set a contrast ratio, that makes exposures perfect for print or reproduction, all add up to a package that will soon be indispensable.

Check out the demonstrations here:

[www.alphadigitalservices.co.uk](http://www.alphadigitalservices.co.uk)

## Affordable Monitor Color Correction

Take a picture, any picture. It might be perfectly exposed, but you don't know because your computer monitor might be a little off, and have colour tint itself. So, you make those little adjustments to your image to make it look great on screen and you then print it, you might get something like purple instead of the red you see on your screen.

Pantone has an inexpensive solution: Consider the hueyPRO or its bigger sibling the ColorVision Spyder to calibrate your monitors. If you do this for a living and print on art stock or use custom inks, investigate the ColorVision solution.

The hueyPRO colorimeter distinguishes itself with the following features:

\* It's quite small (the size of a marker) and weighs almost nothing so you can easily travel with it—and unlike other devices—you might want to.

\* It detects changes in ambient light, adjusting the monitor at regular intervals (which is why you might want to travel with it)

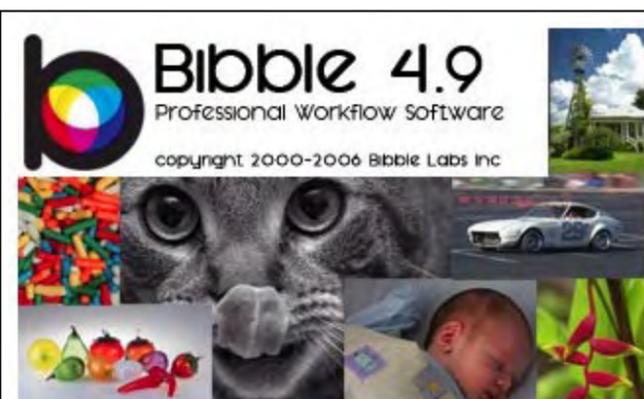
\* It can calibrate multiple monitors connected to the same computer ■

Read a fuller review [here](#)



DxO FilmPack is a plug-in for Adobe Photoshop and DxO Optics PRO. It is also available as a stand-alone application.

DxO FilmPack gives digital images the style of the most celebrated conventional films: the colors—and the grain!—of over 20 film types including Kodachrome, Tri-X, Velvia have been analysed and reproduced so they can be applied to all your images with just one click. DxO FilmPack digitally simulates the vibrant colours of Kodachrome 64, the soft grain of Tri-X, or the gentle fleshtones of Astia.



Bibble Pro Version 4.9.8 Adds New Features and Cameras, Including Full Support for the Canon 1D Mark III and Fuji S5 Pro and processing of Fujifilm's Wide Dynamic Range and Canon's new sRAW format

New cameras added in this release include Canon 1D Mark III, Fujifilm S5 Pro, Nikon D40x, Olympus E-510, E-410, and SP500 UZ and Panasonic FZ8. Like its preceding eleven major and minor releases, this latest update is free for all current Bibble 4 customers.

Bibble Pro is the most comprehensive cross-platform RAW Workflow application available today, the Bibble Pro plug-in for Adobe Photoshop supports CS2, CS and version 7, providing native access to the latest camera formats otherwise inaccessible in these older versions of Photoshop. ■

# 34<sup>e</sup> FESTIVAL MONDIAL

# DE L'IMAGE SOUS-MARINE



## ANTIBES - ALPES-MARITIMES

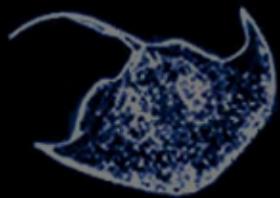
MARINELAND – Antibes – France

24 au 28 octobre 2007



SOUS LE PATRONAGE DE  
JEAN LÉONETTI, DÉPUTÉ-MAIRE D'ANTIBES  
ET DE CHRISTIAN ESTROSI,  
PRÉSIDENT DU CONSEIL GÉNÉRAL DES ALPES-MARITIMES





X-ray mag

Business Directory



#### To order a directory listing:

Call or email to reserve space 30 days before publication. Text due 15 days before publication date. Send link and text info to: [BizDir@xray-mag.com](mailto:BizDir@xray-mag.com)

€195 PER YEAR:  
Six serial text listings (60 x 15 mm, 3 lines x 30 characters per line incl. spaces). Must be prepaid with credit card through PayPal.com and text received no later than 15 days before publication.

FORMAT:  
LINE 1: Business name, city/state or province, country  
LINE 2: Slogan or services/offers  
LINE 3: Website or email address (active link)

INFORMATION:  
[www.xray-mag.com](http://www.xray-mag.com)  
[BizDir@xray-mag.com](mailto:BizDir@xray-mag.com)

### Dive Operators AMERICAS

**At the Water's Edge, MA, USA**  
When you just gotta dive!  
[www.lovetodive.com](http://www.lovetodive.com)  
**Captain Slate's Atlantis Dive Center**  
For the very best diving in the Florida Keys [www.captianslate.com](http://www.captianslate.com)  
**Tiedeman's Diving Center, NY, USA**  
Long Island's Premier Scuba Ed Facility  
[www.tdconline.com](http://www.tdconline.com)  
**Tunefte Island Lodge**  
A private Caribbean Island  
[www.tuneftelodge.com](http://www.tuneftelodge.com)  
**Utila Dive Center, Honduras**  
Welcome to the Whaleshark experts  
[www.utiladivecenter.com](http://www.utiladivecenter.com)  
**Utopia Village** —Coming 2007: Dive, Fish, Relax in Utila, Honduras. Opening specials sign up [www.utopiautila.com](http://www.utopiautila.com)

### Dive Operators EUROPE

**Dive Academy Gran Canary Island**  
Europe's most southern dive center  
[www.diveacademy-grancanaria.com](http://www.diveacademy-grancanaria.com)  
**Diving World, Netherlands**  
Dive travel specialists  
[www.divingworld.nl](http://www.divingworld.nl)  
**Dykkercenter Langeland, Denmark**  
Cabins & Wreck diving in Denmark  
[www.dykkercenterlangeland.dk](http://www.dykkercenterlangeland.dk)  
**Eden Roc Amigos Del Mar**  
Costa Brava Irish owned, reef, wrecks, caves, Clubs & individuals welcome  
[www.eden-roc-dive.com](http://www.eden-roc-dive.com)  
**Media-Sub, Erstein, France** —Underwater video and photography equipment and service [www.mediasub.com](http://www.mediasub.com)  
**Profondo Blu, Ustica**  
An underwater paradise in the Med  
[www.ustica-diving.it](http://www.ustica-diving.it)  
**Scuba.Lu, Luxemburg** —Diving Luxemburg-Worldwide expeditions  
[www.scuba.lu](http://www.scuba.lu)  
**Timuna Sea, London, UK**  
Premier diving specialist in East London  
[www.timunasea.com](http://www.timunasea.com)  
**West Wales Diving Center, UK**  
Longest serving dive center in Wales  
[www.westwalesdivers.co.uk](http://www.westwalesdivers.co.uk)  
**Zapp Divers, Denmark**  
Dive tours around Jutland  
[www.zappdivers.dk](http://www.zappdivers.dk)

### Dive Operators RED SEA

**Emperor Divers, Sharm El Sheikh, Egypt**  
Your Red Sea dive specialists  
[www.emperordivers.com](http://www.emperordivers.com)  
**Nemo Divers, Eliat, Israel**  
Red Sea's best little dive center  
[www.nemodivers.co.il](http://www.nemodivers.co.il)

### Dive Operators AFRICA

**Dive Solutions, South Africa** —Diving Mozambique, tech & rec dive educ  
[www.divesolutions.co.za](http://www.divesolutions.co.za)

### Dive Operators ASIA

**Bali International Diving Professionals**  
Specialists in Macro to Pelagic Sights  
[bidp-balidiving.com](http://bidp-balidiving.com)  
**Big Bubble Center, Singapore**  
Taking the mystery out of scuba diving  
[www.bigbubble.com](http://www.bigbubble.com)  
**Delphis Diving, Maldives**  
Since 1982. Safe, personal & organised  
[www.delphis.com.mv](http://www.delphis.com.mv)  
**Lumbalumba Diving - Manado**  
Small, cosy and personalized dive resort in Bunaken Marine Park  
[www.lumbalumbadiving.com](http://www.lumbalumbadiving.com)  
**Sipadan Water Village Resort, Sabah**  
Luxurious diving resort in Borneo  
[www.swwresort.com](http://www.swwresort.com)  
**Tioman Scuba** —Finest diving at the best price in Peninsula Malaysia  
[www.tioman-scuba.com](http://www.tioman-scuba.com)  
**Ocean Adventures** —Philippines  
Welcome to the world of wonder  
[www.oceanadventure.com.ph](http://www.oceanadventure.com.ph)  
**Swanido, Biak, Indonesia** Discover the Hidden Treasures in Cenderawasih Bay  
[www.swanido.com](http://www.swanido.com)

### Dive Operators AUSTRALIA

**Abyss Scuba Diving, Sydney Australia**  
Scuba diving in Australia is worldclass  
[www.abyss.com.au](http://www.abyss.com.au)  
**Aquapro Dive Services Australia**  
Your first choice for instructor training  
[www.aquaprodiver.com](http://www.aquaprodiver.com)  
**Deep Sea Divers Den, Australia**  
Diving Great Barrier Reef & Queensland  
[www.diversden.com.au](http://www.diversden.com.au)  
**Eagle Hawk Dive Center, Tasmania**  
Tasmanian Peninsula dive specialists  
[www.eaglehawkdive.com.au](http://www.eaglehawkdive.com.au)

**New Zealand Dive Experiences**  
Expand your diving and underwater photography horizons in Kiwi country  
[www.nzdivexperiences.com](http://www.nzdivexperiences.com)  
**Ningaloo Reef Dive, Western Australia**  
Preferred operators on the West Coast  
[www.ningalooreefdiver.com.au](http://www.ningalooreefdiver.com.au)  
**Perth Diving, Australia** —Western Australia's premier diving organisation  
[www.perthdiving.com.au](http://www.perthdiving.com.au)

### Liveboards

**Eagle Bay Liveboard, Maldives**  
Maldives Oceanic Dreams—where your ultimate diving experience begins  
[www.maldivesdivingadventure.com](http://www.maldivesdivingadventure.com)  
**Nautilus Explorer Liveboard, USA**  
Diving Mantas to Icebergs  
[www.nautilusexplorer.com](http://www.nautilusexplorer.com)  
**Ocean Rover** —Cruises in Thailand, Myanmar, Indonesia and Malaysia  
[www.oceanrover.com](http://www.oceanrover.com)  
**SMY Ondina** —Dive Indonesia  
[www.smyondina.com](http://www.smyondina.com)  
[www.thebestdivingintheworld.co](http://www.thebestdivingintheworld.co)

### SCUBA & UWP Clubs

**Aalesunds Sportsdykkerclub, Norway**  
På Voldsdalsberga ved Borgundfjorden  
[www.aasdk.no](http://www.aasdk.no)  
**Ajax Scuba Club, Ontario, Canada**  
Serving Durham Ontario since 1975  
[www.ajaxscubaclub.on.ca](http://www.ajaxscubaclub.on.ca)  
**Alberta Underwater Council, Canada**  
Underwater sports & eco-awareness  
[www.albertaunderwatercouncil.com](http://www.albertaunderwatercouncil.com)

**Barnacle Busters Scuba Club, USA**  
Los Angeles/Long Beach (Gay/Lesbian)  
[www.barnaclebusters.org](http://www.barnaclebusters.org)  
**Bottom Bunch Dive Club, San Diego, US**  
Promoting safe diving and having fun  
[www.bottombunchdiveclub.com](http://www.bottombunchdiveclub.com)  
**British Sub Aqua Club (BSAC), UK**  
Where sport diving began...  
[www.bsac.co.uk](http://www.bsac.co.uk)  
**Dansk Sportsdykker Forbund, Denmark**  
7500 members in 152 clubs in Denmark  
[www.sportsdykning.dk](http://www.sportsdykning.dk)  
**Los Angeles Underwater Photographic Society, USA** [www.laups.org](http://www.laups.org)  
**Northumbria Sub Aqua Club, UK**  
Dive training and trips  
[www.divenorthumbria.co.uk](http://www.divenorthumbria.co.uk)  
**Saddleworth Sub-Aqua Club, UK**  
Based in the Pannine hills of Lancashire  
[www.saddleworth-subaqua.co.uk](http://www.saddleworth-subaqua.co.uk)  
**Southern Division Diving Club**  
Netherlands: Dive with us, you can't sink lower!  
[www.sd-diving.nl](http://www.sd-diving.nl)  
**Tufts University Scuba Club, MA, USA**  
New adventures, new buddies  
[www.ase.tufts.edu/scuba](http://www.ase.tufts.edu/scuba)

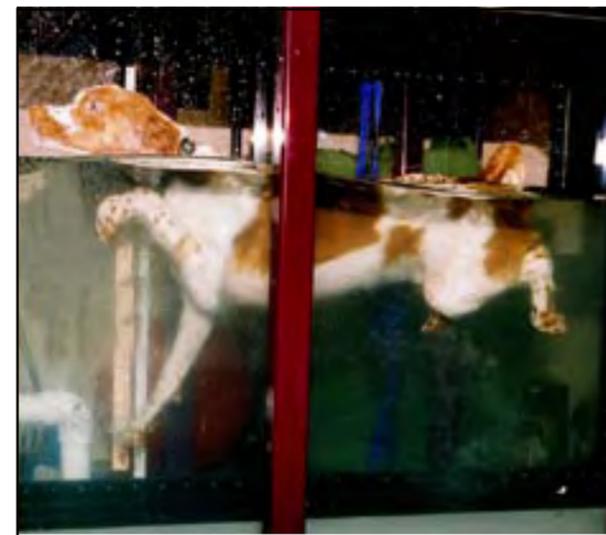
### Dive Shops

**Carlsens Dykkercenter, Denmark**  
Education, Equipment & Service  
[www.cdcdyk.dk](http://www.cdcdyk.dk)  
**Deep Six Underwater Systems, USA**  
New Paltz, NY —We ship worldwide  
[www.deep-six.com](http://www.deep-six.com)  
**Divers Supply, USA** —Shop us for the best prices, equipment and service!  
[www.diverssupplyusa.com](http://www.diverssupplyusa.com)

**Dykkercentret, Denmark**  
Danish dive shop & online store  
[www.dykcen.dk](http://www.dykcen.dk)  
**Diveshoppen, Denmark**  
In the heart of Copenhagen  
[www.diveshoppen.dk](http://www.diveshoppen.dk)  
**LondonDivingNet** —The best place in London to learn to dive  
[www.londondiving.net](http://www.londondiving.net)  
**Ocean Dive Explorers, Denmark**  
TDI/SDI Scandinavia  
[www.oceandive.dk](http://www.oceandive.dk)  
**SuperDive.dk** —Copenhagen dive center, tours and trips  
PADI, NAUI and NAUI Tech  
[www.superdive.dk](http://www.superdive.dk)  
**Simply Scuba, UK & International**  
One-stop online dive shop  
[www.simplyscuba.com](http://www.simplyscuba.com)  
**Thyges Dykkercenter, Denmark** —IAHD  
5 star PADI instructor development ctr  
[www.thygedive.dk](http://www.thygedive.dk)

### Dive Travel Agents

**AquaTours UK**  
Aquatours specialise in Scuba Diving holidays world-wide. [Aquatours.com](http://Aquatours.com)  
**Blue o Two** Operating since 2001, blue o two offers tailor-made diving holiday packages to THAILAND, RED SEA, USVI and MALTA. [www.blueotwo.com](http://www.blueotwo.com)  
**Dive Discovery, Houston, TX, USA**  
Complete dive & adventure travel  
[www.divediscovery.com](http://www.divediscovery.com)  
**US Dive Travel Network, USA**  
Not just a vacation, an adventure!  
[www.usdivetravel.com](http://www.usdivetravel.com)



Underwater treadmill helps dogs heal

## U/W Doggie Rehab

These days, dogs with weight, health and fitness problems or need post-operative rehabilitation receive hydrotherapy, which is considered a primary treatment in canine rehabilitation. The exercise in the underwater treadmill can help your dog improve in strength, flexibility, endurance, agility, function and well-being. It can also help shorten healing time and decrease pain, and it can progress from buoyant to resistive exercise to vigorous activity by varying the water depth, speed and duration. ■

**Wet & Weird**

News edited by Willy Volk

SOURCE: PEWAUKEEVETERINARYSERVICE.COM



X-ray mag

Business  
Directory

## Publishers

### Best Publishing Co, Flagstaff, AZ, USA

Scuba diving & hyperbaric medicine  
[www.bestpub.com](http://www.bestpub.com)

### Oceans Enterprises

Diving and Underwater Books  
[www.oceans.com.au](http://www.oceans.com.au)

### Pine Belt Publishing

Online Book Distributors  
[www.pinebeltpublishing.com](http://www.pinebeltpublishing.com)

## Dive Manufacturers

### Cochran

Undersea Technology  
[www.divecochran.com](http://www.divecochran.com)

**Dive Junkie, Singapore** —Fun, fashionable and expressive scuba dive t-shirts  
[www.divejunkie.com.sg](http://www.divejunkie.com.sg)

### Diving Unlimited International, USA

Unlimited comfort, performance, quality  
[dui-online.com](http://dui-online.com)

**Fourth Element, UK** —High tech, high quality dive clothing and design  
[www.fourthelement.com](http://www.fourthelement.com)

### Nocturnal Lights, CA, USA

Advanced lighting systems for diving, UWP, video  
[www.nocturnallights.com](http://www.nocturnallights.com)

### Reefling Clothing

Divewear that inspires diving  
[www.reefling.com](http://www.reefling.com)

### Silent Diving Systems, USA

Closed circuit rebreather distribution  
[www.silentdiving.com](http://www.silentdiving.com)

## Non-Profit Organisations

**International Association of Handicapped Divers (IAHD Foundation)**  
[www.iahd.org](http://www.iahd.org)

**Coral Reef Alliance** —Working together to keep coral reefs dive  
[www.coralreef.org](http://www.coralreef.org)  
**The Manta Network**  
Help Save the Mantas  
[www.save-the-mantas.org](http://www.save-the-mantas.org)

## Online Dive Resources

### Cairns Scuba Diving Australia

Dive training & travel holidays  
[www.divedirectory.com.au](http://www.divedirectory.com.au)

### DiveGuru, Deerfield, FL, USA

When you want answers...  
[www.diveguru.net](http://www.diveguru.net)

**DiveIndex.com** —All links diving related  
Newest, top-rated, most popular  
[www.diveindex.com](http://www.diveindex.com)

**DivePhotoGuide** —The essential resource for UWPs & Videographers  
[www.divephotoguide.com](http://www.divephotoguide.com)

**Diverlink** —A comprehensive resource for divers and dive businesses  
[www.diverlink.com](http://www.diverlink.com)

### Divester

Weblong's premier diveblog  
[www.divester.com](http://www.divester.com)

### Dykcentralen, Sweden

Swedish divelink index  
[www.dykcentralen.se](http://www.dykcentralen.se)

**Lines & Shadows** —Home of the best source of UWP, travel & adventure  
[www.linesandshadows.com](http://www.linesandshadows.com)

**NauticFriend.com** —The Ultimate Worldwide Watersports Directory  
[www.nauticfriend.com](http://www.nauticfriend.com)

### Onderwaterfoto, Netherlands

Digital UWP Forum  
[www.underwaterfoto.net](http://www.underwaterfoto.net)

**One Ocean** —Earn frequent diver points toward equipment & travel  
[www.oneocean.com](http://www.oneocean.com)

### Patrick Musimu, Freediving Champion

Accept No Limits  
[www.patrickmusimu.com](http://www.patrickmusimu.com)

**Scuba Duba** —Online diving resource for news, equipment, buddies & travel  
[www.scubaduba.com](http://www.scubaduba.com)

**Scuba Spots** —The World's Oldest, Largest Scuba Directory  
[www.scubaspots.com](http://www.scubaspots.com)

**Scuba.start4all.com** —Diving directory in cooperation with Diving World  
[www.scuba.start4all.com](http://www.scuba.start4all.com)

**ScubaDiveSites.com, Australia**  
Listing Dive Sites Worldwide  
[www.scubadivesites.com](http://www.scubadivesites.com)

**UK Diving** —UK Scuba Diving Resource & Network  
[www.ukdivers.com](http://www.ukdivers.com)

**Underwater Australasia** —Australia & Asia Pacific's most popular dive portal  
[www.underwater.com.au](http://www.underwater.com.au)

**UnderwaterTimes** —A daily journal of life in and around water  
[www.underwatertimes.com](http://www.underwatertimes.com)

### University of Michigan, OSEH

Dive links by Larry "Harris" Taylor, PhD  
[www-personal.umich.edu](http://www-personal.umich.edu)

### WetPixel, USA

Digital imaging for divers  
[www.wetpixel.com](http://www.wetpixel.com)

### World-Newspapers.com

Scuba Diving Magazines Online  
[www.world-newspapers.com/scuba](http://www.world-newspapers.com/scuba)

## UWP Competitions

### National Wildlife Photography Awards

Deadline: July 15th, 2006  
[www.nwf.org](http://www.nwf.org)

### Santa Barbara Ocean Film Festival

Deadline: August 30, 2006  
[www.ocean.com](http://www.ocean.com)

### XARIFA Unterwasser Foto & Film Festival

14-15 October 2006, Germany  
[www.uwfv.de/xarifa](http://www.uwfv.de/xarifa)

### World Festival of Underwater Pictures

25-29 October 2006, Antibes, France  
[www.underwater-festival.com](http://www.underwater-festival.com)

## UW Photo, Video, Film

### Alex Mustard, PhD, UK

UWP and Marine Biologist  
[www.amustard.com](http://www.amustard.com)

### Amos Nachoum Big Animals

Worldwide expeditions & adventure  
[www.biganimals.com](http://www.biganimals.com)

### Bill Becher Outdoor & Adventure

Writing & Photography —CA, USA  
[www.becher.com](http://www.becher.com)

### Cathy Church, Cayman Islands

UWP Center, Classes, Trips, Services  
[www.cathychurch.com](http://www.cathychurch.com)

### City Seahorse, Dallas, TX, USA

UWP & Raja Ampat stock & tours  
[www.cityseahorse.com](http://www.cityseahorse.com)

### Edwin Marcow, UK

Marine & Wildlife Photographer  
[www.edwinmarcow.com](http://www.edwinmarcow.com)

### Jack Connick, WA, USA

UWP & Graphic Design  
[www.opticalocean.com](http://www.opticalocean.com)

### John Collins Photography, Kinsale, UK

Cool Waters-Emeral Seas  
[www.johncollinskinsale.com](http://www.johncollinskinsale.com)

### Jon Gross & Keith Clements, WA, USA

Marine Life Index  
[www.seaotter.com](http://www.seaotter.com)

### Michael Portelly, UK

Director and Cinematographer  
[www.portelly.com](http://www.portelly.com)

### Nonoy Tan, Metro Manila, Philippines

Underwater images of the Philippines  
[nonoytan@yahoo.com](mailto:nonoytan@yahoo.com)

### Poppe Images, Philippines

Marine Iconography of the Philippines  
[www.poppe-images.com](http://www.poppe-images.com)

### Thomas Peschak, South Africa

Africa's Oceans and Coasts  
[www.currentsofcontrast.com](http://www.currentsofcontrast.com)

### Tony White, UK

Underwater imagery at its best!  
[www.seaofdreams.co.uk](http://www.seaofdreams.co.uk)

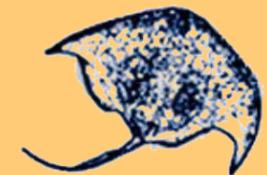
### UV Foto, Norway

Underwater photos of Stein Johnsen  
[www.uvfoto.no](http://www.uvfoto.no)

### Water Ventures

Travel, diving and culinary images  
[www.waterventures.no](http://www.waterventures.no)

## Wet & Weird



News edited by  
Gunild Symes

# New Frogmobile from Nissan

A car designed specifically for underwater photographers? Yes, that is what Nissan has done in their new NV200 concept car to be unveiled at the Tokyo motor show later this year. Styled at the Nissan Design Centre in London, the NV200 sports a large "storage pod" that slides out of the back of the car when it is parked. Small feet emerge from underneath the pod as it slides backwards, which maintains the pod's stability on the ground.

The pod is divided into dry and wet areas to provide storage for dive gear and photographic equipment. It even has a solar powered fridge and sink unit. The solar panels are mounted onto the roof of the car. Once the pod is deployed, the center of the car becomes a mobile office with a

computer and an office chair, which is one of the passenger seats rolled backwards and swiveled around. They have even incorporated a warm environment to greet the underwater photographer when he or she comes back from a dive—wood laminate flooring and bright yellow plastics.

Nissan Europe's Senior Designer Martin Uhlarik styled the exterior. He told Autocar Magazine why Nissan chose to focus on underwater photographers: "We brainstormed all the likely users of a vehicle of this type and decided to focus on underwater photographers because they're in touch with nature, and their equipment has a high-tech but utilitarian appeal. It's also exotic—if we'd designed a bread van, we wouldn't get so much attention." ■

SOURCE: SPEEDTV.COM



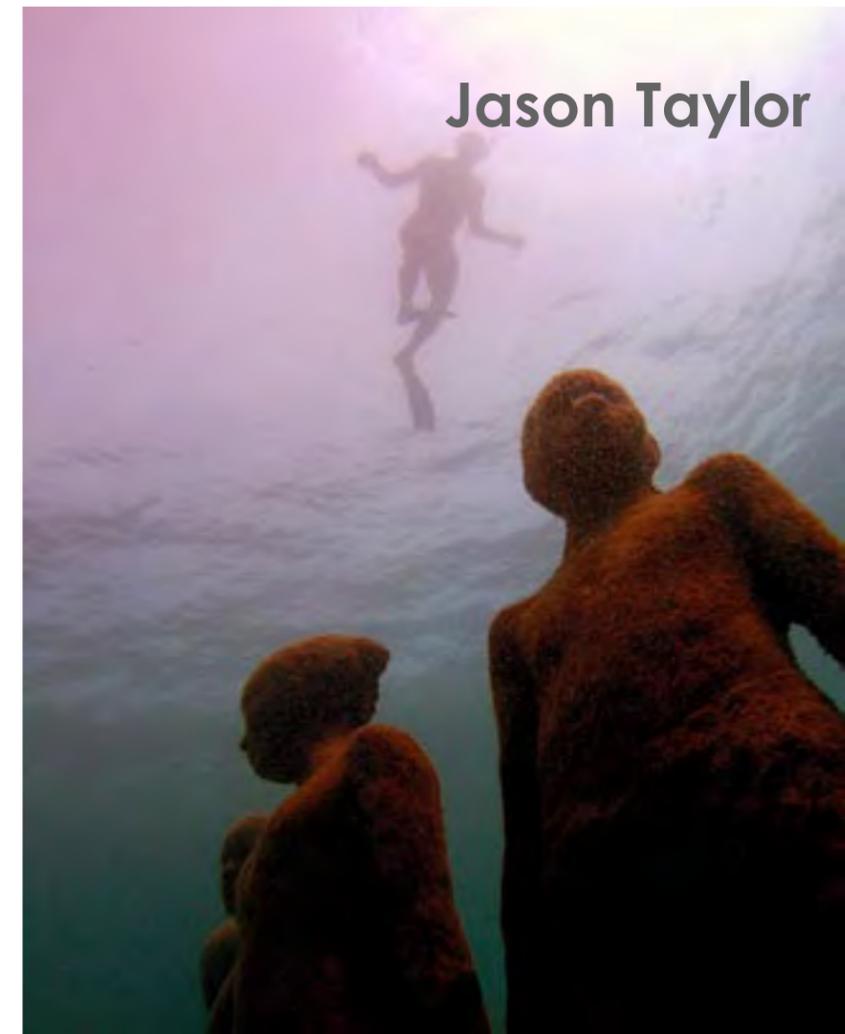
# Jason Taylor

Text by Gunild Symes  
Photos by Jason Taylor

*“You can use sculpture art as a way of conveying hope... providing hope for the future and inspiring people to think about their role on the planet.” — Jason Taylor*



THIS PAGE: Various views and details of *Vicissitudes* by Jason Taylor, depth 4.5m, 5m diameter circle of concrete figures



Jason Taylor

CLOCKWISE FROM LEFT: *Sienna* by Jason Taylor, depth 3.8m, dimensions 120 x 52cm; Detail of *Tam CC Project*, depth 2m, dimensions 20 x 36cm; Detail of *Vicissitudes* with diver. All sculptures and photos by Jason Taylor

**Not all artificial reefs are shipwrecks or scuttled vessels, tanks or planes. Now divers can enjoy artificial reefs growing on original sculptures mounted underwater. Jason Taylor, a sculptor from England, recently finished a photo-documentation of his underwater sculpture project in Grenada. X-RAY MAG caught up with Taylor to find out how and why he did it.**

Taylor studied sculpture and painting in London, but he was always fascinated

with creating pieces on site in the environment. He said that he never created works for viewing inside a gallery. His sculptures were site-specific, meaning that they were created specifically for the site in which it would be viewed, such as town squares, bridges, plazas, etc. This work is equally important to Taylor.

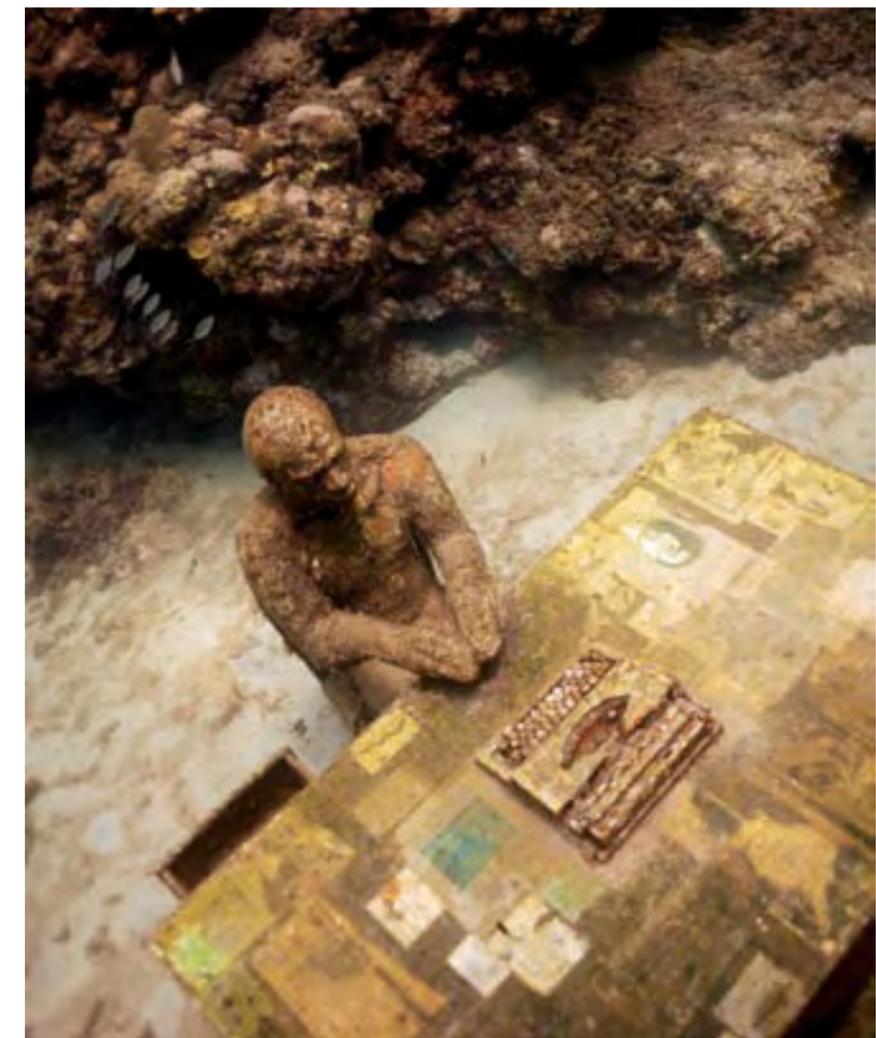
He grew up in Malaysia, and everyday after school, he went snorkeling. At age 12-13, he made a big adjustment and switched to graffiti art, leaving his mark on various urban surfaces under bridges and on trains. By age 18, graffiti art had lost its luster for Taylor, but he still views this phase as an important one of his development as an artist.

Now, Taylor works in cement or any

material he can get his hands on. All of Taylor's work in Grenada was made from local resources, since conventional materials were too expensive because they had to be imported. In Grenada, Taylor turned to local materials such as bamboo.

Taylor started sculptural work as an art project in school. He did a series of workshops in casting and sculpting. But at that point, he was not diving. Later, he got his diver's certification, and decided to marry the two great loves of his life, diving and sculpture.

Why did he create his underwater sculpture in Grenada? Well, he lived and worked there for some time as a dive instructor, getting to know the place and the people and allowing them to get to know him, before he



ABOVE: Two views of *The Lost Correspondent*, depth 7m, dimensions 140 x 43 cm. TOP CENTER: *Un-Still Life*, depth 7.8m, dimensions 120 x 130cm. All sculptures and photos by Jason Taylor



started working on his underwater art. Taylor funded the project himself and did most of the construction on the project as well. At first, people thought he was crazy. Taylor explains, "Why was this white guy spending all his money on concrete and then submerging it underwater?" Later, when divers started visiting the site and it became a standard stop for dive and tourist boats, people saw the value of the project in terms of tourism and management of the local reef.

### The creative process

Taylor says that his creative process is different every time. "I don't do a drawing. I just think it through and make a clay model... a mock up of what to do. Then, I cast the

forms," he said. In *Vissitudes*, casts were taken of the local children along the coast. Then, Taylor filled the casts with fiberglass and silicone and worked each piece out of these materials.

Then, he had to figure out how the sculpture should be connected to the sea floor. Some of the best ways to do this, he said, is by mounting metal pins into the rock face, but "it's too expensive". So, he had to find places in the gully which were not facing the tidal surge and currents. A big part of the foundation was made of oil drums as base plates, he said. The current had to be able to go through the sculptures, because just the force of the current put so much pressure on the feet and ankles of the figures that they would break. Taylor had

to find a way to allow the current to pass through the sculpture, which was a good thing for filter feeding organisms that later adhered to the forms.

There were several design considerations. Taylor said, "I spend a lot of time on that. How am I going to get the sculpture into the dive boat, without breaking it or the boat?" Cranes to lift the sculptures were available, but it cost US\$1000 to use the dive boat and the crane.

Taylor said that he found the planning and the creation of the underwater sculpture park really stressful. He said, "It was not like I was relaxing on an island paradise everyday." But he did get a lot of help from friends.

At first, Taylor worked independently. He said that he usually does

## Jason Taylor

not run around much in artistic circles, even though a lot of his family members are artists, just not sculptors. But he said that there were a couple artists who wanted to get involved.

He had to design and divide the sculptures into pieces, because he could not afford to hire a vessel with a crane. Hence, there were a lot of pieces to transport separately.

The project took three months on land to build and one week underwater to install. Taylor had a team of three divers installing the pieces during two 2-hour dives. The sculptures lie at a depth of about five meters. Taylor said that an initial survey of the site found that it was not quite flat. So, before installation could begin, the gradient had to be fixed.

Before the project could get off the ground and into the water, Taylor drew up some technical drawings, GPS location, and permission from the local government as well as submit an application to the fisheries department, who, Taylor admitted, did think it was "a bit weird".

Taylor chose a site that was already really desiccated, a place that he could not damage very much more than it was already. In the area, there were a couple of bays full of charter boats. The heavy use of the bays led to a rapid deterioration of the reef, he said.

Taylor had to construct the sculpture so it would last and evolve into a true reef, so he wanted to use metals. But that required sponsorship. He said, "It gets lots more expensive from there." So, he turned to cement. Taylor actually took a course with the Reefball Foundation, to learn about the cement balls with holes used to develop new reefs. "It was very complicated," said Taylor. "The cement you use has to have the right pH." Now, Taylor actually places coral into his structures, imbedding coral into the sculptures for propagation purposes.

Taylor explains, "In the skeletal figure,



Jason Taylor



the coral shapes the body—staghorn and elkhorn coral, which grows about two inches per year.” Taylor documented the changes to the sculpture park over time. “It really makes things more eternal even though the sculpture, such as the big tall woman, will be gone in only 15-20 years.” To keep it longer requires a maintenance program from local dive centers, he said.

### Response

The response to the project was mixed. A lot of the locals could not see the reason why someone would want to build such a thing and not even get paid for it, said Taylor. Many locals linked the sculptural figures to slavery, because the local history involved slavery. Taylor was surprised by this since he certainly did not have that issue in mind in the creation of the work. “I was just making sculptures of different kids holding hands,” he said.

Taylor said that he had a hard time getting into the routine of life down there. “They thought it was crazy that somebody used all his money to put concrete in the sea,” he said. “They are coming around now.” Dive boats have their own chartering system, and it is only a five minute ride to the sculpture park, so now they come and include it as a stop on a dive trip.

Taylor said that he received so many emails from all around the world—Uzbekistan, Russia, Bali and some inquiries from the U.S. and Europe. People responded to the press coverage of the sculpture park and the photographs of the sculptures, which Taylor posted on his website. They like the work, he said, and the response has been fairly positive from environmentalists, too.

Taylor’s sculpture park was big news in England, he said. He hopes to do another park in Europe in the Mediterranean Sea. The visibility is better in cold waters, he said. And there are plenty of soft and hard coral species to populate the sculptures.

“I have worked in Australia, the Red Sea and Asia,” said Taylor, “I like to work anywhere that has better visibility. It makes the photography of the sculptures easier.”

### Subject matter & symbolism

Taylor tries to do sculptures of easily identifiable objects so people can see a scene opposite of what one would usually find underwater. “Notice that I do no fishes or mermaids. I want to create a contrasting world. The guy at a desk is surreal. There’s a peacefulness about the figure enhanced by the diving experience.”

The sculpture park lies in shallow waters,



CLOCKWISE FROM LEFT: *Vicissitudes* at depth; Back view of *The Lost Correspondent*; Detail of *Grace Reef*, depth 4.2m, dimensions 180 x 46 cm; Portrait of the artist. All sculptures and photos by Jason Taylor





about 1.5 meters. The point of the park is to make something artistic in the underwater world, said Taylor. People in Grenada are not rich, he said, so accessibility of the park was important to allow the local people to be able to see it, too. "Usually, locals don't look underwater," he said, "They just fish."

One of the sculptures depicts the Devil Woman, a powerful mythical character in Grenada, said Taylor. She runs around at

night and steals children, so locals have mixed emotions about the work, he said.

What is this all about, you ask? "It's about change... how your surroundings affect your being. Children are meant to echo their environment. The influence is determined by the physical being... their surroundings. It would be nice to cross that link," said Taylor.

### Future plans

Taylor wants to design other sculpture parks. In real time, he works in London as a freelance stage and set designer. In dream time, he

wants to do a lot more diving and go abroad, of course, but finds that marketing to raise the funds is very time consuming. In the meantime, he installs exhibitions. "I am trying to wind down and do more artificial reefs. But the making of them is stressful." So he turned to cement.

Taylor has learned to be an underwater photographer using a small compact digital camera, in order to document his underwater works. Taylor said, "I find it really important to get into the ocean." He wants to do a series documenting the life he sees growing in and around the sculptures such as colonies of invertebrates, octopus, a green moray eel in the dress of the woman, fish living in the desk and in the drawers of the desk. The sculptures seem hard and static, but the marine life living in them is not, he said.

### Future processes

In the future, Taylor wants to produce the structures for sculptures in London and then transport them to the site. "Then, all I have to do is cast the cement," he said. "The reef ball is a very clever design. You cast cement around the ball and then deflate the ball leaving the cement form."

Taylor said, "It is amazing to start an

idea, something small, and then realize how it evolves." Say, an artist wants to put something underwater. Then, you need an engineer to work out how to do this, he said. "Then, you need an underwater photographer to document it."

Taylor does not aim for new venues for his work or to exhibit in galleries. "For me, it's all about the future," he said, "I have some great ideas I want to try. For instance, I would like to incorporate a shipwreck into an underwater sculpture park, and make it look like a Noah's ark with figures

around it." Taylor wants to challenge the use of materials and work modern materials in a way that makes them look like part of an archeological dig, combining glass into sculptures so one can see through the piece and light can shine through the work. He said, he wants to build a Sushi restaurant underwater with living fish moving through it.

"There are a lot of subtleties of life with cement... a lot of development goes on. It's not always resolute. I have a vague idea of what I want to try to achieve. I wanted to do a really abstract symbol, and started looking at a man sitting on a chair and reading, watching tv and drinking coffee at a table. The still life is about moments in time." Taylor wants to allow the sculptures to be part of creating a vibrant varied habitat. "I am not into cleaning the sculptures or bringing them back up to the surface for maintenance. Eventually, they will disappear."

Form more information, please visit: [www.underwatersculpture.com](http://www.underwatersculpture.com) ■

CLOCKWISE FROM FAR LEFT: Detail of *Grace Reef* with fish; Detail of *Vicissitudes*; *La Diablesse*, depth 7.5m, dimensions 220 x 50cm. All sculptures and photos by Jason Taylor

## IN OUR NEXT ISSUE

*Fabulous Fiji*  
*Sea of Cortez*  
*Saltstraumen, Norway*



SCOTT BENNETT



SCOTT BENNETT



DONALD TIPTON

COMING IN OCTOBER  
Subscribe now FREE!  
[www.xray-mag.com](http://www.xray-mag.com)