

*Sun Protection & Skin Care for Divers*



GLOBAL EDITION  
June :: July 2007  
Number 17

Red Sea Adventure  
**Saudi Arabia**

Profile  
**Bob Evans**

Equipment  
**Fins**

Science  
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Photography  
**Mastering  
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**COVER PHOTO**  
*Red Coral, Red Sea*, by Magnus Lundgren  
(CONTINUED ON PAGE 4)



## Your Skin is an Organ: Protect It Sun Protection & Skin Care For Divers... page 76

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Red Sea Reefshark. Photo by Magnus Lundgren



**24**  
THE RED SEA  
EGYPT  
BY PETER SYMES

**62**  
PROFILE:  
BOB EVANS  
BY PETER SYMES

## columns...

**79**  
MERMAID MATTERS:  
MASCARA ADVISORY  
BY CINDY ROSS

**32**  
THE RED SEA  
PARTED BY MOSES  
BY ARNOLD WEISZ

**66**  
SCIENCE:  
SALINITY  
BY MICHAEL SYMES

**70**  
MEDICAL  
NASAL IRRIGATION  
BY DAVID F COLVARD MD

**34**  
THE RED SEA  
MYSTERIES OF EGYPT  
BY BARB ROY

**71**  
ECOLOGY  
WHY & HOW  
BY PETER SYMES &  
MICHAEL ARVEDLUND

**81**  
SHARK TALES:  
BITS & BITES  
EDITED BY EDWIN MARCOW

**42**  
THE RED SEA  
SAUDI ARABIA  
BY DAN BEECHAM

**76**  
SUN PROTECTION  
& SKIN CARE FOR DIVERS  
BY GUNILD SYMES

**83**  
UW PHOTO:  
MACRO  
BY KURT AMSLER

**57**  
FINS  
& FIN CARE  
BY MILLIS KEEGAN

**94**  
PORTFOLIO:  
LIDUNE BEKMAN  
EDITED BY GUNILD SYMES

**88**  
TECH TALK:  
REBREATHING ADVENTURE  
BY CEDRIC VERDIER

**plus...**  
EDITORIAL 3  
NEWS 6  
DIVE GURUS 49  
NEW EQUIPMENT 50  
WHALES&DOLPHINS 54  
BUSINESS DIRECTORY 92

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# Fighting for what we love

*There is light at the end of the tunnel...*

Earlier this month, UN delegates reached a deal on combating global warming. Indonesian governors have agreed to curb logging to reduce climate change. Restaurants in Hawaii are taking bottom fish off their menus. No-take zones show how fish stocks can be protected. Pacific Nations are banning bottom trawling.

These are just some of the latest headlines I have been picking out of the stack lately. I guess I have felt starved for a positive outlook, and all the doom and gloom was starting to get to me as well.

*"It is possible to stop climate change"*

I haven't been feeling good about the way we have been managing the planet and worried about whether we could come to our senses in time to steer clear of the impending apocalypse—a sentiment I think many of our fellow human beings share.

But lately, I have started to feel better about it all.

The delegates at the UN's climate conference in Bangkok not only managed to reach a deal that pretty much cut through most of the usual political crap that so often sabotages or waters down the experts' clear recommendations—those days are finally over—as the gravity of the message seems to have finally sunk in across the board. In addition, their conclusion was:

"It is possible to stop climate change."

The closing document made it clear that it is still within our

financial and technological means to avoid the disastrous spike in temperatures that could wreak economic and ecological havoc on the planet. The delegates also approved the first road map to curtailing the rise in greenhouse gas emissions.

According to AP and CCN, delegates hailed the policy statement as a key advance toward battling global warming and setting the stage for an even stronger international agreement to replace the 1997 Kyoto Protocol on greenhouse emissions when it expires in 2012.

**Sounds good to me.** Now, we just have to stick to the plan and keep our elected politicians accountable.

Growing up, I remember listening to what my grandparents told me about enduring the horrible years of the World War. How the whole sentiment in society changed. Everyone stood much closer together in the face of hardship during those horrible years. Sacrifices were made by individuals, families and society as a whole. Priorities were changed, and new in-



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# Editorial

ventions were sped up to face the threat of an outside enemy.

This time, the enemy is not made of guns and tanks, but in part, our own ignorance.

However, I sense that there is a subtle yet undeniable change in sentiments of the kind that my grandparents talked about. The way of thinking is changing—at last.

I read about private citizens changing their entire households and the manner in which they manage them to reduce their carbon footprint. I hear how Governor Arnold Schwarzenegger in California pushes through tougher legislation on greenhouse emissions, and how Richard Branson of Virgin Airways now wants to tow his aircrafts to the runway to save fuel.

And I have read about all the smaller things people have done, like the restaurant owners who have taken bottom fish off their menus.

I have no idea how much each of these measures actually counts, but they all add up. And

we've got to start somewhere, don't we? At least, it is a start.

## Nostalgia

I love the sea, and my love of it goes back a long way. Once in a while, I visit the wonderful, pristine beach where I spent so many summers as a little kid with my grandparents.

Here, time seems to stand still. The waves are still gently lapping the beach, kids are still building sand castles with their green buckets and red shovels while their older siblings try to catch small crabs and chase shrimps in tidal pools. I used to wonder how this timeless joy and curiosity with the sea seemed to go on and on without changing, generation after generation. I want it to continue.

For me, the choices and priorities are clear. I love that beach and the clear water. I need it. But

there's a lot of other stuff that I don't need. We have no car in the family, no expensive plasma TV's, no energy-gulping air-conditioners (opening the windows and letting in the breeze works just fine) and we've got a thermostat on the heater and warm water and so forth. It is not such a sacrifice, as I never give it a thought.

And that is the issue at hand here. It is, to a large extent, down to the shaping of daily habits to have a fairly low carbon footprint.

And should it come to making a choice, I'd take the dive gear and give away the new TV any day. Mantas, manatees and morays are just so much better live, in 3-D!

—Peter Symes  
Publisher and Editor-in-Chief



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# NEWS

## Grey nurse shark habitat protected

A critical habitat for the endangered grey nurse shark off the mid-north coast of New South Wales has been protected by the federal government. All forms of fishing will be banned from the popular cod grounds off Laurieton at the end of this month when the 300 hectare area becomes an official marine reserve.

The area was recognised as a key habitat for the grey nurse shark in 2002.

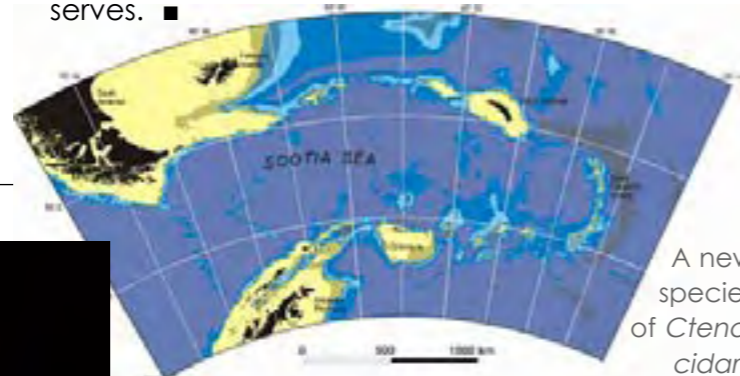
There are less than 500 of the sharks remaining off the east coast of Australia after the population was decimated in the 1960s by spearfishers, anglers and commercial fishing. ■

## Japanese Government to take steps to protect coral reefs

The Environment Ministry will revise the range of nature preserves, such as nature conservation areas and natural parks, to protect coral reefs.

The ministry will design protective measures for coral reefs endangered by a flow of red soil into the ocean and other factors and also revise the current management methods.

Coral reefs cover about 96,000 hectares in Japan, mainly around Okinawa Prefecture. However, less than half of them are designated as nature preserves. ■



The deeper waters of the Scotia and Weddell seas are some of the least explored parts of the world's oceans

A new species of *Ctenocidar* (urchin)



The Asellota (left) are one of the most diverse groups of isopods, comprising about 25 percent of all marine species. They are most successful and diverse in the deep sea

Male *Munna* crustacean



## Cool rain provides relief for Barrier Reef

Recent torrential rains and monsoons in northern Queensland have provided some rare relief for the Great Barrier Reef in Australia.

The poor conditions have significantly reduced ocean temperatures, making them the coolest for up to five years. It has been a blessing for the corals—usually in the summer, they are at risk of serious scorching and bleaching. The Great Barrier Reef, stretching over more than 345,000 sq km is also under threat from a combination of global warming, pollution and over-fishing. ■

## New NOAA Report Shows US Marine Sanctuaries Made Significant Gains in 2006

Leading the effort to establish the world's largest area of marine protection in the Northwestern Hawaiian Islands, increasing marine life in the Florida Keys National Marine Sanctuary, and moving shipping lanes to help protect whales off New England, are some of the NOAA National Marine Sanctuary Program's top accomplishments for 2006, according to a new NOAA report. The **2006 State of the Sanctuaries Report**, which includes accomplishments and highlights from each sanctuary, is available **online**.



## Antarctic Waters Continue to Produce New Discoveries

An extraordinarily diverse array of marine life has been discovered in the deep, dark waters around Antarctica.

Scientists have found more than 700 new species of marine creatures in seas once thought too hostile to sustain such rich biodiversity.

Groups of carnivorous sponges, free-swimming worms, crustaceans and molluscs were collected.

The findings, published in the journal *Nature*, could provide insights into the evolution of ocean life in this area. ■

SOURCES: BBC NEWS, BRITISH ANTARCTIC SURVEY

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BIOZENTRUM GRINDEL UND ZOOLOGISCHES MUSEUM

Edited by Peter Symes

### Threat to tropical reefs growing

55 per cent of the 49 island nations who register their fish catch are fishing unsustainably by taking more fish, molluscs and crustaceans than the reefs are able to replace, according to a global survey of reef fisheries, published in the online journal *Current Biology*.

The scientists estimated that the amount of fish being caught on tropical coral reefs is 64 per cent higher than can be reasonably sustained.

The findings suggest that it would take an additional area of tropical coral nearly four times the size of the Great Barrier Reef—the biggest reef system in the world—to sustain current levels of fishing. If the commercial exploitation of tropical corals continues at present rates, many reefs will be irreversibly degraded, and millions of people will have to look for other sources of food.

"Millions of people are dependent on coral reef fisheries. We are facing a global crisis among communities, which have limited alternative livelihoods or major food sources," said Katie Newton of the University of East Anglia in Norwich. ■

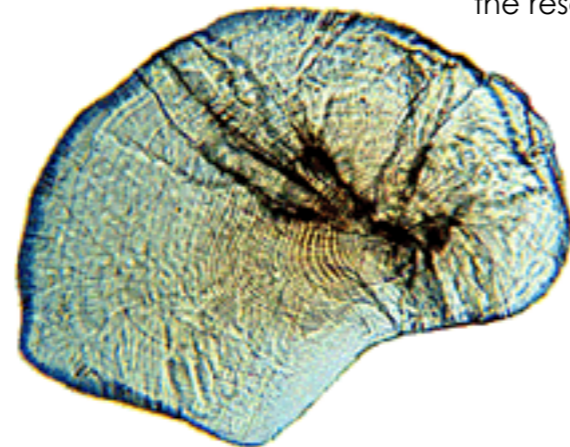
# Effects of Global Warming on Fish

## Surface Fish Growing Faster

Fish are fattening up faster near the Pacific's surface, which is warming, a new study says. The shallow-living fish are growing 20 to 30 percent faster today than they were 50 years ago, according to the researchers' analysis of fish ear bones. The faster growth rates closely match a warming trend in the ocean's surface waters.

"There's no question that the shallow-water fish are tracking our local version of global climate warming," said Ronald Thresher, a fisheries biologist with the Commonwealth Scientific and Industrial Research Organization in Tasmania, Australia. The faster growth, he added, could make the near-surface fish more resilient to overfishing. ■

Cross-section of a fish ear bone (otolith). From this, growth rates can be estimated



## Fish Stocks to Fall as Oceans Warm

**Scientists working with NASA believe warmer ocean temperatures will drastically reduce the amount of plankton available for sea creatures to eat.**

Global warming is creating an ocean famine in swaths of tropical and sub-tropical seas. This poses a potential threat to fisheries and ecosystems.

## ... while Deep Sea Fish are Growing Slower

In contrast to the shallow living cousins, deepwater fish are growing 20 to 30 percent slower than they were 50 years ago. Changes in ocean temperature have altered the growth rates of commercially harvested fish over the past century, according to a new study published in this week's early online edition of the *Proceedings of the National Academy of Sciences (PNAS)*. Their slowing growth rates correlate with a long-term cooling of the deep waters. The cause of the cooling trend is unclear, but analysis of deep water corals suggests it has been going on for centuries and may be independent of global warming.

While the results have potential implications for commercial ocean fisheries, the researchers say the trend might also

be temporary.

"With increasing global warming, temperatures at intermediate depths are likely to rise near globally... suggesting that... the decrease in growth rates for the deep-water species could slow and even be reversed."

Deepwater fish tend to be longer-lived than shallow water dwellers—some species, like the warty oreo (*Allocyttus verrucosus*) and orange roughy (*Hoplostethus atlanticus*), may live to be more than 130 years old. Their slow reproductive rate means they are especially vulnerable to over-exploitation and conservation groups have recently warned that a number of deep water fish stocks are at the point of collapse. ■



Orange Roughy

The findings, which has long been predicted by computer models by comparing nearly a decade of global ocean satellite data with several records of Earth's changing climate, suggests that as warming continues, fish stocks in tropical and sub-tropical regions will drop significantly. The study showed that in some ocean regions, microscopic

plants in the plankton, known as phytoplankton, respond to rising temperatures by scaling down their productivity by 30 percent or more.

The changes occur because warmer surface temperatures lead to changes in the flow of ocean currents that deliver nutrient-rich water

from the cooler depths to the surface. About half of the production generated by the world's living organisms is done by phytoplankton, microscopic green plants which operate in the top 100 to 200 metres of the ocean where light levels are high enough for photosynthesis. Each day, they pull in more than 100 million tonnes of CO<sub>2</sub>. ■

*Each day, they pull in more than 100 million tonnes of CO<sub>2</sub>*

## Europe Gets Tough on Vessels Polluting Ocean Waters

Starting April 1st, the 27 member states of the European Union will display their common determination to tackle unlawful discharges of polluting substances at sea as legislation adopted in 2005 is implemented. Illicit discharges at sea are still occurring, and preventing them is now more than ever a priority for Europe, the European Commission said.

"We must get tough on illegal discharges and gross negligence must be fought at all cost: the threat of criminal penalties hanging over polluters' heads will help to protect our coasts. We cannot tolerate deliberate pollution or gross negligence by a minority of operators who tarnish the image of the shipping industry," said Jacques Barrot, the commission's vice president in charge of transport. ■



No more of this. Oil-tanker *Prestige* sinks in 2002

## Double Hulled Tankers for Heavy Oil Now Law in Europe

European officials has signed into law a requirement that only double hulled tankers carrying heavy oil can enter European ports. The law was enacted in response to disastrous oil spills from single hulled tankers, the *Erika* in 1999 and the *Prestige* in 2002.

President of the European Parliament Hans-Gert Pottering, said the law represents an important response to offshore tanker accidents and will lead to better protection of the seas and the environment from oil spills. ■

GREENPEACE

Big sharks now 'functionally extinct' along the US eastern seaboard

# The Demise of the Atlantic Great Shark and Mollusc Populations



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## Winners and Losers

### Winners

Cownose Ray  
Smooth Butterfly Ray  
Little Skate  
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Atlantic Sharpnose Shark

### Losers

Bull Shark  
Blacktip Shark  
Scalloped and Smooth Hammerheads Shark  
Tiger Shark  
Great White Shark  
Mako Shark  
Dusky Shark  
Sandbar Shark

**The rapid decline of the great sharks in the Atlantic Oceans due to over fishing and accidental by-catch of Bull, Great White, Dusky and Hammerhead sharks has led to the explosion of ray, skate and smaller shark prey species.**

With as many as 73 million sharks killed annually worldwide and with numbers falling rapidly off the eastern seaboard of the United States, the situation has become critical.

"I am not using the word extinction at this point. The ecological terms we would use are functionally eliminated," co-author of a recent published study Julia Baum said. "There are simply not enough sharks in this region to keep the environmental balance in check." This has brought on far-reaching unexpected consequences.

With fewer sharks there are now more of the fish they once ate. The Cownose ray population has jumped eight per cent

per year to an estimated population of 40 million. While Tiger and Scalloped Hammerhead sharks have declined by more than 97 percent, and Smooth Hammerheads and Bull sharks have fallen by 99 percent since the mid-1980's.

With this rise of the more lowly species of fish—Cownose Ray, Smooth Butterfly Ray, Little Skate, Chain Catshark, Atlantic Sharpnose Shark—comes the collapse of the scallop, oyster, soft shell and hard clams populations. The Cownose Ray, which can grow up to four feet across, will consume large quantities of bivalves including bay scallops, oysters, soft-shell and hard clams in the bays and estuaries they frequent during summer and through which they migrate during fall and spring—often clearing once abundant areas with a vibrant scallop population into an underwater desert devoid of life.

With an average population increase of about eight percent per year, the East Coast cownose ray population may now number as many as 40 million.

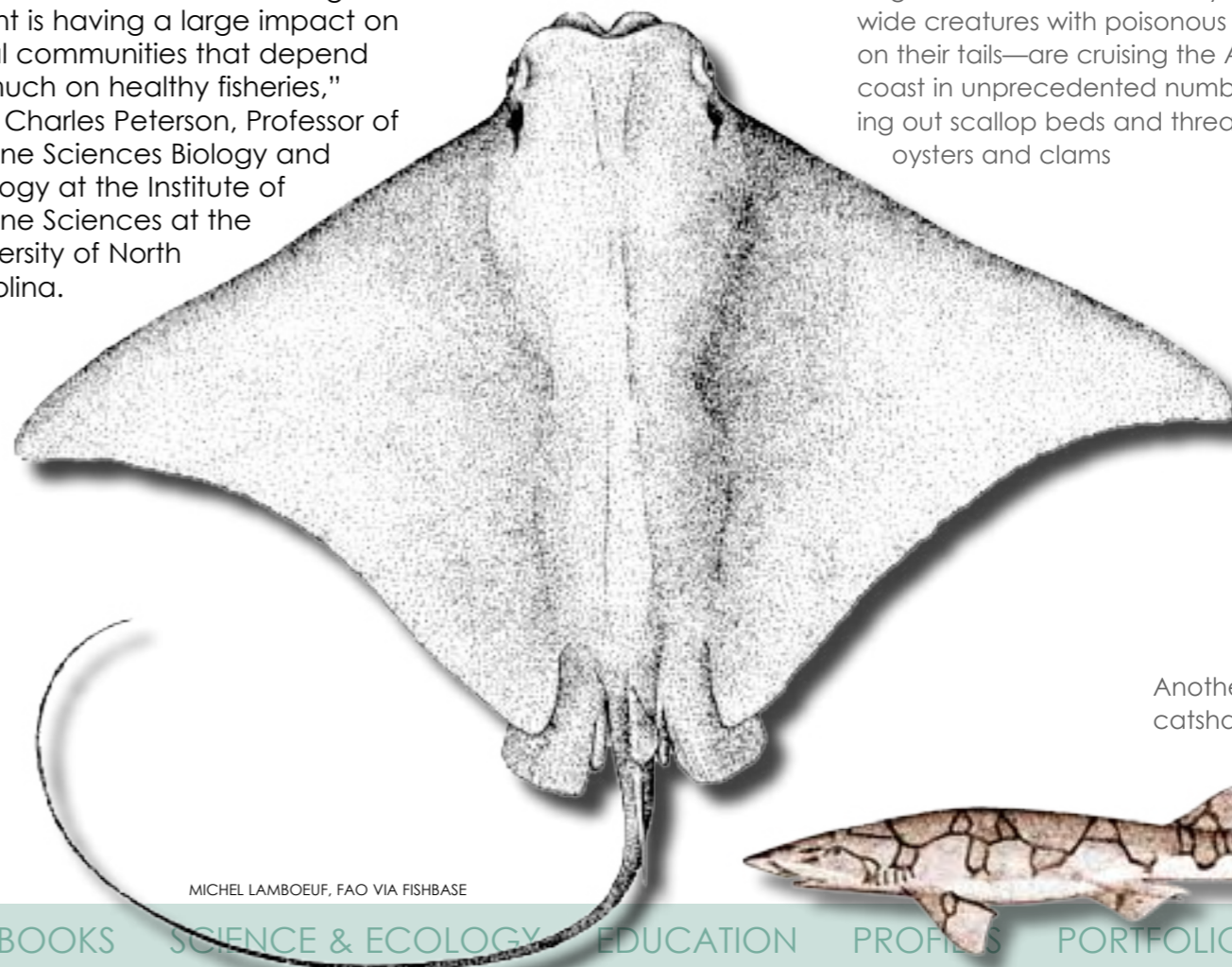
North Carolina's now destroyed bay scallop fishing industry is testament to the domino effect we have created by removing the ocean's apex predators to the

point. "So many sharks have been killed that they are functionally extinct, which means they can no longer perform their role of controlling middle predators in the marine ecosystem," Baum stated in a recent CBS news interview.

By 2004, the scallop population in the Carolina's was devastated. Bringing to an end North Carolina's 100-year-old scallop fishing industry. This brought tremendous financial hardship to the local fishing community and far reaching consequences for the environment. "This ecological event is having a large impact on local communities that depend so much on healthy fisheries," said Charles Peterson, Professor of Marine Sciences Biology and Ecology at the Institute of Marine Sciences at the University of North Carolina.

Peterson added, "Despite the vastness of the oceans, its organisms are interconnected, meaning that changes at one level have implications several steps removed. Through our work, the ocean is not so unfathomable, and we know better now why sharks matter." ■

Huge schools of Cownose rays—metre-wide creatures with poisonous stingers on their tails—are cruising the Atlantic coast in unprecedented numbers, wiping out scallop beds and threatening oysters and clams



Another "winner" Chain catshark (*Scyliorhinus retifer*)

MICHEL LAMBOEUF, FAO VIA FISHBASE

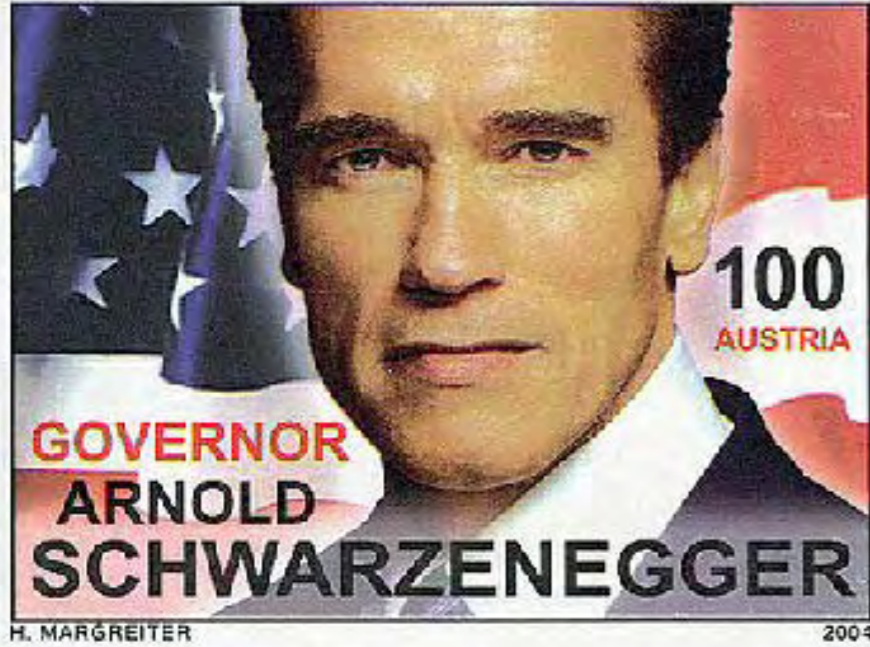


Scallop populations are being wiped out



Edited by  
Willy Volk

*Climate change  
campaigners need to  
shake off the image of  
being "treehuggers"  
and "fanatics".*



## Schwarzenegger Says Battle Against Global Warming Must Be "Hip and Sexy" to Succeed

Global warming is a... um... hot topic right now. While some people are resistant to the idea that the earth is slowly warming, others are working feverishly to figure out how to halt the process. In an effort to promote awareness of the issue, Arnold Schwarzenegger—the governor of California, a state considered to be at the vanguard of the fight against global warming—recently announced that for the environmental movement to succeed, he thinks it must become "hip and sexy".

Speaking at a conference in Washington, he urged campaigners to focus on the positives of cutting carbon emissions rather

than on making people feel guilty. "Successful movements aren't built on guilt," the Governor argued. "They are built on passion." Moreover, he warned that climate change campaigners needed to shake off the image of being "treehuggers" and "fanatics".

Comparing environmentalists to "prohibitionists at a fraternity party," the Governor argued that with positive marketing, environmentalism can become mainstream and attractive. To that end, the next time you see a person tossing an aluminum can in the garbage, be sure to tell them how much sexier they'd be if they recycled it. ■

SOURCE: BBC

## Australian Researcher Returns From Very Long Dive

Australian Lloyd Godson recently returned from a very long dive. Though shallow—he was only five meters underwater—he lived sub aqua for 13 days. In a converted metal box in a flooded gravel pit at Australia's Wonga Wetlands, Godson—a marine biologist and the winner of a competition by Australian Geographic that awarded him \$40,000 to fulfill his dream of living underwater—worked and slept inside his BioSUB, a self-sufficient, self-sustaining underwater habitat only three meters long, 2.4 meters wide, and two meters high. Guess he wasn't playing basketball.

To generate electricity, Godson pedaled a bike and used solar panels positioned outside the BioSUB. To generate air, he used Biocoil technology to grow Chlorella, a unicellular green algae, which he watered with his own urine, and which absorbed carbon dioxide and released oxygen. While he ate some of the algae, an onshore support crew provided additional water and food, including fruit, nuts and home-made lasagna. To keep things interesting, an "Easter shark" swam by with a supply of chocolate eggs, and Godson was able to chat with the world over a wireless Internet connection.

Though it might sound difficult to be a real-life Aqua-Man, Godson claims, "It's been a lot easier than I thought mentally. I thought it was going to be like being locked up in a cupboard, but it's actually quite fun."

I spoke with Godson in February 2006 about this project. I'm thrilled for him that he accomplished his dream. Way to go, Lloyd! ■



## President of Philippines Inducted into the Women Divers Hall of Fame

President Gloria Macapagal-Arroyo of the Republic of the Philippines has been inducted into the Women Divers Hall of Fame. President Macapagal-Arroyo has been accorded this honor, not only because she is an experienced diver, but because of the outstanding contributions she has made to both the marine world and the dive industry. By establishing sanctuaries and a series of mandates for the protection of the Philippines' underwater coral and marine life, President Macapagal-Arroyo has committed her government to protecting her nation's natural wealth, and has enacted a national conservation policy for the Philippines to protect the Coral Triangle, considered to be the most diverse ecosystem in the world. Moreover, in 2005, President Arroyo signed a Proclamation declaring every second week of January as "Best Dives Philippines Week," promoting local scuba diving spots while emphasizing protection and conservation. ■

SOURCE: TRAVELVIDEO

## Jimmy Hall, Host of 2007's Shark Week, Dies

You probably know of Jimmy Hall, even if you don't think you do. The owner of Hawaii Shark Encounters, Hall catapulted to fame in January 2006, after he entered the water with a Great white and swam with it. The footage of the event raced across the Internet, and Hall subsequently appeared on news shows across the world. Sadly, on May 9, 2007, Hall died. Ironically, he was base jumping in Canada at the time. Chosen to host 2007's Shark Week, he was taking a break from filming the Discovery Channel's juggernaut when he died. Our sympathies go out to Hall's family, of course, but X-RAY MAG would like to officially nominate itself to be the new host of Shark Week 2007. Seriously, Discovery Channel, we won't even require a salary! ■

Early detection is key to winning the battle against Breast Cancer. Dive for the Cure is committed to providing early detection information to women and men at all of our events. Join us and get involved! Sign up at:  
[www.DiveForTheCure.com](http://www.DiveForTheCure.com)

Debra  
Messing



## 18 Hours in a Tank

That's how long Debra Messing's trainers needed to teach her how to swim with a mermaid tail. Messing—the Emmy award winning star of "Will and Grace"—has been busy learning how to swim in a mermaid costume for her new movie "Lucky You." In the soon-to-be-released romantic comedy, Messing plays a Las Vegas aquatic showgirl. The film also stars Robert Duvall, Eric Bana, Drew Barrymore. How was the experience? According to Messing, "I swam with 20,000 fish underwater in a mermaid costume dancing to country and western." The swimming with the fish part sounds okay... but the country and western music? No thanks! ■

WWW.NBC.COM

Edited by  
Willy Volk

## William Trubridge Breaks Freediving Record

In the Bahamas in April, Kiwi freediver William Trubridge broke a world record for freediving. Shattering the previous record held by Czech Martin Stepanek, Trubridge descended unassisted to a depth of 81 meters and swam back to the surface, requiring only three minutes and two seconds to complete the feat. Now, he's already talking about going deeper. According Trubridge, "I've been past that depth in training." In fact, Trubridge claims he's already been to 85 meters, but the nervousness brought on by attempting a world record makes an attempt all the more difficult. Interestingly, Trubridge has only been freediving for about four years. Imagine what he has left to accomplish. ■

SOURCE: WWW.NZHERALD.CO.NZ

## Mandy-Rae Cruickshank Breaks Constant Ballast Freediving Record

In April, Canadian Mandy-Rae Cruickshank broke the record for women's constant ballast freediving (an event in which a person using weights kicks to depth and returns to the surface under his or her own power) by plunging 88 meters off Grand Cayman's Seven Mile Beach. A member of Performance Freediving International, Cruickshank had been training in the Cayman Islands for most of April. The women's constant ballast record was held previously by Natalia Molchanova of Russia, who managed to descend 86 meters. Freediving competitively since 2000, Cruickshank has held seven world records. ■ SOURCE: WWW.DIVENEWSWIRE.COM



YANN SAINT-YVES

## Freediver Loic Leferne Dies While Training

In other, sadder, freediving news, French freediver Loic Leferne—former holder of the world record for "no limit" free diving—died while training off Villefranche-sur-Mer, near the southern city of Nice. In "no limits" freediving, divers descend to depths using a weighted sled, then use a balloon system to return to the surface at speed. Leferne's instructor, Cedric Palerm, told a French news agency that Leferne's rope got caught on something underwater and failed to return him to the surface following a dive to 171 meters. Leferne is survived by wife, Valerie, and two children. ■

## 6 Aquanauts, and 2 Robotic Surgeons Living 67 Feet Underwater

In May, six aquanauts and two robotic surgeons plunged 67 feet below the waves of the Atlantic Ocean to test new medical and exploration tools for long-duration spaceflight. Led by Heidemarie Stefanyshyn-Piper, the crew consisted of astronauts, doctors and divers who lived and worked in NASA's Extreme Environment Missions Operations (NEEMO) 12, an undersea laboratory off the Florida coast. For 12 days, the group staged mock moonwalks and evaluated two robots: the Raven robot, a portable two-armed automaton built by researchers at the University of Washington; and the M7 surgical robot constructed by California's SRI International. The robots were operated by surgeons on land and guided through a series of tasks on a simulated patient. These "telemedicine" experiments are important, according to the crew of the NEEMO 12, because NASA needs to learn the best ways to care for astronauts in space. ■

SOURCE: WWW.SPACE.COM



NASA's Aquarius undersea laboratory

## The Peter Benchley Shark Conservation Awards

The Shark Research Institute (SRI) is an international, multidisciplinary, non-profit organization that sponsors and conducts research on sharks and promotes their conservation. SRI created the Peter Benchley Shark Conservation Awards to ensure continuation of Benchley's conservation efforts on behalf of sharks. The author of *Jaws*, Benchley claimed he always struggled with the portrayal of sharks in the media after his toothy juggernaut bit into worldwide consciousness. On May 8, the Conservation Awards were presented in three categories:

media, scientific research and advocacy. The recipients included Sharkwater, a documentary film about the world of shark finning; Ecocean, a computer program that utilizes the body patterns of whale sharks to catalogue and track the global movements of individual animals; and Sonja Fordham, who received the award for her outstanding efforts as an advocate for shark conservation at national and international forums. X-RAY MAG congratulates the winners and wishes them all continued success. ■



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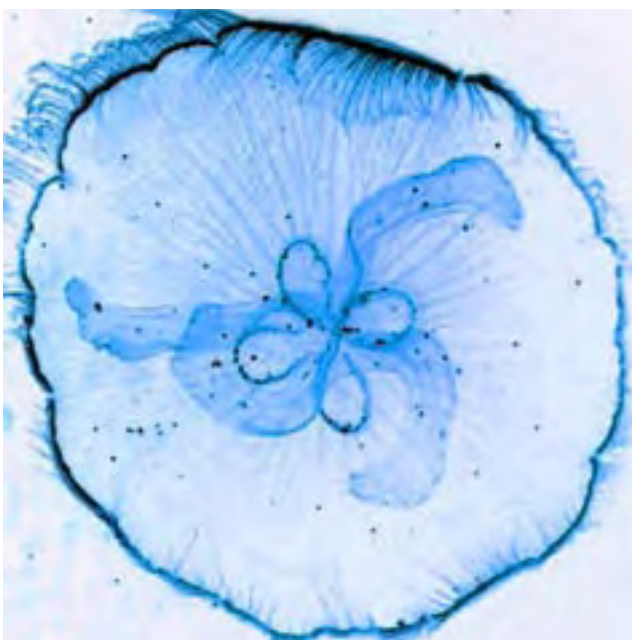
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## New Plastic Might Not Harm Dolphins or Sea Turtles

A new environmentally friendly plastic that degrades in seawater may make life a lot safer for turtles, dolphins and other marine life.

The biodegradable plastics could replace conventional plastics that are used to make stretch wrap for large cargo items, food containers, eating utensils and other plastics used at sea.



"There are many groups working on biodegradable plastics, but we're one of a few working on plastics that degrade in seawater," says study leader Robson F. Storey, a professor of Polymer Science and Engineering at the University of Southern Mississippi (USM).

"Conventional plastics can take years to break down and may result in byproducts that are harmful to the environment and toxic to marine organisms, conditions that make their disposal at sea hazardous," explained a release from USM. "The new plastics are capable of degrading in as few as 20 days and result in natural byproducts that are nontoxic." Depending on the composition of the plastics, these compounds may include water, carbon dioxide, lactic acid, glycolic acid, succinic acid, caproic acid and L-lysine, all of which can be found in nature. ■

### New species of coral found off Oman coast

Two new species of coral have been discovered off the Oman coast, as well as other existing coral species that had previously not been known to live in the region.

The two new species, discovered by Dr Michel Claereboudt, a coral reef biologist, include the blue coral (*Porites decussata*) and the 16-finger flower coral (*Calathiscus tantillus*).

The 16-finger flower coral is very rare and unusual, with short-lived colonies that are found only in Oman including the Daymaniyat Islands. There are now estimated to be approximately 130 species of coral off the coast of Oman, much more than was formerly thought to subsist in the region. Scientists believe there are probably at least 20 more species yet to be discovered, possibly including five more new to science. ■

### Rare Reef Found in Scottish Loch

A rare type of coral-like reef has been found in a second location in Scotland.

Serpulids, colourful structures found in only four other spots in the world—one of them also in Scotland—have been found growing on the bottom of Loch Teacuis in Argyll. They are built by the tubeworm, *serpula vermicularis*, and twist upwards off the sea bed. Serpulids have only previously been found growing sparsely in coastal lagoons near Taranto in Italy, Ardbear Lough and Killary Harbour in Ireland, and Loch Creran also in Argyll. ■



File photo of serpulids. (NOAA)



Turtles mistake plastic bags for jellyfish upon which they prey—and end up choking

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## Scuba-Academie shows off at Extreem Duiken event

On April 14 and 15, the event Extreem Duiken (extreme diving) took place in Antwerp, Belgium. The event turned out to be a meeting point for technical divers from the Netherlands and Belgium. Scuba-Academie, NAUI representative

for the Netherlands was there! The tec team, consisting of Cees den Toom, JP Bresser, Eddy van Vliet and Robert Leenen, talked to many divers about the technical diving

courses by NAUI, which have a high reputation worldwide. And it was not just informing interested divers. Some of them even applied for various courses, from Intro to Tec to Instructor. According to one of the new students, it was "because of the professionalism, the team members show and their wide experience in technical diving of all sorts."

Would you like to know more? Visit [www.scuba-academie.nl](http://www.scuba-academie.nl) or drop us an email at [info@scuba-academie.nl](mailto:info@scuba-academie.nl). ■

Technical divers unite! JP Bresser(left) with Leigh Bishop



## United States Coast Guard Accepts NAUI Training Course

NAUI is pleased to announce the acceptance of our new First Aid Training Course by the United States Coast Guard. This is in addition to meeting International Liaison Committee on Resuscitation (ILCOR) recommendations.

Shortly after the publication of our First Aid Textbook and Instructor Guide, we submitted our instructional materials to the United States Coast Guard for their review and possible recognition and approval. We have just received a letter from their

Training and Assessment Division accepting our course. The letter states that our course "meets or exceeds the standards of the American Red Cross Standard First Aid and Emergency Care or Multimedia Standard First Aid and will satisfy the first aid training requirements of 46 CFR 10.205(h)(1)(iii) for a merchant mariner license."

The approval is effective June 1, 2007. We are elated that the quality and thoroughness of our new first aid course has warranted this recognition by the USCG.

Once again, NAUI is recognized as a leader in education, training and safety in the industry.

This new First Aid Training Course trains community members, divers and leaders in the knowledge and skills needed to render emergency care at the scene of an accident or respond to an emergency. NAUI course graduates are considered competent to perform consistent with the level of training completed. ■

## Deep Sea Sounds of Antarctic Revealed

A team of Oregon State University researchers has returned from Antarctica, near the South Sandwich Islands, where they retrieved an array of sensitive hydrophones they are using to listen for clues to the unique seismology, ice field movements and biology of the region.

What they have found thus far in analysing the data is a symphony of sounds revealing undersea earthquakes, the movement of massive icebergs and the vocalisations of whales, penguins, elephant seals and other marine mammal species. The scientists were particularly intrigued by the humming sounds recorded from the movement of icebergs following the earthquakes. Icebergs that are grounded on the seafloor often get slowly pushed by currents and wind, causing them to vibrate like a tuning fork and make a loud hum.

Blue whale blowing



FRED BENKO - NOAA CENTRAL LIBRARY



NASA

This relationship between earthquakes and ice fields is a new idea and unique to the region, for this is the only place at either pole where large earthquakes occur in proximity to ice sheets.

In addition to the sounds of earthquakes and moving icebergs, the hydrophones picked up the sounds of numerous birds and marine mammals including the vocalization of a pygmy blue whale, which wasn't known to frequent the area. Whales have unique "voices" that cannot only be differentiated by species, the researchers say, but by geographic dialect. In other words, blue whales from one part of the world have a different "accent" than blue whales from the other side of the globe. ■

## Electric fields could give submarines 'fish-like' sense

Robotic and uncrewed submersibles could operate more effectively by mimicking the way some fish probe their surroundings with electric fields, say researchers.

Many marine and freshwater fish can sense electric fields, but some also generate their own weak fields over short ranges to help navigate, identify objects and even communicate with other fish. Researchers at Northwestern University in Chicago, US, studying the biomechanics of these weakly electric fish, have now come up with an artificial electric-field sensing system. They say it could ultimately give robot submersibles the same additional sensory capabilities.

To maneuver enough to do work in tight quarters, such as coral reefs, requires not only a high amount of agility, but also being able to sense in all directions. Electro-location is perfect for this. The researcher's electro-location system consists of two field-emitting electrodes and two voltage-sensing electrodes. These electrode pairs are arranged at opposite corners of a diamond, and were submerged in shallow water for testing purposes. If the electric field is not disturbed by anything in the water, the two pairs of sensor electrodes should provide identical readings. But if something is placed within a few centimetres of the sensors, the field is disturbed and causes a variance in the sensor readings.

Since the position of the object affects the way the electric field is disturbed, a computer can use a series of sensor readings to determine the object's location. It is even possible to detect small objects by amplifying subtle perturbations in the field.

The research was presented at the International Conference on Robotics and Automation (ICRA), held in Rome, Italy, in April 2007. ■

Edited by Peter Symes



Assistant Tourism Secretary Cynthia Carrion and Michael Aw sign an agreement, which sees the next Celebrate the Seas event held in the Philippines this September



help much either. Why weren't these two shows put together!? Instead, ADEX was merged with a boat show—in the same hall too—a combination that I have never seen working properly anywhere. Boaters and divers just don't mix for some reason; they are breeds apart. Putting them both in a badly signed annex to the main convention center didn't score many points either.

most exhibitors. Many of those present expressed that they looked forward to the next one.

It wasn't like the expo was all together bad—there were plenty of booths, presentations, talks and other events of the usual infotainment—but for a show that boasts at being the biggest and most important in Asia, it did not meet the standards and expectations.

However, herein also lies a paradox as some attendees—like myself for example—actually get more quality time with the people we need to see, because they are less busy with other people and serving the general audience. The trade aspect was absolutely worthwhile. But I think I speak for the minds of most of the other exhibitors by saying that we look forward to ADEX in 2008, when it is back in Singapore. And despite this hiccup we remain fervent supporters of this event. ■

**Bangkok** – The city greets you with an intensity like few other places on Earth. It is huge, it is vibrant, dense and messy. Myriads of people, construction going on everywhere and oh... the worst traffic jams on the planet. In one breath you can inhale the scent of jasmins and orchids, a whiff of sewer, a mouth watering sweet smell of street food, charcoal smoke and car exhaust. That was the backdrop for the 2007 edition of the Asia Dive Expo, aka ADEX among insiders.

**So, how was the show?** Well.. ummm... it was like being invited over for dinner, and then the host serves you horrible food, which is burnt or maimed. Criticizing the host is not one of my favourite pastimes but this show was—let me put it this way—less than optimal for most. First of all, the choice of venue, Bangkok International Trade & Exhibition Centre (BITEC) was not a good one, as it was quite a ride out of town and away from the hotels. It was ridiculous in fact; it took a +20-minute ride by taxi, and that was on those rare occasions, i.e. in the evenings where there was little traffic. However, in the mornings where I had to head out to the show from my hotel during rush hour, 90 minutes seemed more



like the norm, as traffic was plainly dreadful. It was not workable. Whether the distance to the city centre was also responsible for making the public's turnout mediocre at best, is anyone's guess, but having another dive show—the Thailand Travel & Dive Expo scheduled already for May 24th in the far more conveniently downtown located Queen Sirikit National Convention Center—probably didn't

Archipelago Fleet had a busy show

It is a public secret that of the two cities that ADEX alternates between, Bangkok and Singapore, the latter is widely regarded as the bigger, more popular and, consequently, a far more interesting venue for



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## Exhibitors looking forward to ADEX 2008 in Singapore

# Impressions of ADEX 2007 in Bangkok all too forgettable

*"The news from Simeulue is not all bad"*

## Massive Coral Death Attributed to 2005 Indonesian Earthquake

In March, scientists from the Wildlife Conservation Society investigated the condition of coral reefs in Pulau Simeulue and Pulau Banyak off Aceh, Indonesia,

The surveys covered 35 sites along 600 kms of coastline, have documented, for the first time, the effects of earthquake uplift on coral reefs. The entire island of Simeulue, with a perimeter of approximately 300 km, was raised up to 1.2 m following the 28 March 2005 earthquake, exposing most of the coral reefs which ringed the island.

Dr Stuart Campbell coordinator of the Wildlife Conservation Society -Indonesia Marine Program reports: "This is a story of mass mortality on a scale rarely observed. In contrast to other threats like coral bleaching, none of the corals uplifted by the earthquake have survived."

*None  
Survived'  
Uplift*

Dr Campbell adds "The news from Simeulue is not all bad. At many sites, the worst affected species are beginning to re-colonize the shallow reef areas. The reefs appear to be returning to what they looked like before the earthquake, although the process may take many years.

"The challenge now is to work with local communities and government agencies to protect these reefs to ensure the recovery process continues," he says. The team found coral reefs ranging from highly diverse assemblages of branching corals in sheltered waters to vast areas of table corals inhabiting surf zones. The team also documented, for the first time in Indonesia, extensive damage to reefs caused by the crown-of-thorn starfish, a coral predator that has devastated reefs in Australia and other parts of the world. ■

Coral reef on Simeulue. File photo from 2006



FRANCESCO RICCIARDI

*The reefs appear to be returning to what they looked like before the earthquake, although the process may take many years.*

## Solomons quake lifts island up by 3m and exposes reef

The earthquake that triggered April's tsunami in the Solomons lifted the entire island of Ranongga up by 3metres, exposing coral reefs that are now becoming bleached and dying.

The tsunami destroyed houses in low-lying areas, killing 30 to 40 people,

The 8.0 magnitude quake has permanently changed the island's geography, One villager told an Agence France-Presse (AFP) reporter that the quake almost split Ranongga in half with cracks up to 50cm wide appearing. The shoreline now extends out to sea by another 70m in places and its fringing reefs have been transformed into a barren moonscape. The coral, once colourful and has now dried out and turned into brittle sculptures.

Locals are still struggling to digest the enormity of the changes wrought on their mountainous island, 32km long by 8km wide. Danny Kennedy, a dive operator based on Ghizo, the main island, predicted that the tourism industry could be seriously affected. "Diving is huge here, it employs so many local people," he told AFP.

Mr Kennedy said the most beautiful corals were also the most delicate, and they had suffered the worst destruction. "The fear is that people are going to come here and see the reefs are damaged, then tell people not to come back for a few years until they are recovered."

The coral reefs of the western Solomons, including Ranongga's, were ranked among the best in the world. Now reefs all over the disaster zone are dying, because the violent movements of the earth disturbed the fragile ecosystem.

"The whole food chain has been disrupted," said Jackie Thomas, acting manager for WWF in the Solomons. The reefs around Ranongga were a protected marine environment, and the locals had worked with WWF in recent years to manage them sustainably. "Now it's another marine environment that has been destroyed," she said. "Who knows if the coral reefs will recover and the fish will come back?" "Villagers will have to travel further to find the same food and nutrition they've relied on." ■

## Caribbean Coral Reefs Result of Mass Extinction and Rise of Isthmus

Extinctions that resulted from the formation of the Panamanian isthmus were delayed two million years according to a new study. The findings may have implications for global species extinction and evolution.

Three to four-and-a-half million years ago, the volcanic rise of the Panamanian land bridge between North and South

America divided a once great ocean into the Caribbean Sea and Pacific Ocean we know today. The closure of the isthmus eventually led to the development of coral reef ecosystems in the Caribbean and the formation of a nutrient-rich, upwelling current in the Pacific. It also caused the so-called "Great American Interchange" where ter-

restrial animals migrated between the once separated continents, as well as a mass extinction among some marine species.

The new research, published in the March 12 issue of the Proceedings of the National Academy of Sciences, focused on this extinction of marine species. ■

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## Countries Agree to End Deep-Sea Bottom Trawling

A new agreement to restrict deep sea trawling in the South Pacific ocean affirms earlier moves by Pacific countries to protect their marine resources. The agreement covers a quarter of the world's oceans and will restrict fishing vessels from dragging huge weighted nets across the sea floor.

More than 20 countries have agreed to work together to end bottom trawling, which is a multi-million dollar industry, but causes huge damage to the environment as it destroys deep-water coral.

It is a very indiscriminate and destructive way of fishing. Ahead of the net are some steel rollers that clear the path for the net to come behind, so that the net doesn't snag on anything. Anything that's in the way of the net, like corals or sponges, gets rolled over.

China, the United States, France, Japan, Chile and South Korea were among the countries signing the agreement. Russia however did not sign, and says it will continue fishing in the same way. ■

### US Court Slams Government Over "Dolphin-Safe" Tuna

The U.S. government has arbitrarily and capriciously sought to ease rules for foreign fisherman on "dolphin-safe" tuna, a U.S. federal appeals court ruled upholding current standards.

The dispute involves the use of huge "purse seine" nets. As decades of such fishing dramatically lowered the numbers of certain species of dolphins, the U.S. Congress enacted a law in 1990 that said companies could not market tuna as "dolphin-safe" if they caught the fish by purposely surrounding dolphins with the nets. Officials in Latin America have since lobbied for a less stringent rule that would allow the "dolphin-safe" label if observers on the foreign boats had not seen dolphins killed or seriously injured. ■

### Sea Creatures to Be Tracked Worldwide

Researchers are planning a worldwide effort to track the movement of sea creatures tagged with tiny electronic devices. Sea life ranging from salmon to whales, turtles to sharks, will be tagged, so they can then be tracked as they swim past arrays of sensors placed at critical locations in the oceans. The goal is to eventually have 5,000 ocean receivers arranged in 60 lines worldwide capable of tracking up to one million animals at the same time. The Ocean Tracking Network "will foster a deeper understanding of the effects of climate change and help shape fisheries and endangered species management worldwide," Peter MacKay, Canada's minister of foreign affairs said in a prepared statement. ■

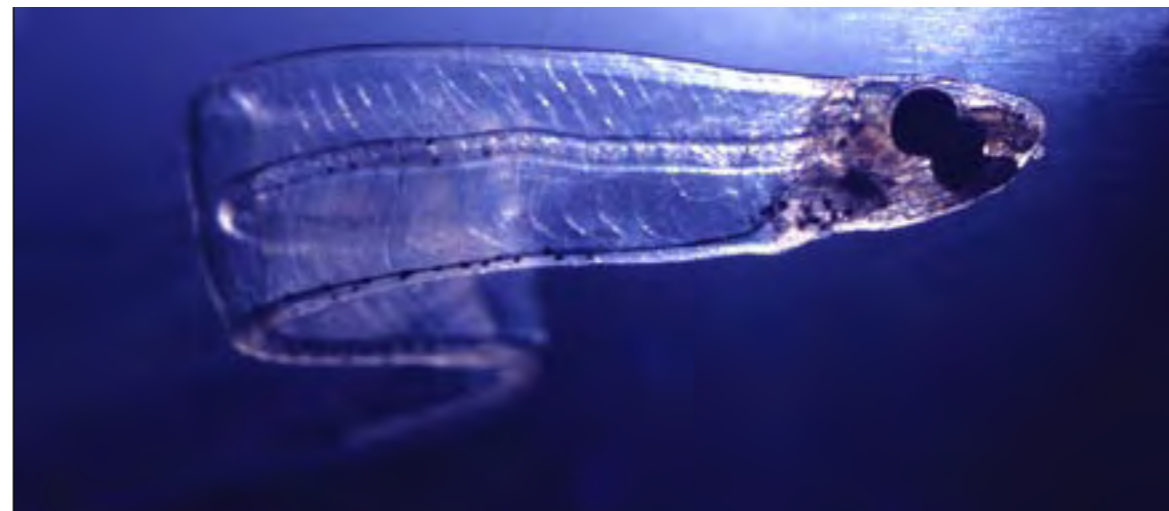
## Pacific whirlpools are 'floating oases of life'

Huge whirlpools of nutrient-rich coastal waters are spinning away from the US west coast into deep Pacific water, taking with them a wealth of marine life ranging from tiny plankton to huge whales. It is believed that whales are in eddies because they find more food there. The eddy water has iron in it, which stimulates plankton growth.

The eddies, which can be hundreds of kilometres in diameter, are visible from satellites because the warm



coastal water they contain shows up in the colder, deeper Pacific. Now research scientists want to know if salmon, too, are living in what they call "floating oases of life", because it would help predict how many salmon are returning to spawn in B.C. rivers. ■



Leptocephalus larva of an ocean eel

## Mystery of the Sargasso Sea Solved

For years, scientists were puzzled by the vast blooms of phytoplankton that erupted in the middle of the Sargasso Sea. The region is warmer, saltier, bluer and clearer than most other parts of the North Atlantic, and it was thought that the region was the desert of the ocean, with few signs of life.

But oxygen and other elements were being consumed at a higher rate than theories and models could account for, leading scientists to think there must be some nutrient source fueling the blooms. In a new study detailed in the May 18 issue of the journal Science, researchers have shown that eddies—episodic swirling current systems—pump nutrients up from the ocean's depths to feed the phytoplankton.

The very salty Sargasso Sea is home to some seaweed of the genus *Sargassum*. This seaweed floats en masse on the surface there. The Sargasso Sea also plays a major role in the migration of the European eel and the American eel. The larvae of both species hatch there and go to Europe and/or the East Coast of North America. ■



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Edited by  
Peter Symes



## News from SDI **Online Deep Diving Specialty Course**

**SDI is breaking new territory once again with the launch of the first in its series of online specialty courses: Deep Diving.**

"If we have learned anything from the feedback from our online training initiatives in the past couple of years, it's been that the consumer loves learning this way," explained Brian Carney, president of SDI. "They see it as convenient and fun. But the most important lesson was that they wanted more courses offered this way!"

The SDI Deep Diving specialty is presented in a similar format to the popular Open Water and Easy Nitrox programs, where students purchase a sign-up code and select a dive center through which to conduct their training. With this code entered into the secure system and a simple sign-up procedure completed, they can begin their academic training immediately.

The proven online system sends automatic notification to the dive store when the student enrolls in the course and allows an instructor associated with that facility to track the student's progress through the course. When the final exam is completed, the student is reminded to contact the store for the fun part of the class—the diving—and a full report of the student's progress through the course and their exam results are made available for instructor review. ■

[www.sdi-onlinetraining.com](http://www.sdi-onlinetraining.com)

## More news from SDI **New Solo Diving Specialty Course**

**International Training has released a completely rewritten student and instructor materials for its unique SDI Solo Diver Specialty Course.**

The all new solo diver educational system includes a completely revised 100-page student manual, a full instructor guide, new electronic academic presentation, two-piece dive-planning slate and student knowledge quest.

"The solo course is one of SDI's most popular specialties and one of the many innovative ideas we have pioneered over the years. It has set our

agency apart from the competition," explained Steve Lewis.

Brian Carney, president of International Training added that since the initial release of SDI's solo program several years ago, the agency has promoted solo diving as an option for experienced sport divers engaged in certain activities.

"Let's be clear that SDI's position has always been that solo diving requires experienced scuba divers willing to make the necessary commitment to train and equip themselves to manage the added risks involved," Carney explained. "A person with the required attitude and aptitude can safely pursue responsible solo diving." ■

## USA & Canada: **Oxygen is Now Easier to Obtain**

**Praxair has developed a process by which DAN providers and trainers can obtain medical-grade oxygen.**

For many U.S. providers, this is welcome news. From this point forward, DAN-certified Oxygen Providers can obtain oxygen fills from Praxair throughout the United States and Canada. Over the past decade, getting fills for oxygen equipment has been challenging at times. In 1996, the U.S. Food and Drug Administration issued guidelines that prohibited the dispensing of oxygen without a prescription, except in the



case of an emergency. These guidelines seem to have caused confusion for the DAN-certified oxygen providers who were seeking to have their oxygen cylinders filled.

Since this pronouncement, DAN Training has pursued oxygen fill companies to reach an agreement on providing fills. As of April 9, 2007, DAN has reached an agreement with Praxair, Inc., headquartered in Danbury, Conn. That agreement will enable DAN-trained and DAN-certified Oxygen Providers to obtain oxygen fills through any Praxair retail location in the U.S. and Canada. ■

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**Don't miss Mark Cheng with  
Jet Li in the movie "Rogue" this spring!**





wreck  
rap



## China: Ancient Ceramics Discovered Off Xisha Islands

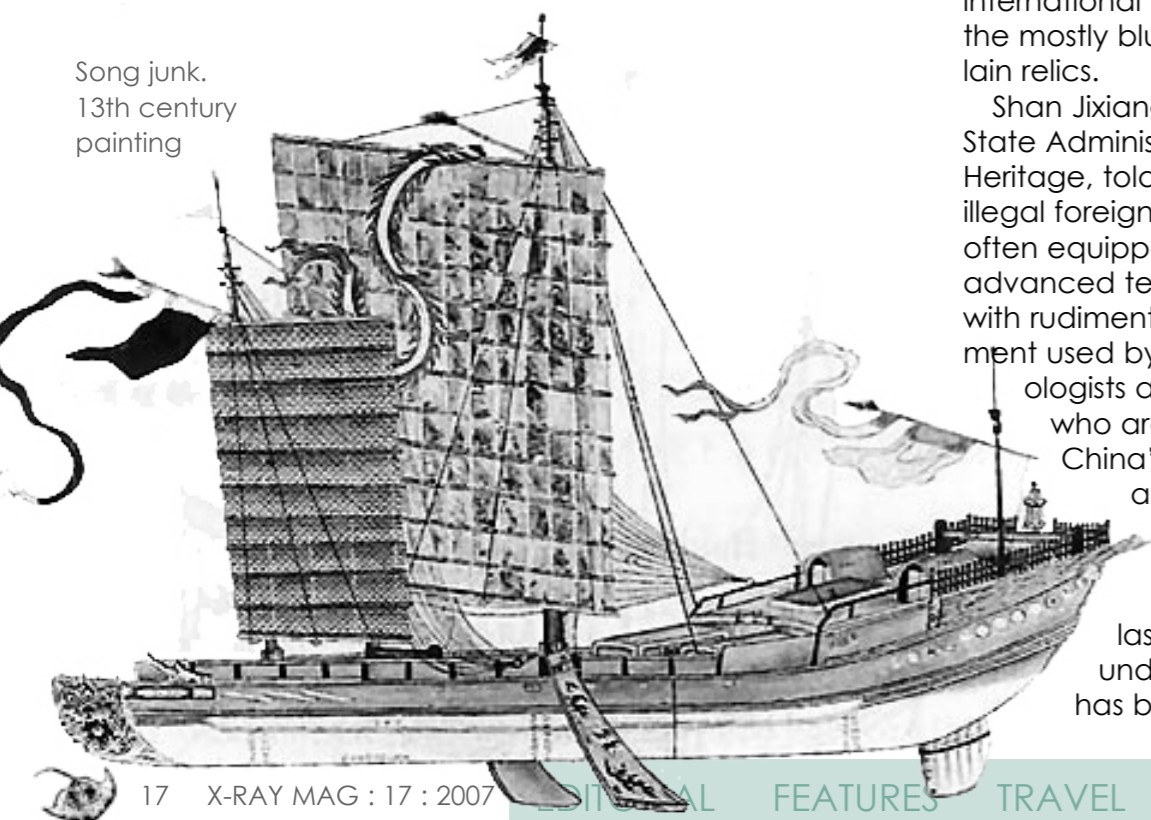
Chinese archaeologists have recovered around 10,000 pieces of antique pottery and porcelain in an underwater excavation of a shipwreck believed to date back to the Southern Song Dynasty (1127-1279) in the Xisha Islands in the South China Sea.

The findings provide important evidence of an established trade route between China and the rest of the world in the 13th century, according to Zhang Wei, the lead archaeologist for the 55-day excavation in the Xisha Islands.

"What we found from the shipwreck on Huaguang Reef No.1 are pearls of the ancient Silk Road on the sea," said Zhang, "and it is first time we have found such precious antiques in the high seas."

The wreck, 20 meters long and six meters wide, was stumbled upon by a group of Chinese fishermen in 1996, three meters below the sea water near Huaguang Reef. ■

Song junk.  
13th century  
painting



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## Treasure Smugglers Remains a Challenge for the Chinese

Foreign smugglers and antiques raiders are using sophisticated salvage equipment to steal China's underwater treasures, an investigation by the Cultural Heritage Administration has found.

In China's territorial sea, there are thousands of sunken ships carrying ancient treasures, mostly priceless porcelain. AFP reports a government official as saying the smugglers are being financed by international black market sales of the mostly blue and white porcelain relics.

Shan Jixiang, director of the State Administration of Cultural Heritage, told China Daily that the illegal foreign salvage ships were often equipped with the most advanced technology, in contrast with rudimentary ships and equipment used by Chinese archaeologists and conservationists, who are trying to protect China's underwater heritage.

Smuggler activities have been particularly heavy over the last two years. China's underwater heritage has been pursued by art

collectors and dealers since the beginning of 2005, when about 15,000 pieces, mainly blue-and-white porcelain about 300 years old, were found in a 13.5 meter sunken ship off the coast of East China's Fujian Province.

The relics are traded on the international waters beyond China's maritime boundaries before they are shipped to markets worldwide, many to the United States. Besides underwater heritage artefacts, cultural items from ethnic minority groups, such as costumes and musical instruments, are also a favorite among international dealers and smugglers, Shan said. The Chinese government has recovered a "great number" of cultural heritage items stolen from the country in the past few decades, he said without elaborating.

China has signed agreements with four countries—Peru, the Philippines, India and Italy—on the protection and recovery of cultural heritage. The first one, signed with Peru in 2000, has ensured "effective cooperation" as both countries now share substantial intelligence on stolen relics. ■

## Sunken object may be Chile's long-lost submarine

The Chilean navy and marine scientists say they may have located the *Flach* on the seabed in the Bay of Valparaiso, 140 km west of the capital Santiago.

The 12-metre vessel was Latin America's first submarine designed in the 1860s by German immigrant, Karl Flach, and made several successful test voyages in 1866. But on May 3 of that year, it sank. The crew—two Chileans, two Frenchmen and seven Germans, including Flach and his 15-year-old son—all died. Three days later, the crew of a British frigate located the vessel and tried to raise it, but it was stuck in thick mud some 50 metres below the surface.

Since then, no one has seen it.

"This object, its dimensions—a steel tube topped by cannons—its position, the way it's facing and the depth it's at, are all extremely similar to the characteristics of the *Flach*," the Navy said in a statement. The team looking for the *Flach* say it was the first submarine built in Latin America and only the fifth in the world to make a successful underwater journey. ■

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# wreck rap



## Tech Divers to Dive the *Stella Polaris*

On September 2, 2006, the first-class luxury liner *Stella Polaris* sank to a depth of 72 meters off the coast of Kushimoto, Japan. Situated in the Kuroshio current—the second strongest tidal current in the world (after the Gulf Stream) with speeds up to 4 knots—the dive is considered extremely challenging. Despite the dangers involved, the *Stella Polaris* will be explored by a dive team composed of members from Austria, Sweden, the UK and Japan. Using CCRs, the team plans to dive the wreck for ten days starting May 22nd, in order to photograph and film it. In addition to a ripping current and extreme depth, the team is also hoping the area's sharks will leave them alone. ■



Making a booming business—the sinking of *Oriskany* gave a return of investment in three days

## Ships Two Reefs Bills Clear First Hurdles in Florida

Bills in the Florida House and Senate designed to help increase the number of artificial reefs was passed unanimously, without question or comment, by the Senate Environmental Conservation Committee on March 22.

Research by the National Oceanic and Atmospheric

Administration (NOAA) and Florida State University indicates that Florida's artificial reef program has been a world leader for many years in dollars generated and jobs created. The recent overwhelming economic success of the former *USS Oriskany* demonstrates the economic possibilities for local communities

when large ships are deployed as artificial reefs. The Pensacola Florida Convention and Visitors Bureau invested \$1 million dollars in bringing the former *Oriskany* to Pensacola, and recently estimated their entire investment was returned during the three days immediately after the former aircraft carrier was sunk. ■

## Turkey: Divers demand access to British WWI battleship *Majestic*

The Dardanelles—dubbed the city with the most shipwrecks of war in its waters—has been one of the most important diving destinations in the world with numerous shipwrecks hidden in the depths of its waters. Among them lies the British warship, the *Majestic*—Pre-Dreadnought battleship sunk by the German submarine *U-21* in 1915 during the battle of Gallipoli.

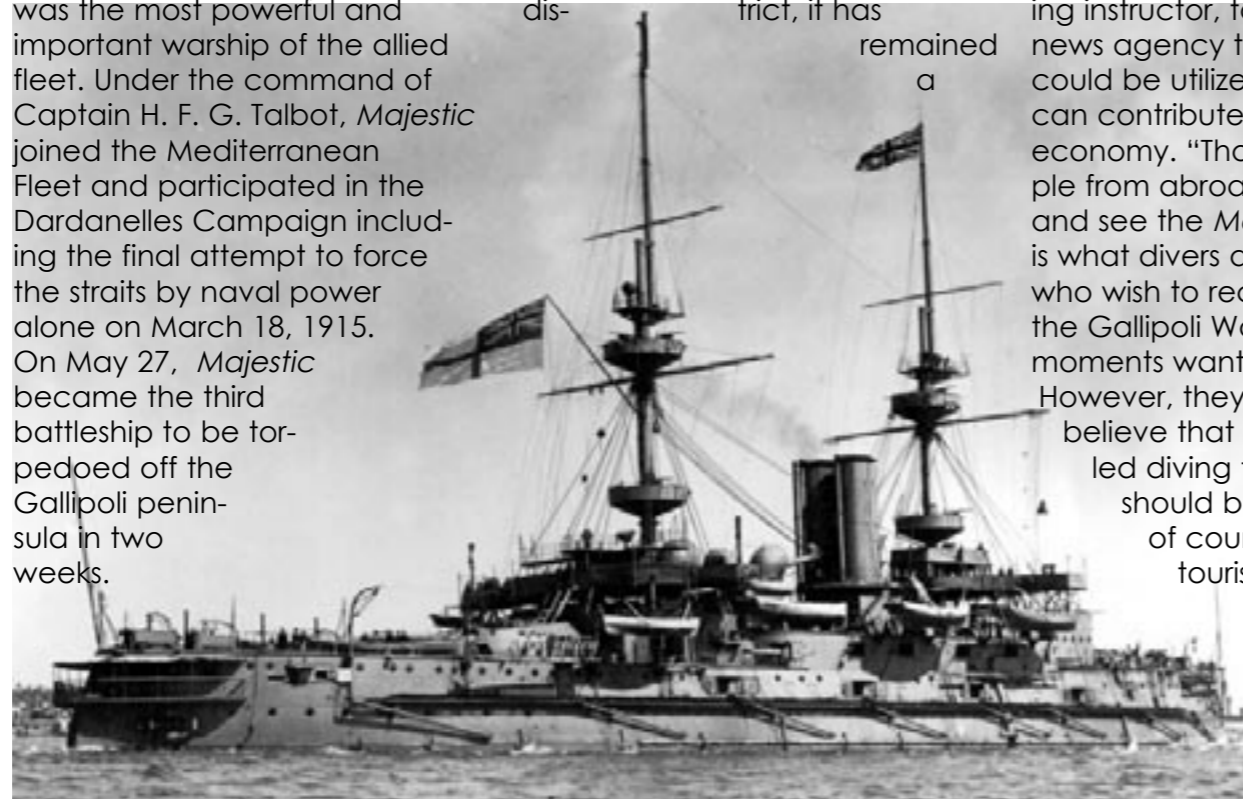
The *Majestic*, which weighed 14,900 gross tons and was 119 meters long with a crew of 757, was the most powerful and important warship of the allied fleet. Under the command of Captain H. F. G. Talbot, *Majestic* joined the Mediterranean Fleet and participated in the Dardanelles Campaign including the final attempt to force the straits by naval power alone on March 18, 1915. On May 27, *Majestic* became the third battleship to be torpedoed off the Gallipoli peninsula in two weeks.

Around 06:45, Commander Otto Herring of the *U-21* fired a single torpedo through the defensive screen of destroyers and anti-torpedo nets, striking *Majestic* and causing a huge explosion. The ship began to list to port, and in nine minutes, had capsized in 16 metres of water, killing 49 men. The upturned hull remained visible for many months, until it was finally submerged during a storm on the night of November 17.

Lying at a depth of only 33 meters in the Seddülbahir Feneri district, it has

remained a dream wreck for both Turkish and international divers, but diving it has never been possible, since it is located in a restricted area. The shipwreck—the silhouette of which can be seen from a depth of 15 meters—remains among the most attractive shipwrecks, especially for British and Australian divers, due to its live bombs, tilted observation tower, chimneys and underwater fauna around it.

Turgay Yeğin, professional diver for 25 years and scuba diving instructor, told the Anatolia news agency that the shipwreck could be utilized for tourism and can contribute to the region's economy. "Thousands of people from abroad want to dive and see the *Majestic*, as that is what divers dream of. Those who wish to recall the memory of the Gallipoli War and live those moments want to come here. However, they cannot dive. We believe that at least controlled diving to the *Majestic* should be allowed in terms of country and regional tourism." ■



## Quake brings WWII PT boat up from ocean floor

Wreckage from a World War II torpedo boat was tossed up from the sea in the Solomon Islands after a powerful 8.1 earthquake hit the area in early April, Jay Waura of the National Disaster Management Office said the explosive-laden boat was exposed when reefs were pushed up three meters above sea level by the April 2 quake, which caused a devastating tsunami in the western Solomon Islands that killed 52 people.

The Solomons' coastline is still littered with decaying military wrecks from World War II, including the torpedo patrol boat commanded by U.S. President John F. Kennedy. "My team members believe that this boat could have been one of those U.S. torpedo boats such as the famous PT-109, which the late U.S. President John F. Kennedy had served aboard during the war," Waura said. ■



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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.



See [www.vr3.co.uk](http://www.vr3.co.uk) for further information and to find a VR dealer near you.

## wreck rap



All recovered items have been legally imported into the United States and placed in a secure, undisclosed location where they are undergoing conservation and documentation.

It is believed that this recovery constitutes the largest collection of coins ever excavated from a historical shipwreck site. They were recovered in conformity with Salvage Law and the Law of the Sea Convention, beyond the territorial waters or legal jurisdiction of any

identity, if possible, of the shipwreck.

"Our research suggests that there were a number of Colonial period shipwrecks that were lost in the area where this site is located, so we are being very cautious about speculating as to the possible identity of the shipwreck," said John Morris, Odyssey Co-founder and CEO.

"Nevertheless, we have treated this site with kid gloves and the archaeological work done by our team out there is unsurpassed. We are thoroughly documenting and recording

*SS Republic*, a shipwreck lost in 1865 off the US coast. The deep ocean robotic archaeological excavation of that site produced approximately 65,000 artifacts, including over 50,000 coins with a retail value of over US\$75 million. ■

# 17 Tons of Silver

In what is believed to be the largest collection of coins ever excavated from a historical shipwreck, Odyssey Marine Exploration recently recovered over 500,000 silver coins weighing more than 17 tonnes, hundreds of gold coins, worked gold and other artifacts, from the wreck of a Colonial period shipwreck code-named "Black Swan", located in an undisclosed location in the Atlantic Ocean.

country. The company does not believe that the recovery is subject to sovereign immunity by any nation pursuant to the Law of the Sea Convention.

The work accomplished to date on this site has diligently followed archaeological protocols using advanced robotic technology, and the artifacts are now undergoing a meticulous conservation process by some of the world's most experienced coin conservators.

The company is not prepared to disclose the possible identity of the shipwreck at this time, and may only do so after thoroughly examining the artifacts, analyzing the research and proving the

the site, which we believe will have immense historical significance."

"The remarkable condition of most of the first 6,000 silver coins conserved has been a pleasant surprise, and the gold coins are almost all dazzling mint state specimens," said Greg Stemm, Odyssey's Co-founder. "We are excited by the wide range of dates, origins and varieties of the coins, and we believe that the collecting community will be thrilled when they see the quality and diversity of the collection."

The excavation of this site follows Odyssey's successful excavation of the



Odyssey officials look at coins recovered from the "Black Swan" shipwreck

Odyssey Marine Entertainment, Inc., will open SHIPWRECK! Pirates & Treasure, an interactive shipwreck and treasure exhibit at the Museum of Science & Industry in Tampa, Florida. The 12,000 square foot exhibit is scheduled to run from June 22, 2007 through January 31, 2008.

## Search for more sunken gold to resume

Odyssey Marine Exploration has concluded negotiations with Spanish officials and can now resume a once-suspended search for the wreck of a British vessel, the *HMS Sussex*, in the western Mediterranean off Spain, according to the foreign ministry.

The *HMS Sussex* was leading a British fleet into the Mediterranean for a war against France and its leader, Louis XIV, when it sank in a storm in 1694 with 500 men and 80 guns aboard.

Historians believe the 48m warship was carrying nine tonnes of gold coins for buying the loyalty of the Duke of Savoy, a potential ally in southeastern France. The coins are believed to be worth anywhere from US\$500 million to US\$4 billion.

Odyssey's archaeologists say they have identified a site with cannons and ship remains that seem to match that of the *Sussex* and agree with British naval records as to where the vessel went down. "Basically, I would be very surprised if this site is not the *Sussex*," Greg Stemm, co-chairperson of Odyssey.

Odyssey had already begun exploration work off southern Spain but suspended it in 2005 after complaints from Spain. ■

## Treasure hunters can also go bankrupt

International treasure hunters who have been searching for colonial shipwrecks off the Jamaican coast under a licence from the government have declared bankruptcy.

US-based Admiralty Holding Company announced in April that it has ceased operations, as it has been unable to get funding to continue its search and recovery efforts. A release from Admiralty states that it is in a dire financial condition. ■

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Edited by Peter Symes

# How Jellyfish See Things

Box jellyfish are active swimmers with a strong directional sense, able of performing rapid u-turns and moving in between objects. How do they do it? Box jellyfish have four morphologically different types of eyes. Two of these eye types, called the upper and lower lens eyes, are camera type eyes with spherical fish-like lenses. Dr Anders Garm of Lund University, Sweden, has now demonstrated that obstacle avoidance was visually guided and likely mediated by the lower lens eye, as it was found that the jellyfish did not respond to objects above the surface of the water, which are detected by the upper lens eye.

More importantly, the strength of response correlated with the intensity contrast between the obstacle and its surroundings. "Contrast is important, because without contrast, the object cannot be detected by any eye," says Dr Garm. However, there are two kinds of visual contrast: colour contrast and intensity contrast. "Obstacle avoidance is governed by intensity contrast, which fits with our other data, which strongly suggest that the jellyfish are, in fact, colour blind." ■

SOURCE: SOCIETY FOR EXPERIMENTAL BIOLOGY



DR ANDERS GARM

A new study suggest jellyfish use contrast to avoid objects

## Florida Cave Divers Discover 2 Miles of Underground Caves

Recently, divers with the Woodville Karst Plain Project announced that they had discovered almost two miles of cave passages extending northwest from Florida's Wakulla Springs close to caves extending from Leon Sinks. This discovery almost completes a quest—begun in 1990!—to find a link between Leon Sinks and Wakulla Springs. It is believed that the two cave systems are now separated only by a distance of between 1,000 feet and one mile. According to Casey McKinlay, one of the divers on the discovery, the cave system grows to as large as 50 feet across. The cave system could be even wider, but the divers were forced to abandon their exploration, as they were low on air. ■

## Jellyfish halts Hollywood production

Irukandji jellyfish are among the world's most toxic creatures. Until recently, it was thought that they were confined to Australia's northern tropical waters, but marine biologists have now found them off Queensland's Fraser Island—a popular tourist spot about 400 miles south of their previously assumed range.

Their discovery has halted production of a Hollywood film, *Fool's Gold*, starring Kate Hudson and Matthew McConaughey, who were originally due to be filmed swimming in the sea. r Jamie Seymour, from James Cook University, stated he had found five of the creatures off the island. "They have the potential to kill you," he said. "But unless you really know what you're looking for, you're not going to see them in the water."

If the Irukandji migrate south in sufficient numbers, they would threaten southern Queensland's Gold and Sunshine Coast holiday destinations. ■

## Restaurants take bottomfish off menus

The Hawaiian Department of Land and Natural Resources has banned commercial and recreational fishing from May through September for onaga, 'ehu, gindai, 'opakapaka, kalekale, lehi and hapu'upu'u found in the main Hawaiian islands.

Now TS Restaurants, which owns Duke's Waikiki and six other island establishments, and Hawaii chef Peter Merriman, who owns two Big Island eateries, have taken the tasty and popular fish off their rotating menus all together to protect the sustainability of the overfished species, Richard Moon, TS Restaurants' vice president told Associated Press.

Other restaurants have said

they'd get the fish from the Northwestern Hawaiian Islands, where limited bottomfishing in the Papahānaumokuākea Marine National Monument is still allowed, or import the fish from other countries.

"We want to help decrease the year-round demand for these slow-growing fish," Moon said. "We don't want to just shift demand to other areas. We think our customers will realize this is the right thing to do... We've sold a lot of bottomfish and made a nice reputation for that," he said. "But we've changed the thinking of the company. When things are in danger, we need to pay attention." ■

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Tailgating the lone dugong, KAT, on Cocos (Keeling) Islands. Photographed by Karen Willshaw ~ underwater.com.au member

Edited by Peter & Gunild Symes



## Sharm El Sheik nominated for the travel industry's annual Oscars

The Egyptian resort town in the Red Sea has been nominated as best African destination in the 14th annual World Travel Awards. But not only is the town nominated, but so have many of the area's countless resorts and hotels.

The nominations fall across a range of categories, highlighting the incredible diversity of accommodation and activities that Sharm El Sheik has developed to maximise its incredible natural setting. ■

## Aqua-trek on Fiji heading for prestigious international award

The World Travel & Tourism Council of London announced the finalists for the 2007 Tourism for Tomorrow Awards and Aqua-Trek, a scuba diving company in the Fiji Islands, is one of three awards finalists chosen for the conservation category. Tourism businesses from all over the world applied for these prestigious awards, which represent the highest accolade for best practice in Travel & Tourism development. ■

# Curacao Targets Female Travelers

Today's traveling divas will enjoy the adulating attentions of the Dutch Caribbean Island of Curacao, which is now offering unique packages that cater to women and their vacation dreams. Going above and beyond to please the most discriminating female jet-setters, Curacao hoteliers are offering special deals on adventure packages to single week stays.

For women who want it all, Curacao is the ideal unique vacation destination with beautiful beaches and historic landmarks and architecture. Adventurous women will find excitement at Sunset Waters Beach Resort, a place well-known for its serene and secluded location and lovely private beach with easy access to some of Curacao's best diving. The resort is

offering a seven-night package of hiking, scuba diving, snorkeling and kayaking, May 1 - July 31. The deal includes lodging in the Oceanfront Superior Room starting at US\$1250 for double occupancy. They also offer a fun-filled Sizzling Singles Week in September for those looking to meet new friends or perhaps a new love. It includes snorkeling, scuba diving lessons, casino

night, parties and trips to the Dutch colonial city of Willemstad.

The Stretch, Shop, Sip & Soothe Package offered by the Curacao Marriott Beach Resort & Emerald Casino is for girlfriends who want to escape to paradise and includes resort view accommodations, yoga and massages on the beach, cocktails and shopping sprees in downtown Willemstad. ■



## Win a FREE TRIP Aboard Solmar V

The 112-foot Solmar V luxury live-aboard dive vessel, based in Cabo San Lucas, Mexico, visits the Socorro Islands, Sea of Cortez and Guadalupe Island.

The new owners have just launched a new website. As part of the celebration they are offering four ways to win a FREE TRIP to the Socorro Islands.

Solmar V has teamed up with Atomic Aquatics to bring you a one-of-a-kind Trading Card Treasure Hunt. There are 20 trading card designs that you can collect. Be the first to collect ten Solmar V Trading Cards and win a free trip to Socorro or the Sea of Cortez. Ten cards with the Atomic Aquatics logo wins you an Atomic Aquatics B2 regulator. Runners up can also win an Atomic Aquatics Vision mask or SplitFins.

Other ways to win a free trip include the Solmar V Photo Contest, YouTube Video Contest, or just by subscribing to their eNEWS newsletter for a random drawing.

To get you started in the Trading Card Treasure Hunt, X-RAY MAG is providing a link to one of the Trading Cards.

You won't find this card anywhere else, so be sure to download it now from [www.solmarv.com/xraymag](http://www.solmarv.com/xraymag)

Good luck and see you on board the Solmar V! ■

## St. Kitts Foundation Fund

The St. Kitts Foundation, a fund of The Ocean Foundation, is hosting the "Southeast Peninsula Marine Ecosystem Survey Week" on the island of St. Kitts to get a real-time snapshot of the fish and corals these waters harbor and their current health status.

Two expert US-based organizations, REEF and Reef Relief, will lead local divers in on-land trainings and in-water surveys. A third US-based organization, Earth Echo International and its Executive Director Philippe Cousteau, will be documenting the coral-damaging sediment from soil erosion and nutrient runoff caused by overgrazing and over-abundance of feral animals such as goats for Living on Earth, a weekly environmental news and information program distributed by Public Radio International. ■

## Great Barrier Reef Named World's Best Destination

Recently, Australia's Great Barrier Reef—the world's largest living organism and pretty much every scuba diver's fantasy—was voted the planet's best destination by the World Travel & Tourism Council as part of its Tourism for Tomorrow Awards. Beating out more than 130 entries from 40 countries across seven continents, the win is considered the foremost accolade for sustainable tourism. Amazingly, the GBR is believed to generate an estimated US\$5 billion in tourism earnings each year and supports roughly 50,000 jobs along the Queensland coast. ■

## Arroyo Restricts Manila Bay Reclamation

President Gloria Arroyo curtailed reclamation activities along the famed Manila Bay and declared 175-hectare coastal lagoons in the bay cities of Las Pinas and Paranaque as Metro Manila's bird sanctuaries and eco-tourism areas. "A minimum of 15 per cent of the Manila Bay's reclamation site must be set aside for the wildlife habitats. Reclamation must be done in a way that would help restore shellfish and fish productivity in Metro Manila's [endangered] coastal areas," said Arroyo. ■

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## New Partnership Announced at Aggressor Fleet

VIA DIVENEWSWIRE

Wayne Hasson and Wayne Brown from new partnership to build on Aggressor Fleet's industry leadership.

On April 20, 2007, Wayne Brown and Wayne Hasson formed a new partnership and took 100 percent ownership of Aggressor Fleet, [www.aggressor.com](http://www.aggressor.com). Brown was so impressed with the trips he took with the Aggressor Fleet, that he decided to make it a more "intimate" relationship.

Aggressor Fleet, the world's largest fleet of franchised live-aboards, has dive yachts in Belize, Cayman Islands, Costa Rica, Fiji (two Yachts), Galapagos (two Yachts), Hawaii, Maldives (two by 2008), North Sulawesi, Palau, Turks & Caicos and Utila, Honduras.

Between Brown's commitment to great customer service and Hasson's long leadership tenure in the dive industry, there could not be a better blending of talent. The beneficiary of the new partnership is the customer. The new partners will ensure that everyone enjoys the wonderful experience Aggressor has to offer from the reservation team, to the diving, to the superior accommodations and enthusiasm from the ship's crew.

The Aggressor corporate headquarters is located in Augusta, Georgia. ■

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

# Beautiful Oceans Offers First Dive Vacations That Address Global Warming

Setting a new standard for sustainable ecotourism, Beautiful Oceans offers the first dive vacations and eco-courses that address global warming.

A progressive eco-dive tour operator and premiere coral reef education organization, Beautiful Oceans, announced that it will offset carbon emissions of all its customer flights and dives, thereby addressing the impact of global warming from the eco-dive vacations it offers.

A first in the dive travel industry, this groundbreaking maneuver was made possible by an initiative of Sustainable Travel International (STI) called the *carbon calculator*, which was adapted for the diving industry by Ocean Frontiers in Grand Cayman.

From air travel and diving activities, the dive carbon calculator determines the carbon emission costs incurred by vacationing guests. What Beautiful Oceans then does is com-

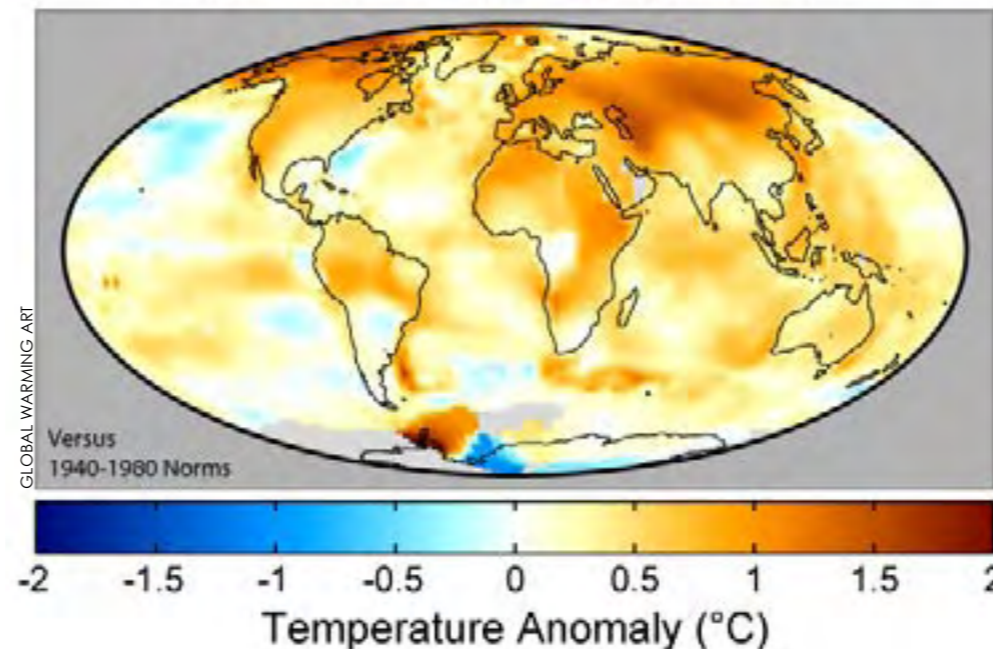
pensate for these emissions by funding carbon offset projects on behalf of each guest. The projects funded are shown to verifiably reduce greenhouse gas emissions according to

international standards set by the Kyoto Agreement. As a result, guests can be assured that they are enjoying a much more climate-friendly, and thus ocean-friendly, dive vacation.

CEO and founder of Beautiful Oceans, Stephan Becker says, "Carbon emissions generated through the burning of fossil fuels are largely responsible for the increase of greenhouse gases in our atmosphere. The resulting worldwide temperature increase represents a major threat to all ecosystems in the world, including coral reefs. For an eco-dive tour operator and coral reef education organization like Beautiful Oceans, it is imperative that we ensure that the carbon emissions generated during our dive trips will not contribute to the further loss of coral reefs."

SOURCE: SUSTAINABLE TRAVEL INTERNATIONAL ■

## 1995-2004 Mean Temperatures



Anomalies of the Earth's mean surface temperature during the period 1995 to 2004 with respect to the average temperatures from 1940 to 1980

## Join DivePhotoGuide's Expedition: Galapagos 2008

Prepare for a life changing diving experience. We will cruise the Galapagos on the *M/V Galapagos Eco Explorer I*, the newest and most luxurious live-aboard boat in the Galapagos. Enjoy a little luxury with your adventure. The cabins are more spacious than most live-aboards and of course have all the amenities—air conditioning and private bathrooms.

What more can you ask for?

### Expedition Itinerary

This seven-day expedition will begin in by flying into San Cristobal. The primary objective is to dive the sites with the highest concentration of the dramatic marine life that is the Galapagos Islands—Sea Lions, Whale Sharks, Hammerheads, Dolphins, Turtles, Manta Rays, schooling fish by the thousands, and more. During the week are stops for at least three land excursions on various islands, including a stop at the infamous Darwin Station. You will have a chance to see the giant Galapagos

Tortoises that can live over 150 years, the endemic Marine Iguanas found nowhere else on earth, Blue Footed Boobies, and other rare and exciting wildlife. However, the focus of the expedition is diving the northern most islands of Wolf and Darwin, home to a plethora of marine life that can boggle one's mind.

### Trip Extensions

Trip add-ons include individually guided trips to mainland Ecuador to explore the native culture of this

South American gem. Volcanoes, colorful rural markets and a colonial city are among some of your options of land based additions before or after your Galapagos adventure. DivePhotoGuide will post the supplemental land based add-ons within the next few months.

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## Tight Luggage Regulations Cause Lots of Problems in Britain

British Airways set a new high in luggage displacement last year after the implementation of new British rules forcing passengers to check-in a larger proportion of their possessions. According to American newspapers, British Airways lost more bags than any other major airlines in 2006—among 24 European airlines. British Air Transport customer relations has stated that 23 pieces of luggage per 1000 travellers did not make it to the destination with the passenger. The average in the industry is 16. Globally, 5.6 million pieces of luggage were lost or delayed. British airports are the only ones in Europe permitting only one carry-on item, including laptop computers. This has led to a 25 percent increase in checked-in luggage. ■

## No cell phones please

A survey among 4,000 English business travellers by the credit card company Barclay card shows that 59 percent of them are opposed to permitting use of cell phones on aircraft. ■

Edited by  
Peter Symes

## Sipadan to have better facilities

The dilapidated facilities on Sipadan Island will be replaced once the building plans are approved. Acting Tourism, Culture and Environment Minister Datuk Masidi Manjun said that the existing buildings would be used by divers and to house the 33 security people and park personnel until the new buildings were completed, likely by year's end. The project has been delayed as the building plan is subject to approval by various committees in the federal government as well the state cabinet, he said.

"It's unfair to blame the state government. What is important now is to get rid of the bureaucratic red tape and focus on getting it done," Masidi told AP. ■

## Malaysian Divers Break Local Records

On April 27, 270 divers in Malaysia descended on a patchy area of sand off Soyak Island to help lay 50 reef balls on the seabed for corals to grow. In addition to installing the artificial reefs, the divers also broke two records in the Malaysia Book of Records: "The largest formation of scuba divers underwater"; and "The largest deployment of artificial reef balls underwater." Who knew Malaysia had its own Book of Records? ■

# Protecting Tioman Marine Life

In order to protect and preserve marine life in Tioman, artificial reefs were built around Soyal Island by the Regent of Pahang Tengku Abdullah sultan Ahmad Shah and some 130 divers.

In September 2003, the Tengku Mahkota had deliberated upon the project with the first dive near the Berjaya Tioman Beach Resort on Renggis Island.

Around 50 reef balls were laid down on the seabed for corals to grow by a total of 270 divers participating in the event setting two Malaysian records. (see Malaysian Divers Break Local Records, this page).

One of the objectives of the event was to gather local and foreign divers together in a sporting event to promote another dive site in Tioman to follow up on the 2003 programme.

Seven clusters of "fish house" constructed of polyethylene and PVC were laid in the seabed by the divers this year, which created a new habitat for a variety of fish, corals and other marine life.

Other notables who participated in the dive were Tengku Datuk Kamarulzaman Stultan Abu Baker, project chairman, and Datuk Seri Dr Jamaluddin Jarjis—Science,

Technology and Innovation Minister. There were others including state Culture, Arts, Tourism and Heritage Committee chairman Datuk Maznah Mazlan, Tioman assemblyman Md Rusli Ismail, Bukit Ibam assemblyman Mohd Sahfri Abdul Aziz, Rompin district officer Roslan Harun and Tioman Development Authority general manager Datuk Hashim Mat Tahir who were on board several accompanying boats to witness the dive from a distance.

Several hours later, divers emerged from the depths after completing their task to shots fired in the air in celebration. Following the event, locals and foreign tourists gathered with Tengku Abdullah for a feast and entertainment by traditional dancers in Kampung Salang.

MyReef Foundation was also launched by the crown prince to help raise awareness, education and research as well as raise funding for nature and marine life conservation efforts. Tengku Abdullah urged the state to do more to promote Tioman and other local attractions to foreign tourists while emphasizing the need to maintain efforts to step up "sustainable tourism" for the long term ecological health of the region. ■

## Sweden and Malaysia get new airlines

Fly Excellent is Sweden's new airline and Firefly is Malaysia's new low price airline. Swedish Fly Excellent is waiting on its last permits, the Air Operator Certificate and Operativa Licens. They have two McDonnell Douglas 83 (MD83) airplanes with space for 165 passengers for special charter flights available for booking in the fall. Malaysian Firefly has two propeller-driven Fokker 50 airplanes, which will serve destinations that Malaysian Airlines cannot feasibly cover. These include routes from Penang to Langkawi, Kota Bharu, Kuantan and Kuala Terengganu, plus Penang to Thailand's islands, Phuket and Koh Samui. ■

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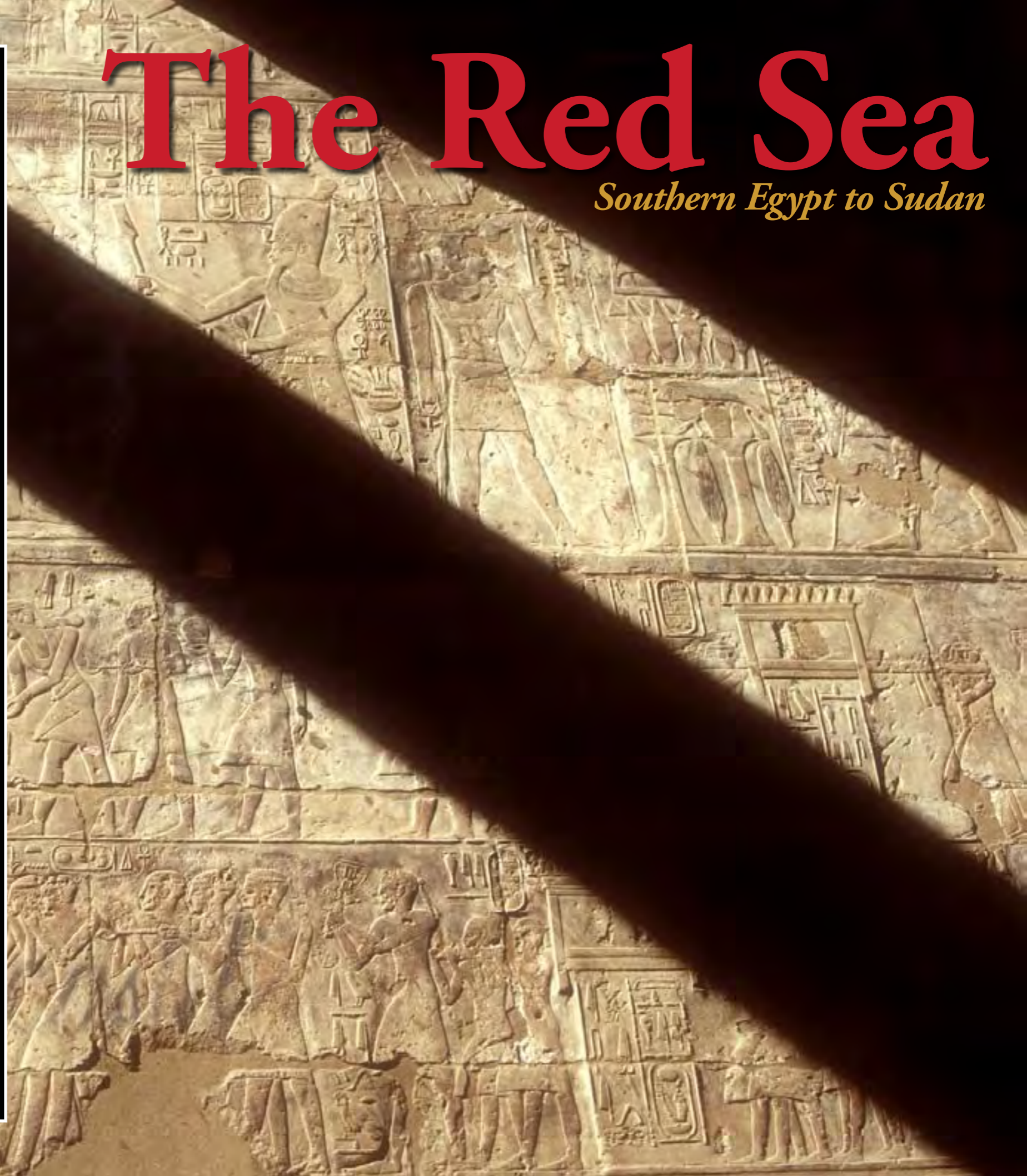
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# The Red Sea

*Southern Egypt to Sudan*



MAGNUS LUNDGREN



PETER SYMES





## The Red Sea

Text by Peter Symes  
Photos by Peter Symes  
and Magnus Lundren

There is something special about it, the Red Sea, that I have not found anywhere else on the planet. Granted every destination has its own, but here there is this special ambience of timeless mystique, of remoteness and rugged adventure that just hangs thick in the atmosphere with a whiff of historical greatness and millenias past, topped up with a scent of spices and a distant smell of charcoal from a campfire, or perhaps a *sisha*—a waterpipe. Once you get past the sprawling resorts that now send their sprouting tubers and seeds out along the barren coastline—yes, they do market this place aggressively as the “Red Sea Riviera”—you suddenly find yourself in a land where time just seems to cease to exist. The sun wanders across the sky, so does the moon, but what day is it? Out in the desert, who cares? Who is there to care anyway, save for a few scattered Bedouins?



MAGNUS LUNDGREN



PETER SYMES

Despite its relative proximity to Europe and the ever increasing convenience and affordability of cheap direct flights, once you head out of the resort areas, you can still wander off and turn around the next corner, or anchor behind the next reef and see no other people or boats in the horizon—nothing but dry and magnificent wilderness. This goes both for what is above and below the surface, but what a contrast. Above the surface, it is dry, reddish and scorched by the merciless sun under which only mad dogs and Englishmen stray during the height of the day; every other sensible creature is hiding. Below the surface, it is like a garden of Eden, rich in vibrant colour and teeming with energetic life.

LEFT TO RIGHT: Squat lobster; Egyptian sisha; Squid. PREVIOUS PAGE: Egyptian hieroglyphs. INSET: Diver explores Lahami cave. NEXT PAGE: Diver explores a wreck at Brothers Island

travel

The Red Sea





LEFT TO RIGHT: Dugong face with underwater photographer lurking in the background; Closeup of a goby on soft coral

Sitting on the deck of a Red Sea liveaboard after a good day's diving, enjoying a pensive moment of après-diving and a cool drink as glowing red sun sets over the Egyptian desert, is the epitome of escapism. Pondering who wandered those mountains in biblical times or during the reign of the pharaohs blend in and out of reflections on the day's experiences down in the blue realm. What day it is soon ceases to have any meaning. Email and SMS is far away, and the daily cycles just break down into a rhythm of diving and dining in no particular order.

**Ohoy! There's a wreck down there...**

One morning, as we were enjoying a lazy breakfast while anchored at a reef enroute on a live-aboard to Brothers' Islands, we heard cries from the water. Startled, we got to our feet to see what all the commotion was all about fearing that someone was in trouble, since an early bird buddy team had gone out before breakfast (certainly not me, as I need my infusions of hot coffee first).

"There's a wreck down there—come, come!" Within one gulp of coffee everything else about breakfast was instantly forgotten, and we were in our dive gear quicker than Clark





PETER SYMES

Kent could change into Superman. Getting into the water could only go too slow. Still covered in breadcrumbs from brunch, I jumped in the clear blue water and immediately caught a glimpse of a whitish wooden hull in the distance. It was another dive boat that sank recently—a fact that only very fleetingly managed to bother me before a primal urge to explore got the upper hand.

This is the Red Sea in a nutshell. You never quite know what you might bump into, and there are still so many undiscovered nooks and crannies along the extended coastline that anyone can be some kind of explorer in these parts. The beauty and fairly good health of the Red Sea reefs stem from its vast expanse and relative absence of human infrastructure along its extended coastline, thanks to the sur-

rounding landscape being a desert.

Until quite recently, looking back past only a few decades during which resorts started to dot the coastline,

there were only a couple of small fishing villages here and a few ports. The place was empty, pretty much, until divers started coming in the sixties and



MAGNUS LUNDGREN

CLOCKWISE FROM LEFT: Divers explore the mast gun of the *Thistlegorm* wreck; Excursion on camel-back to a Beduin camp for music and feasting; Diver and Green sea turtle with remora attached

NEXT PAGE: Decorative interior of a mosque



PETER SYMES

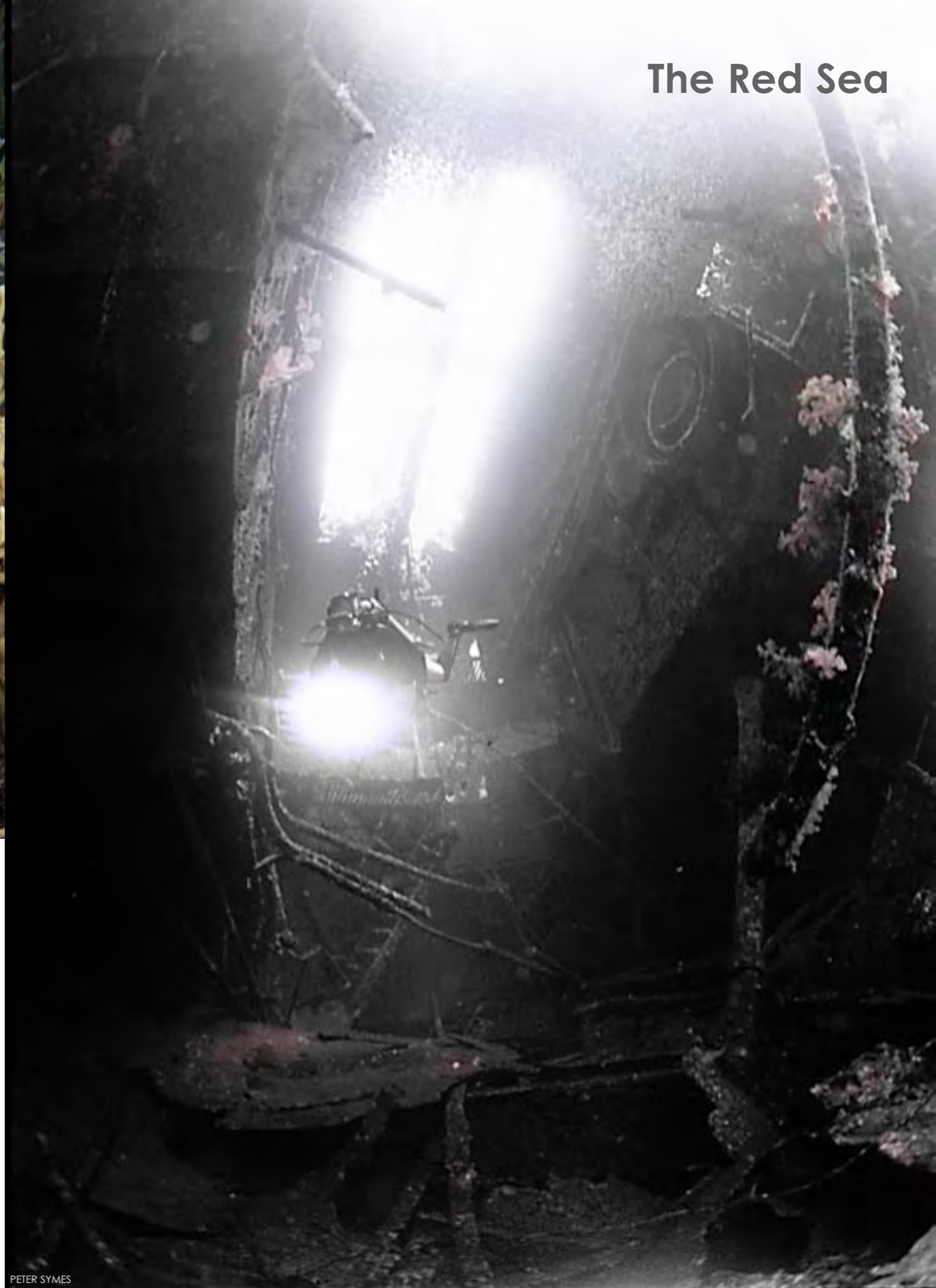




MAGNUS LUNDGREN



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PETER SYMES

LEFT TO RIGHT: Portrait of a Hawkfish; Hunting Moray Eel; Diver explores internal caverns of the *Aida* wreck at Brothers Island

seventies. This particular ratio of wilderness to human infrastructure is still quite favourable if we, for arguments sake, ignore the immediate vicinity of the big resort towns of Sharm el Sheikh and Hurghada, which have now grown to a considerable size—each with a number of hotel beds well into the six figures. But even here, considering the massive load of tourists and divers in the area, the reefs even close to the towns appear to be in a decent condition. I was actually pretty impressed to see a healthy garden of fragile and sensitive gorgonians at Ras Umm Sidd, just outside Sharm el Sheikh.

**“Deep South”**

It is in the south that the frontier of development lies today. In the past few years, places like Marsa Alam have apparently started undergoing the same transfor-

mation from a sleepy village with a dirt road to a resort dotted community that Sharm el Sheikh underwent 15 years earlier. Down here, you still have shore diving in the old style, which is one thing you can't do up in Sharm anymore (and one reason that I won't head for Sharm el Sheikh again). In contrast, you can still dive your preferred time, have a breakfast in your own time before rigging your gear and simply wade out to enjoy the nearby house reef. I like this style of diving and holiday making simply because it is so relaxing, and that is what I usually need. But who knows how long it will last. The developments seem to happen fast and the frontier just gets pushed southwards by the day.

But it is the live-aboards that are the *crème de la crème* down here. Ever more luxurious and spacious yachts take discerning divers on one or two-week long



winding itineraries in and out of archipelagos and reef structures. In the deep south of the Red Sea, we find many of the great renowned reefs including St. John, Deadelus, Elphinstone and the Zabargad islands. You find some of the best diving in the word here. Surely, there are more small critters and biodiversity in the Far East; that is no secret. But the corals of the deep south—especially the gorgonians—are lush and colourful, and there is an amazing amount of fish life. And if you are on good vessels with all the amenities you can ask for, lip service and great food, then life can hardly get any better. Often you can get as many dives as you like and your Nitrogen loading permitting but what's the point of diving yourself to exhaustion? You can work your self haggard back in the office. ■

LEFT TO RIGHT: Profile of the Sphinx with one of the great pyramids behind it; White tipped shark diving; Feeding Squat lobster; Cloud of Anthias display the bounty of the coral reefs



Text by Arnold Weisz  
Edited by Gunild Symes

# The Red Sea

*Parted by Moses... Bridged by Islam*



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**Erythra Thalassa—Red Sea, as directly translated from the ancient Greek name—is what it was called by the ancient Romans as well. Long has this great body of water been a focal point of trade in the Middle East, which has stood as a crossroads between Europe, Asia and Africa for many thousands of years. The Red Sea, today, is still an important vehicle of global trade as well as a major tourist destination for millions.**

The Red Sea has acquired world-wide interest in more recent times from the allure of its underwater wonders. Yet, if we go back a long way to the time of

The Exodus, we find the Red Sea a birthplace of legends like that of Moses, who is said to have parted the Red Sea to lead the Israelites to safety from the pursuit of the Pharaoh's army.



Along its shores, the Red Sea has seen much

history including the development of trade routes by the Phoenicians, as far back as the 12th century B.C., when extensive routes up and down the coasts were established as well as a base at what is now the port city of Jiddah, Saudi Arabia. Later, ancient



*Moses Smashing the Tables of the Law* by Rembrandt Harmenszoon van Rijn

Roman ships, laden with cargoes of treasure such as gold bound, for Indian cities, visited ancient Egyptian Red Sea ports such as Berenice.

The Red Sea continued to be an important trade route from the 7th century AD when untold numbers of boats and dhows—traditional Arab sailing vessels—carried merchants and muslim pilgrims to Mecca. In those days,

ships bearing clothing, copper and cooking pots left the ports at el-Quseir and Berenice and came back with elephants, ebony, spices and gems. In the Medieval Age from the 13th to the 16th centuries, Mamluk merchants brought Iranian and Chinese ceramics to el-Quseir via the Red Sea, which virtually became an Ottoman lake after the Turks took Cairo in 1517.

By the 15th century, Europe began to show interest in the region. The first European chart of the Red Sea was drawn in 1760 by Carsten Niebuhr on a scientific expedition sent by Frederick V of Denmark to explore Egypt and Arabia.

During World War I and II, the Red Sea saw its fare share of the fighting. The Ottoman Empire controlled large parts of the Red Sea coast during the first world war—from the Bay of Aqaba to Aden on the east side and on the west side, the Egyptian and northern Sudanese coastlines. Arabs had brief control over the territories around the Red Sea during the Arab Revolt of 1916, from which rose the fame of a certain Captain T.E. Lawrence, or as Lawrence of Arabia as he is more commonly known, when he staged an attack against the port city of Aqaba. By the end of World War I, the Red Sea was controlled in practice by Britain, France and Italy.

In World War II, Italy entered the war against the Allies in 1940. Italian forces became a potential threat to British supply routes in the Red Sea and the Suez Canal. Britain had troops in Egypt and Sudan. Italy had troupes in Libya,

NASA

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MAGNUS LUNDGREN

## The Red Sea

LEFT: Sea turtle and two remoras going for a ride. BELOW: Whitetip shark patrols the waters of the Red Sea

Eritrea and Somalia. The conflict in the Red Sea left some great wrecks for divers to explore later. Well-known ships such as the *Thistlegorm* and *Umbria* were sunk during World War II.

One of the most important events to affect the Red Sea region was the creation of the Suez Canal. Even though a canal had been envisaged since the reign of the Pharaohs, the realization of a canal was not made until 1869 when the Suez Canal was first opened. The Suez Canal reinforced the role of the Red Sea as a trade route and "Passage to India" for European travellers. In 1967, the canal was closed as a result of the Arab-Israeli conflict. The Six Day War culminated in the closure of the Suez Canal from 1967 to 1975. However, the canal was reopened in 1975 and enlarged.

It was Austrian Hans Hass who, in the 1950s, discovered that the Red Sea was an amazing diving destination. Within the same decade, Jacques-Yves Cousteau also touted the underwater wonders of the Red Sea.

In 1949, Hans Hass set off alone for Port Sudan. Over a period of two months of solitary diving, using underwater camera housings he designed and built himself, Hass took over 1,500 photographs of the underwater realm of the Red Sea. He returned again to Port

Sudan in 1950 and made the motion picture, *Under the Red Sea*. The film presented the first images ever taken of a whale shark underwater.

In 1951, Jacques Cousteau arrived in the Red Sea on the *Calypso*. His first book, *The Silent World*, and a film by the same name, was researched while diving near Port Sudan and on the shallow reefs of the Saudi Arabian coast.

Soon after Hass and Cousteau revealed the fantastic underwater wonders of the Red Sea with their books and films, the first leisure divers arrived at

the Red Sea. Recreational diving came to the area in the 1950's when Greeks and Italians working for oil and mining companies took to skindiving along the Hurghada coast. However, the wars between Israel and the Arab nations in the next two decades stopped large-scale tourism to the Red Sea region. But, tourism to the area resumed in 1982 when the last section of the Sinai was returned to the Egyptians. The late 80s saw a building-boom at the Red Sea, and resorts like Sharm el Sheik and Hughada sprung up. ■

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### THE RED SEA – OR THE SEA OF REEDS

#### *Did Moses cross the Red Sea?*

The biblical event where, in the Exodus, Moses crossed the Red Sea with the Israelites has always been difficult to explain without using the help of a miracle. However, the designation 'Red Sea' appears nowhere in the Hebrew text of the Bible. The Hebraic term yam sulph is used which means sea of reeds. The word yam means any large body of water, be it fresh or salty, while sulph means reeds or rushes, as used, for example, in the account of Moses in the bullrushes.

This mistranslation, or whatever you like to call it, which was introduced in the King James' version of the Bible, has led to much debate and confusion. Although there are still many different hypotheses about the route actually taken, one thing is sure – due to this mistranslation most of the suggestions put forward have been nonsense.

The actual location of this 'Sea of Reeds', plainly not the Red Sea, is the subject of much discussion even today. For an interesting discussion of this topic see [www.crivoice.org/yamsuph.html](http://www.crivoice.org/yamsuph.html). ■



# Mysteries of Egypt

Text by Barb Roy. Photos by Barb Roy, Magnus Lundgren and Peter Symes

ALL PHOTOS THIS PAGE BY BARB ROY

LEFT TO RIGHT: A hot air balloon floats along the Nile in the early morning; Merchant drives a donkey through the streets of Cairo; Khan El Khalili bazaar in Cairo; Nubian felucca guide in Aswan

**The sun was just greeting the day as I hurried to the top deck of our cruise boat with a steaming hot cup of coffee in one hand and a camera in the other. I was alone, enjoying the splendor of another Egyptian morning. Wispy veils of fog danced across the Nile's glassy surface, slowly dissipating as the sun's rays enveloped the distant mountains and countryside. As I sipped my cup of java, I wondered how many of Egypt's nobility had once come this way.**

I gazed upon the beauty of an early morning colorful terrain. Was the Nile used to trade with other communities? Did they travel with their gold and jewels and attendants? Two hot-air balloons in the distance broke my concentration as their pilots stoked their fires to gain altitude. Several local fishing boats pushed off from shore and it seemed within minutes the morning had come to life once again on the Nile.

After hearing about the unrest and turmoil in the Middle East I almost canceled my trip to Egypt, a place I have always wanted to visit and dive in the Red Sea. My friends and associ-

ates were afraid that I would become a Caucasian target and my dive and photography gear was sure to get stolen! I am happy to say, their worries did not detour me in the least. By investing some time on the Internet, my research proved Egypt to be a wealth of cultural and historic knowledge, well worth a visit indeed. Actually there was little to no risk involving security, because I would be traveling with a group of other journalists, all desiring to experience Egypt's wonders as I did. There was even another diver along, who I later talked into joining me for some Red Sea diving!

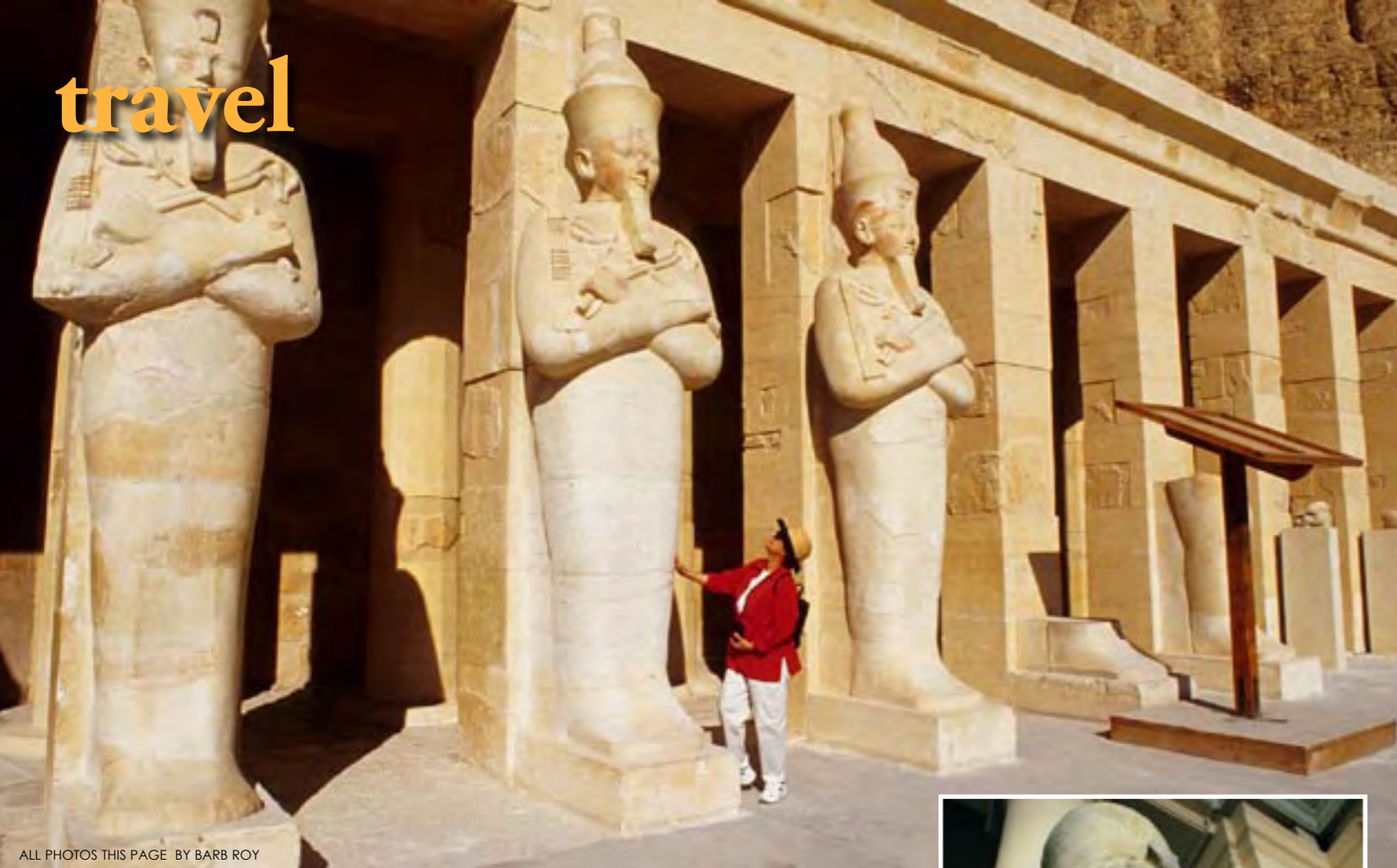
Egypt is located in the northeastern

corner of Africa, between Libya and Saudi Arabia. The Sinai is to its northeast, Sudan is just below, with the Mediterranean Sea along its northern shore and the Red sea bordering its eastern shore. Egypt's history was first recorded around 4000 BC when nomadic hunters settled in the Nile Valley. In 3100 BC Egypt crowned its first Pharaoh – Menes, who unified Egypt's two regions. The development of society, law and religion soon followed.

Today, historians are still debating whether Egypt's history doesn't date back even further, perhaps 8 or 10 thousand years BC. With the help of missions and archeologists from

around the world, Egypt's history is slowly being uncovered. To date, over 62 tombs have been discovered and archeologists have compiled a treasure of over 120,000 objects for the Egyptian Museum of Antiquities in Cairo (established in 1902). Among the objects displayed in 107 halls are actual mummies, statues of past royalty and the most prized – a collection of King Tutankhamen's burial items, including his golden sarcophagus.

Over the years Egypt has built modern skyscrapers and leaped head first into the computer age, but occasionally one can still see small stone huts and women washing clothes in



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Queen Hatshepsut Temple. INSET: Bust of King Akhenaten at the Cairo museum

the Nile. Donkey pulled carts surrounded by cars and trucks in the cities, still hint of an old and new era trying to coexist. The country's government is called the Arab Republic of Egypt, with a democratic society and an elected president.

**The Journey**

It was December when I visited, during the mildest time of the year (60-80 degrees Fahrenheit) with little to no wind and not too many tourists. From New York I flew to Amsterdam, then to Egypt's capitol city of Cairo. During the day the city is packed with automobiles and constant honking because there are very few traffic lights and only a few stop signs! Needless to say, we took a taxi or hired a car and driver for transportation while in Cairo.

After a visit to the Museum in Cairo, we were able to tour the

Khan El-Khalili Bazaar, boasted to be the largest bazaar in the Middle East, where we found a selection of fine fabrics, clothing, souvenirs, jewelry and excellent local cuisine. I was able to find a reputable jeweler recommended by our guide, to custom make a cartouche (pendant) made of fine silver for each of my three daughters back home. I had their name printed on one side and the Egyptian hieroglyphic symbols for their name on the other. It was very stylish and well received.

The 4500 year-old Pyramids on the Giza Plateau (9 miles West of Cairo) were next on our tour, built as burial chambers for the Pharaohs. I'll have to admit I felt a bit like Indiana Jones climbing up and down makeshift ladders, through narrow passageways and crawling at times to reach the various pyramid chambers. We were

told each of the huge structural blocks used to build the pyramids, weighed an impressive 2.5 tons each!

To the east was the legendary Sphinx, guardian to the Pharaohs, representing power and wisdom.

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I noticed at most of the Pyramids, temples and other antiquities, armed guards stood watch from camels and at all attraction entrances.

The sight of camels intrigued several of us to opt for a camel trail ride. I guess this is one of those things we like to do – just once in our lives. We soon discovered these creatures had very individual personalities, and can be extremely moody. Fortunately, I had an apple to share with mine, which gained me the lead of the herd, at least for a while! I found out quickly it's no fun being behind other camels.

### Sharm El Sheikh

The day finally came when the group was flown to Sharm El Sheikh, located at the southern tip of Sinai. I was amazed to see very modern seaside luxury hotels and resorts, all with big swimming pools and beautiful landscaped decor. Even our hotel, the Four Seasons Resort, came with a property directional map for navigation. The town was equally as nice, filled

with restaurants, novelty shops, fresh food stands and great coffee shops. We were mainly surrounded by other tourists, mostly European, but friendly nevertheless. If I didn't know better, I would swear I was in Bonaire or another Caribbean dive hot spot!

Although all but two of us were to spend the day touring temples and monuments, I was looking forward to getting wet! We booked a day of diving with one of the many day-boat dive charter operators servicing the Sharm area. On the way to the departure dock our driver explained that the Red Sea runs from the Gulf of the Suez down to the Gulf of Aden. He also said it was the mineral-rich red mountain range that gave the ancient mariners the idea to call it Mare Rostrum or the commonly known today as - The Red Sea.

"But our beaches are almost white," he explains. "At different times of the year you can see migrating birds along the shore; bird watchers really love it. We even have National Parks and

protected areas. There is an area of the Elba Mountain and Abrak and the coastal islands with mangroves. Shayeb Al-Banat is another protected area southwest of Hurghada city. There are many more too, where you can find wildlife."

We thanked our knowledgeable driver and bid him farewell as we went to board the dive boat. Most boats leave around 8-8:30am, and return at 4-5pm, serving lunch and snacks between two dives. Tanks and weight belts are supplied, although rentals and

Nitrox were available for an additional fee. A night dive tempted us, but we were expected back at the resort for a Bedouin style dinner with the group.



HARVEY PAGE

ALL PHOTOS THIS PAGE BY BARB ROY

CLOCKWISE FROM ABOVE: Camel gurard; Egyptian temple; Nile boats; Cairo mosque; Camels catch a ride in a chevy



Egypt

PETER SYMES

The Red Sea is abundant with soft coral (left) and marine life such as the lionfish (right)

PETER SYMES

### Diving

Our boat was wide and roomy, with over 20 divers and room for more. After the briefing I grabbed the divemaster to inquire about what the Red Sea has to offer visiting divers.

He seemed pleased to elaborate, "Most of the operators who take divers out, don't allow the taking of any marine life or shells, or touching or spear fishing. In Ras Mohammed National Park you can not even wear gloves! There are over six good sites in the park alone, but we must leave even earlier than today to get there."

When asked what kind of marine life lives in the Red Sea, he replied; "Just about everything you see in other parts of the world lives here. We have giant mantas, whale sharks, dolphins, big sharks and other pelagics, turtles and beautiful soft corals, the *Dendronephytia* species. You can see lionfish, polyclad colorful flatworms, clownfish, triggerfish, butterfly fish and the graceful blue-spotted stingray. And if you are lucky, maybe even a cuttlefish – of the *Sepia* species."

All of this info was wonderful and helped prepare us for our first dive, only 45 minutes from where we departed. Our divemaster also noted that most of the day boats all find great sites within an hour run from Sharm.

Water temperature was warm as we entered off the back of the boat, maybe 27 degrees Celsius (82 Fahrenheit). All I wore was a shorty wetsuit. To keep things simple for my underwater photography, I used a wide angle lens so whole scenes could easily be captured. The water was no deeper than 18 meters (60 feet) and the visibility must have been over 30 meters (100 feet)! I did notice the water was quite a bit saltier and I needed more weight on my belt, compared to a Caribbean destination. Perhaps with all of this heat, evaporation over the years has caused the Red Sea to have a higher saline content.

With camera in hand I began to photograph one tall coral head after another, each covered with a dressing of soft coral and tiny reef fish. With over twenty divers in the water, I was

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PETER SYMES



LEFT TO RIGHT:  
Steep wall at Brothers Island  
Top view of coral garden  
BOTTOM: Crocodilefish

a merchant vessel 126 meters long (413 feet) in 30 meters (98 feet) of water near the Suez Canal, sinking in 1941. You can see trucks, motorbikes, parts of WWII plane parts and more. The Dunraven is a British steamer, 80 meters (252 feet) long, found on the Southern side of Beacon Rock in 30 meters (98 feet) of water. It went down in 1876 and is now upside down! There are four more wrecks at

"I can think of fourteen good dives between Ras Nasrani in the north, to Ras Katy in the south."

It wasn't until the second dive that I noticed all of the lionfish (also called turkeyfish) hiding under the coral head ledges. Unlike the brave frilly looking ones we are used to seeing in aquariums, these were quite reserved and shy. The few morays of a formidable size, with cool gray eyes, were also spotted. I really enjoyed just going into deeper water and looking back on the beautiful reef, brightened by a ballet of rays from the sun. It was like watching a virtual underwater scene playing on a computer screen!

a wider range of diving and area coverage, try a liveaboard dive boat. After talking with the local divers, most believe fall through spring is exceptional for diving in the Red Sea, but a few prefer July and August, if the heat can be

tolerated!

If you decide to do a little trekking on your own in the Sinai, it is advisable to stick to well-known trails or tracks, and only explore beaches recommended 'safe' by the locals. Unfortunately Sinai may still hide live land mines, left over from previous wars, so caution would be advised.

### Egyptians

During my journey through Egypt I found the Egyptian people to be extremely friendly and very helpful in every way. Most of the local people active in tourism, speak English, Spanish, French, German and Italian, besides their native tongue. On many occasions, residents in Luxor, Cairo, Aswan and Sharm el-Sheikh (South Sinai) would come up to me and just start chatting. Our whole group was invited to smoke a Sheesha water pipe sweetened with apple juice in Aswan during our Nile River cruise. We were also treated to a sailboat ride in a felucca (boat)



surprised to rarely see anyone except my buddy. A few snorkelers glided overhead, often following the divers. On a sandy patch between fingering small reefs, I spotted a crocodile fish! It looked prehistoric and oddly cute with its long snout and sharp little teeth. It was only about a 30-5 cm (12 inches) long, but I kept my distance, in case it had a

nasty disposition. The underwater sounds were like any other tropical reef and the water a bit cooler at depth. Life was everywhere I looked including critters hiding in the sand.

During lunch the divemaster continued with his talk to us about the various places within the Red Sea to dive; "We have many shipwrecks too. The Thistle gorm is

Saab Abu Nuhas and more to the south."

Several other divers also on-board had joined us by now, listening intently as he continued; "There are four nice dive sites in the Straits of Tiran to the north and six popular sites within Ras Mohammed, one of my favourites."

When asked about the dives accessible from shore, he replied;





PHOTOS THIS PAGE BY BARB ROY

on our Nile journey. Egypt doesn't tolerate terrorism, which was very evident from the additional security measures at the airports, hotels and to protect the antiquities.

For a city of over twelve million, Cairo's crime rate was almost non-existent. I did gather, with the conservative nature of Middle Easterners, concerning women and sex, females can avoid verbal harassment by simply covering more skin. I didn't notice this attitude at the resorts in Sharm, as most visitors are European. I would recommend women to bring or buy a lightweight scarf to use when needed. The scarf also will come in handy when touring some of the more

popular mosques.

As with traveling to any international country, a little knowledge will go a long way in making any trip as smooth and incident-free as possible. The State Department's Bureau of Consular Affairs has an excellent website for visitors from America, accessible at; <http://travel.state.gov/> to learn more about Egypt's local health conditions, entry requirements, political stability, as well as any current travel warnings. If you are concerned with the safety aspect of a country, travelers can also register a detailed itinerary with the U.S. Embassy or Consulate in that country before you go. Leaving the same detailed itinerary with a friend or relative

at home provides even more peace of mind.

### Travel Hints

The National currency is the Egyptian Pound (LE), but US cash, Travelers Checks and major credit cards are accepted. Many businesses and banks are usually closed on Fridays. *Gratuity* or *Bakshish* should be awarded based upon service, but generally around ten percent will work. Be sure to get receipts for all purchases, and if the items are antiques, be sure to get an official museum export tag. Hint: the marble statues make great gifts—you can tell if they are authentic by scratching the bottom with your fin-

gernail. Real marble won't scratch!

Bring plenty of sunscreen, shades, a valid passport, a windbreaker to wear after boat dives, your certification card, an electrical adapter or converter (220V AC, 50 Hz) and plenty of film or memory cards and batteries. By making a list of the serial numbers of the computers, dive and photography gear you are traveling with, you may avoid problems concerning ownership with Customs upon entering and exiting the country. Drink only bottled water, and take along a supply of Imodium in case the Pharaohs Curse catches up with you. Remember, a little research goes along way... ■

INSET: Traditional musicians perform at Luxor LEFT TO RIGHT: Traveler enjoys a Sheesha pipe; Temple of Horus; Women washing on the Nile; The great pyramids dwarf visitors

# fact file



SOURCE: WWW.CIA.GOV

## Egypt



**History** One of the world's great civilizations was born on the banks of the Nile. Due to the richness and regularity of the annual flooding of the Nile River as well as the semi-isolation of the valley created by the surrounding deserts, the rise of a unified kingdom around 3200 B.C. brought a series of dynasties into power in Egypt for the next three millennia. In 341 B.C., the last native dynasty fell to invading Persians who in turn were replaced by the Greeks, Romans, and Byzantines. It was the Arabs in the 7th century who introduced Islam and spread the Arabic lan-

guage and religion throughout the region over the next six centuries. Around the year 1250, a local military caste, the Mamluks, took control. They continued to govern the country after the Ottoman Turks conquered Egypt in 1517. In 1869, the Suez Canal was completed and Egypt became an important center for world trade. However, it also fell heavily into debt. In order to protect its investments, Great Britain seized control of Egyptian government in 1882. However, some allegiance to the Ottoman Empire maintained influence in Egypt until 1914.

Egypt gained partial independence from the UK in 1922 and acquired full sovereignty following World War II. The time-

honored place of the Nile River in the agriculture and ecology of Egypt was altered by the completion of the Aswan High Dam in 1971 and the resultant Lake Nasser. Even so, dependence on the Nile continues, and with a rapidly growing population—the Arab world's largest—and limited arable land, resources and society continue to be stressed. The government has

initiated economic reforms and massive investments in communications and physical infrastructure in an effort to ready the economy for the new millennium. Government: Republic. Legal system: Based on English common law, Islamic law and Napoleonic codes. Capital: Cairo

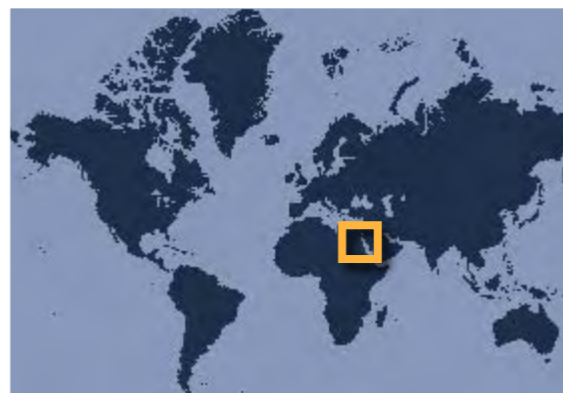
**Geography** Egypt occupies the northeast corner of the African continent. It borders the Mediterranean Sea—between Libya and the Gaza Strip—and the Red Sea north of Sudan, and includes the Asian Sinai Peninsula. Coastline: 2,450 km. Terrain: Vast desert plateau is interrupted by the Nile River valley and delta. Lowest point: Qattara Depression, 133 m. Highest point: Mount Catherine, 2,629 m. Egypt controls the Sinai Peninsula—the only land bridge between Africa and the remaining Eastern Hemisphere. Egypt also controls the Suez Canal—a sea link and major trade route between the Indian Ocean and Mediterranean Sea. Because of its size and juxtaposition to Israel, Egypt plays a major role in Middle Eastern geopolitics. However, Egypt does continue to depend on upstream neighbors and deal with the dominance of Nile basin issues. The country is also prone to influxes of refugees.

**Climate** Desert—hot, dry summers with moderate winters. Natural hazards: periodic droughts; a hot, driving wind-

storm called *khamisin* occurs in springtime; dust storms, sandstorms; frequent earthquakes, flash floods, landslides

**Environmental issues** Desertification—agricultural land is being lost to wind-blown sands and urbanization. Soil salination below the Aswan High Dam is increasing. Oil pollution is threatening coral reefs, beaches and marine habitats. Additional water pollution comes from agricultural pesticides, raw sewage and industrial effluents. There are very limited natural fresh water resources away from the Nile River, which provides the only perennial water source. Rapid population growth is overstraining the Nile River and other natural resources. Egypt is party to the following international agreements: Biodiversity, Climate Change, Climate Change-Kyoto Protocol, Desertification, Endangered Species, Environmental Modification, Hazardous Wastes, Law of the Sea, Marine Dumping, Ozone Layer Protection, Ship Pollution, Tropical Timber 83, Tropical Timber 94, Wetlands.

**Economic** In the last three decades, the Egyptian government has reformed the highly centralized economy handed down from President Nasser. Energy subsidies, and personal and corporate tax rates were reduced, and several enterprises were privatized in 2005 by Prime Minis-



World map and map of Egypt

ter Ahmed Nazif. There was a stock market boom, and GDP grew by about 5 percent for the next two years. Unfortunately, living standards remain the same for the average Egyptian despite these achievements, compelling the government to continue to provide subsidies for basic necessities. These subsidies have helped increase a growing budget deficit continue to be a significant drain on the economy and foreign direct investment continue to be low, however, export sectors—especially natural gas—show positive prospects. Agriculture: cotton, rice, corn, wheat, beans, fruits, vegetables, goats, sheep, cattle, water buffalo. Industries: textiles, food processing, tourism, chemicals, pharmaceuticals, hydrocarbons, construction, cement, metals, light manufactures. Natural resources: petroleum, natural gas, iron ore, phosphates, manganese, limestone, gypsum, talc, asbestos, lead, zinc.

**Currency** Egyptian pound (EGP). Exchange rate: 1EUR=7.69EGP, 1USD=5.69EGP, 1GBP=11.25EGP, 1AUD=4.69EGP, 1SGD=3.73SGD

**Population** 80,335,036 (July 2007 est.). Ethnic groups: Egyptian 98%; Berber, Nubian,



Bedouin and Beja 1%, Greek; Armenian and other European (primarily Italian and French) 1%. Religions: Muslim (mostly Sunni) 90%, Coptic 9%, other Christian religions 1%. Internet users: 5 million (2005)

**Languages** Arabic (official), English and French is understood by educated classes

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El-Gouna Hospital (065) 5800118 EMERGENCY (012) 2187550  
Naval Hospital Hurghada (065) 3544195  
**Marsa Alam**  
Marsa Shagra (065) 443156

**Dive Centers**  
Wildcat Liveaboard Charters [www.redseadiving.com](http://www.redseadiving.com)  
Camel Dive Club & Hotel [www.cameldive.com](http://www.cameldive.com)  
Sinai Divers Diving Centers [www.sinaidivers.com](http://www.sinaidivers.com)  
Red Sea Rangers Diving [www.redsea-rangers.com](http://www.redsea-rangers.com)

**Web sites**  
Egyptian Tourist Authority [www.egypt.travel](http://www.egypt.travel)  
Egypt Tours & Travel [interoz.com](http://interoz.com)  
Egyptian Museum [Egyptianmuseum.gov.eg](http://Egyptianmuseum.gov.eg)  
Four Seasons Hotels & Resorts [www.fourseasons.com](http://www.fourseasons.com)  
Abercrombie & Kent Nile Cruises [www.abercrombiekent.com](http://www.abercrombiekent.com)

**Books**  
*Imaging Egypt* by Mark Millmore [www.eyelid.co.uk](http://www.eyelid.co.uk)  
*Egypt and Diving and Snorkeling the Red Sea* published by Lonely Planet [www.lonelyplanet.com](http://www.lonelyplanet.com) ■



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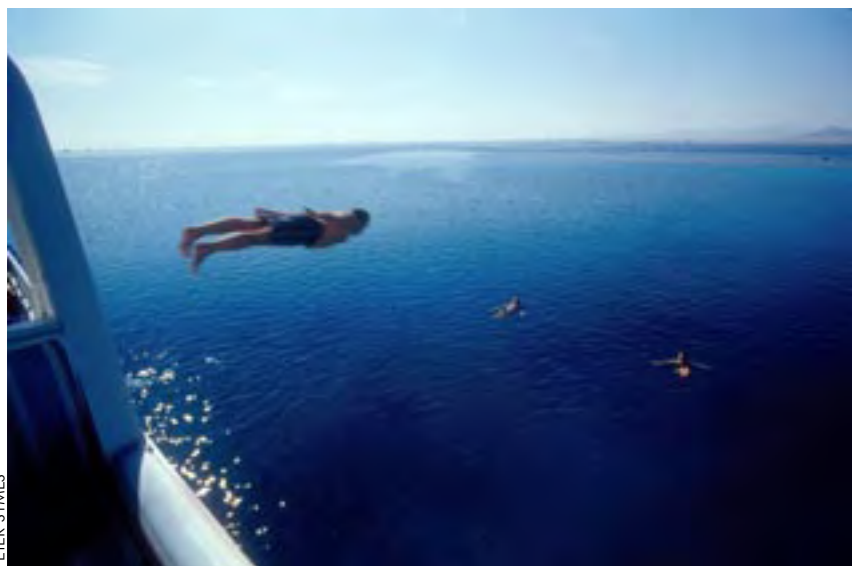


# Diving the Red Sea

Text by Arnold Weisz

*Sustainable tourism or environmental disaster?*

**There is no doubt that the Red Sea offers some of the best diving on the planet. Additionally, the Red Sea is easily accessible for European divers, which makes it one of the most popular dive travel destinations in the world. Diving has become a booming branch of the tourism business.**



PETER SYMES

The Red Sea was "discovered" as a diving destination by Hans Hass in the 1950s. Tourism has grown steadily since the 1970s and has reached the point of becoming an essential part of the region's economy.

However, looking beyond the fantastic coral reefs, awesome wrecks, luxurious resorts and sandy beaches, there is a downside to the paradise. The reef-lined coasts all along the Red Sea, but especially in Egypt, depend on high numbers of tourist divers, thus resulting in degradation of reefs by mechanical damage, waste and water pollution. Often, this is accepted due to the short-term gain

from the tourism business.

Hotel complexes are springing up almost unchallenged all along the Egyptian Red Sea coast. Along the coastline of Egypt, from the Suez canal to the Sudanese border, huge armadas of dive vessels are bringing hordes of divers to the coral reefs.

## Tourism—highway to wealth

It's almost stunning to see the enormous armada of dive charter boats at the

ports of Dahab, Sharm el Sheikh, Hurghada, Safaga and Marsa Alam in the morning. The rumbling of marine diesel engines laying a carpet of fumes over the crisp sea air. Loud calls in Arabic whiz through the place, sometimes Russian or English pierce through the hustle and bustle, as the crews prepare to take out thousands of divers.

Everywhere, there are pyramids of airtanks and equipment bags.

Convoys of trolleys shuttle between the mini-buses and pickups at the parking lot and the dive boats.

Can we really criticise the Egyptians for taking advantage of dive hungry tourists? The mighty Nile is the life line, which feeds most of the country's 73 million inhabitants. The coral reefs of the Red Sea gives thousands of Egyptians jobs and supplies the country's economy with much needed hard currency.

Many of those who make a living in the tourist and dive industry come from Cairo or other large cities along the Nile. They work every day for three weeks, and then spend a week together with their

families in their home cities and towns. From their point of view, dive tourism is feeding their families.

## Increased awareness

The coral reefs of the the Red Sea are generally in good shape with rich, bio-diverse reefs the rule. However, coastal development continues to destroy mangroves, and damage from coral reef tourism is on the rise, especially in the Red Sea's northern Gulf of Aqaba.

The picture is not as bleak as it may seem. Awareness about the environmental damage has risen in the last few years. The local government, dive and tourism industries are seeing the effect of years of rapidly growing numbers of tourists and have started to take measures to protect their natural assets.

Several organizations have sprung up, and efforts to protect the marine environment are being put into effect. Everything from reef rehabilitation, mooring-buoys, waste control and non-contact diving practices are reducing the impact on the environment.

Still, many of the reefs show clearly visible signs of wear and tear. And it's not uncommon to encounter plastic bottles and other non-biodegradable waste.

Many of these problems can be eliminated by simply changing the indifferent attitudes of locals and tourists. Nature can recuperate, if you just give it time! ■



Reef ball. Illustration courtesy of [www.reefball.org](http://www.reefball.org)

## KURT AMSLER'S PHOTO-WORKSHOPS IN FRANCE 2007

In co-operation with AQUANAUT Dive Centre in Les Lecques on the coast of the Mediterranean Sea, we have the best prerequisites for learning all the different techniques quickly and successfully in a pleasant atmosphere. The workshops are open to analogue and digital photographers!

For the theoretical lessons, we have a classroom and a photolab at our hotel, with light boxes, projector, beamer and all the necessary hardware and software for digital photographers.

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We dive down the drop-offs of Ile Verte at the light tower; Balise, the cave of La Vierge; and visit the wreck of the famous P-38 Fighter, which was discovered by us in the spring of 1997. The participants are accommodated at the hotel, La Bastide, surrounded by beautiful countryside, the landscapes *provençal*. Guests have the possibility of booking only the hotel and/or diving.

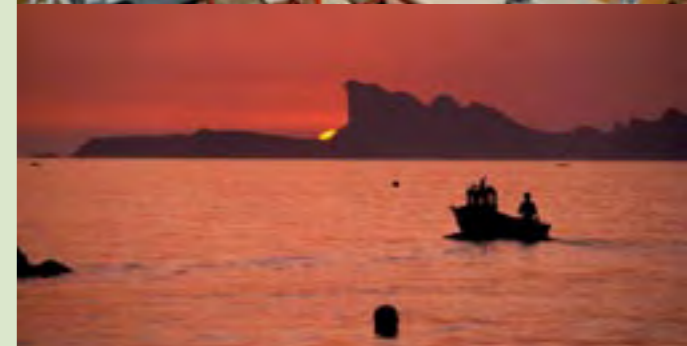
My photo-courses are built upon a learning pyramid, which has been approved for over 15 years: "Hear, see and do!"

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—Kurt Amsler

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



# Saudi Arabia

*Diving the Kingdom*

Text and photos by Dan Beecham

In the heart of the Middle East, occupying 80 percent of the eastern shoreline of the Red Sea, sits the Kingdom of Saudi Arabia. It covers an area of over 870, 000 square miles, almost all of which is desert, which holds more than a quarter of the world's oil reserves. Despite its close proximity to Egypt and Sudan—places that are considered by many people to be some of the world's greatest diving locations—the reefs around Saudi Arabia have barely been dived.



Saudi Arabia is infamous for being difficult, and oftentimes impossible to get into. At the same time, it welcomes with open arms thousands of expatriate workers every year, as well as over 3.5 million tourists annually, almost entirely comprised of pilgrims performing the Haj or Umrah. If you're non-Muslim and are not sponsored by an employer in Saudi, attaining a visit visa is nigh on impossible.

It's this strict level of control, as well as the continued threat of terrorist activities that keeps the majority of westerners out of the country. The problems do not stop there however.

Saudi Arabia is a country that is struggling to strike a balance between its roots, which are firmly planted in Islamist tradition, while its younger generation demands reform to a modern, more western society. Many Saudi's want to defend

the Kingdom's fiercely Muslim character, returning to 18th century ideals where Islam reigned supreme, and where foreigners were not welcome. Others wish for change; there is talk of democracy and reforms on many issues including women's rights, a topic that is especially divisive.

The modern generation is demanding change, and it is slowly happening; western commercialism is increasingly impinging upon Islamic ideals.

Because of these reforms, there is tension in the Kingdom, so visiting or living in Saudi presents new challenges everyday. Clashes with the authorities including the religious police, or *Mutawwa*, are not uncommon. The *Mutawwa* strictly enforce the many social rules of Islamic culture. Women especially must be mindful of these rules, covering themselves head to toe in the traditional *Abaya*, not being able to

bounds, count themselves lucky that they can enter, explore and dive a part of the world that is generally off limits to westerners; Saudi Arabia can be considered the final frontier of diving in the Middle-East.

**The Oil Giant**

Sadly, Saudi is not known for it's diving, there's only one thing its famous for; Oil.

The 8.5 million barrels of crude that are pumped out of Saudi Arabia every day ensure that the Kingdom remains a driving force in the global economy. Unfortunately, the oil industry and the preservation of pristine marine environments do not make good bedfellows. There are large areas of reef that remain untouched, but in other places the environment is very much neglected; extensive damage caused by oil extraction or the reclamation of land for refineries has

work, go out in public unescorted and not being allowed to drive are just a few of the issues that must be overcome.

It is all of these strict rules as well as the issues relating to visit visas that either stop or put people off diving in Saudi. The opportunity to dive untouched, pristine reefs or discover new wrecks is impossible in other parts of the Red Sea. Because of this, many people (this writer included) who are given the opportunity to visit a country that normally sits so far out of

CLOCKWISE FROM ABOVE: Mosque in Jeddah; Mosque tower; Jeddah street scene; Saudi souk, or traditional market. INSET: Door to women's prayer chamber in a mosque. PREVIOUS PAGE: Saudi desert mountains



wiped out entire ecosystems. In 1991 during the Gulf War, eight billion barrels of oil were released into the Arabian Gulf on the Saudi's Eastern coastline by retreating Iraqi forces. There are fears in many that a similar event could one day happen in the Red Sea; the damage this could cause is unimaginable.

The threat of terrorist attacks remains very real today. Post 9/11, many expatriate workers who had called Saudi home for a long time moved away to neighbouring countries in the Middle East, in response to terror attacks on housing compounds and foreign embassies. Numbers of ex-pats in Saudi Arabia are steadily increasing nowadays, and with it, the diving scene, but once in a while an event will occur to shake everybody's confidence over safety in the Kingdom. In February this year, four French tourists were killed near Jeddah, and in April, authorities arrested more than 150 terrorists, seizing weapons and bomb-making equipment that was intended for one of Saudi's largest oil refineries.

### Environmental issues

Some areas of the Red Sea that lie within Saudi waters are thankfully now protected. This is largely thanks to the work of active marine conservation groups. National Parks and "no-go" zones where fishing is completely prohibited have been created. This is often enforced, but unfortunately, not always. In other areas, fishing goes completely unchecked, but mainly consists of local fishermen on small boats. There is little commercial fishing in Saudi as there is simply more money to be made in the oil industry.

Shark meat is unfortunately very popular, and small sharks often appear in abundance on the fish counters in large supermarkets. Row upon row of juvenile reef shark and Hammerhead Shark adorn these counters. Even though I see more sharks in Saudi waters than I have in other parts of the Red Sea, I regret to say that I see more sharks on the fish counter during my weekly shop than I would during a whole week of diving. The shark meat generally sells for

LEFT TO RIGHT: Sunlight spills into the corridor of a mosque; Saudi oil refinery at dawn; Desert scene



dreds of tonnes of land-fill, but it's difficult to comprehend how far-reaching the effects of this construction will be, and what effects the increased air and water pollution will have. Projects such as the iconic Palm Jemera in Dubai have disrupted the local ecosystems in more ways than was originally predicted, but thankfully now a lot of effort is being put into undoing this damage. Only time will tell what effect the King Abdullah Economic City will

have on the local and surrounding ecosystems. Spear-fishing is very popular in Saudi, both within the local communities and with the population of Southeast Asian workers that are present in Jeddah as well as the rest of the country. Unfortunately, this has damaged populations of many species of large reef fish. The reefs further offshore have been less affected by this though and remain healthy.



around ten Saudi Riyals per kilo—less than three US dollars.

Much of the coastline of Arabia is currently undergoing major changes. Reclamation of land for huge offshore projects is very common in the Middle East, and countries including Bahrain, the UAE and Qatar are creating huge offshore housing developments to try and attract overseas investors and strengthen economies. Dredging recently began off the sleepy town of Rabigh, which sits north of Jeddah in preparation for an ambitious building project—the King Abdullah Economic City. This kind of construction will obviously effect the local ecosystems. Infact, most of the local ecosystem will be covered in hun-



CLOCKWISE FROM FAR LEFT INSET: Hammerhead shark on the butcher's block; Juvenile shark on display in a fish market; Jeddah skyline; Jeddah airport; Store with the local fashion; Ancient Saudi fort



## Jeddah

The city of Jeddah is where much of the diving in Saudi Arabia is focused. Jeddah attracts large numbers of expatriate workers attracted to the Kingdom by the big salaries that are often available when working for large Saudi companies. Jeddah is seen to be more liberal than cities such as Riyadh, the capital, and as such, there has long been an expat community present. There are a number of dive shops and boat operators that cater for this diving scene.

Shore diving is very popular in Saudi, as you often face difficulties with the local authorities when planning boat trips. Permission must be attained ahead of time before any private vessel may head out to sea, and failure to do so can result in heavy penalties including confiscation of diving permits. Saudi

Arabia continues to face a big problem with illegal immigration from poorer neighbouring countries, and the coast-guard's strict rules are an effort to reduce this problem, as well as curb smuggling of illegal contraband. Because of these regulations, many Hotel chains have set-up small dive operations in private beaches.

Here, you pay a nominal entry fee to get what can feel like a little piece of paradise, away from the strict every day rules of Saudi. Men and women can socialize together, which is normally forbidden, and women can remove their Abaya without fear of punishments from the authorities. Many people shore dive from these private beaches, and the reefs are very healthy, although sometimes the visibility can be poor due to sedimentation from construction

projects.

To get to the more impressive sites you need to get offshore. Reefs such as Abu Faramish, Abu Madafi and Shi'b al Kebir provide truly world class diving. In these areas, visibility is often excellent, 20-25m. The quality and diversity of soft and hard corals is very high, and you'll spot all the usual Red Sea reef fish alongside some larger specimens that are generally more difficult to see in more commonly dived areas.

Jeddah port is the busiest port in Saudi, and as one would expect, a few of the ships on their way to or from the port have inevitably ended up on the bottom of the sea. Mismari, the Cable Wreck and Chicken Wreck are just a few of the wrecks that are easily accessible lying in just 20-30meters of water, so allowing for long leisurely wreck dives.

ABOVE: Descending with spear; TOP RIGHT: Diver explores the wreck of the *Mismarie*



Away from the more frequented diving areas, there exists miles of coastline that remains largely unexplored by western divers. From personal experience, the diving in these areas can differ dramatically. Head south and visibility generally deteriorates, and there are some areas that are completely devoid of life. Head north, near to Wedjh, and you can drop in on spots where there are huge numbers of reef fish and pelagic fish including Tuna, Spanish Mackrel and Barracuda as well as healthy numbers of sharks including Hammerheads, Silvertips and Silkys. When you look at the size of the coastline and how little of it has been developed, it's tantalising to think what wonders are waiting to be discovered.

For now, divers who are lucky enough to gain access to the Kingdom of Saudi

Arabia can enjoy an abundance of beautiful reefs, devoid of the crowds of divers found at many popular sites in other areas of the Red Sea. Maybe one day, when things have changed and relaxed in Saudi Arabia, people will be able to visit and appreciate what's there, not only the diving, but also the historical sites, beautiful deserts and wildlife.

Let's just hope that the authorities realise what potential they have lying right beneath their noses, or beneath the waves, and that they must implement measures to properly protect the reef and regulate the numbers and movements of divers.

It's sad that so few people have been able to experience the amazing

diving that is on offer in Saudi Arabia, but in ways it's nice knowing that there are places out there that remain untouched, pristine and waiting to be discovered. ■

LEFT TO RIGHT: Scene from the Cable wreck; Diver examines a propeller; Interior of the *Mismarie*

# fact file

## Saudi Arabia



X-ray mag



SOURCE: WWW.CIA.GOV

**History** Islam was born in Saudi Arabia, which is home to two of Islam's holiest shrines in Mecca and Medina. In fact, the official title of the king is the Custodian of the Two Holy Mosques. In 1932, the modern Saudi state was founded by Abd al-Aziz bin Abd al-Rahman Al Saud (Ibn Saud) after a three decade campaign to unify most of the Arabian Peninsula. Today, his son, Abdallah bin Abd al-Aziz, rules the country according to the country's Basic Law of 1992. In 1990, Saudi Arabia accepted the Kuwaiti royal family and 400,000 refugees after Iraq's invasion of Kuwait. The country also allowed Western and Arab troops to deploy on its soil for the liberation of Kuwait in 1991. After the liberation of Kuwait, the continuing presence of foreign troops on Saudi soil was a source of tension between the public and the royal family until all operational US troops left the country in 2003. In the same year, major terrorist attacks compelled the government to initiate a strong continuous campaign against domestic terrorism and extrem-

ism. King Abdallah has continued the cautious reform program, which was started earlier when he was crown prince. In 2005, the government held elections nationwide for half the members of 179 municipal councils in order to promote an increase in political participation. King Abdallah completed the process at the end of the year by appointing the remainder of the members of the advisory municipal councils. Saudi Arabia remains a leading producer of oil and natural gas. Located within its borders is approximately 25 percent of the world's proven oil reserves. In 2005, Saudi Arabia joined the World Trade Organisation. Since then, the Saudi government has promoted foreign investment in the kingdom and continued to pursue economic reform and diversification. On-going concerns include

a growing population, depletion of aquifers and an economy primarily dependent on petroleum output and prices. The country is governed according to Islamic law. Government: Monarchy. Capital: Riyadh

**Geography** Saudi Arabia is located in the Middle East. It borders the Persian Gulf and the Red Sea north

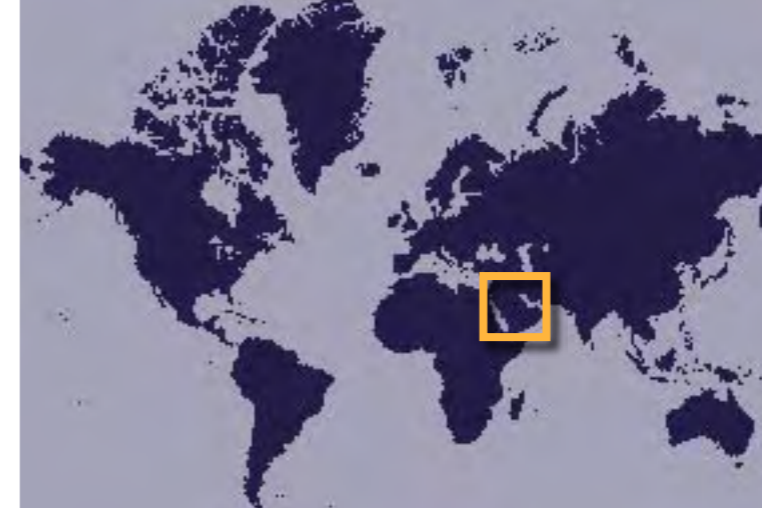


of Yemen. Coastline: 2,640 km. Terrain: Sandy desert—mostly uninhabited. Lowest point: Persian Gulf 0 m. Highest point: Jabal Sawda' 3,133 m. Saudi Arabia's extensive coastlines along the Persian Gulf and the Red Sea give the country a lot of leverage in the shipping of crude oil and other cargo through Persian Gulf and Suez Canal.

**Climate** Rugged, dry desert with wide extremes in temperature. Natural hazards: Frequent dust and sand storms.

**Environmental issues** Desertification; underground water resources are being depleted; the lack of permanent bodies of water bodies and perennial rivers has led to the development of extensive seawater desalination facilities; coastal pollution from oil spills. Saudi Arabia is party to several international agreements including Biodiversity, Climate Change, Climate Change-Kyoto Protocol, Desertification, Endangered Species, Hazardous Wastes, Law of the Sea, Marine Dumping, Ozone Layer Protection, Ship Pollution.

**Economic** Saudi Arabia's economy is oil-based with strong governmental controls



LEFT: Map of Saudi Arabia and global map highlighting region

BOTTOM LEFT: Whitetip shark

**Languages** Arabic

### Deco Chambers

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**Riyadh** King Faisal Specialist  
Hospital & Research Centre

(966-1) 4647272 pager 8517

**Jubail** Armed forces hospital KANB

### Warning to travelers

Check your travel advisory for updates on travel to Saudi Arabia. Due to attacks targeting foreigners in recent years, many travel advisories are recommending that foreigners avoid or leave Saudi Arabia unless on essential business. According to security departments, more attacks on foreigners are being planned. If you must stay in the country, it is recommended that you avoid public places where foreigners are known to congregate and to make sure your hotel has a good reputation for maintaining high security precautions.

### Visa information & restrictions

Saudi Arabia has proclaimed this year the Year of the Diver. Dive tourism in Saudi Arabia is still new and in development, but some operators have pre-approved tourist visas for Europeans and Americans. These visas take 2-3 weeks for processing rather than the usual two months. Please note that destinations in Saudi Arabia report that they cannot accept visa applications from women travelling alone or with their boyfriends. Married women must be accompanied by their husbands, and single women must be accompanied by a father or brother.

### Cultural issues & dress code

Be aware that local custom and law in Saudi Arabia have specific requirements in public dress and behavior, especially for women. Consult your local Saudi embassy for more information. ■

placed on major economic activities. Holding 25 percent of the world's proven petroleum reserves, the country ranks as the largest exporter of petroleum and serves as a leading power in OPEC. The petroleum sector makes up roughly 75 percent of budget revenues, 90 percent of export earnings and 45 percent of GDP. The private sector makes up about 40 percent of GDP. About 5.5 million foreign workers contribute to the Saudi economy, particularly in the service and oil sectors. After high oil revenues led to large budget surpluses, Riyadh substantially boosted spending on infrastructure development, job training and education and government salaries. A plan to establish six "economic cities" in different regions of the country to promote development and diversification has been announced by the government. Natural resources: petroleum, natural gas, iron ore, gold, copper. Agriculture: wheat, barley, tomatoes, melons, dates, citrus, mutton, chickens, eggs, milk. Industries: crude oil production, petroleum refining, basic petrochemicals, ammonia, industrial gases, sodium hydroxide (caustic soda), cement, fertilizer, plastics, metals, commercial ship repair, commercial aircraft repair, construction

**Currency** Saudi riyal (SAR). Exchange rate: 1EUR=5SAR, 1USD=3.75SAR, 1GBP=7.4SAR, 1AUD=3SAR, 1SGD=2.46

**Population** 27,601,038 including 5,576,076 non-nationals (July 2007 est.). Ethnic groups: Arab 90%, Afro-Asian 10%. Religion: Muslim 100%. Internet users: 3.2 million (2006)



MAGNUS LUNDGREN



# Opinions

Letters &

All perspectives expressed in this section are those of the individual author and do not necessarily reflect the views of X-RAY MAG, DiveGuru.Net, or their associates



Edited by  
Millis Keegan

KURT AMSTER



I have received some questions regarding turtle nests, and how we can best protect them. One of the questions mentioned Gary Appelson, who turned out to be the Policy Coordinator for the CCC organization. CCC stands for Caribbean Conservation Corporation, which most likely is the oldest sea turtle conservation organization in the world. So, I figured, who better, you know? I contacted him.



I asked him straight up, "Are we the turtles' worst enemies?" And Duh! Of course we are.

**Gary Appelson:** Sea turtles have been around and were doing just fine for millions of years, until people arrived. People are definitely their worst enemy!! Adult sea turtles have almost no predators except sharks, which rarely actually kill a sea turtle. Many predators eat hatchlings, but the predation is simply overwhelmed by the sheer number of hatchlings that actually make it to the water. That is why turtles nest multiple times each year and lay so many eggs; it's nature's insurance against predation.

**Millis:** I found some numbers that say that Florida is the number one place for turtles to nest—that 80 percent of the sea turtles in the world actually make it over here.

## Save the Sea Turtles

Sounds like a high number; is it valid?

**Gary Appelson:** Ninety percent of all sea turtle nesting in North America takes place in Florida. One hundred percent of all green and leatherback nesting in North America occurs in Florida. About 25 percent of all turtle nesting in Florida occurs in the Archie Carr national Wildlife Refuge in Brevard and Indian River Counties on the mid Atlantic coastline. Loggerhead turtle nesting in the refuge is very intense, and the refuge hosts one of the two largest, if not the largest, aggregation of nesting loggerheads in the world.

But there are turtle nesting beaches in many locations in the tropical Atlantic and Pacific. The largest green turtle nesting population in the world is adjacent to our research station in Tortuguero, Costa Rica. CCC is credited with saving this nesting population from extinction—a great conservation success story!!

**Millis:** So, not quite 80 percent of all the turtles in the world then, but the numbers are still impressive. Impressive enough to name Florida the Capital Turtle State in the US, we think.

### Questions

**Q:** How does one protect a turtle nest?

*Something wonderful has happened! We own a beach property in Florida,*

### What do you think?

Get heard! Send us your opinion at [diveguru@xray-mag.com](mailto:diveguru@xray-mag.com) by May 10, 2007, and get a chance to win a gift certificate for US\$30 for a great dive shirt generously sponsored by Dive Junkie. [www.divejunkie.com.sg](http://www.divejunkie.com.sg)

*and this week, late one evening, a turtle came crawling up on the beach. She crawled with quite some effort, and at first, we thought she was sick, but then she started digging and laid eggs—about 60 of them. It took hours. We watched the whole process from a distance, careful not to disturb her. It was wonderful, and it brought tears to my eyes. Now, obviously, we want to protect the nest. Our first instinct was to mark the nest, thinking that beach goers would stay clear from the area. Then a neighbor told us not to do that, since that would just be like setting up a sign for turtle egg poachers. We feel responsible for our nest, and we do not want anything to happen to the turtles. How can we help?*

—Molly, previously a snowbird, bird now retired in Florida

*(Editors note: The term Snowbird is used to describe people who spend a large portion of the winter in Florida or any other warm place in the sun belt region.)*

**Gary Appelson:** It is illegal under Florida law and the Federal Endangered Species Act to harm, harass, kill or disturb marine turtles or their hatchlings. It is also illegal to disturb the nest in any way. While residents and tourists often feel compelled to help hatchlings get to the water, it is illegal to do so. If residents want to ensure that a nest is adequately pro-



Our DiveGuru sponsor this issue is Dive Junkie based in Singapore since 2003. They are a fast growing specialty retailer of stylish scuba clothing and distinctive casual apparel in unique and interesting styles depicting the attractions of scuba diving and the unique experiences of divers. They plan their collections with great care and thought. And their range of clothing is constantly revitalized with new designs and styles on a regular basis in order to keep up with current themes and fashion trends. The Dive Junkie aesthetic is about connecting the unique experiences of divers with artistic designs, combining elements of comfort with great styling, and versatility with fashion and colour. They are also committed to giving divers superior products, and place a great emphasis on the quality and durability of their products capturing the diver's adventurous spirit, revelry and fun-loving nature. Dive Junkie apparel is available in a wide range of sizes sold in Singapore, Malaysia, Indonesia, Korea, U.A.E, Australia, New Zealand, U.K., Greece and the United States through retail stores. Online store T-shirts have sold to customers in Hong Kong, China, Japan, Norway, France, Spain, Belgium, South Africa, Finland and Gibraltar. ■

## How You Can Help: Adopt A Sea Turtle!

Sea turtles have navigated the earth's oceans for more than 100 million years. In the last half century, scientists have learned a great deal about their habits, but many mysteries remain. Join CCC and its Sea Turtle Survival League today!

### Adoption Options

#### Satellite-Tracked Turtle

Several named turtles with satellite transmitters attached to the back of their shells are monitored by the Caribbean Conservation Corporation. This allows CCC to use space age technology to learn more about the turtles migratory behavior. Adopt a satellite-tagged turtle and track the turtle's movements through their website! You can find out which satellite turtles are available for adoption by checking the current list of **Satellite Tracked Turtles For "Adoption"**.

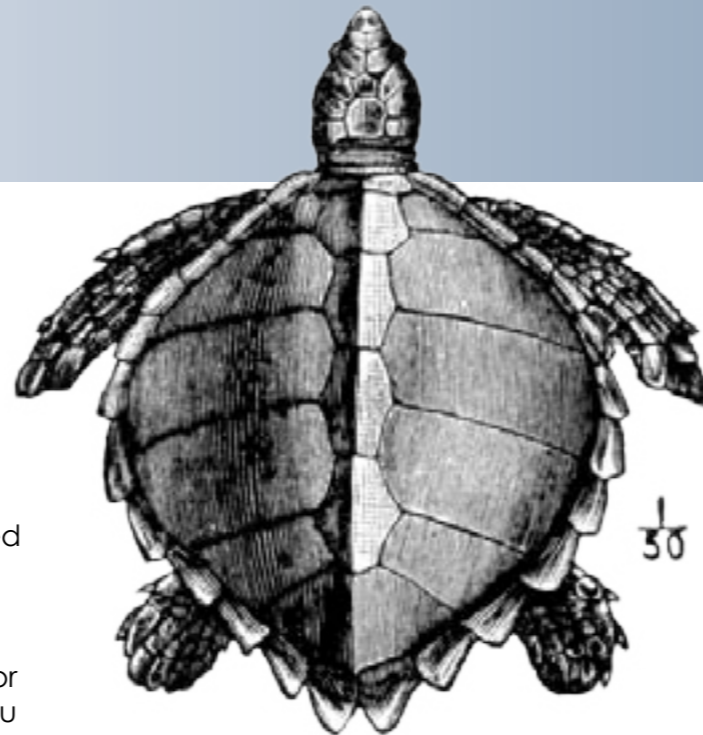
#### Name Your Own Turtle

Adopt one of the several turtles CCC researchers tag on the hot sandy beaches of their Costa Rican research station. With a Name Your Own Turtle Adoption, you will be the only person to adopt your turtle, and you can choose the name of the turtle. If CCC sees your turtle again, they will notify you via newsletter. ■

tected, they need to contact an authorized "sea turtle permit holder." Marking a nest may actually put future hatchlings at increased risk. Female adult turtles do a very good job of disguising their nests. In Florida, only individuals trained and permitted by the state are authorized to directly interact with marine turtles or their nests. Authorized permit holders, either volunteers or local government staff, monitor all nesting beaches in Florida. You can contact local government environmental officials to report a nest.

The best way to help protect turtles and their nests is to follow all the guidelines for limiting your impacts. These guidelines can be viewed on the Florida Fish and Wildlife Conservation Commission website at <http://myfwc.com/seaturtle>. You can also support a sea turtle conservation organization such as the Caribbean Conservation Corporation/Sea Turtle Survival League, [www.cccturtle.org](http://www.cccturtle.org).

*Question: How come there is a market for turtle eggs? What do they want the eggs for that an chicken egg can't provide? Is it true that the going rate for a turtle egg is 50 cents a piece? That's awful!*



**Answer:** All over the world people eat turtle meat and turtle eggs. Turtle eggs are considered a delicacy and, most importantly, as an aphrodisiac by many cultures. Those cultures are represented in Florida, and consequently, there are people that place a high value on turtle eggs even in the US. In the US, mainly in Florida, there is an illegal black market for sea turtle eggs.

*Question: Gary Appelson, advocacy coordinator of the Caribbean Conservation Corporation said—I think I read it in the papers—that poachers poke a wooden stick or fishing pole into the sand, and if the pole comes out sticky with yolk, it's a fresh nest and ready for harvest. I think you should do something about this, let people know what's going on.*

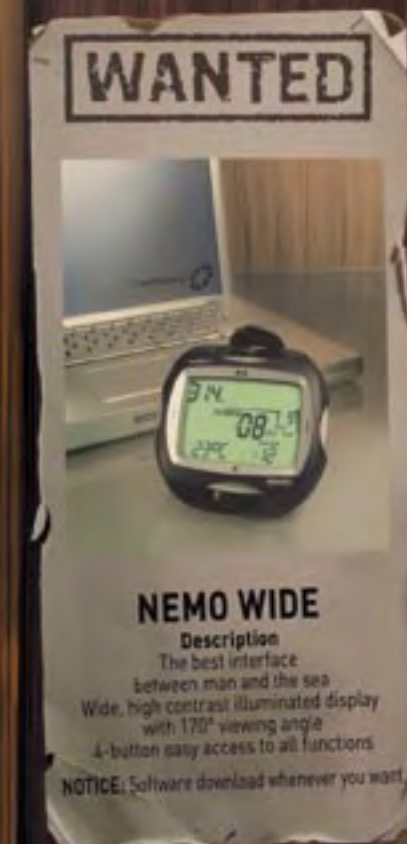
*I also would like to know what I can do, and since I know I probably won't have time to do whatever you suggest, tell me where to send money to help the cause!*  
—Buying a concious-Johnny, Tampa.

**Answer:** To answer your second question, yes, you can be directly involved in sea turtle conservation by buying a Florida Sea Turtle Specialty License Plate ([www.helpingseaturtles.org](http://www.helpingseaturtles.org)), joining a sea turtle conservation group like the Caribbean Conservation Corporation ([www.cccturtle.org](http://www.cccturtle.org), phone-352-373-6441), or by simply just donating money to a sea turtle conservation group. All the money generated from the sale of the sea turtle specialty license plates goes directly to sea turtle conservation in Florida! See Tracked Turtles For "Adoption". ■

## BIO for Gary Appelson

Gary Appelson graduated from college with a BA in Political Science with a specialty in Environmental Policy. He has a masters degree in Wildlife Ecology and Conservation from the University of Florida. He joined the Gainesville-based Caribbean Conservation Corporation as its Policy Coordinator in 1999. Appelson is currently involved in all aspects of sea turtle conservation and policy and is a registered lobbyist in Florida. He monitors the laws and regulations impacting coastal policies, the coastal environment and sea turtles. Appelson watchdogs the state's regulatory program for coastal construction, beach nourishment, coastal armoring and other activities impacting the beach, dune and near shore environments. CCC is currently in the forefront of the debate calling for coastal management policy reform and increased protection of coastal and near shore resources in Florida. In 2005, Appelson served on the Coastal High Hazard Study Committee, a 19-member governor-appointed committee to look at the need for coastal policy reform with an emphasis on balancing coastal development with resource protection. Appelson filled the only environmental position on the committee. He currently serves on the steering committee of the newly formed Oceans and Coastal Alliance. The alliance is a group of national and Florida-based conservation organizations focusing on coastal and marine resource protection issues. ■

The daily journal of life in and around water  
**UnderwaterTimes.com**



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

**mares**  
just add water



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POINT & CLICK  
ON BOLD LINKS



Edited by  
Millis Keegan  
& Peter Symes

# Equipment

Heaven sent



## Data directly in your mask

The DataMask HUD from Oceanic, with the air-integrated dive computer built directly into the mask has so far only been available for the military. Soon, it will be released to the public. With the digital optic system, you can clearly see the information you need, but still be able to focus on the dive, and it does not matter if viz is bad.

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

## Seac Sub Dry tech

This 5.5 mm drysuits 5.5 is anatomically cut for comfort and comes with large pockets, a sturdy sole boot and protection for the knees. The valves are reliable SI-TECH design.

[www.seacsub.it](http://www.seacsub.it)



## Evolved ride

You wanna zip from here to there? You wanna zoom without effort? The new AV2 Evolution has evolved to gold-plated contacts, so you will be traveling in style. But there is a reason for that extravaganza, and it is definitely worth it.

Gold is probably the best conductor of electricity and will not corrode. For the price, you also get an aluminium box to transport the hot scooter after use.

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

## Color-coded dive

This friendly dive computer, XR-Nx from Aeris has both Air and Nitrox modes, display oversized digits for easy reading, and is designed with color-coded bar graphs for easy reference while diving. When you reach a safety stop, the display changes to a count down display. Hot Swat compartment makes for an easy battery change.

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



## Roll the Bag

This padded roller dive bag comes with a regulator bag. Made out of sturdy material, reinforced box-stitching and corrosion-resistant locking slides and pulls, this bag might last you a lifetime. Lots of grab points makes handling it easy.

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



## A Warm Experience

No need to be warm-blooded with this suit that keeps you warm with a panel heated with batteries. The heat can be turned on and off when needed, and it takes only minutes to heat you up.

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





## Finest fit

Tailored fit... finest degree at shoulders waist and.. Sounds like a fitting for a tux now, doesn't it? But the stabilizing cradle, which eliminates tank roll and can hold up to four tanks, tells another story. Chest straps are positioned to fit both men and women. [www.apvalves.com](http://www.apvalves.com)

## Bob the hybrid

Feel like a manta ray as you glide over the ocean floor. The SeaBob is a cross between a jet-ski and a bodyboard, a nice little toy for some fun in the ocean. Surf and leap through waves, or take a deep breath and dip down to explore under the surface when feeling like it. You steer yourself along the ocean floor by moving your bodyweight and using your legs. [www.seabob.com](http://www.seabob.com)



## Field of vision

The Favola is a compact mask, with a small internal volume and a wide field of vision, looking up, looking straight ahead and even looking down. Check the patented "double joint" buckles. With the silicone skirt, the mask adapts to most any head. [www.technisub.com](http://www.technisub.com)

## Scout the area

A magic underwater eye allows you to scout the area before a dive. Or if you like to fish, check your hunting ground. While some anglers use Aqua-Vu systems to help them immediately catch more fish, others simply enjoy the excitement of being able to see and learn what's below the surface of a favorite lake. However you define "viewing" fun, the continuing cutting-edge refinements make Aqua-Vu the most potently effective, easy-to-use underwater viewing systems available.

[www.naturevisioninc.com/aquavu](http://www.naturevisioninc.com/aquavu)



## White fins with spring strap

Fit for a wedding, do be this pair of white colored fins. The Bio-fin Pro is made out of 100 percent rubber and promises to reduce muscle fatigue, energy use and air consumption. Just what a bride needs. They come in black for the groom.

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



## Wet/Dry

Mesh Gear Bag and Backpack with dry and wet compartments all in one. Drain-hole grommets in the bottom helps excess water run off. [www.armorbags.com](http://www.armorbags.com)





## The Zeagle combination

A combined regulator and inflator keeps the check-in weight down when traveling. Still, breathing performance has to be top priority, and the manufacturer promises easy breathing at all depths within sport diving limits. [www.zeagle.com](http://www.zeagle.com)



## Use your ocean eyes

With the inverted drop lenses, you get a great downward vision. But the real treat is the easy quick release lense system, that allows you to change to prescription lenses in a few moments, by yourself. [www.cressi-sub.it](http://www.cressi-sub.it)



## V-16

Not cylinders, but the Vortex V-16 can provide speed. The maker promises that it is up to 30 percent faster and more efficient than conventional fins. The design and the use of four material compounds makes the fin light weight and helps to optimize power and reduce drag. [www.oceanicworldwide.com](http://www.oceanicworldwide.com)

## Revamped skin

The Otter Skin MK2 has been revamped for 2007, which means that among other things, it now comes standard with a double back zip, heavy duty latex seals and double knees pads. [www.drysuits.co.uk](http://www.drysuits.co.uk)



## Get the booty

AKUMAL is a nice little boot with a rugged sole that creates a good grip on slippery slopes. [www.cressi-sub.it](http://www.cressi-sub.it)



## A snap & its done

The Eagle goggles bring clarity back to the swim also for those that needs glasses. The optic lenses are individually available in half-step increments from -1.5 to -6.0. [www.aquasphereswim.com](http://www.aquasphereswim.com)

## Minireview: Surface Marker

by Peter Symes



## No more excuses No reel needed

Surface Marker Bouys or Safety Sausages are among the most underrated pieces of equipment. Yet, they constitute such cheap potential lifesavers that it's beyond me why they haven't long since been made a mandatory part of the standard kit. Would you not wear a seatbelt in a car? Enter, this lightweight SMB from SurfaceMarker, and you are out of excuses. It comes in a handy pouch, which is easy to toss into the dive bag and carry in a BCD pocket. Deploying a Surface Marker Bouy isn't exactly rocket science—just get it inflated—yet some have to struggle with it. Despair not. The new two-tone buoy from SurfaceMarker presents an new way to deploy your safety sausage using a "Webbing Deployment System" (WDS). It is a total no-brainer, and you don't need a reel. The WDS consists of a 5.5m long and 2cm wide red and white webbing with a large stainless steel ring at one end and a snap hook at the other. Hook it onto the bouy, slip the ring over the thumb as shown on this drawing, inflate the bouy and, hey presto, it deploys at the surface. Any problems—and you just let the ring slide off your finger.

The bouy is 145 cm tall. While the webbing cord allows for good support during a safety stop, the manufacturer stresses that this is not a deco bouy. Later models will be. ■



## Warm & cozy

A 3-layer undersuit, with an outer wind-proof shell and a nice polar fleece lining will keep the dry suit diver warm and cozy on the inside. A zipped key pocket keeps your car keys in place during the dive.

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



## Hand held

Bright light leads the way, and size does not matter too much with the Kowalski Mini Xenon. For a compact hand held diving lamp, this little light provides a great shine. Charges externally, because a lamp that always remains closed will not leak easily.

[www.taucherlampen.de](http://www.taucherlampen.de)



## Challenger

Immersion watches are inspired by Italian designs and the brand is a part of the Geco Watch Company. They are famous for their distinct style and high technology.



## No mystery

Despite the name, there is no mystery with the good field of vision of the Mistique Single Lens, just a good design. This is a low volume mask, that has a double sealed skirt.

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

Balance: new Aero and Back Jac range.



AERO PRO →

BACK JAC ↑

**Cressi**

[www.cressi.it](http://www.cressi.it)

**Back Jac:** Rear inflating jacket with a large volume: 20 kg for size M. Two front fold-away pockets, two rear pockets, adjustable elasticised band. Lock Aid System weight pockets.

**Aero Light:** the new "Travel Friendly" Cressi Jacket, light on weight but full on substance: adjustable shoulder straps, two zip-up pockets. Lock Aid System weight pockets.

**Aero Pro:** Large volumes. Size M: 18.50 Kg. Fully adjustable shoulder straps. Fully adjustable shoulder straps.

**Aero Queen:** same features of the Aero Pro but specific style and anatomy for women. Adjustable elasticised band. Lock Aid System weight pockets.



AERO LIGHT ↑



# whales & dolphins



Edited by Peter & Gunild Symes



## Beluga Whales Facing Extinction

The isolated population of beluga whales of Cook Inlet in Alaska should be listed as endangered. Only about 300 individuals remain—a 75 percent drop from 1,300 animals estimated only three decades ago. Biologists concluded the whales have a one in four chance of going extinct within 100 years, according to an official status review released in December.

Beluga whales are small, toothed whales that are gray when born and white as adults. According to the fisheries service, they are extremely social and found in groups of between ten and several hundred. Alaska has five distinct populations.

*US Fisheries service proposes endangered listing for Beluga whales of Alaska's Cook Inlet*

"There are few places in the world like Anchorage where a species of whale is as visible, enthralling and accessible as the Cook Inlet beluga," said Mike Frank, attorney for Trustees for Alaska, which represented a dozen conservation groups who have petitioned to get the whales protected. "We need to do all we can to make sure that continues in the future."

The proposal will undergo a year-long review with public comment before written into law, modified or rejected by the agency. Previous attempts to list the whales have landed in the Alaska Supreme Court. This time, the issue will trigger emotional arguments about whether human activity near Anchorage, Alaska's largest city, has damaged a unique whale population isolated from its species since the end of the ice age. ■

NOAA



## Scientists enlist narwhals to collect deep-sea data

For years, scientists have been trying to collect deep-sea data in the ocean north of Greenland where warm, salty water is moving north and cold, fresh water is moving south. The mixing of these elements is of particular interest because it helps regulate the weather in northern Europe. Since some data suggest there has been a warming and freshening of water in the area, scientists are eager

"They basically collect data all the way down on their dive profile and on the way back,"

Over each 24-hour period, a single narwhal diving in the Davis Strait—which connects Baffin Bay in the north to the Labrador Sea in the south—transmits about 410 depth-temperature readings from depths ranging between one and 1800 meters. ■



to learn what this means for the climate models that policymakers are using to determine how the world should respond to global warming.

But the researchers have been deterred by harsh weather in the region. Now they have found deep-diving oceanographers willing to do their work for them: narwhals whose wintering territory is near the northern Labrador Sea. Although scientists have measured ocean temperatures during the region's two warmest months of the year, no one has gauged the water in winter. The scientists hope to attach satellite tags to as many as ten narwhals over the course of a year. The tags have time, depth and temperature recorders that will allow researchers to track whale movements and diving behaviour as well as ocean temperatures in Baffin Bay. Narwhals dive more than a mile below the ocean's surface.

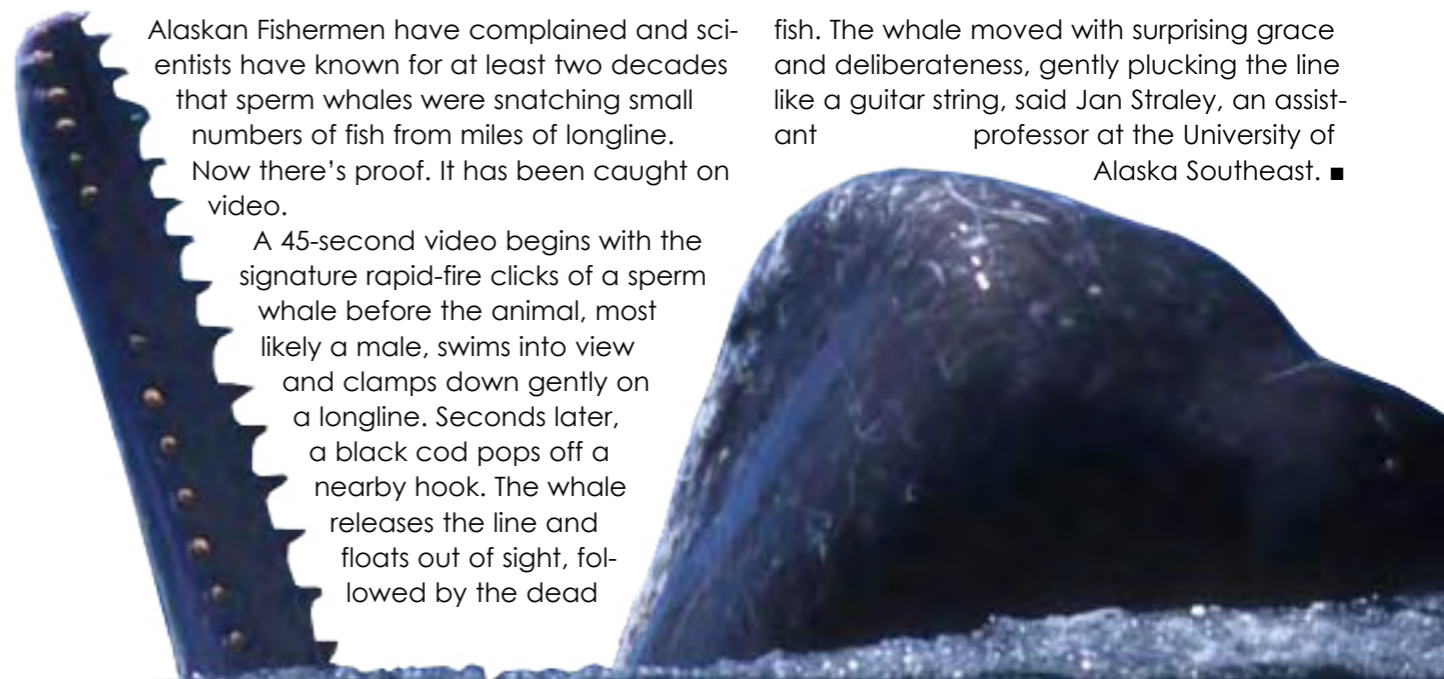
## Sperm whale caught red-flipped

Video footage shows sperm whale pilfering fish from fishing line

Alaskan Fishermen have complained and scientists have known for at least two decades that sperm whales were snatching small numbers of fish from miles of longline. Now there's proof. It has been caught on video.

A 45-second video begins with the signature rapid-fire clicks of a sperm whale before the animal, most likely a male, swims into view and clamps down gently on a longline. Seconds later, a black cod pops off a nearby hook. The whale releases the line and floats out of sight, followed by the dead

fish. The whale moved with surprising grace and deliberateness, gently plucking the line like a guitar string, said Jan Straley, an assistant professor at the University of Alaska Southeast. ■



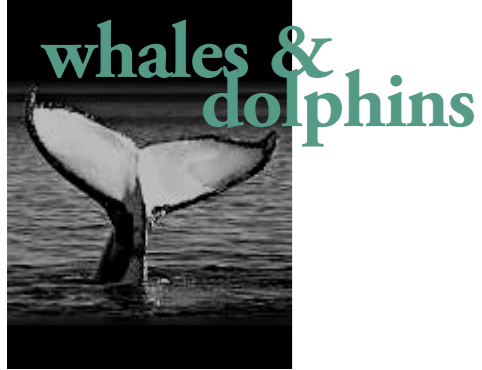
BARB ROY PHOTOGRAPHY

Topside & Underwater Photography  
Expedition Photodocumentation  
Dive & Travel Journalism



CLICK AD TO EMAIL OR CALL:  
604-588-1588 BC CANADA





PETER SYMES



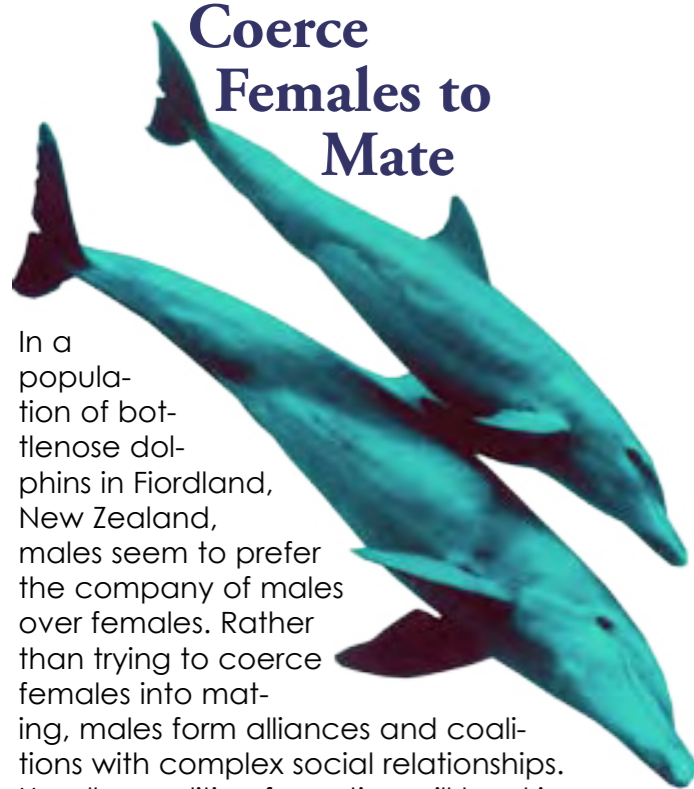
## Some Bottlenose Dolphins Can't

### Coerce Females to Mate

In a population of bottlenose dolphins in Fiordland, New Zealand, males seem to prefer the company of males over females. Rather than trying to coerce females into mating, males form alliances and coalitions with complex social relationships. Usually, coalition formation will be driven by short-term gains for the helper (for example access to females). But there does not appear to be any short-term benefits in coalition and alliance formation in this population. Instead, one male band seems to spend much more time with sexually receptive females and females with new calves than others.

This may explain the complex relationships we observe in male bottlenose dolphins, which are only paralleled by human social strategies: the formation of alliances and alliances of alliances, also called coalitions. These alliances and coalitions are then used to out-compete other male bands to access females. ■

SOURCE: D. LUSSEAU (2007) PLOS ONE 2(4)



## Florida Manatees About to Lose Their 'Endangered' Status

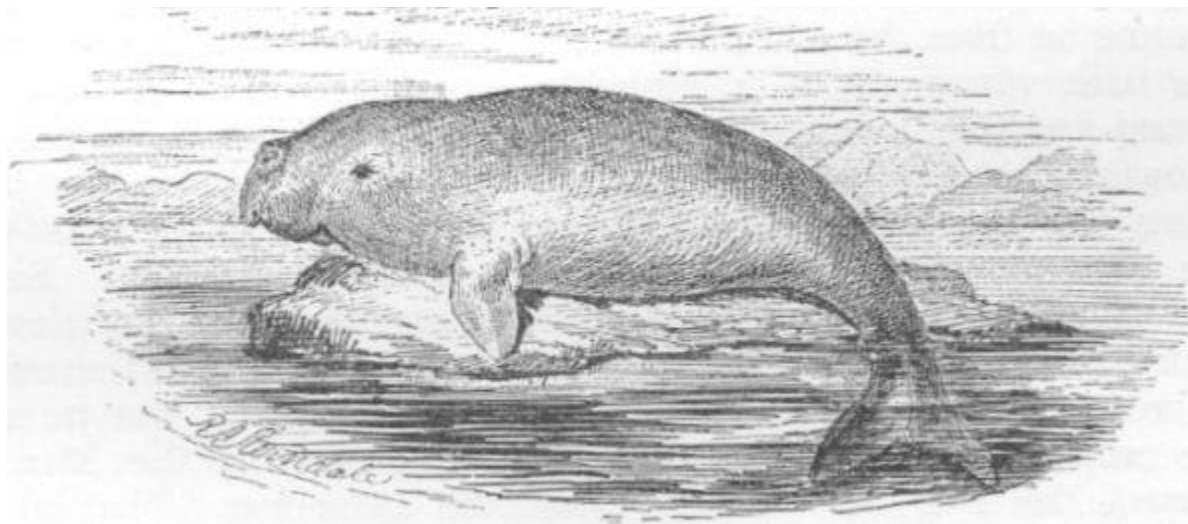
The U.S. Fish and Wildlife Service recommended downlisting the manatee's status from endangered to threatened, a move that indicates the animal has rebounded from the brink of extinction. Following a five-year review of manatee populations in Florida and Puerto Rico, the Fish and Wildlife service has found that the species no longer fits the criteria to be deemed endangered.

Federal endangered status means an animal is at immediate risk of extinction. Threatened status means a species could become endangered in the future if protections are not maintained. The manatee remains protected under the federal Endangered Species Act, making it illegal to harass, poach or kill the animals. in the state.

"Based on the science it is clear that

manatees are no longer facing extinction in all or a significant portion of its range," Dave Hankla, field supervisor for the Fish and Wildlife Service's Jacksonville office, said in a statement. This year's annual manatee census recorded 2,812 animals in Florida. In 1991, the survey's first year, 1,267 manatees were counted. "This is an opportunity for all of our manatee partners to celebrate a conservation success milestone."

Patrick Rose, executive director of the Save the Manatee Club disagrees. He said a classification switch could mean changes in boating and development restrictions that were established to protect manatees. "This is not the time to be moving to say that they're going to be downlisting the manatees and then dilute the protection for them." ■



## Humpback Whales Boast the Longest Mammal Migration

Each winter, humpback whales travel all the way from the Antarctic to the northern tropics to find warm water in which to raise their young. This migration is the longest for any mammal ever recorded. Some researchers claim that the grey whale holds the record for longest mammalian migration—from Mexico to the Arctic—estimated at about 7600 km. However, no individual grey whale has been documented travelling the full extent of their migratory range, and it's possible that no grey whales actually make the entire migration.

On the other hand, one humpback mother and calf have now been recorded to have made a 8300-kilometre trip in 161 days.

Using satellite data, researchers at Cascadia Research Collective in Olympia, Washington, US, also recorded sea-surface temperatures for the sites where humpbacks spent the winter. Wintering areas occur where waters with temperatures between 21°C and 28°C are found. This supports the idea that the long migration saves the whales energy in the end.

But the whales and other migratory creatures are suffering from global warming that puts them in the wrong place at the wrong time. A warmer climate disrupts the biological clocks of migratory species including dolphins and turtles, said Lahcen el Kabiri, deputy head of the U.N.'s Bonn-based Convention on Migratory Species.

Many creatures are mistiming their migrations, or failing to bother as changes between seasons become less clear. The shifts make them vulnerable to heat-waves, droughts or cold snaps. ■



FRITZ GELLER-GRIMM





focus

Text by  
Millis Keegan

# Fins

ALL PRODUCT  
IMAGES AND ACTION  
DIAGRAMS ARE  
COURTESY OF THE  
MANUFACTURERS



Diagram of how the Oceanic Suction Force 2 split fin design forms a directed vortex providing forward thrust

WOLFGANG LEANDER

**Fins provide a great way to get from point A to point B in an H<sub>2</sub>O environment. In fact, with few exceptions, it is the only way to get around with ease while diving.**

The good news is, there are more styles and models to choose from than ever before. By the same token, the bad news is, there are more styles and models to choose from than ever before.

As a diver you are limited by your strength and stamina. This is when the design of the fin really can work for you. If you are an able-bodied, strong person, you will have little problem with whatever fin you happen to wear. A good blade design will merely fine tune your performance. But if you know your stamina is low, and it has been some time since you visited a gym, choosing the right fin can make all the difference between a

bad or good experience. However, it is easy to get confused. Fin designs have evolved over the years. Long fins, short fins, split fins, twisted fins, stiff fins, soft fins...

### How to choose?

We keep telling you to do your research, but looking at specifications in isolation will most likely just add to your confusion. To figure out what the right fit for you is, you need a step-by-step approach that will narrow down the options with a process of elimination.

### Fin Formula

Begin with clarifying which kind of diving you would normally be doing. Also, consider the level of your physical fitness in this context. Then, start looking for a fin. Today, there are choices that respond to different needs. It's a good thing. At the end, the fins need to be comfortable, and they need to perform.

### So, who are you?

Will you be mostly diving in a way where you need to cover long distances and rough water during your dives? Will you be fighting current and waves on a regular basis? Is it more important for you to be able to maneuver with ease under water? Or, are you one of those that just likes to cruise along and enjoy the view?

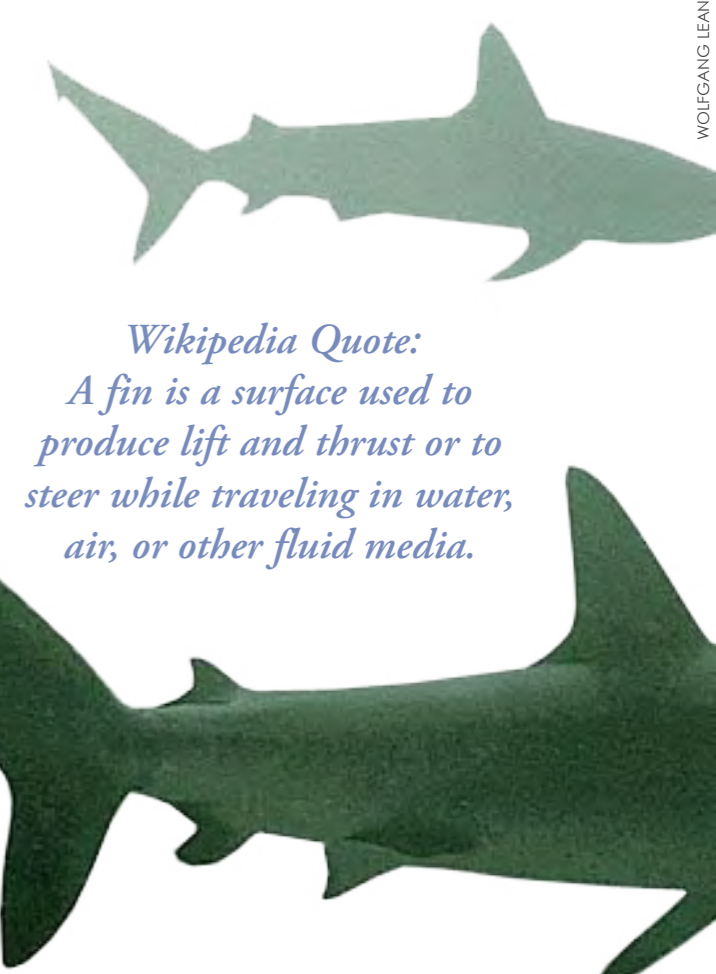


### The Mount Everest Diver

The Mount Everest Diver is a diver looking to move effectively and effortlessly through water,

while covering long distances during his dives. He does not like to take the easy road, the tougher conditions the better. With a compass in hand, he plots the course to the dive site from the shore. Then, he endures the long surface or under water swim to the site with a smile on his face—at least, with the right fins, he does.

You need a good pair of fins that can push water effectively and move you forward without tiring you. You need a large blade with some

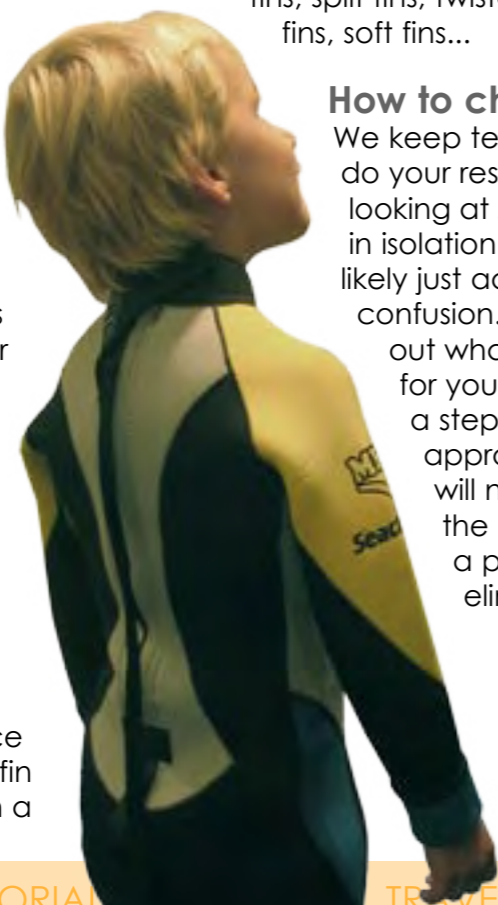


*Wikipedia Quote:  
A fin is a surface used to produce lift and thrust or to steer while traveling in water, air, or other fluid media.*

stiffness built in. How much stiffness depends on how fit you are, but you will need a fin that can transport you and your dive equipment through the water resistance without tiring you.

### The Spear Fisher

The Spear Fish Diver needs maneuverability as well as the option to move effectively through water. In fact, he needs to go from 0-





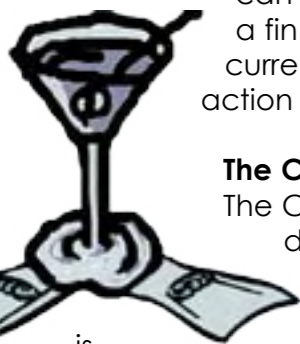
# focus



60 in a split second in order to land that catch.

### The Ocean Diver

The Ocean Diver is a diver who knows that any second of the dive, the current can pick up. He needs a fin that can fight the current and violent wave action on a regular basis.



The Cocktail Diver is a diver that just likes to cruise along and enjoy the view. He is typically found in tropical water, and cares nothing about efficiency and speed. He lives in the moment, knowing that the dive boat will pick him up when he runs out of air or time—whatever comes first.

### The Cocktail Diver

### The Explorer

The Exploration Diver is a diver on a mission. They can be photographers, wreck and/or cave divers, and the one thing they all have in common is that there is a purpose to their dive. They need full control of every movement during the dive, not to stir up silt or scare the wild life. They have to be able to maneuver with ease. A conscientious tropical diver who needs to move carefully around to protect the reef might fall under this category, too. You need a shorter, more flexible fin than the average, which still has the capacity to move you forward with ease.



### The Snorkeler

The snorkeler hangs mostly on the surface. Occasionally, he takes a plunge to take

Illustration of the split fin principle. The blade opens up, creating both a pushing vortex directed away from the diver and lift on the inside of the blade

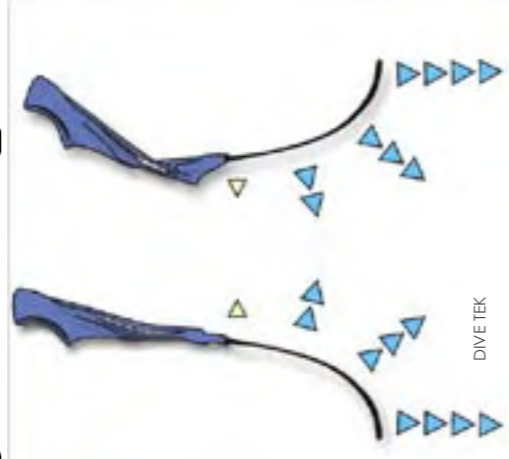
a closer look at something, but the main objective of his time in the water is to observe from above.

The snorkeler does not have the advantage of using the fin while immersed. He might favor a more flexible, light weight fin to handle the occasional "air" flip in an effective way.

Gone are the days when the rubber fin ruled the world. And for all you rubber fin fans out there, don't get offended. That is still a good design, but maybe not for everyone.

### The Physics of Fins

When diving, you need a flexible fin of moderate length. When you push down on the fin when kicking, you bend it, and it is largely the spring-back force from the fin as it straightens that propels you forward. This makes the material choice—



and fin shape critical to getting the right spring force for optimal efficiency.

### Fin Types

#### Paddle fins

The traditional paddle fin is a really simple design, a flat blade with a mounted foot pocket. The material of the blade is made out of stiff plastic, composite or rubber. The design of the fin generates quite a bit of resistance during the kick cycle and requires rather good leg muscle strength for effective strokes. Because of this, the paddle fins are sometimes considered to be not so efficient.

A more developed paddle fin can come with a water vent through the blade, opening backwards on the underside and forwards on the upper side, blowing a jet of water backwards out of the fin as the fin flexes. Others have convoluted channels and grooves, in an effort to improve efficiency.

In 1985, Mares developed a new feature for water fins called channels. Traditional paddle fins suffered from water "spilling" off of the edge during the down stroke of the diver's kick. This loss of water translated into a loss of thrust,

Mares Quattro with the characteristic rubber strips that makes the fin flare creating the channelling effect



A traditional paddle fin with stiff blade—simple, durable



meaning that the diver's effort was not being fully utilized. Mares' channels worked to maximize fluid stream channeling, keeping the water under the fin in place, so that it can be displaced during the down stroke. This increase in water displacement allowed for greater thrust levels and improved overall performance.

The addition of channels or grooves made the effort and energy expended by the diver more valuable—more thrust was generated with each stroke. But this advance in technology did not solve the energy inefficiency of the kick cycle upstroke.

### Split fins

Split fins are considered one of the most efficient hydro-dynamic fin designs. However, that does not necessarily make it the best overall fin.

In the split fin, as the name indicates, the blade is split, which causes a kind of propeller movement. Using traditional fin kicks causes a suction and creates a lift, which allows the diver to move with less effort compared to using a paddle fin.

Water flowing towards the center of the fin's "paddle" portion also gains increased speed as it focuses, creating a "scooping" or channeling effect.

Split fins are generally regarded as among the most efficient fin designs, although there is



APS Mantaray's Dual Water Channeling System and side wings function as a combined unit to give the fin its ultimate stability and performance



# focus

Force Fin in a nutshell. Made in one piece, blade is split down the middle and with upturned fintips



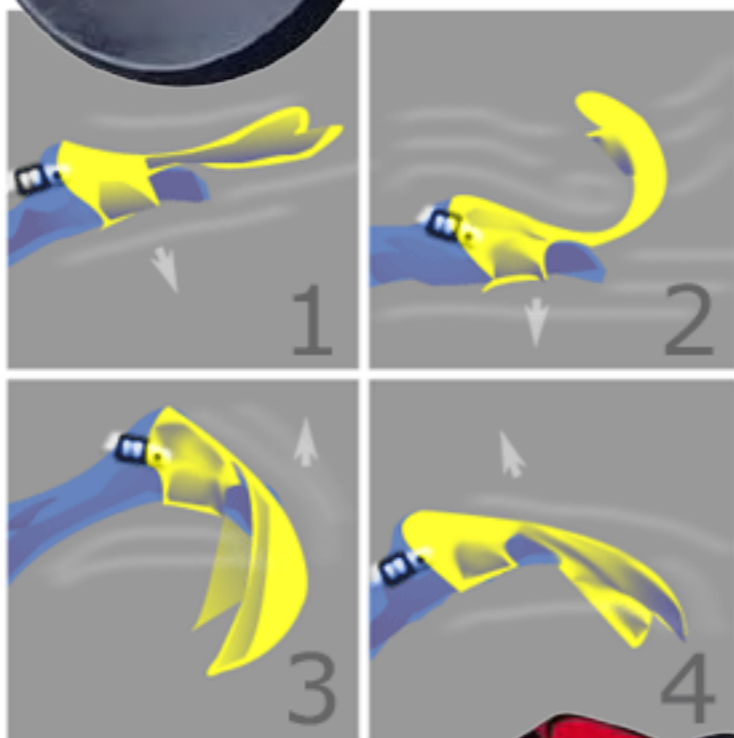
Force Fin swimming fins utilize the body's strength and put it where it's needed. The human body is built to have more strength when kicking down (during freestyle), than when kicking up. The downward, or power, phase of the kick emphasizes the powerful quadriceps muscle group at the front and side of the upper leg. The upward, recovery phase uses the weaker hamstrings at the back of the thigh

ongoing controversy among divers as to their versatility—many report that split fins cannot be used for frog kicks and are poor for maneuverability.

### Force fins

Force fins are in a category of their own. Radically different from all other fins, their now classic model is characterised by having a wide upturned blade made of polyurethane, with a shallow V-shaped cut into the end. Force Fins were the first to mimic the fins seen in nature and also pioneered the split fin.

The fins are characterised by a different swimming sensation and valued among their devoted fans for their high efficiency and acceleration, while others dislike their maneuvering characteristics. However, it



Attaching adjustable whiskers that channel the thrust enable the wearer to change the characteristics of the fin to make it fit the type of dive

is also said that you can back up with Force Fins. Also, for divers who wear neoprene wetsuit boots in colder waters, the negative buoyancy of the lightweight Force Fins is not sufficient to counter the positive buoyancy of their boots, calling for the use of ankle weights.

**Freediving fins** are far longer and are designed to work with slow stiff-legged kicks that conserve energy and oxygen. Though primarily intended for high efficiency at variable depths, they can still deliver



Top-end freediving and snorkelling fins are now made in advanced materials such as layers of carbon fiber and fiberglass

Monofins are made with speed swimming in mind



Karmo Maasik is owner of SpecialFins in Estonia specializing in high quality swimming fins for lifesavers, freedivers, swimmers, underwater rugby players and spearfishers. Twice the world champion in finswimming, Karmo Maasik custom make all their fins according to individual needs and requirements. They are made of carbon, Kevlar, fiberglass and hand-laminated fiberglass, which are vacuum processed in special moulds. SpecialFins mission is to make the world's best fins for sports and challenge, fun and adventure.

Karmo Maasik writes: "I recommend the following fins for these types of divers: The Mount Everest Diver should use the Freediving Stereofins Carbon. They are very good flexible fins, hand laminated and produced from two layers of

thin carbon and 18 layers of fiberglass.

The Spear Fisher should use the Hybrid Professional made of two layers of hybrid material 50 percent Carbon and 50 percent Kevlar, hand laminated, with more than 20 layers of fiberglass.

The Snorkeler should use the Freediving Stereofins Pro." ■



WWW.SPECIALFINS.COM

**John Melius, President of Morfin Corporation, writes:**

Have you ever wondered how it would feel to be a fish in water and wander effortlessly, or to maneuver with speed through tight areas hardly disturbing the environment? Now you have the opportunity to come closer to this feeling than ever before. What you need to have in order to do this is the same kind of propulsion tools that fish use, which means pelvic and dorsal fins and a tail fin moving like a fish.

Why do they work? As in nature, excellent hydrofoils (wing shapes) generate excellent lift just like airplane wings. But wings only work when there is a flow over them, and so, an airplane needs a propeller (a rotating set of wings generating flow) just like the fish needs a relatively flat body and pelvic and dorsal fins to generate flow. Our fins work exactly that way, unlike paddle and split fins that work by creating a void in the water and being sucked into the void.

*What benefits does this new fin technology bring to every type of diver?*

First, you can make much smaller kicks (like fish) for greater control in tighter environments. Mor-Fins do not need to create a "void" in the water to work (the reason that "scuba kicks" are so large is to work the void longer) and our fins work in each phase of the kick (there is no recovery kick which means that you can swim almost full speed with only one fin). Second, the tail fin gives extra power and speed to your kick with no extra work.

### Why?

Because it generates power simply by being in the right place, as water flows over it the same way that an airplane wing generates power when air flows over it.

Third, these fins cause less silting while generating more directed power where you want it. This comes from the delta wing shape of the tail fin and blade that focus

the flow of water directly in the center of the fin pulling water from the sides of the fin to reduce silting and reduce vortices and drag.

Fourth, the blade and tail fin work in serial amplification of the flow of water to increase lift producing more power with less effort.

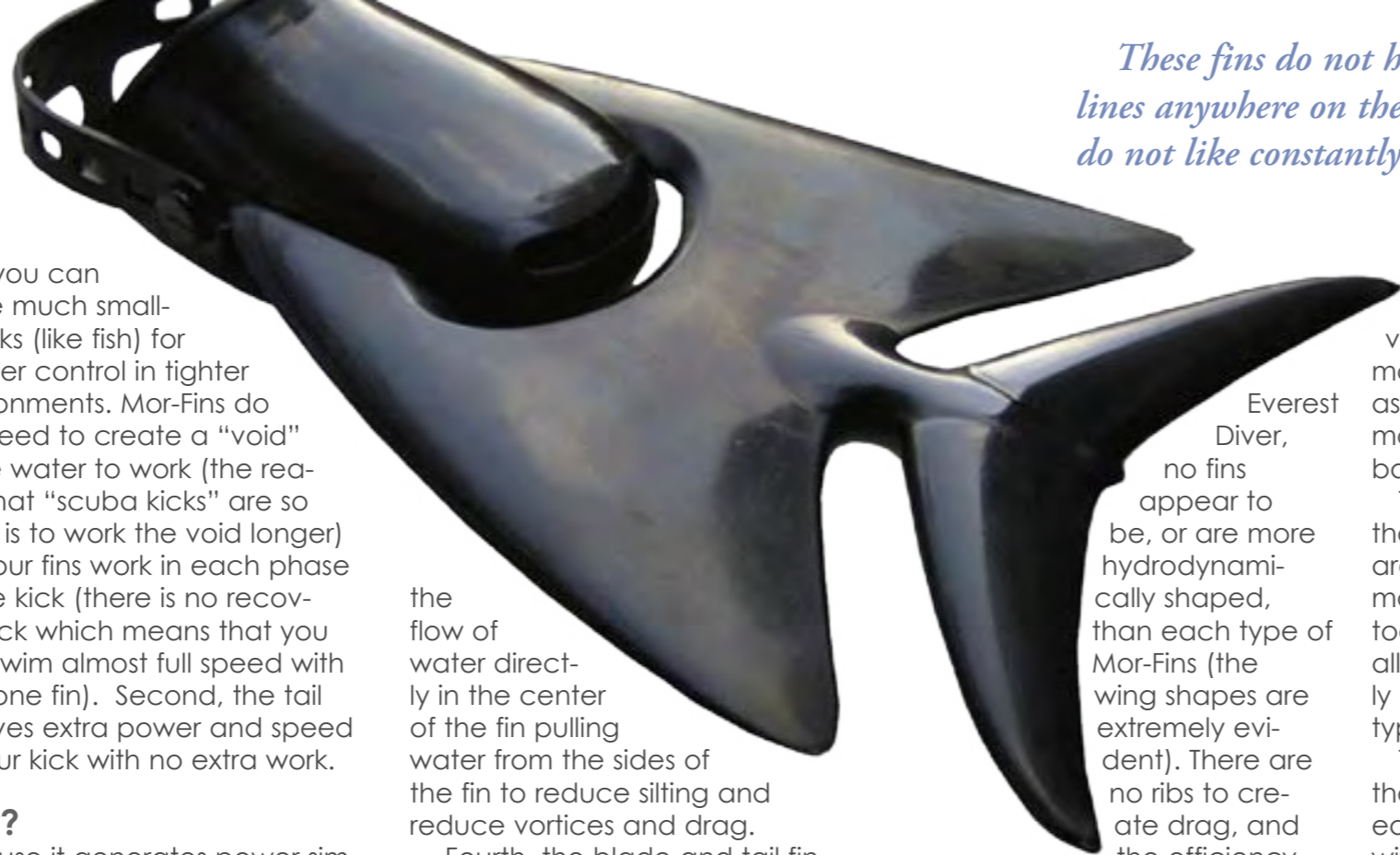
Fifth, the fins bend near the ball of your foot to allow more natural movement with less effort while producing more power using a living hinge.

All of these features are patented except for the living hinge that is patent pending. Therefore, these fins benefit you with more power, speed and comfort with more maneuverability using tighter kicks with less effort more efficiently.

### Which one?

The question is not which one of these fins would work best for which type of diver. The question is which one of these divers wouldn't gain from using Morfin's Delfins or VT-300's? For the Mount

*These fins do not have any straight lines anywhere on them, and machines do not like constantly changing curves.*



Everest Diver, no fins appear to be, or are more hydrodynamically shaped, than each type of Mor-Fins (the wing shapes are extremely evident). There are no ribs to create drag, and the efficiency

and ease of use of these fins are remarkable.

The Spear Fisher will accelerate faster and for a longer period using these fins and tight small kicking like the fish that he is tracking. Tighter smaller kicks create less drag using less effort and allowing more of your effort to go towards speed.

The Ocean Diver cannot have a better fin

for handling currents because these fins do not try to create voids in the water to move. The moving water in the current is an asset to fins with wings. Wings use moving water and convert it into badly needed power in a current. The Explorer cannot find fins that have this much power and are smaller. These smaller fins maneuver just by moving your toes without your legs moving at all when necessary, but give highly efficient movement with any type of kicking too.

The Snorkeler will not find fins that are more comfortable and easier to use with speed coming with effort that is less than walking on land. Fish propulsion is fast yet efficient, powerful yet comfortable, and very maneuverable.

*What other qualities could you want for any diver?*

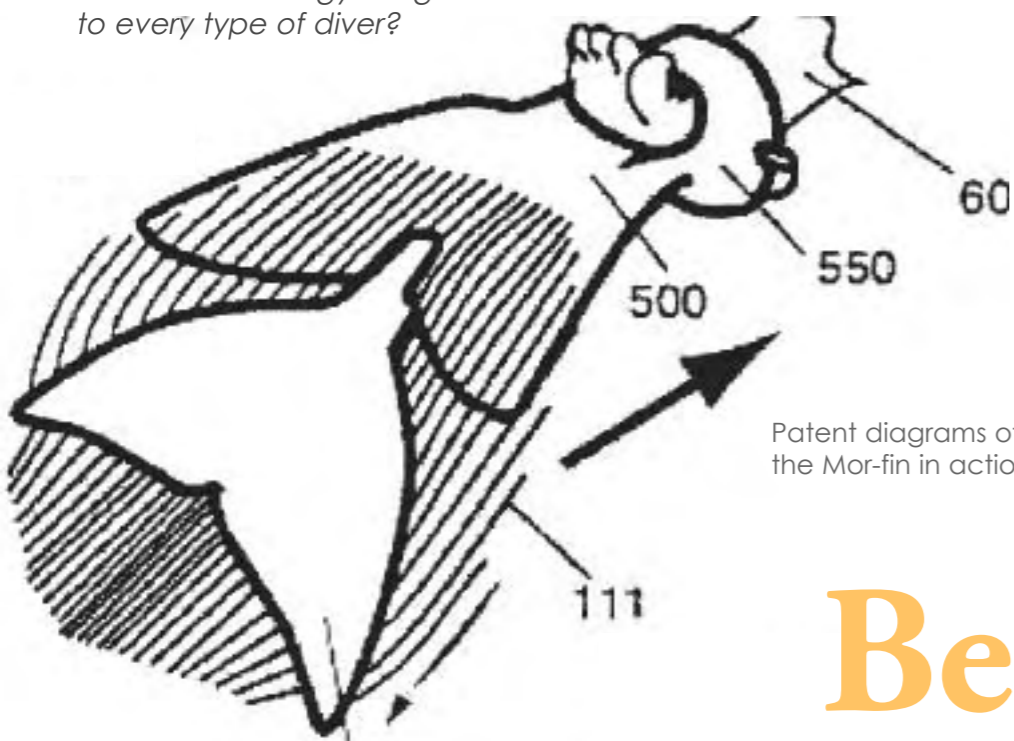
One last question may remain. Why don't you know someone who already uses these fins and loves them? Even though the first patent

was filed about ten years ago on these fins, the road to manufacturing has been difficult because of the hydrodynamic shape of the fins. These fins do not have any straight lines anywhere on them, and machines do not like constantly changing curves. So, the road to quality manufacturing has been a slow, but steady one leading us to today.

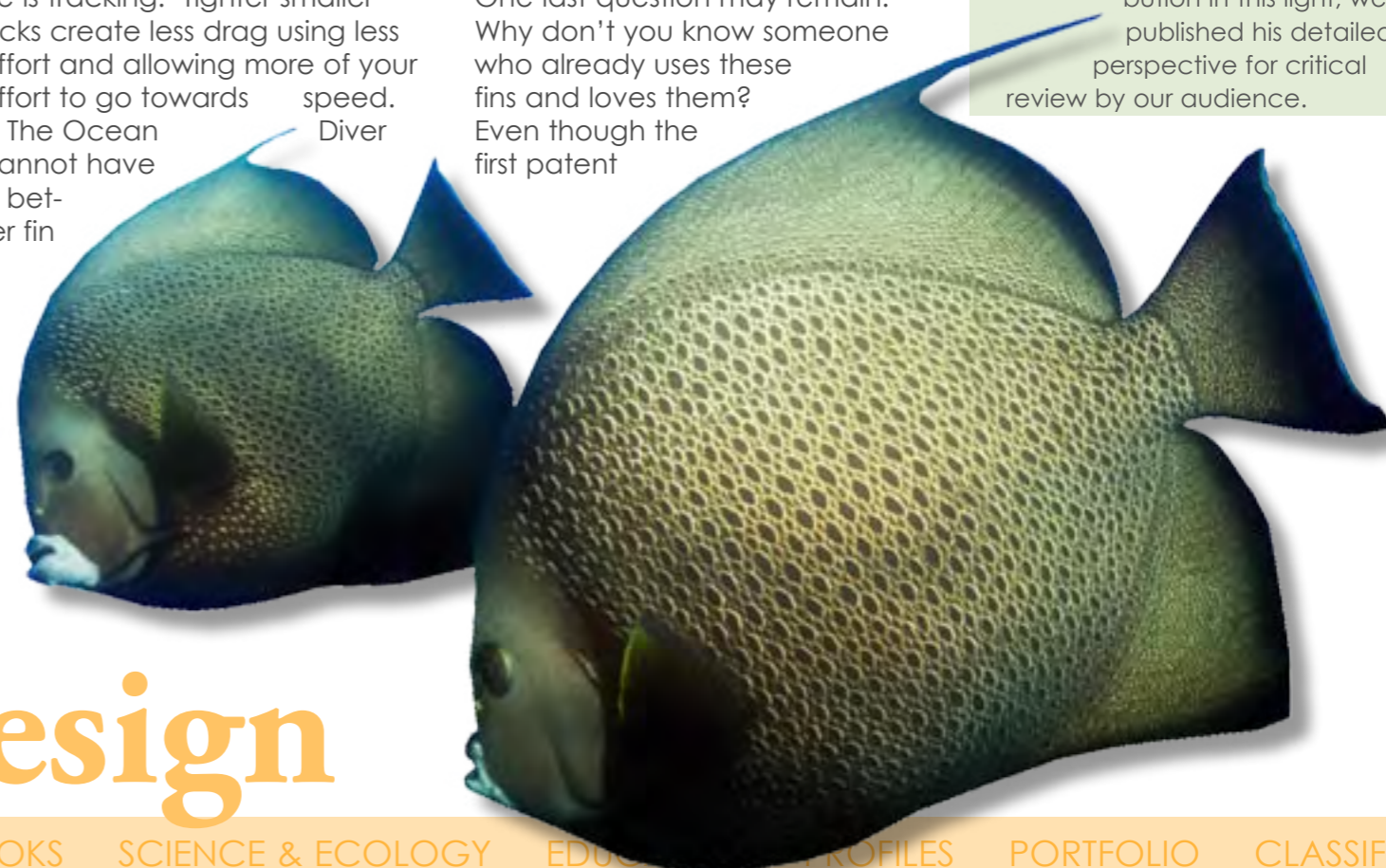
They are available now, and will be available soon in six sizes for open heeled fins. So, if you are curious to experience how fish swim instead of swimming like frogs (paddle and split fins), check out our web site, [www.mor-fin.com](http://www.mor-fin.com) for a no risk purchase to experience swimming with the only winged fins, Mor-Fins. ■

### EDITOR'S COMMENT:

Publishing Mr Morfin's letter took a bit of deliberation, since as president of a fin-manufacturing company, Mr. Melius obviously has a vested interest in the subject and promoting his fins. However, as we would like to credit our readership with being able to view his contribution in this light, we published his detailed perspective for critical review by our audience.



Patent diagrams of the Mor-fin in action



# Behind a design



# Fin Care



Rinse with fresh water after a dive

## Do's & Don'ts

Store your fins properly, and they will last a long, long time. Save the inserts, that helps keep the shape. They should be rinsed with fresh water after a dive, and dried before stored away, with the inserts. This is particularly important for a full foot fin.

- Store in a cool and dry place. Do not store in direct sun light.
- Do not store them standing on their blades for any long period of time. Hang them up if possible.
- Avoid leaving the fins in a car trunk or in direct sunlight for a long period of time on a hot summer day. The heat deforms the blade, which can seriously affect the performance of the fins.
- Also, avoid contact with chemicals. Exposure means that rubber and plastic materials can degrade, and that goes for pretty much all of your dive equipment. Even storing your equipment near chemicals, gasoline and solvents can cause problems.



Leave out of sun, avoid chemicals

## Use

To avoid stress on a full foot fin, wet the pocket, fold over the back of the fin, insert your foot and flip up the back part.

To avoid stress on a heel strap fin, use your buckle. Loosen the strap, buckle up, pull to fit. That way you reduce the stress on your buckle, which will most certainly not like you if you keep stretching and pulling your strap when putting your fin on. However, if you are one of those who like the speed and convenience of the pull the strap-method, always, always keep a couple of spare straps at hand.

## Buckle up, buckle down, buckle shut, buckle tight

There are a number of different solutions to keep your foot in your fin, and the buckle and/or strap should also be considered when shopping for a fin. All you warm water divers out there, you probably have no idea why we are even addressing this, unless you have some physical problems that makes it tougher for you to handle yourself before and during a dive. But for us cold water divers, a dry suit and dry gloves can really put a damper on our graceful appearance in the water. Before we spend money on a good quality fin, we should take care to look for a fin we can put on and adjust with ease, and at least bring your dry suit gloves with you while you do your shopping.

*Always keep one complete strap as a spare*



Metal springs are more durable, and flexible

Metal springs with finger strap

Simple rubber strap for buckles

reinforced with slats of steel

The commonplace buckle and strap set allow for easy adjustments of strap tightness

## A variety of fin straps

You have heard it before, and we all know it, yet I have enough dives under my belt to know that we don't always follow our own advice, and this one is worth being a nag about: Be prepared, always keep one complete strap as a spare, including both locking buckle ends. ■

**Special thanks** to the following participating fin manufacturers for their help with the fin feature article:

APS Mantaray  
[www.apsmantaray.com](http://www.apsmantaray.com)

Beuchat  
[www.beuchat.fr](http://www.beuchat.fr)

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

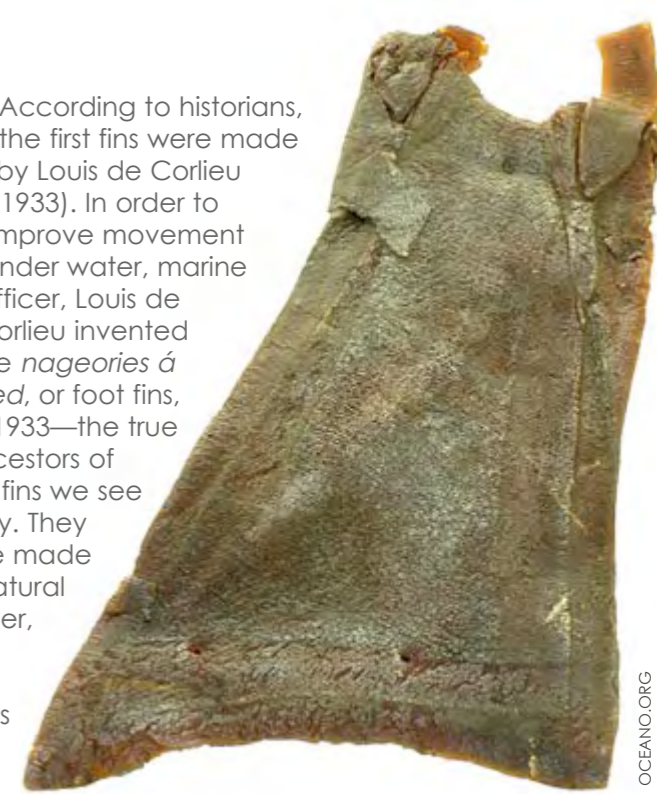
Mor-fin  
[www.mor-fin.com](http://www.mor-fin.com)

Seemann Sub  
[www.seemannsub.de](http://www.seemannsub.de)

Elastic bands for securing fins with footpockets



Mares' ABS buckle is hinged and can be flipped open even with gloves on



According to historians, the first fins were made by Louis de Corlieu (1933). In order to improve movement under water, marine officer, Louis de Corlieu invented the *nageoires à pied*, or foot fins, in 1933—the true ancestors of the fins we see today. They were made of natural rubber, reinforced with slats of steel

With Aqualung's HF (Hands Free) Buckle, you just step on the red bottom to release the strap

For bare feet or boots? If you dive in cold water you'll need the boots. You can use these in warm water too



OCEANO.ORG

# profile

Interview and photos:  
Peter Symes  
Supplementary product  
photos and historical  
images courtesy  
of Force Fin



Jean-Michel Cousteau tries out the Force Fin Design that Bob Evans designed for his team

to think of inspiration as floating in the universe like seeds. Ideas are out there just looking for a fertile mind in which to grow. Take our new OPS fin that we are making for Jean-Michel Cousteau's Ocean Futures Dive Team. I conceived of this fin watching water wick to the end of a leaf of a tropical plant. The concept is before us everytime it rains.

**What influence did your friends and family and your upbringing have on the choices you made in life?**

I can credit my family for everything

**Our talks with Bob Evans were just full of good ole plain fun, with lots of laughs and entertaining anecdotes, yet serious and focused on the subject. From the first impression, he was open, welcoming and very conversational. Inventor of the legendary Force Fin, multiple**

**award-winner and industry legend with a long list of merits to his credit Bob Evans is obviously both multi-facetted and multi-talented and impossible to fit into any of the usual stereotypes boxes. Here are some of his thoughts on the connection between shape and function.**

**When were you first attracted to the ocean?**

My great-grandmother had a summer house in Hermosa Beach, California. My grandmother taught me to swim in the sand troughs that remain full of water at low tide. I grew up in Hermosa Beach, California, home for California surfing and diving industries. The Ocean has always been there for me.

**What sparked your interest in diving?**

When I was a child, my family and I were having lunch on a breakwater in Marseilles. A truck pulled down the jetty, and a couple of guys in wetsuits with steel tanks on their backs jumped out of

the truck and into the water. They reappeared about 20 minutes later dragging a box between them. As they passed, my father told us all not to look at them. It was there and then, I decided I was going to be a scuba diver.

**What inspires you, and how do you get your ideas?**

Dr Phil Nuytten (see interview with Phil Nuytten in X-RAY MAG issue #9) calls me "Bob by God". I like



## A conversation with Bob Evans

# Splitting Fins



# profile

Force Fin Extra with the characteristic whiskers



*If you feel a fin, then it is working against the water. If you move or better yet, feel like you are effortlessly flying, but you feel no fin, then it is a good, maybe even great design.*



*Force Fins are shaped by hand  
We do not use computers.*

Force Fin also supplies the military

## How do you sense or judge that a design is right?

By its lack of sensation. Earth is all water. Everything in nature is designed by and for the movement of water. Water always takes the path of least resistance. If you feel a fin, then it is working against the water. If you move or better yet, feel like you are effortlessly flying, but you feel no fin, then it is a good, maybe even great design.

and Excellerating Force Fins are longer and flatter than the Original models, so we enhance their effectiveness by adding winglets, Bat Wings, Whiskers, Speed Pods or Sharks' Teeth. These shapes are designed to increase the speed and volume of water travelling over a longer and flatter fin blade.

An early study of vortex generators

I have ever done. After Marseilles, my parents gave me a surf mat with a clear window that allowed me to look down into the clear waters of the Mediterranean and see all of the fish and creatures below. I became obsessed with the ocean at this early age. A cousin taught me to free dive. My father is an artist. He taught me to sculpt. Force Fins are shaped by hand; we do not use computers.

## Explain what you perceive as the connection between shape and function?

Fins are a perfect example of the importance of this relationship. Engineers make other fins in a computer. They are all flat and their function is best understood 2-dimensionally—pushing and pulling the fin blade against the water. As I said, I sculpt the

Force Fin shapes. There is a volume of water behind you, above and below, all waiting to be activated by the movement of your fins. The shape of Force Fin, its leading edges at the side of the foot pocket, its smoothness and curves, its structure combined with its flexibility, all work to draw the total volume of water over and under the blade, and the reaction of the water to the motion of the blade all work to accelerate the water through the V-split, no matter what position you move your leg. Our Extra

Having fun making customized fit for Jean-Michel Cousteau



**What do various shapes mean to the performance of a fin?**

Everything. For example, holes in fins inhibit water flow. They create more work. We're terra creatures and our frame of reference for moving is resistance against the soles of our feet. That makes us comfortable with fins that offer that resistance. But for water to move quickly, it must be free. Shapes that are designed to freely move water from the front of the blade to the rear will give better performance than shapes that are designed to capture water.

**How does one select which fin is appropriate for him or her?**

We have found that the most important factor for fin performance is how it fits the personality of the diver. That is why we make so many models of Force Fin. All fins marketed today work. I believe that ours work better and our company is exclusive in its ability to explain how and why they work better, but the fact is that the fin must fit the diver's personality for it to work best for them. First, it must comfortably fit

Bob Evans engaging X-RAY MAG editors Andrey Bizuykin and Millis Keegan in debate

the foot of the diver. It must also fit their application. A soft flexible fin will be most efficient for a diver who is under light loads—diving for recreation in warm waters. A flexible fin may work in more demanding conditions, but it will have a fall-off in efficiency if the diver is carrying heavy loads, diving with doubles, wearing a drysuit, and if their kick is very strong. In this case, the fin must give more power, which we prefer to call leverage under load, and a stiffer fin is more suitable.

**What do you consider your best idea?**

I will not argue with experts. Our Tan Delta Force Fin, which is based upon the Original Force Fin design is in the New York Museum of Modern Art for changing the way in which we perceive moving through water. That is a very tough act to follow. I am excited about our new Launch Pad line of fins. They have a foot pocket to which you can attach many different fin blades, but with a new twist. At the point where they attach there is an interlocking gear surface, so you can easily turn the blade to change its relationship to your foot and the water. It can become stiffer or more flexible. You can change its pitch or orientation simply by turning it at its point of attachment. This can be done before you enter the water or when you are underwater and underway. It's the next generation of our Force Wings, Bat Wings, Whiskers, Speed Pods, Sharks' Teeth and their like.

Tinkering in the wizard's workshop

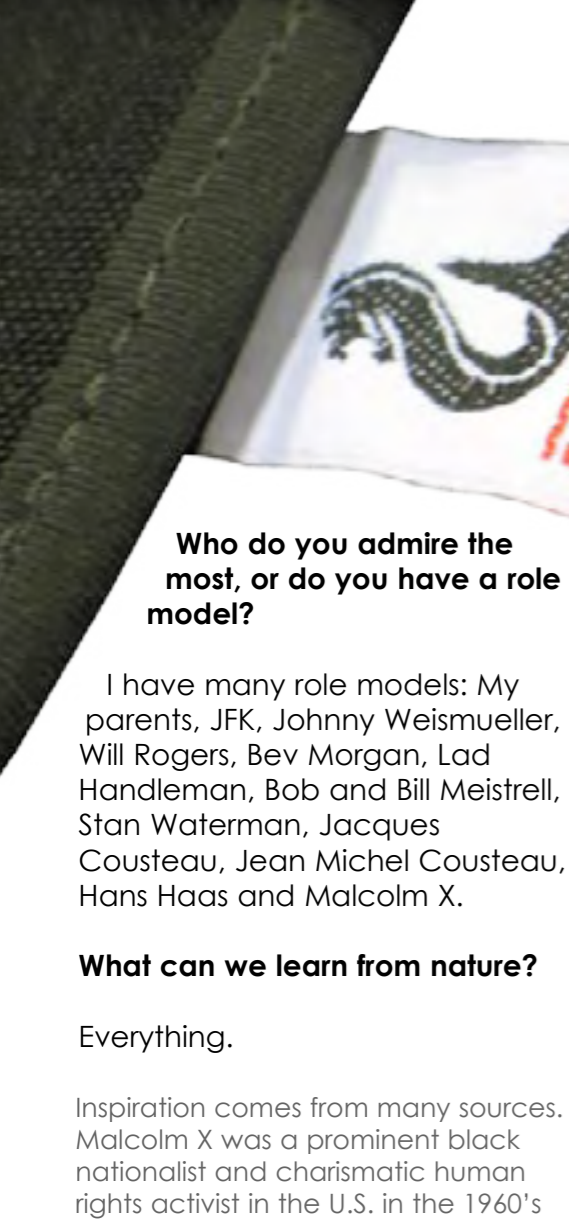


*I can credit my family for everything I have ever done*

*"...to help people move through the water as freely as the marine inhabitants that inspire our fin designs."*







Angelwings



*The most important factor for fin performance is how it fits the personality of the diver.*

**Who do you admire the most, or do you have a role model?**

I have many role models: My parents, JFK, Johnny Weismueller, Will Rogers, Bev Morgan, Lad Handleman, Bob and Bill Meistrell, Stan Waterman, Jacques Cousteau, Jean Michel Cousteau, Hans Haas and Malcolm X.

**What can we learn from nature?**

Everything.

Inspiration comes from many sources. Malcolm X was a prominent black nationalist and charismatic human rights activist in the U.S. in the 1960's



**Do you think modern societies can co-exist with nature in a sustainable manner i.e. through implementation of new laws, conventions and new technology?**

We're at a very difficult time. There are many of us who acknowledge that this is imperative, but there are so many conflicting forces polarized in their positions. Technology or laws will not achieve the necessary change. A change in global consciousness is required. The majority of the world perceives the water as cold and dark, with inhabitants that are alien at best. They are more frequently understood as monsters. The funny thing is that everything is water, and we are the ones that are in an alien environment when immersed.

The mission statement of our company is "to help people move through the water as freely as the marine inhabitants that

*One diver can make a difference*

inspire our fin designs." I began my career as an underwater pho-

tographer. My fins are designed to make it free and easy for people to move through water. In my own way, my life is dedicated to educating the public that the underwater environment is a place of beauty and freedom. When we raise the collective consciousness to understand the oceans in this way, that will result in the change necessary to our own survival.

**What role do you think recreational diving can play in raising the public's awareness in the future?**

Divers sharing their underwater experiences is part of the educational process necessary to raise global consciousness. Our current administration has one of the worst environmental records in history. A private showing to the President and his staff of a "Voyage to Kure", the first of the new television series by Jean Michel Cousteau and his Ocean Futures Dive Team, catalyzed the President into designating the Northern Hawaiian Islands as the world's largest marine preserve. It is true. One diver can make a difference.

**What new innovations in diving do you think we will see in the next 5-10-15 years? How can diving be made easier and safer?**

Masks. They are due for an update. Methods of carrying less weight.

**Do you consider doing other types of dive equipment but fins?**

Yes. I have a great mask design, but I think my energy is best spent applying what I have learned to making ships more efficient. I also have some great ideas on how to make underwater current generators better.

**What legacy would you like to leave behind?**

Creativity is a gift we all have. To learn how to tap into it you must push forward with positive solutions in response to the negative.

**What's next for Bob Evans?**

Efficient ships and clean energy. ■

From Academy of Underwater Arts and Sciences:

**Biography**

Bob Evans is Founder and President of Bob Evans Designs, Inc., the corporate entity behind Force Fin. He is a world class photographer, visionary and noted inventor who has been awarded over 33 patents for his revolutionary fin designs, including fins that use lift as opposed to drag forces to propel a diver, fins that snap to increase diver efficiency and fins that are split. His Tan Delta Force Fin is part of the permanent collections of the New York Museum of Modern Art and along with his Extra Force Fin, is part of the collections of the Costume Institute of the New York Metropolitan Museum of Art.

Bob has devoted his life to sharing the oceans. His company's mission statement reflects his vision to help people feel as free as those who inhabit it. His diving career began in 1964 when he learned to free dive and purchased his first Nikonos. From 1966-73, he was employed by Dive 'N Surf in Redondo Beach, California, and was certified by Bob Meistrell, County of Los Angeles Instructor No. 1. In 1967, he was trained as a commercial diver and over the years, he has made over 850 dives documenting life below platforms in Santa Barbara Channel under contracts with Exxon, Shell Oil Company, Atlantic Richfield, Union Oil, Western Oil & Gas and the American Petroleum Institute. As a photographer he is best known for his Channel Islands Collection, which includes images he took on and in the waters surrounding the California Channel Islands.

Bob Evans is an original SSI Platinum Pro 5000. He was awarded

an Honorary Masters of Science by the Trustees of his alma mater, Brooks Institute of Photography for extraordinary contributions to art, science and photography.

Evans' photography has appeared in over 300 publications including Time, Life and National Geographic. He has published two books, *The Living World of the Reef* and *The Channel Islands Collection*.

Bob Evans has designed underwater camera housings for time-lapse systems, camera towing systems and a buoy system to carry cameras to preset depths. He was Chief Photographer of the SCCWRPP's study of artificial reefs managed by Willard Bascom and John Isaacs of Scripps Institute of Oceanography. Atlantic Richfield Foundation funded Evans' productions for the Cabrillo Marine Museum.

Santa Barbara's Sea Center opened with an exhibit of his photographic work. In the 1980's, Evans received a research grant from Kennedy Foundation to study the feasibility of harvesting and canning mussels from the offshore oil platforms of the Santa Barbara Channel. Bob Evans is best-known for his fin designs, the most popular of which is his Force Fin, which he patented in 1981. His day job is serving as President of Bob Evans Designs, Inc., a research and development company that also manufactures and distributes Evans' fins. ■





**Water is obviously important as a basic necessity for maintaining life. Quite simply, if you don't regularly take in water you can die within a few days.**

Text by Michael Symes

Fundamentally, this all depends on the fact that water has a great ability to dissolve things. These solvent properties of water are vital in human biology, because many biochemical reactions take place only within aqueous solutions. Water is also used to transport the resulting biological molecules, such as the oxygen-carrying haemoglobin in the blood, not only around the body but also to carry away the waste-products of metabolism, such as urea in urine.

In a completely different context, this ability also enables us, for example, to keep ourselves and our clothes clean and free from pathological bacteria, thus helping us to maintain good health.

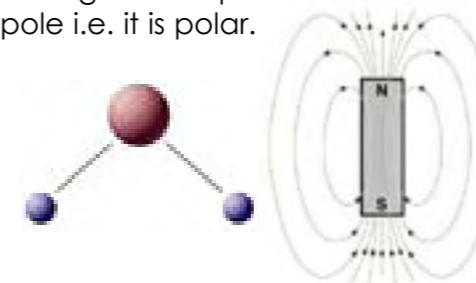
Water can, in fact, dissolve more substances than any other solvent—that's what makes it unique. It has often been called the universal solvent, although this is something of an exaggeration. But what is it that makes water such a good solvent?

### The solvent properties of water

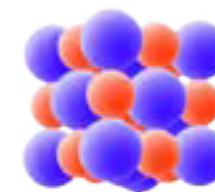
To put it briefly, water is a good solvent due to its polarity. This polarity arises from the shape of this relatively small molecule. As we have shown in previous articles, the shape of the water molecule is non-linear.

The significance of having 2 hydrogen atoms on one side of the water molecule is that oxygen, being a stronger attractor for electrons than hydrogen, is able to pull the shared electrons towards it. This results in an unequal sharing of the electrons. It will be seen that, due to this

uneven distribution of electron density, the molecule has a positively charged end and a negatively charged end. It thus acts like a small electromagnet having a north pole and a south pole i.e. it is polar.



**The ability of ions and other molecules to dissolve in water is due to this polarity.** Take, for example, the ionic NaCl molecule (sodium chloride, or salt). The solid NaCl crystal consists of a lattice of positively charged Na ions and negatively charged Cl ions. They are held together by attractive electrostatic forces, otherwise known as van der Waal forces.



When a crystal of NaCl comes into contact with water the small water molecules can penetrate between these ions and thereby

eliminate the effect of the van der Waal forces, allowing the ions to separate. On dissolving, the positive sodium ions then become surrounded by water molecules where the negative end of the polar water molecule is attracted to the positive sodium ion. And similarly, the positive end of the water molecule is attracted to the negative chloride ion. The relatively small size of the water molecule allows many water molecules to surround one molecule. An ionic or polar compound in water is thus surrounded by water molecules to give a stable solution of solute.

An example of a non-ionic solute is table sugar, where the water dipoles hydrogen-bond (see X-RAY MAG no. 7) to the dipolar regions of the sugar molecule thereby allowing it to be carried away into solution.

In general, ionic and polar substances such as acids, alcohols and salts are easily soluble in water, and non-polar substances

# A Unique Solvent <sup>Water</sup>

# Water



such as fats and oils are not. Non-polar molecules stay together in water because it is energetically more favourable for the water molecules to hydrogen bond to each other than to engage in van der Waal interactions with non-polar molecules.

## Salinity of the Oceans

For a diver, one of the most obvious facts about the water of the oceans is its salinity, due of course to the ability of water to easily dissolve all ionic salts. The salinity, as all divers know, has a great effect on buoyancy.

Salinity is a measure of the amount of dissolved salts in seawater, and is calculated as the amount of salts in grams dissolved in 1 kg of seawater. In the case of common salt, NaCl, for example, the maximum solubility is 357 grams in 1000 grams of water at 0 °C.

About 70 percent of the Earth is covered with water, with about 97 percent of that water in the oceans. The oceans contain about 3.5 percent of dissolved minerals, so it is nowhere near a saturated solution. However, the Dead Sea has a salinity of about 30 percent, which is getting close to saturation.

The following elements make up 99.99 percent of the total mass of Earth's

ocean water.

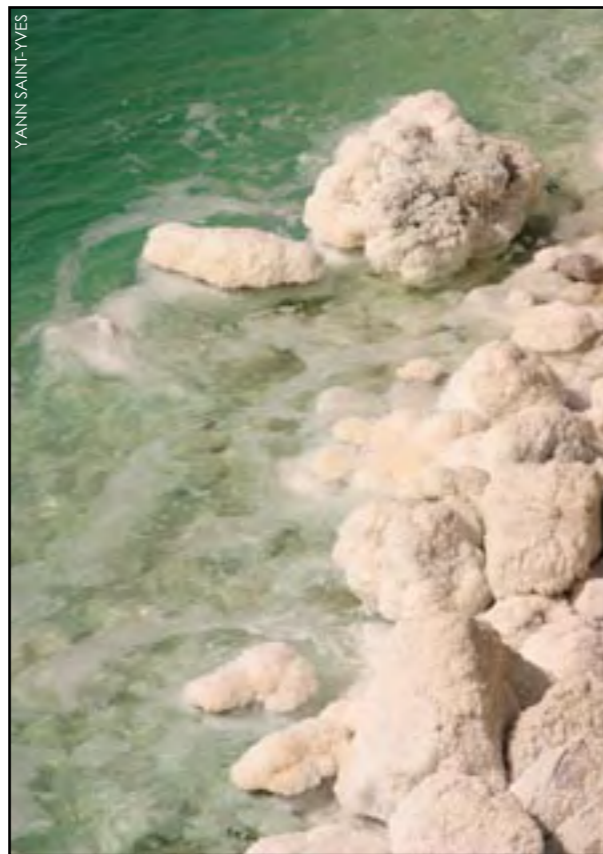
It will be seen that, apart from water of course, the major component of sea water is NaCl, some 85 percent of the total salts. This is because sea life has a strong influence on the composition of sea water. Crustaceans take out large amounts of calcium salts to build their shells, and diatoms remove silica to form their shells. Some elements,

however, are not affected to any real extent by plant or animal life. For example, no known biological process removes the element sodium from the sea, thus allowing it to accumulate.

Now, while the average salinity of the oceans is about 3.5 percent, varying from about 3.2 to 3.7 percent, there can be great differences in salinity between different bodies of water. For example, The Black Sea, which is greatly diluted by river run-offs, has an average salinity of only 1.6 percent, while the Caspian Sea has a salinity of only 1.2 percent. This is still quite salty, though, when compared to fresh water with a salinity less than 0.05 percent.

Not only are there slight differences between the oceans regarding their salinities, in much of the Earth's oceans there is a marked difference in salinity between the surface zone and the deep zone, with the salinity increasing with depth. Although salinity generally increases with depth, there is a distinct layer where salinity increases sharply, called the halocline. These sharp differences in salinity can be due to several causes, e.g. an excess of evaporation over precipitation which leads to surface water being saltier than deeper water. This again can lead to some strange oceanic effects, both physically and biologically.

The salinity of the oceans is thus a very interesting and complex subject due mainly to the unique solvent properties of water. ■



The Dead Sea

Element	%	Element	%
Oxygen	85.84	Sulphur	0.091
Hydrogen	10.82	Calcium	0.04
Chlorine	1.94	Potassium	0.04
Sodium	1.08	Bromine	0.0067
Magnesium	0.1292	Carbon	0.0028

# Dive

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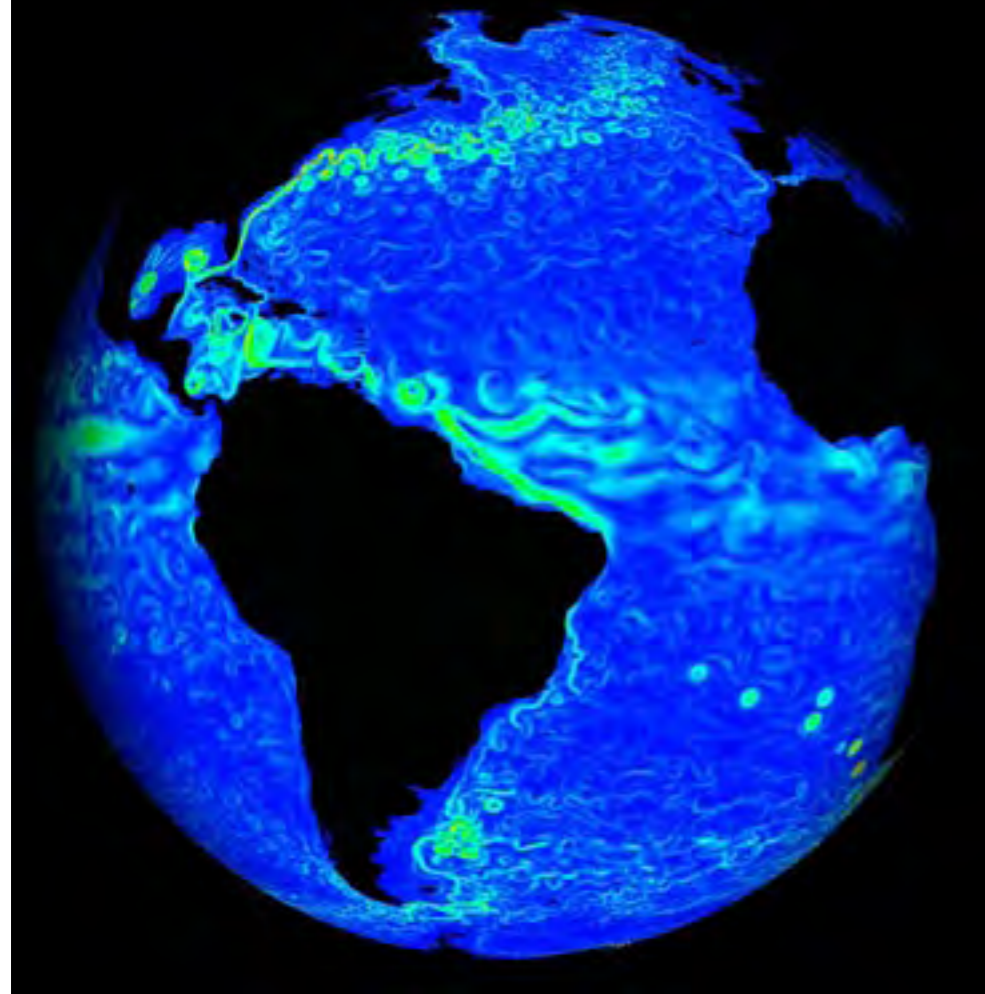
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## Short-circuit found in ocean circulation

A *short-circuit* in the circulation of the world's oceans has been discovered that could aid predictions about future climate change. This process in the Southern Ocean allows cold waters that sink to the abyss to return to the surface more rapidly than previously thought.

This affects the Southern Ocean circulation, which links all the other oceans, and is also relevant to uptake and release of carbon dioxide by the sea; transport between the deep and surface waters in the Southern Ocean is particularly important for this process.

The researchers made use of a unique signal—the spread of helium released naturally from the Earth's interior at deep vents in the Pacific. The helium dissolves in the deep sea and a plume of this marked water travels down the coast of Chile. It is injected at depth into the Antarctic current on the Pacific side of Cape Horn. It then streams through into the Atlantic with the current, but in the process is spread, shifted and diffused by the circulation. Measurements of this spreading of the helium were used to deduce the short-circuit. ■

## Striking deep current reversal in the tropical Pacific Ocean

The near-surface currents of the Pacific Ocean are generated essentially by the winds, whereas the deeper ones (known as thermohaline currents) result from water-density variations induced by differences in temperature and salinity between the distinct masses. The prevailing winds in the tropical Pacific, the trade winds, blow from the American continent towards Asia, causing the warm surface waters to drift in a general East-West direction. As they approach the Asian continent, these waters accumulate, then change direction, part of them turning North, part going South, while another portion flows at depth, feeding the Equatorial Undercurrent (EUC), which runs between 100 and 150 m below the surface. The EUC flows along the Equator, from Papua New Guinea to the Galapagos Islands, counter to the trade winds, and extends over a width of nearly 300 km at a maximum velocity of around 3.6 km/h.

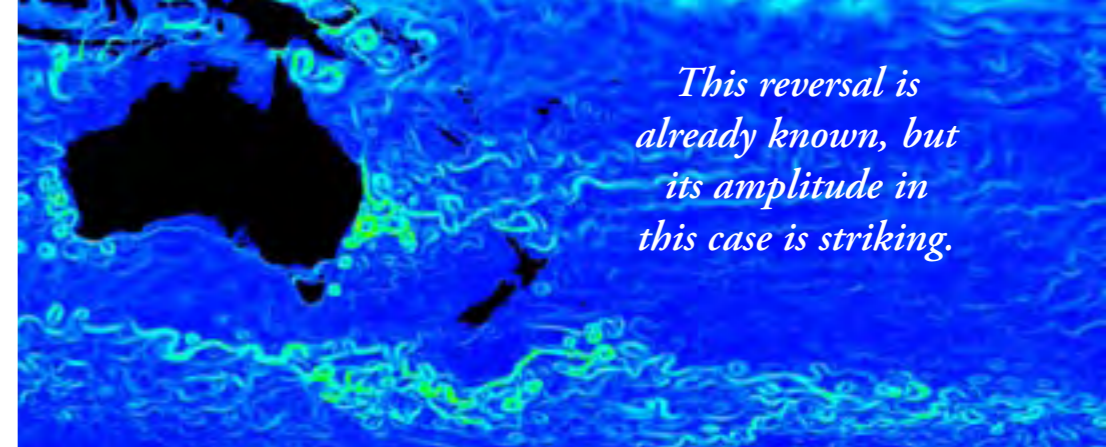
In two oceanographic cruises run in October 1999 and April 2000 as part of the IRD's ECOP programme, the Institute's researchers were able to study this region and, in particular, the El Niño-Southern Oscillation. The latter has a determinant effect on the distribution of ocean water masses, ocean/atmosphere exchanges in the tropical southern Pacific and many anomalies of climate that occur on the continents that border the Pacific. Physical determinations of currents and masses of water under transport were made from the surface down to 1200 m over a large area, 1700 km in length.

These series of measurements give a well-defined picture of the tropical circulation in this zone, but they also reveal a surprising variability of intermediate equatorial currents, which plunge at the Equator under the Equatorial Undercurrent and flow in the same direction between about 300 and 1200 m depth.

Between October 1999 and April 2000, these equatorial intermediate currents changed direction, between 2° S latitude and the Equator, over the 1700 km of the zone investigated. This reversal is already known, but its amplitude in this case is striking. The resulting variation in water mass transport is considerable.

### What causes this reversal?

One hypothesis put forward involves the passage of an oceanic instability wave, but no disturbance of the EUC was detected during the research cruises and the reversal remains unexplained. Further current measurement campaigns in the future should shed light on this event and bring clues for unravelling the dynamics of these currents. ■



*This reversal is already known, but its amplitude in this case is striking.*

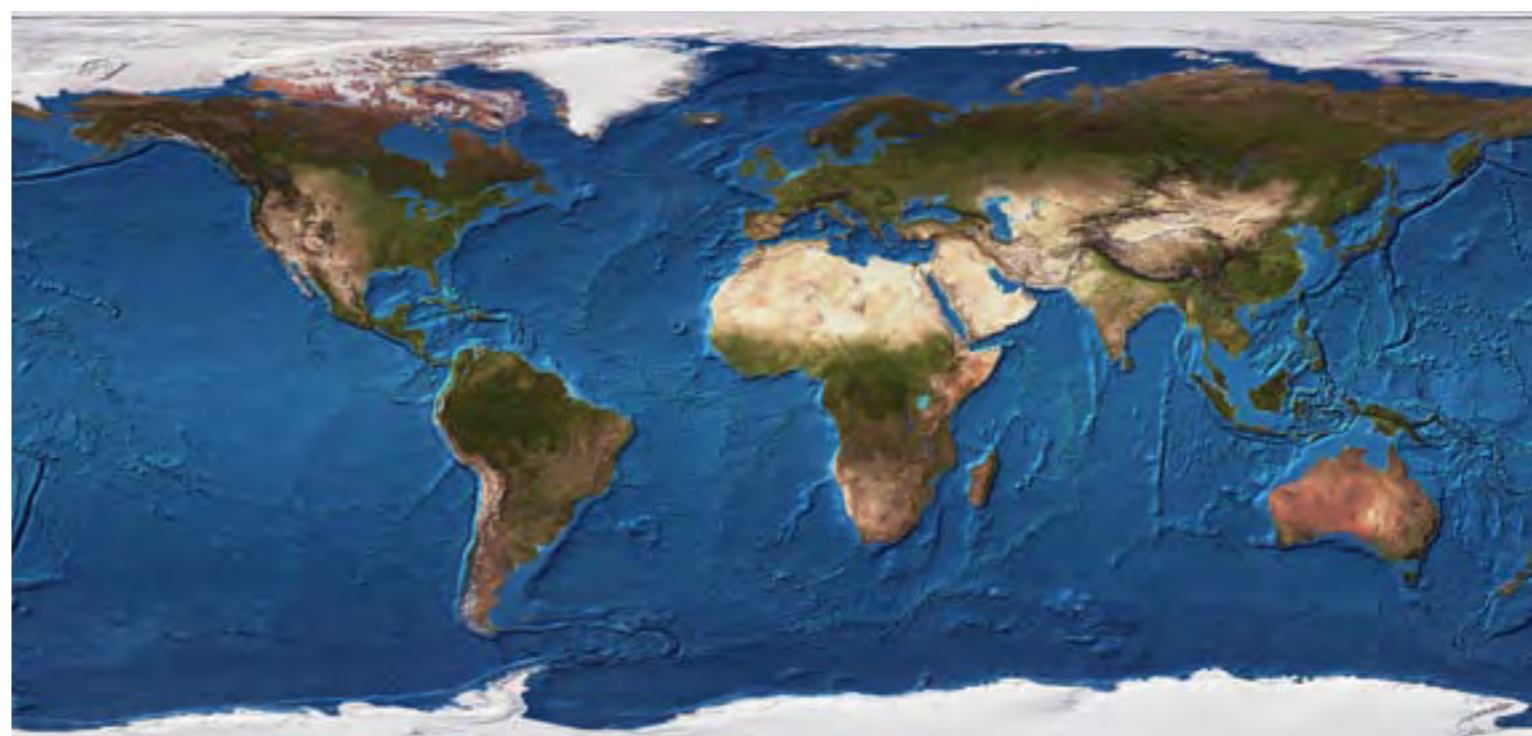
## NZ scientists study Antarctic currents

New Zealand scientists have been getting close to the world's biggest ocean current in a bid to shed light on some unanswered questions about climate change.

A NZ research vessel is back in the country after travelling more than 3000 kilometres in rough southern seas, on a mission to anchor scientific recording gear in the sub-Antarctic ocean. The deepest mooring is in 4500 metres of water. The equipment will help study just how much water flows in the Antarctic circumpolar current, which is estimated to be 110 times bigger than all the water in all the world's rivers.

It will be a while before the initial data is analysed, and it is the next sail south that will reveal more about the world's biggest current. The data obtained will tell us about how currents vary and how the ocean temperature varies over a year, and that allows us to understand whether there are sudden changes, or whether things just change with the seasons. ■

*The Antarctic circumpolar current is estimated to be 110 times bigger than all the water in all the world's rivers.*



## Ocean eddy observed off northern Baja California

Eddies are important because these giant swirling areas of sea-water are frequent in the world's oceans. Passing eddies can accelerate local currents, retain and transport plankton and nutrients, enhance open water productivity and stimulate fast, deep sinking. Quasi-permanent eddies can retain larvae in the lee of an island, for example. Important vertebrates like sea turtles, elephant seals, blue whales and sperm whales seem to track these pelagic features, presumably because they aggregate prey species.

Eddies are easily detectable by satellites, although a recent article in Geophysical Research Letters reports that some deep eddies can go undetected by satellite, because they remain submerged.

The authors conducted a 21-day hydrographic survey in the southern region of the California Current, and observed for the first time a subsurface anticyclonic (warm core) eddy off northern Baja California with the same water mass characteristics as the California Undercurrent. The core of the eddy was quasi-circular with radii of 35 km and thickness of 250 m. ■

## Giant cold water eddy off Sydney lowers sea level

Australian oceanographers have discovered a giant cold water eddy off Sydney, which has lowered sea levels by almost one meter and impacted a major ocean current.

The eddy, which has a diam-

*The sea surface was lowered by 70cm at its centre*

eter of about 200 km and reaches to depth of 1 km, lies about 100 km off Sydney. It was stated that the eddy was so powerful, it had pushed out to sea the strong East Australian Current, although shipping traffic and fishing have not been affected.

The cause of the giant eddy was a mystery. The sea surface was lowered by 70cm at its centre, although the dip in the surface of the ocean was invisible to the eye, it had been accurately measured by European and U.S. satellites.

Ocean eddies can have a life of up to three weeks, although similar eddies off South Australia and Western Australia are known to have survived several months. ■

## Arctic Deep Sea May Hold World's Largest Fuel Supply

The energy source of the future may lie beneath the ocean floor and under Arctic permafrost. Both places are sources of gas hydrates, strange ice-like substances that trap methane—the primary component of natural gas.

The hydrates were discovered in 1983, and no one knows how much of them exist. But there appear to be enough hydrates to represent a larger energy source than all of the world's gas, oil and coal combined. Because each cubic meter of hydrate releases 225 cubic meters of natural gas they are a very good storage system for methane.

Efforts to extract the methane are focusing on the Arctic, where tests have shown that gas can be produced from hydrates using conventional drilling and pro-

duction technology. Rather than mining solid hydrates, scientists are working on ways to melt the deposits underground. This would free the gas from the ice, allowing the methane to be captured in the same way ordinary natural gas is collected.

Because methane is a powerful greenhouse gas, some experts wonder if massive methane releases from melting seabed hydrates might have contributed to past epochs of global warming, while others are concerned that current global warming may heat the oceans enough to melt the hydrates,

causing similar methane releases today.

Unstable hydrates could also cause underwater landslides, which could damage offshore drilling equipment and possibly create surges large enough to generate tsunamis, according to some models. ■



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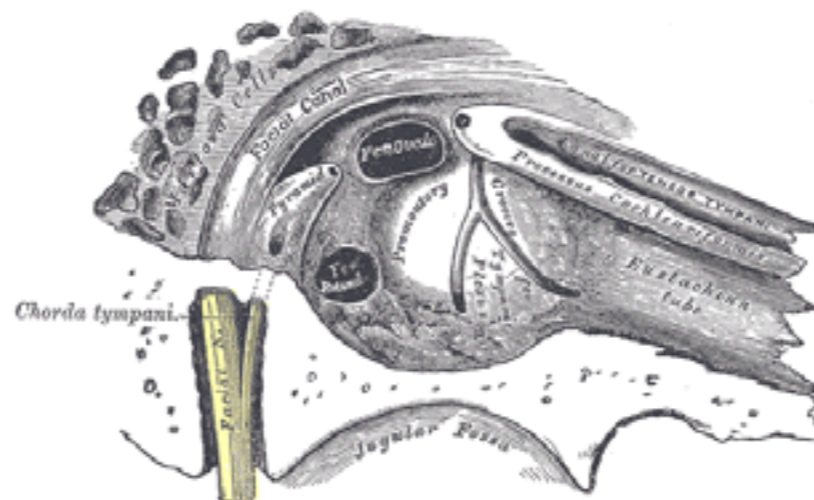
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Levering ook per post!





The hollow space of the middle ear has also been called the tympanic cavity, or cavum tympani. The eustachian tube joins the tympanic cavity with the nasal cavity (nasopharynx), allowing pressure to equalize between the inner ear and throat



## Dehydration

A dangerous condition—even for a diver

Text by Michael Symes

**During an average day in a temperate climate, a person's body loses about 2.5 litres of water through sweating, urination and loss of water vapour from the lungs. This must be replaced; if not, dehydration, to a greater or lesser extent, will occur.**

Dehydration can be very insidious in its effects on the human body. Initial symptoms may only be a headache or slight dizziness. But if ignored too long, then suddenly—wham! Before you realise it, if it is not treated quickly by drinking up to a whole litre of water or more, it can result in unconsciousness and finally, if you are unlucky, in death.

Symptoms become increasingly severe with greater water loss. Dehydration symptoms generally become noticeable after about 2 percent of one's normal water volume has been lost. It is also at this point that the feeling of strong thirst begins to be felt. Thus, a feeling of thirst is a sign that you are already partially dehydrated.

At about 5 - 6 percent water loss one may become confused and get strong headaches.

With 10 - 15 percent water loss there will be cessation of urination and onset of delirium.

Losses greater than 15 percent are usually fatal.

### Avoiding dehydration

As always, it is true that prevention

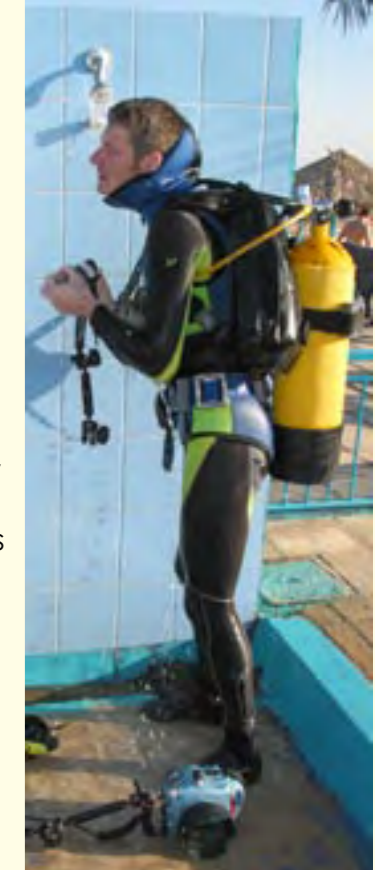
is better than cure. And so, dehydration is obviously best avoided by drinking plenty of water to maintain one's liquid balance, concurrently with the loss of water. Excess water is generally not harmful, as it is efficiently removed by the kidneys and expelled as urine.

However, when large amounts of water have been lost due to sickness, for example with diarrhoea, there may be a large loss of important electrolytes such as sodium and potassium ions, which can lead to malfunctioning of the heart. The re-establishment of the correct electrolytic balance in the body thus becomes important.

Commercial physiological electrolyte mixtures are available for dissolving in water and should always be carried with one's medicine supplies. (For example, in Denmark, Revolyt® can be bought over the counter at any pharmacist. Details of this formulation can be found on the Internet.)

Failing this, a useful rule of thumb in an emergency is to add the juice of two oranges to a litre of cooled boiled water together with a handful of sugar and a couple of large pinches of salt.

In any event, with continual large losses of body liquids medical assistance should be obtained as soon as possible. ■



# Nasal Irrigation Helps Divers Clear Ear Squeeze

Text by David F Colvard, MD  
www.divepsych.com

NeilMed Pharmaceuticals, Inc. of Santa Rosa, California, USA, sponsored the study to determine the efficacy and safety of buffered saline nasal irrigation among experienced divers to help equalize pressure in their middle ears and reduce their use of decongestants.

**Middle ear squeeze caused by difficulty equalizing the pressure in middle ears during descent and ascent is among the most common problems in recreational scuba divers. A recent study showed that buffered saline nasal irrigation can help naturally. Many divers use pre-dive oral or spray decongestants to help equalize pressure in their middle ears and sinuses.**

Between November 2005 and September 2006, 100 experienced scuba divers completed web-based "Before" and "After" questionnaires. They were invited to participate after reporting difficulty equalizing the pressure in their middle ears or using decongestants in an earlier diver safety survey conducted by myself. After completing the "Before" questionnaire, the study participants were sent free samples of NeilMed's Sinus Rinse

buffered saline nasal irrigation system. They completed the "After" questionnaire after using the product and diving.

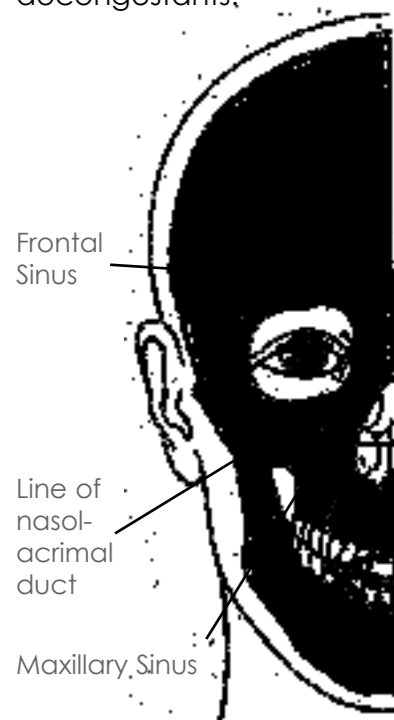
- 44.0% reported less nasal congestion after using Sinus Rinse
- 10.0% reported more nasal congestion.
- 69.0% reported less frequent difficulty in clearing or equalizing their ears
- 5% reported more frequent difficulty.
- 60.3% for whom use of oral decongestants were applicable reported decreased or discontinued use.
- 55.3% for whom use of decongestant sprays or drops were applicable reported decreased or discontinued use.
- None reported increased use of decongestants in any form.
- 72.0% would recommend the Sinus Rinse system to other divers
- and 3% would not.

Experienced scuba divers continue to dive despite the medical risk of nasal congestion and difficulty clearing or equalizing the pressure

in their middle ears. Buffered saline nasal irrigation can effectively and safely reduce nasal congestion and decrease the frequency and difficulty in clearing or equalizing the pressure in the middle ears of many divers. Additionally, nasal irrigation can decrease the use of decongestants, either oral or spray or drops, and reduce the risk of rebound congestion and reverse middle ear squeeze during or after a dive when the effect of the decongestants may have worn off.

A buffered saline nasal irrigation system appears to be an economical, convenient, safe and effective natural alternative to decongestants for many recreational divers who have nasal congestion and difficulty equalizing pressure in their middle ears. The same may be true for airline passengers and flight crews, but that group has not been studied yet. ■

**Warning:** Do not rinse if nasal passage is completely blocked or if you have an ear infection or blocked ears.





Edited by  
Michael Arvedlund, PhD  
and Peter Symes, M.Sc.

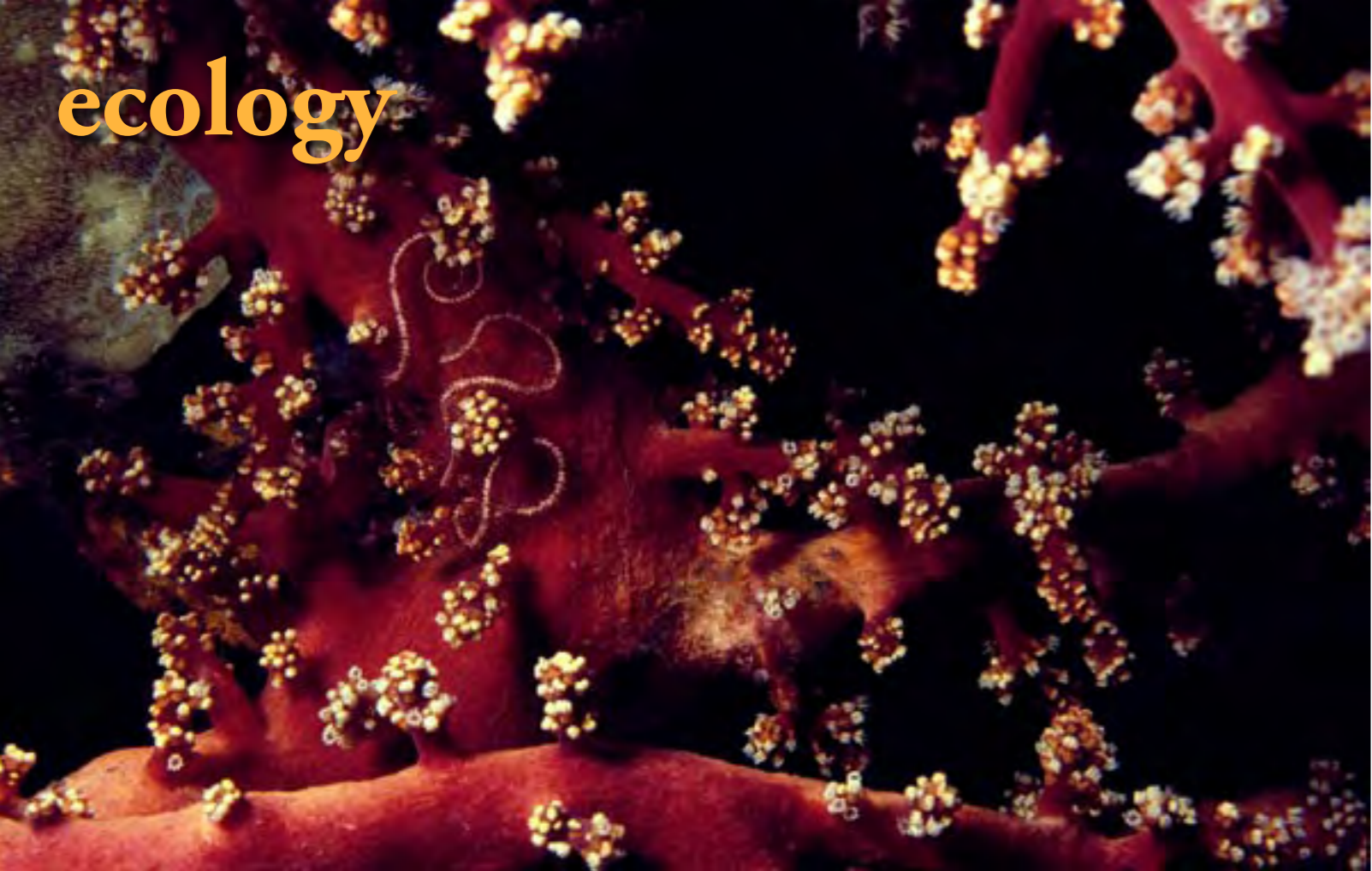
# Why & How our coral reefs change

Coral reef resilience

Across the globe, coral reefs are in peril—this is already old news. Man-made stresses—overfishing, pollution and climate change—has sent even pristine coral reefs around the world into a drastic decline causing major changes in ecosystem structure. The resilience and regenerative capacity of reef ecosystems—that is, their ability to absorb shocks, resist phase shifts and regenerate after natural and human-induced disturbances—are being overwhelmed by these stresses causing dramatic shifts in species composition, often incurring huge economic losses too.

But what is really happening on reefs?





We are well acquainted with the travel catalogue depiction of coral reefs as pristine and colourful shallow-water assemblages of structures and shapes, dominated by scleractinian corals teeming with diverse life forms. Like most other ecosystems in a stable state, reefs usually reassemble themselves after regular disturbances such as tropical hurricanes or disease outbreaks. However, with the addition of human impacts many contemporary coral reefs increasingly fail to regenerate after major impacts, and instead have undergone a rapid shift to an alternate state. In other words, they become something else and often quite different. The most familiar of these transitions is from dominance by corals to dominance by fleshy seaweed, although several other transitions have been documented. The extent to which alternate states are stable or reversible is presently

not well understood. Such a process during which an otherwise stable ecosystem changes into another stable state is called a *phase shift*.

### Stability & phase shifts

Many complex systems—ecosystems, economies—exhibits a dynamic behaviour by which they revert back to a stable equilibrium after minor or lesser perturbations from the outside. This is thanks to various buffer and corrective mechanisms, which kick in with growing effect the further away from the steady state equilibrium the system are brought. A very simple model of this principle is a ball in bowl. The ball will always come to rest in

the middle. Unless, that is, you shake the bowl so violently that the ball falls out. And in that case, question is, where does the ball end up then?

### Where do coral reefs end up?

Regarding coral reef ecosystems, on the other hand, there has been little success in predicting such regime or phase shifts. Mainly because the increased instability of coral reef ecosystems and their state prior to their collapses has often gone unrecognized, even on reefs which have been well studied.



How we like to see reefs, healthy and diverse



A ball on three surfaces illustrate the three basic modes of stability. The ball on a flat surface will just roll and come to rest somewhere else. The ball in a bowl will come to rest in the middle—this is a *stable equilibrium*. The ball balancing on a peak is also in an equilibrium, but in a *unstable one*, as it will roll off at the slightest disturbance

In the news section of this issue of the magazine there is another, yet similar, case-study about a shifted ecosystem.

Scallops along the eastern seaboard of the US are now being overgrazed by cownose rays because the sharks that used to keep the ray population in check have been over-fished. That over-fishing can have such devastating knock-on effects all the way through the ecosystem is hardly surprising as it has happened numerous times in the past.

This cryptic loss of coral reef resilience can manifest itself in numerous ways. For example, in the Caribbean, the collapse of many coral reefs was long preceded by dwindling stocks of fishes and increased nutrient and sediment runoff from land. In the 1950s, what prevented blooms of macroalgae from smothering the reefs was the increasing presence of a single species of sea urchin, *Diadema antillarum*, which grazed upon the algae. This is an example of a buffering mechanism that kicks in acting to return the system to its steady state—the ball seeks to roll back. In the 1970s, the densities of *Diadema* reached extraordinarily high levels on overfished reefs, averaging more than ten individuals per square metre in shallow waters. In 1983, the magnitude and crowded conditions of *Diadema* populations eventually led to an epidemic, which spread throughout

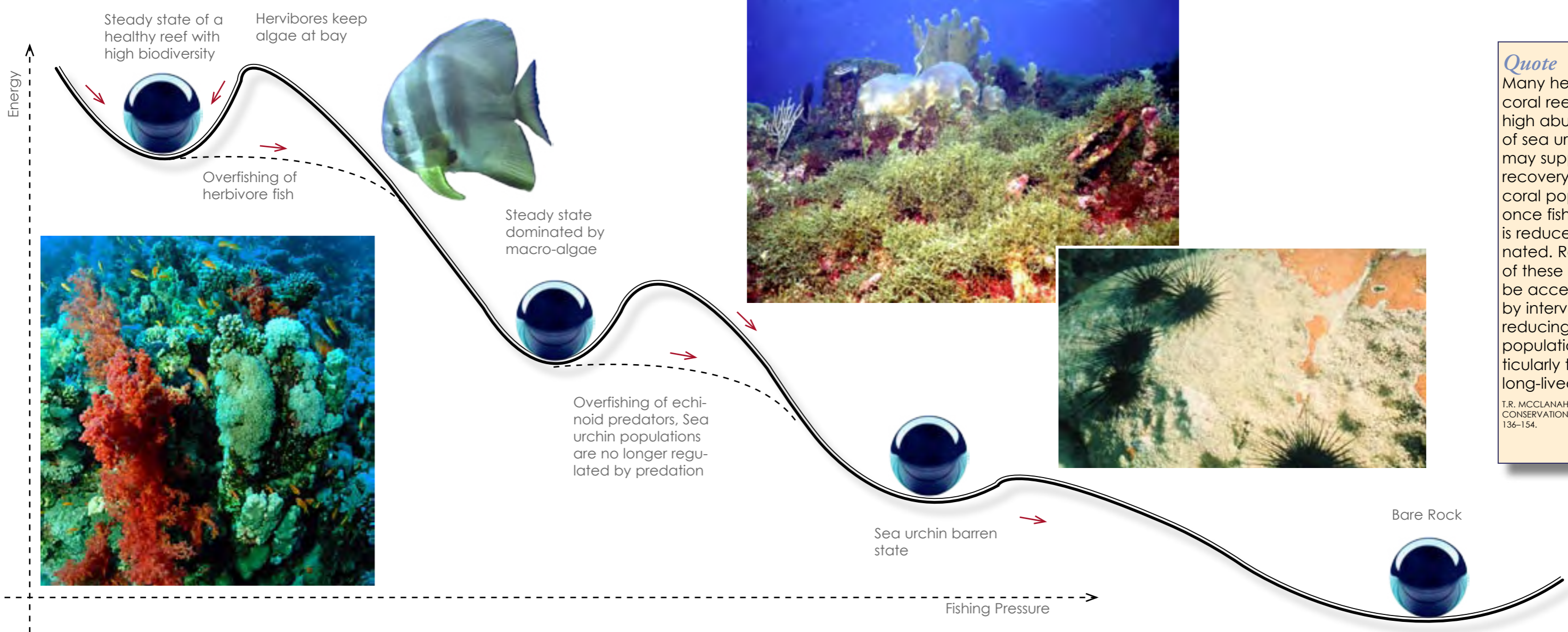
the Caribbean, leading to a near total collapse of the populations and precipitating macro-algal blooms that still persist today. In addition, remnant coral populations are further affected by increasingly prevalent coral disease and bleaching induced by global warming. The ball fell out of the bowl all together.

**In retrospect**, it is now clear that long before the present widespread loss of coral cover, many Caribbean reefs were on an unrecognized trajectory to collapse. The symptoms included loss of macro-fauna and reduced fish stocks. And as the fishes role as the dominant herbivores were gradually replaced by a single species of sea urchins, this led to destructive overgrazing and bioerosion by food-limited sea urchins, and reduced recruitment of corals. Let us look further into the dynamics of these phase shifts.



How did it come to this? A reef laid barren by the overgrazing of sea urchins





**Quote**  
 Many heavily fished coral reefs have a high abundance of sea urchins that may suppress the recovery of fish and coral populations once fishing effort is reduced or eliminated. Restoration of these reefs may be accelerated by intervening and reducing sea urchin populations—particularly those of long-lived species.  
 T.R. MCCLANAHAN ET AL  
 CONSERVATION BIOLOGY 10 (1),  
 136-154.

A simplified model of the correlation between fishing pressure and the structure, or state, of the reef ecosystem. As the fishing pressure grows the reefs collapse into a succession of steady states in a process that is, at worst, irreversible, and at best, difficult and time consuming to reverse.

Restoration of ecosystems is very costly and takes many years. Once again, prevention is such a better strategy than curing after the fact.

As regards to the Great Barrier Reef, inputs of sediment and nutrients from land have increased fourfold since Europeans settled, while the numbers of turtles, dugongs and other macrofauna have greatly decreased. Comparisons of adjacent reefs open and closed to fishing today indicate that the biomass of targeted reef fishes has been reduced by up to 60 percent, causing substantial changes in the abundance of their prey.

Coral cover has significantly declined over the last 40 years, reflecting the impacts of three successive major outbreaks of crown-of-thorns starfish and two large-scale bleaching events in 1998 and 2000. In 2003, more than half the reefs sampled had less than ten percent cover.

### But how is coral cover linked to the fish abundance and diversity?

It has something to do with nutrient cycling. A healthy coral reef is a diverse, highly productive community able of thriving in waters that are actually exceptionally poor in dissolved nutrients.

In other words, reefs accomplish fixing high amount of carbon even in the relative absence of dissolved nitrogen and phosphate, which we all know as the main components of fertilizers. The secret to the success of the coral reefs is commonly believed to be the highly efficient recycling of nutrients in the system, particularly within the corals, where the symbiosis between the

zooxanthellae algae living inside the tissues of the cnidarian host has been fine-tuned to conserving key nutrients very effectively. The algae harness energy from sunlight and fix carbon by photosynthesis. Energy from this source is provided to the polyp host in return for exclusive access to the waste-nutrients produced by the host. These wastes (N and P) function to fertilize the algae. Very little gets wasted to the outside.

### Nitrogen

The most significant, and apparently "limiting" nutrient in the picture is fixed nitrogen, a critical element in the construction of all proteins. This why corals also capture prey and assimilate solid matter containing nitrogen.

Somewhat paradoxically, coral reefs are intolerant of liquid nutrient enrichment as it comes, for example, in run-off from agriculture or sewers (which may also cause smothering algae blooms). Corals need to have the nutrient converted into solid form. And this is where the fish comes in.

In this context, nutrients arrive in the sea from various sources in land, some diffuse, some point-like, in the form of run-off from rivers and seepage of ground-water and discharge from sewers. Under normal circumstances, these nutrients pass through mangrove or seagrass areas before reaching the reef. It is these plants that are capable of utilizing the dissolved nutrients and incorporate them into living matter whereby it enters the food-web,

passing through plankton and ultimately ending up in the biomass of fish.

Of the dissolved forms of fixed N, ammonia is by far the most easily available for uptake from the water by the symbionts. Since living fish constantly excrete ammonia from their gills, it has been suggested that removing major amounts of fish from the system might ultimately deprive corals of needed nutrients.

### Differences

If one looks closer at the major coral reef systems in the world, it soon becomes obvious that there are profound differences in their species richness and composition and in the dynamics and resilience of the ecosystems. For

NOAA Fisheries Service has listed elkhorn, *Acropora palmata* (right) and staghorn corals *Acropora cervicornis* (far right) as threatened under the Endangered Species Act

example, the Caribbean has only 28 percent of the number of fish species and 14 percent of the number of coral species found on the Great Barrier Reef. This is a striking difference, which is largely down to a biogeographic legacy of the evolutionary history of isolation and loss of taxa in the Caribbean basin. This leaves the Caribbean reefs much more vulnerable to the effects of human impacts and possible catastrophic phase shifts.

*In the Caribbean, several critical functional groups are missing or represented by only a handful of species*

## Guilds & Functional groups

It is time to introduce a bit of terminology. In biology, *guilds* are groups of species in a community that exploit the same set of resources in a similar manner, but are not necessarily closely related taxonomically. In marine ecology, the related buzz term is *functional group*, which denotes a collection of species performing a similar function. Fish functional groups are generally synonymous with guilds of species from different trophic levels within a food chain (for example, predators and herbivores), reflecting their role as a major conduit for the flow of energy on reefs.

In the Caribbean, several critical functional groups are missing or represented by only a handful of species. There are, for example, no three-dimensional bottle-brush species and just one species of staghorn coral and one tall, tabular coral, elkhorn. Importantly, these are the dominant habitat-creating functional groups on healthy reefs in both the Indo-Pacific and Caribbean.

Batfish are herbivores that help keep reefs clean of algae and instrumental in reef recovery



NOAA



NOAA

Four-eye butterflyfish (*Chaetodon capistratus*) in a colony of staghorn coral. Some butterflyfishes feed primarily on corals by carefully picking individual polyps off the colony. The presence of butterflyfishes has been proposed as a means to assess the health of a coral reef system; in this role, they are known as an indicator species

Today, many areas have effectively lost not only these two species, but also two critical functional groups and two major shallow-water reef habitats: the elkhorn *palmata* zone and the staghorn *cervicornis* zone. For fishes, the composition of functional groups on Caribbean reefs is also markedly different from that of the Great Barrier Reef. Nocturnal and diurnal planktivores, in particular, are greatly under-represented in the Caribbean.

*In 2003, more than half the reefs sampled on the Great Barrier Reef had less than 10 percent cover.*

High diversity undoubtedly provides the potential for functional redundancy. However, even in high-diversity systems redundancy in critical functional groups can be limited. What does this mean in plain language? Let's look at a metaphor: Human cities, towns and villages. In a big city—the diverse and healthy coral reef—there are many players performing the same roles in parallel. There are many bakers, smiths, etc., all having a functional part

in the fabric of society and all taking part in the flow of the economy. If one goes out of business, there are others to take over, the society doesn't collapse; it adapts. You find another bakery if the one on the corner goes out of business or go to the supermarket instead. This constitutes the functional redundancy in the system. But if all the bakers close, and the supermarket stops stocking bread, and it is essential to your survival, then what do you do? You can have a town full of other sorts of stores, but you can't buy bread at a bookstore or a plumber's. That's when you have a high-diversity system with limited redundancy in critical functional groups. You move to another town—or die.

And this is the problem for many small villages in Europe. They hang on while all their shops close, one by one, since they can't cope with the competition from elsewhere. Once they lose their last supermarket, school, post office, pharmacy, bakery—which together constitute a form of economical functional group—the town starts to die as it stops functioning, and people have

to leave. It is the same case with reefs in our case story with the sea urchins, following the depletion of fishes. They became the principal herbivores on many Caribbean reefs, and they prevented the rapid phase shift to dominance by macro-algae that was precipitated by the die-off of *Diadema*.

## Functional Groups & Resilience

Three functional groups play different and complementary roles in preconditioning reefs to permit recovery of corals. These three groups—bioeroders, scrapers and grazers—are a critical source of both resilience and vulnerability to phase shifts.

**Bioeroding fishes** remove dead corals exposing the hard, reef matrix for settlement of coralline algae and corals.

**Ecosystem resilience** is the capacity of an ecosystem to tolerate disturbance without collapsing into a qualitatively different state that is controlled by a different set of processes.

**Scrapers** directly remove algae and sediment by close cropping, facilitating settlement, growth and survival of coralline algae and corals.

**Grazers** remove seaweed, reducing coral overgrowth and shading by macro-algae.

The extent to which reefs possess these functional groups is central to their capacity to resist phase shifts, regenerate and retain critical functions in the face of disturbance. A key element in resisting phase shifts to degraded alter-

nate states is the maintenance of successful larval colonization by the full range of coral functional groups characteristic of the region.

If coral reefs are to resist phase shifts after disturbance, it is imperative that critical functional groups of fishes, corals and other taxa are actively managed and sustained.

### Meeting the challenge

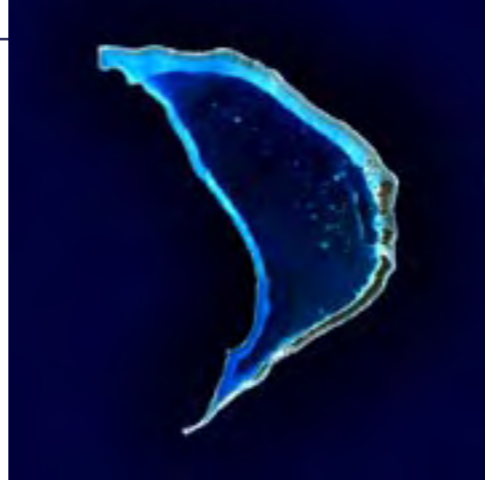
Much has been lost, and some of it forever, but much remains to be saved. Management of functional groups represents a radical departure from previous management philosophies. For example, wise management of herbivorous fishes can facilitate the regeneration of reefs after large-scale disturbances such as bouts of bleaching or disease that are impossible to regulate locally.

But it is imperative to scale up management and governance systems to secure the future of functional groups and their roles in supporting the resilience of coral reefs. Also the management of *no-take areas* (NTAs)—where fishing and other human activities are prohibited—are an increasingly prevalent approach to

*“Today, a new generation of Caribbean researchers and managers may never have seen a decent stand of Caribbean Acropora coral, a manatee or a large shark, nor can they remember the destruction wrought in the 1970s by a million sea urchins per kilometre of coastline.”*

D.R. BELLWOOD ET AL

The isolation of oceanic reefs renders them particularly vulnerable to loss of local broodstocks. On degraded reefs, the local loss of brood stocks is likely to select against self-seeding species and to shift the taxonomic composition of recruits in favour of those with longer planktonic durations, with potentially far-reaching consequences for community structure.



coral reef management. If they are adequately enforced, NTAs provide a spatial refuge from harvesting. Importantly, such protection may also permit critical functional groups to persist, and thus contribute to local ecosystem resilience.

However, even the largest NTAs in the world are not self-sustaining, because they are still too small relative to the scale of natural and human disturbances, and to the dispersal distances of many larvae and migrating adults. The rate of establishment and size of NTAs as a tool for resilience management needs to be hugely increased. The expansion of NTAs in 2004 from five percent to 33 percent of the Great Barrier Reef Marine Park in Australia, with a parallel focus on improving water quality, provides a good model.

### Choosing the right areas to protect

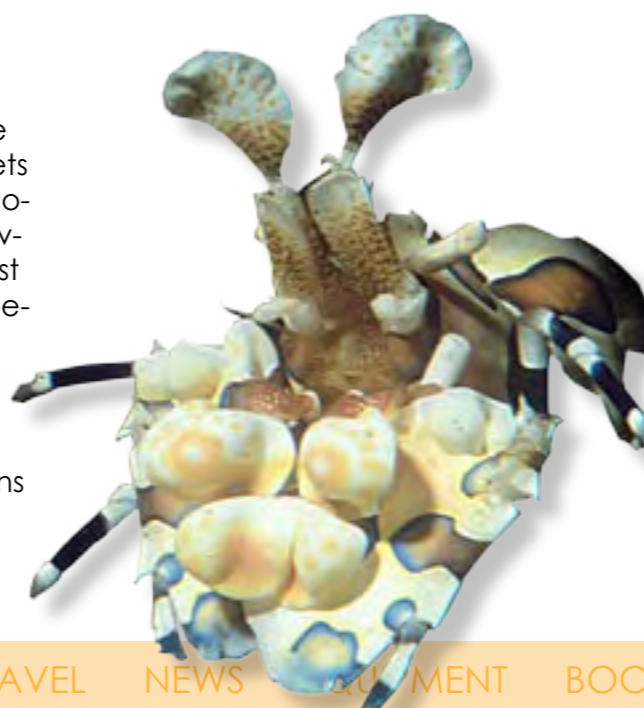
Hotspots, areas of exceptional species richness, are one of the most frequently identified targets for the protection of marine ecosystems. However, there are several lines of evidence to suggest that *cool spots*, areas of low species richness, are more vulnerable. Low-diversity reefs, such as in the Caribbean Basin, the Eastern Pacific and many high-latitude or remote locations in the Indo-Pacific have low functional redundancy where functional groups may be

*If coral reefs are to resist phase shifts after disturbance, it is imperative that critical functional groups of fishes, corals and other taxa are actively managed and sustained.*

represented by a single species. As explained above, in these systems even minor changes in biodiversity can have a major impact. ■

### Acknowledgements

Substantial parts of this article is a popularisation that rests heavily on *Confronting the Coral Reef Crisis* by D.R. Bellwood, T.P. Hughes, C. Folke and M. Nyström in *Nature*, volume 429



AND THE SECOND

# MOM

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Edited by  
Gunild Symes

Super protection for divers having fun under the sun

# Sun Protection & Body Care

All photos are courtesy of the manufacturers



## Eco Lips

Sport SPF30 with Eco Clip is perfect for divers since it is designed for extreme outdoor sports enthusiasts. It protects your lips under the roughest conditions, keeping the sun out and the moisture in. Get 30 times your skin's natural ability to protect itself from the sun's UV rays on your most vulnerable features, your lips, with SPF 30 sun protection. The aluminum carabiner clip is an ideal way to remember care about your lips. Clip it to your gear, belt loop, keychain, backpack, or anywhere for a fast Eco Lips fix. Contains moisturising organic vegetable oils and healing organic herbs. All-natural formulas and certified organic ingredients ensure protection from all the harsh elements: sun, wind, and cold. (The Carabiner is not for climbing and the clip colour may vary.) Price: £3.50 [www.ecolips.com](http://www.ecolips.com)



Sport Cosmetics by Chung Shi is a special line produced by Tanja Lang Cosmetics for the sportive woman. Has Aloa Vera as a hydrating agent. The Sports Women Cosmetics packet includes: Sport Women Skin Re-Balancer, Sport Women Beauty shower, Sport Women Energizing Gel, Sport Women Leg Relaxation Gel, and Sport Woman Cool Starter Gel. Price: €29.00 [www.hartslagmetershop.nl](http://www.hartslagmetershop.nl)



## Aloe Up

Aloe Up Pro Sport SPF 30 Sunscreen was specifically developed to meet the rigorous demands of a diver's lifestyle. Based with 35 percent Pure Aloe Vera Gel, this highly water resistant sunscreen lasts up to eight hours and is certified biodegradable and reef friendly. Available in a 4oz and 1oz. [Alooup.com](http://Alooup.com)

## Ahhhhh... Massage

**BTS 3** is a pure massage cream containing antioxidant vitamins E and C in a base of mineral salts—sodium, potassium, calcium, magnesium—from Tuscany. To aid recuperation, it also contains free-chain amino acids. Serious athletes use it for daily massage in order to remove tension and muscular fatigue caused by hard training over a long period of time. According to the manufacturers, BTS 3 is the most widely used sports massage cream in Italy. To restore muscular equilibrium, apply it during regular massage treatments. Aids in achieving high performance. Price: €16

A delicate shower gel with a fresh scent, **BTS Doccia** is intended for athletes that shower often and need a product that is gentle on hair and skin. Available in several scents for discriminating tastes. Price: €6.80 [www.btssport.com](http://www.btssport.com)



# cosmetics

*UV Protection  
& Sunglasses*



## UV Protection for Kids

Junior surf brand Lion in the Sun stocks sun protective swimwear for children, teens and adults. The fabric all rates UPF50+, and styles include one and two piece surf suits, rash vests and boardies, sun hats and swim jackets. The fabric is top quality, fast drying Italian lyra. Secure online shopping and fast, free delivery from [www.lioninthesun.com](http://www.lioninthesun.com)

**Equator Sun** offers an extensive range of excellent quality UV protective swimwear for all ages, including stinger suits, long-sleeve rash shirts and swim leggings. The fabric provides excellent sun protection of UPF50+ and is durable, cool, soft, quick drying and is suitable for a wide range of watersports. Equator Sun is a UK based business. [www.equatorsun.com](http://www.equatorsun.com)

## Smith MHC

With a name inspired by adventures at 5,280 feet, the MHC is the newest addition to Smiths growing metal collection. In this 8-base lens curve piece the standard stuff you expect from Smith Optics is all there: optical grade metal-frame construction, Tapered Lens Technology (TLT) Carbonic Lenses, stainless steel hinges, 100% UV A/B/C protection and adjustable silicone nose pads for a custom fit. And of course, the MHC is loaded with details that make it pure Smith, including custom acetate temple tips with an inlayed logo, laser etched Smith wordmark, and pad-printed MHC on the lens front. Available frame and lens combinations include Silver with Polarized Gray (\$99), Gold with Brown (\$80), or Blue with Platinum Mirror (\$80). Visit Smith Optics at [Smithoptics.com](http://Smithoptics.com)



## Dirty Dog Wetglasses

"Tube" Dirty Dog Wetglasses with Hydrophobic Green Polarised PC lenses, Superstrong TR90 frame and headstrap to keep the glasses on are ideal for active divers. Hydrophobic coating is a state of the art lens coating that causes water to bead and run off with a similar effect to that of old watercoating sprays on carpets and fabrics. Hypo-allergenic flexible plastic frames are stress-resistant, strong yet lightweight with a snug fit around the face for optimum comfort and maximum protection from glare. Decentered impact-resistant distortion-free polycarbonate lenses provide 100% protection from damaging UVA and UVB rays and 70% infrared (heat) protection. Superb visibility into the water. Comes with cloth pouch and protective case. Price: GB£45.00 [www.dirtydog.com](http://www.dirtydog.com)



## Body Glove Polarized Sunglasses

Hanauma, Shiny Solid Black, Smoke Polarized. Price: \$30.00 USD [www.bodyglove.com](http://www.bodyglove.com)



## Dive Shades

The GRAND CAYMAN II is the newest style to be added to the Dive Shades series. It features a .75mm lens and a soft silicone nose piece for comfort. Available in 4 different frame colors. Crystal Gradient Brown shown here. Combines good looks, superior eye protection and value. New Dive Shades Neoprene Sunglass Retainer also available at: [www.diveshades.com](http://www.diveshades.com)



## Tough T's

A typical 100 % cotton T-shirt has a sun protection rating of only SPF 6, far below the recommended level of SPF 15. Solar Protective Factory's breathable 100% cotton t-shirts are the only totally cotton shirts certified by independent laboratory tests to exceed both AATCC and ASTM standards—the U.S testing and labeling organizations—earning a UV protection rating of UPF 40-50+, which is the highest possible. SPF® co-founder, Terry Breese says, "Our SPF® shirt looks like a T-shirt and feels like a T-shirt, but when it comes to blocking the sun's dangerous UV rays, it's more like a coat of armor." [www.SunProtectionCenter.com](http://www.SunProtectionCenter.com)



# cosmetics

*Skin & Hair Care*



## Kiwi Products

of New Zealand offer the best in skin and hair care using the natural resources and ingredients found on the beautiful islands. Enervating multi-colored Mud & Mineral Rock Soap contains pure Rotorua Thermal Mud from the geothermal area of Rotorua, 6.80 NZD. Thermal Mud Soap is a gentle rich-lathering soap with lots of thermal mud for deep cleansing and enriching your skin, 40g, 4.90 NZD. Get the goodness of Kiwi in Kiwifruit Shampoo & Conditioner for shiny, vibrant hair, 13.80 NZD.

## Products with Paua!

Paua Deep Down Nourishing Creme: luxurious, therapeutic, rejuvenating, nourishing, highly enriched with marine vitamins and minerals—helps slow down the visible signs of ageing, 15.40 NZD. Paua & Sea Kelp Soap with Paua Abalone Extract and Sea Kelp for the moisturising and healing of your skin, 10.40NZD. Exhilarating Paua Facial Scrub Sea & Sand Stimulating Facial Scrub combines collagen and allantoin with natural marine protein, vitamins, minerals and trace elements found in Paua extract. Thoroughly cleanses skin and removes dead cells leaving your complexion glowing, 14.40 NZD. [www.kiwiproducts.co.nz](http://www.kiwiproducts.co.nz)

## Let's face it, mud is great for skin

Mud for Men skin care line has been especially developed with men and mud in mind. The sulphur content of the Rotorua thermal mud used as an ingredient actively kills bacteria on the skin, assisting in the prevention or elimination of dreadful acne. Try Mud for Men Moisturiser with SPF15 sunblock—it's enriched with Rotorua mud to condition and hydrate the skin against daily environmental damage, 15.40 NZD; Mud for Men Aftershave Balm enriched with Rotorua Thermal Mud to help heal and soothe razor stressed and sensitive skin, 14.40 NZD; Mud for Men Facial Scrub with pumice particles and Rotorua Thermal Mud to deep cleanse and exfoliate, for a smooth and healthy appearance, 15.40 NZD; Mud for Men Soap with Rotorua Thermal Mud provides a natural cleanser for the face and body, 7.95 NZD. Give all four in the Mud For Men Gift Box II, 59.50 NZD. [www.kiwiproducts.co.nz](http://www.kiwiproducts.co.nz)



## Cool off with Skyn Iceland

In Iceland—the land of balance and harmony, pristine, unspoiled nature and clean water and air—the term “skyn” translates to “senses” in English. Skyn Iceland wants to point out the direct link between the senses and how your skin looks and feels, especially when overloaded by stress. Winner of this year's Indie Award for innovation, the beauty industry's highest honor, Skyn Iceland is the only skincare line specifically formulated to counteract the detrimental effects of chronic stress on skin. Try the Antidote SPF18 Mineral Sunscreen with Biospheric Complex (anti-oxidants Arctic Cloudberry Seed oil, Red Cranberry Seed oil, Butterfly Bush and Thyme extracts; Icelandic glacial water infused with minerals and Angelica Archangelica—an Icelandic medicinal herb) US\$55, Hydro Cool Firming Eye Gels \$45, Angelica Lip Repair \$15 and the award-winning Stress Defense Cream \$100. [www.skyniceland.com](http://www.skyniceland.com)



## John Masters Organics

John Masters Organics hair, face and skin care products use no harsh chemicals or artificial colour. Take three essential products on your next dive trip in this nifty travel set, which includes Lavender Hydrating Mist for Skin & Hair, Green Tea & Rose Hydrating Face Serum, Lip Calm. Regularly a US\$51 value. On sale now for US\$40.00

Rosemary & Peppermint Detangler has a luxurious light organic conditioning formula. Detangles and conditions without weighing down your hair. Contains protein and vitamins for strength and shine. Hair growth is stimulated by rosemary. Great for dry or fine hair. Only high quality, 100% certified organic ingredients.

Herbal Cider Hair Rinse & Clarifier revitalizes your hair leaving it clean and fresh by eliminating residue build-up including lime from hard water. Sebum and product build-up is removed by a delightful mix of organic apple cider vinegar with wild cherry bark, nettles and rosemary. Lemon oil removes unwanted oil from the scalp. Nettles give the hair a wonderful thickness and shine. This unique organic rinse neutralises the scalp's PH level—especially good after swimming in a chlorinated pool. [www.johnmasters.com](http://www.johnmasters.com)



Text by Cindy Ross. Photos courtesy of the manufacturers



**As you're gazing into the eyes of your buddy, hanging at your 15' safety stop for three minutes, what is he looking at? Is it the brilliant sparkle emanating from your eyes as the overhead light pierces the waves? Or is it the black-around-the-eye raccoon look, causing him to muse about the possibility that you did indeed suffer a mask squeeze on your descent?**

GirlDiver has searched for the answers to the best waterproof mascaras. She has asked fellow female divers, looked for information online, and tried hit and miss with the brands that happened to be in her make-up bag. Some worked, some didn't. So, in the quest to provide proof positive on waterproof mascara, she dove the top recommendations and came up with her own "Top Waterproof Mascara's for Scuba Diving".

First, let's understand what waterproof mascara is. Water-proof mascara contains synthetic polymers that instantly freeze around each lash, creating a water resistant barrier. Keep in mind, these mascaras will dry out your lashes if worn constantly, so unless you live

in rainy Seattle, as GirlDiver does, you should wear these only when embarking into the deep blue.

Now, onto the test. The mascara's in this trial were chosen based on range of price, manufacturer and convenience. These were each tested on five dives in the chilly waters of the Puget Sound. GirlDiver likes to keep the water out of her mask, so full mask flood and clear exercises were not performed during the test. The removal of the mascaras were done the night of the dive, not the morning after, so sleeping in your make-up could skew the results. See sidebar (right) for GirlDiver mascara test results.

### Hoods & Hair

Dive Diva's everywhere have questioned how to tame their wild tresses. While we know that we aren't going to look like the Sports Illustrated models after a dive, we certainly shouldn't surrender to a shaved head either. Saltwater wreaks havoc on our hair leaving a salt residue that depletes the hair of its natural moisture. Add blowing wind into the equation and the result is split ends and brittle hair that feels like straw.

Hair care for Girl Divers is three fold. You must treat your hair before you subject it to the elements, manage your hair during the dives, and restore your hair after the dives.

Chlorine and saltwater can discolor

and dry out the hair's cuticle. Before diving, wet down hair with cool tap water, which will seal the cuticle. Hair is like a sponge; it can only absorb so much water. If it's wet to begin with, it won't absorb as much damaging chlorine and saltwater.

Swear by leave-in conditioner and never leave for the dive without it. Protecting skin with sunscreen is good sense, and the same goes for hair. If you can find a conditioner with a sunscreen in it, all the better, as the UV rays will turn your hair a brassy shade. Also, using some hair crème or pomade as a conditioning barrier will reduce the amount of salt that can adhere to the hair follicles.

During the dive, if you have long hair, you'll want to secure it before pulling and tugging

### GIRLDIVER'S TOP 5 WATERPROOF MASCARA'S FOR SCUBA DIVING:

#### #1 COVERGIRL Professional Waterproof Mascara

Glide on: 4.5/5  
Wearability: 5/5  
Removal: 3.5/5

#### #2 MAYBELLINE Illegal Lengths Mascara

Glide on: 5/5.  
Wearability: 5/5  
Removal: 3.5/5

#### #3 MAYBELLINE Full & Soft Mascara

Glide on: 4.5/5.  
Wearability: 3/5  
Removal: 4/5

#### #4 CLINIQUE Gentle Waterproof Lash Intensifier

(Good for a very natural look—not a lot of length)  
Glide on: 2/5  
Wearability: 4.5/5  
Removal: 4/5

#### #5 SEPHORA Waterproof Mascara

Glide on: 4/5  
Wearability: 4/5  
Removal: 5/5



ABOVE: Sephora Waterproof Mascara  
LEFT: Maybelline Full n' Soft

Lancome L'Extrême Waterproof Mascara  
and Estée Lauder Illusionist Waterproof  
Maximum Curling Mascara

LEFT: Clinique Gentle Waterproof  
Lash Intensifier; CoverGirl Professional  
Waterproof Mascara; Marathon Waterproof  
Mascara and Remarkable Mascara

While we may not wear mascara as artistically as the model in this TUSA ad does, diving divas may still find a few beauty tips from GirlDiver helpful...



# mermaid matters

TOP TO BOTTOM: Two DoWraps and three ScubaDoRags give hair good protection from the elements. Lots of styles and colors available. [www.dowrap.com](http://www.dowrap.com) and [www.scubadorag.com](http://www.scubadorag.com)

on your neoprene hood. Putting hair into a braid or a series of pony holders keeps hair from becoming caught in the hood. Using the conditioner before braiding, will help to hold the braid in place. You may want to wear



beanie for night dives (as this will only tame not your



tresses but avoid getting blood worms tangling in your locks). For day use, a "slap strap", available at most dive stores will keep the mask strap from catching on your hair.



We are told to rinse our gear thoroughly after a dive, but any good Girl Diver knows, that beauty comes before gear rinsing. As soon as possible, rinse out your hair with fresh water. You may find a fresh water shower on the boat or at the dive site. There are also a myriad of shampoos made to remove harsh elements from your hair at your local salon.

Put a wide-toothed comb in your Save-A-Dive kit, so that you can get through those tangles on your way to the pizza place. Again, if you've got some spray in conditioner with you, now would be a great time to add another round to the hair, as it's just been through the dehydration routine.

Keep your hair trimmed of split ends and use a clarifying shampoo weekly to keep your hair looking great.

Even the divas of diving have to treat their locks. "I'm not very good with my hair and don't think about it much," Tanya Streeter said from her home in Austin, Texas. "When I know I'm going to be in the water, I just coat it with a ton of conditioner, braid it, and wear it down my wet suit."

*Cindy Ross is a dive instructor and writer dedicated to promoting the scuba lifestyle for women of all ages worldwide. For more information, please visit: [Girldiver.com](http://Girldiver.com)*



## L'Anza Magic Bullet

This deep-penetrating lightweight mist strengthens your hair from inside the cortex and out, instead of just making it look healthier on the surface. Spray it into your damp or dry hair and leave it in. Apply prior to styling and blow drying.

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

## Hi Shine Leave-In Conditioner Mist

A nourishing, vitamin-rich, naturopathic micro-brewed formula from Australia with keratin and pure silk protein leaves hair with an incredible shine and feeling weightless. To condition and protect your hair from environmental stress, spray over towel-dried or dry hair. Comb through and finger style your hair.

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



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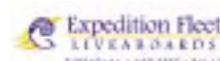


### Official Magazines



### 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 I, 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)



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MANILA



# shark tales



Edited by  
Edwin Marcow

## Captive shark did have 'virgin birth'

Female hammerhead sharks can reproduce without having sex, scientists confirm.

The evidence comes from a shark at Henry Doorly Zoo in Nebraska, which gave birth to a pup in 2001 despite having had no contact with a male.

Genetic tests by a team from Belfast, Nebraska and Florida prove conclusively the young animal possessed no paternal DNA, *Biology Letters* journal reports.

The type of reproduction exhibited had been seen before in bony fish but never in cartilaginous fish such as sharks.

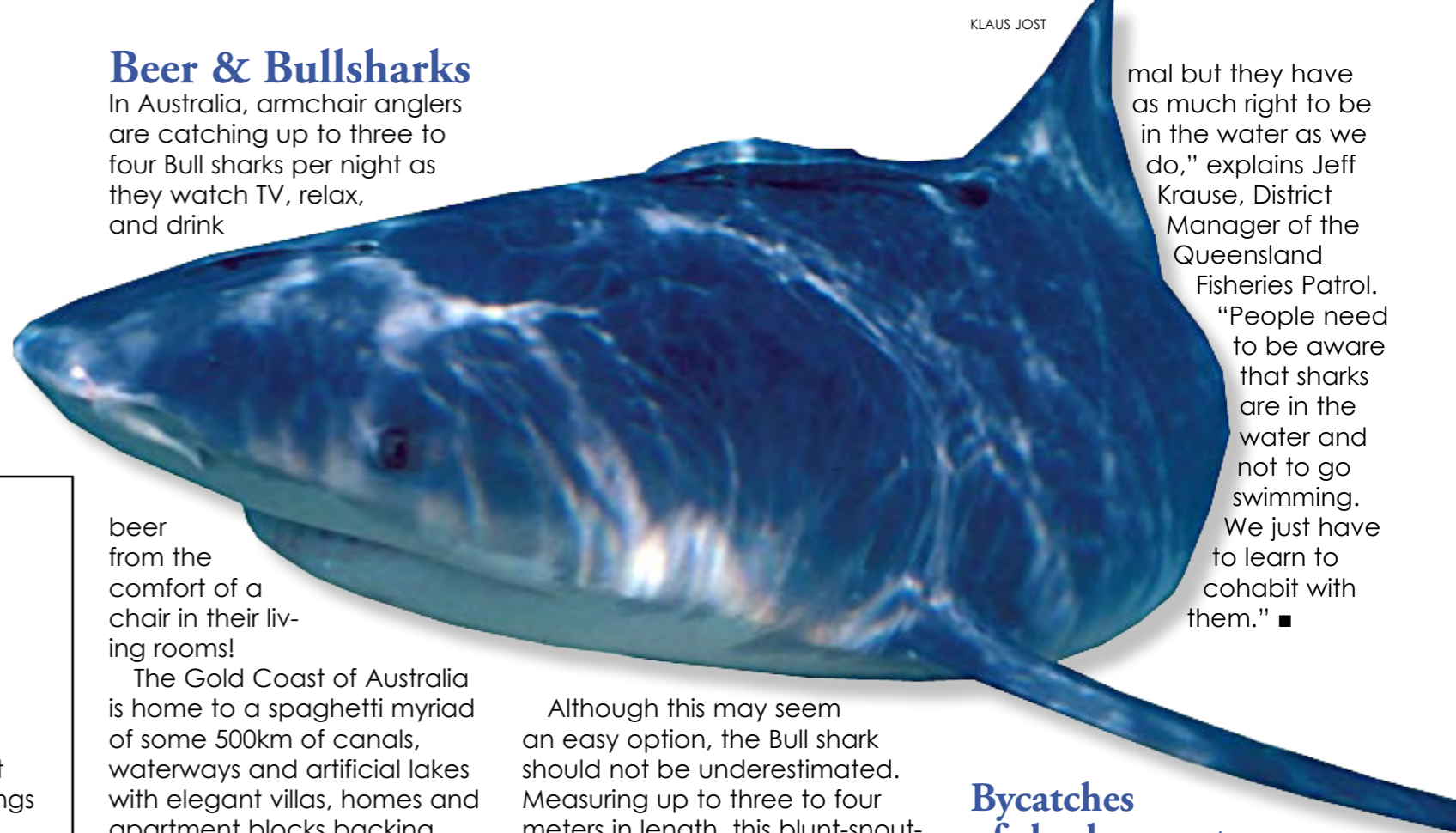
Parthenogenesis, as this type of reproduction is known, occurs when an egg cell is triggered to develop as an embryo without the addition of any genetic material from a male sperm cell.

The puzzle over the hammerhead birth was reported widely in 2001, but it is only with the emergence of new DNA profiling techniques that scientists have now been able to show irrefutably what happened. ■

*Recreational anglers have caught three meter sharks with nothing more than a cooked pork chop taken from the barbeque and dangled from a simple rod and reel resting from a sixth floor balcony.*

## Beer & Bullsharks

In Australia, armchair anglers are catching up to three to four Bull sharks per night as they watch TV, relax, and drink



KLAUS JOST

mal but they have as much right to be in the water as we do," explains Jeff Krause, District Manager of the Queensland Fisheries Patrol.

"People need to be aware that sharks are in the water and not to go swimming. We just have to learn to cohabit with them." ■

beer from the comfort of a chair in their living rooms!

The Gold Coast of Australia is home to a spaghetti myriad of some 500km of canals, waterways and artificial lakes with elegant villas, homes and apartment blocks backing onto the brackish water. With the increasing development of new homes, new canals are excavated, and with them, the Bull sharks' territory and population has grown exponentially.

Recreational anglers have caught three-meter sharks with nothing more than a cooked pork chop taken from the barbeque and dangled from a simple rod and reel resting from a sixth floor balcony.

Ranked as the easiest game fishing in the world, architectural student, Saeed Granfar, has caught 100 bull sharks since his childhood. His technique is simple. With a baited line of chopped eel, he fixes his rod to a pontoon and sits back to watch his favourite film, or listen to a CD keeping an ear out for the ratcheting sound of the line playing out. "It's definitely lazy man's fishing," said Granfar.

Although this may seem an easy option, the Bull shark should not be underestimated. Measuring up to three to four meters in length, this blunt-snouted, barrel-shaped predator with a fearsome aggression and power, is an apex predator. Responsible for the deaths of two bathers swimming in the canals in 2003 and a young woman killed near Stradbroke Island in 2006, the fear among some is that new arrivals to the Gold Coast will be unaware of the potential dangers lurking under this tranquil setting.

With growing pressure from local game fishing operators to create the "Bull Shark Classic" tournament with various prizes for the largest shark caught and the most sharks caught in one day, their future may be bleak.

As mentioned in a previous *Sharktales*, the call for the "Bull Shark Classic" has regrettably gained momentum in Queensland, and local anglers are free to catch and kill as many bull sharks as they wish. Thankfully, the Fisheries department is opposed to any cull. "There have been calls to eradicate the ani-

## Stingrays and Sharks May See in Color

Stingrays may see the world in colour rather than be colour blind, which until now, has been the prevailing consensus. A team of researchers at the University of Queensland, under the direction of Dr Nathan Hart, Professor Shaun Collin and Professor Justin Marshall, began behavioural tests on Shovelnose Rays and Reef sharks at the Heron Island Research Station. At the Centre, the sharks and rays were being trained to associate coloured light with food, and to see if the subjects could distinguish between the training colour and a random colour. Susan Theiss, a PhD student at the University of Queensland remarked, "seeing in colour could help rays find mates,

detect prey and avoid predators".

Due to an unfortunate fire at the Research Station, the findings have been delayed, but they hope to repeat these experiments in the near future. Though the rays have the apparatus to see in colour, further tests should confirm if they could disseminate this colour information. "Knowing more about ray and shark vision could eventually help in the design of wetsuits and surfboards to reduce attacks on divers, surfers and swimmers".

Professor Collin added, "The design of trawler nets could potentially be altered to reduce shark and ray catches". ■

The Blue-Spotted Maskray has the physical framework to see colour vision



PETER SYMES

UNIVERSAL STUDIOS

## Bycatches of sharks are at critical levels

At least 7.8 million sharks are killed off the shores of Southern Africa each year by hooks intended for other animals. This by-catch also includes some 34,000 sea birds and 4,200 sea turtles, according to WWF South Africa and Birdlife South Africa. With an estimated 6.6 million open-ocean sharks (mostly blue and shortfin mako), and a further 1.2 million coastal sharks (dog sharks) unintentionally caught in this region by longlines and netting, the situation is critical.

Some estimates for by-catch



SEA SHEPHERD

Long line hook





Shark fin shop in central Bangkok

would use are functionally eliminated," said the co-author of a recently published study, Julia Baum. There are simply not enough sharks in this region to keep the environmental balance in check.

Researchers have linked declining shark numbers with a boom and bust cycle for other marine life species by allowing more lowly fish species to flourish in numbers such as skates, rays and smaller sharks. The food they predate on—shellfish, scallop, clam and oyster populations—are now also in sharp decline.

The research suggests that with the fall of shark populations, the negative affect it will have further down the food chain will have far reaching consequences. ■

## Sharks die in aquarium —the water was too cold

Three black tipped reef sharks died during their 70-mile move from Great Yarmouth to their new home at the Hunston Sea Life Centre in Norfolk. The centre said that the deaths were "almost unprecedented in the Sea Life network over 100 shark transportations over the past 20 years". Manager Nigel Croasdale also added that he was "deeply concerned" at the loss.

Tragically, the centre confirmed that the water was two degrees Centigrade below the minimum required for the sharks. Though not conclusive, this is the likely cause of the sharks' death. This was due to human error by a staff member. Action has been taken to ensure this cannot happen again, including a retraining and assessment programme for the relevant personnel" a spokesman said. ■



NATIONAL DIGITAL ARCHIVES PROGRAM, TAIWAN.

## Changing Fins

Infant Brown-Banded Bamboo sharks can see a month before they leave their eggs and change their fins as they grow. Working on his Ph.D, thesis graduate student, Blake Harahush, has made a discovery, which is about to be published in the Journal of Fish Biology. The sharks showed signs of fins at about 53 days. This is about one third into their hatching period of 153 days, though this was variable depending on the incubation period. The function of the early development of two long fins Harahush believed, was to circulate fresh water and oxygen and clear any waste products from the egg case. These fins would then morph into dorsal, pelvic and

caudal fins. Warmer temperatures did speed up the growth cycle with one shark hatching after 101 days. Most other species take between several months and two years to develop before birth. The findings also discovered that one month before hatching from their egg cases, the sharks' eyes are fully developed. "It's still a mystery why they develop their eyes so early before they hatch," Professor Shaun Collin, a fish vision expert, stated that the research was useful for identifying the best conditions for shark husbandry, which could help replenish stocks. ■



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Edited by  
Peter Symes  
& Jason Heller

## Photo & Videography

The biggest advantage: using long focal lengths from 100 to 200mm results in a greater distance to the subjects. This is a prerequisite for catching special behaviours of animals. The picture shows a Coral Grouper on the Maldives enjoying the "service" of a cleaner shrimp. Long focal lenses are great tools, but keep in mind, they swallow a lot of light! To work with recommended aperture of 22 or 32, two strobes with guide numbers 16 are necessary for 100ASA

By Kurt Amsler

### Mastering

# M Macro

Differences of opinion have have raged throughout history as to where close-up photography ends and macro photography begins. For underwater photographers this question tends to

be academic, though: all we are trying to achieve is detail and the best angle and frame to make the most of it. Thankfully all underwater cameras allows the use of all the lenses that make sense when we try and get close and personal.

#### Equipment

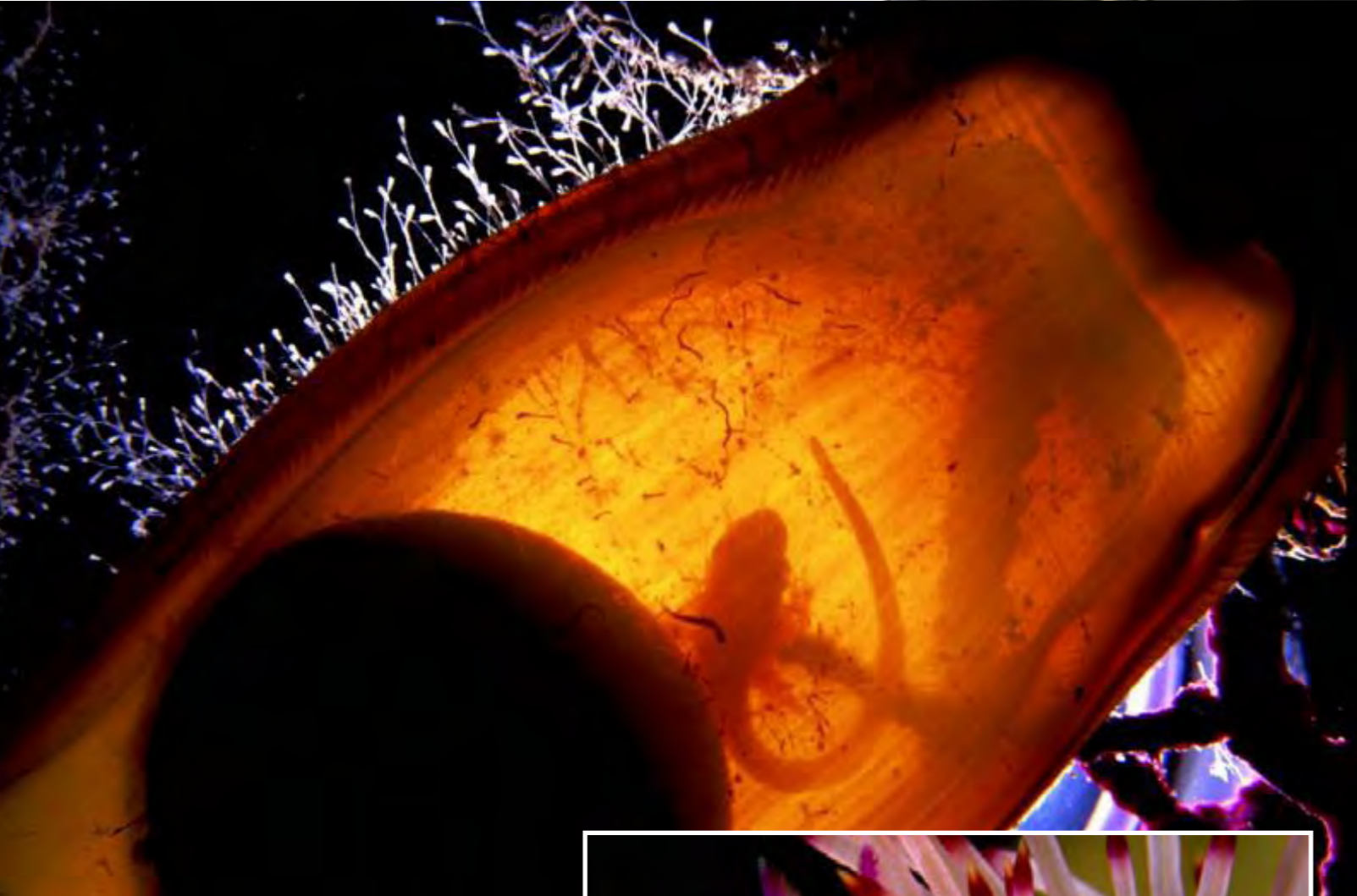
Close-up photography under water is not technically challenging. Thanks to TTL metering or the immediate feedback offered by shooting digital, exposure is a piece of cake. Also, all your tried and proven techniques that you have learned on dry land works under water as well.

Within the scope of this article, we define macro photography as ranging



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UNDERWATER PHOTO & VIDEO

# Photo & Videography



No other technique in UW-photography gives more possibilities to play with light. This picture shows the embryo of a Mediterranean cat shark. The females of this species are one of the few sharks who place their eggs on gorgonian corals where they remain alone until the baby sharks hatch. To make the baby shark visible, the slave strobe was placed behind the egg



The nice thing about Macro photography is that the subject can be fare to spectacular, exceptional and hard to find. Simple creatures, such as this Polynesian sea urchin, make nice pictures. With the Macro camera, photographers do not have to swim mile and miles to find subjects to shoot. Transform your eyes to "short distance" and be patient enough to investigate one single rock or coral head. Most the time, you'll find more subjects than your film can capture

between a reproduction ratio from 1:3 to 1:1. A 1:3 ratio means that the subject's reproduction of film is a third of the actual size. Likewise, a 1:1 ratio means the that the subject gets reproduced on film in its actual size. To take pictures in the macro range, we need special macro lenses and a corresponding flat port for the underwater housing.

Macro lenses can usually focus continuously from infinity down to their maximum reproduction ratio. Alternatively, the standard lens (around 50mm focal lens) can be used in conjunction with distance rings. However, distance rings restrict the lens to a certain focus range close up, and as they can't be removed during a dive, this option has its limitations. A "classic macro lens" has a focal length of 50 to 60mm and f1:2.8.

Focal lengths of 100 or 105mm or 180 or 200mm don't result in a larger reproduction ratio but enables the photographer to keep a greater distance to the subject. This can be a distinct advantage,

even a necessity, when attempting to photograph shy creatures.

### Technique

There are some distinct differences between extreme close-up photography and other techniques. Due to the long extension seen in macro lenses the distance to CCD-Sensor or film is increased and this drastically reduces light transmission.

Owners of TTL strobes (for film cameras) have distinct advantage on this point as they don't need to calculate how to compensate for this reduction. Automatic strobes for digital photography, on the other hand, does not have this important feature anymore, because the photographer can immediately control the exposure of the image—particularly, by checking the histogram, which is the most accurate method.

Focus can also be a challenge in close-up photography, with the depth of field dropping away exponentially as the

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# photography news

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To achieve a blue background—rare to see in macro—look for subjects, like this wire-coral, which can be photographed against the surface. Don't change the recommended smallest aperture of 22 or 32, but bracket with long shutter speeds from 1/15" to 1" of a second. For proper composing, a diagonal placing of subjects is most times the best solution

photographer enters the macro range. Focusing manually to place the few millimetres of focus at the right distance can be challenging and result in many close misses. This is especially true when light conditions are low. Therefore, a low power focus light can come in handy. Once more, experience shows the budding underwater macro photographer is best served by relying on auto-focus.

This mode focus on a point in the finder selected by the photographer much faster and more precise than the eye. Put your camera on servo-autofocus (position S). In this mode, you can make sure the selected point stays sharp while you compose the frame. Wait for the right moment and then release the shutter. If necessary, small adjustments can be made by moving the camera forward or back.

### Exposure

Short depth of focus is also the reason why we stop down the aperture of our macro lens as far as possible to compensate. Macro lenses from all the major brands therefore allow stopping down to f32. But when we combine this with the loss of light due to increased distance between lens elements and film plane,



Wetdiopter on a Seacam housing

a 100mm or 105mm light, output needs to be double that. In these instances, it is better using not one but two macro-strobes, as still longer focal lengths require even more light if one is to keep the aperture down at a f22 or f32 setting. The same applies when we use tele-converters, which double the focal length of a standard lens for reproduction ratios up to 2.5 : 1.

Macro photography is a perfect tool for being creative. Lines, patterns and structures are great for composing pictures in the way you want



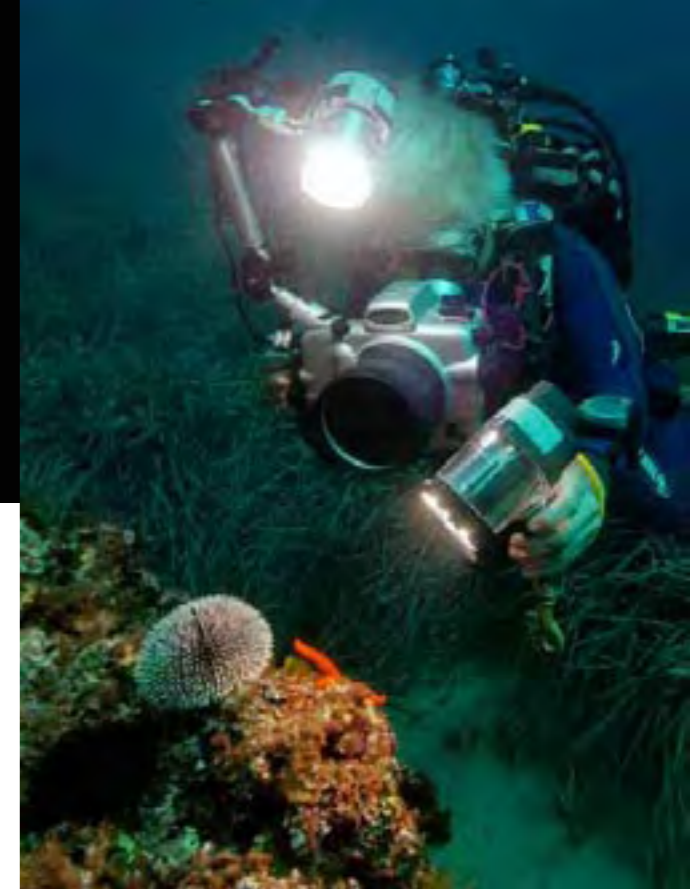
This photograph of a rare red fire-coral, only found north of the Maldives, shows the effect of double strobe. On the picture on the left, only one strobe was used. The colours seem good, and against the black background, the subject may appear nice and contrasty. But comparing it to the second picture, the enthusiasm is soon gone. The difference is day and night! Here, a small slave strobe was used halfway from the back and top. The subject now appears less flat, as the second light source sharpens the edges and show small details.

or sensor, it becomes obvious that we will need a lot of light for a correct exposure.

To some extent, the short distance to the object will compensate for this as will using a 100ASA setting. It is possible to use a strobe with a guide number of only 11 with a 50 or 60mm lens. However, with

### Wet Diopters

Owners of famous Seacam housings may use the so-called, "Wet-Diopters". These are additional lenses mounted on the the outside of the port to give a magnification from 1.5 : 1 up to almost 3.2 : 1 by adding them together. This system has great advantages in comparison compare to converters as no light gets lost



and, as they are attached outside the plan port, they can be removed if not needed even during a dive.


In the field, it is far better to use two or



## 10 Macro Tips

- 1 Very important is the isolation or exemption of the main subject. Macro photos that make the onlooker search for the main feature are usually boring. The main subject should be recognized in a second! This can be easily achieved by shooting the subjects against the water or a faraway background. Also, firing the strobe from the top can keep backgrounds in the dark.
- 2 In no other technique is playing with light so important as in macro. One strobe above the camera fits most situations. Two strobes, for example one frontal and one side light, will change the picture dramatically. Using a SEA&SEA YS-30 strobe, which works in TTL Mode without a cable, the strobe can be fired from any direction the photographer wants or the subject needs.
- 3 Due to the very small depth of field—which is decreasing dramatically the closer you get—it is necessary to set the lens always on aperture 22, or if possible, on 32. Consider that macro lenses “swallow” plenty of light! Make sure your strobe is strong enough, or choose 100 ASA film rather than 50 ASA.
- 4 Macro photographers may never swim more than 50 meters during a dive. Macro subjects have to be observed by searching a small area cm by cm. A small torch helps anyone who requires “reading-glasses”. It is a good idea to have the diving mask prepared with your prescription.
- 5 Your camera set up has to be “handy”! This means that even with one or two strobes, the camera has to lie in your hands absolutely balanced and weightless. If so, you will be able to hover a long time in one spot, holding the camera without straining while you wait for that small gobyfish to open its mouth.
- 6 Patience is the main ingredient here, as we can't direct the animals we're photographing. And sometimes, you need quite a lot of it while waiting for a snail to arrive in that perfect spot... Not to mention, it is NOT the way of a serious photographer to place snails and other slow moving animals by hand!
- 7 Proper buoyancy, diving gear, which fits to the body and exact weights, are prerequisites for successful macro photos. To hover in one spot, stabilized only with two fingertips on a dead piece of coral, will be easy then. Good diving skills and fitness will bring advantages in any situation.
- 8 Owners of amphibious cameras such as NIKONOS or MOTORMARINE have to use the so-called, “Macro-frames”. These frames have to be used because it is just not possible to estimate precise distances by a centimetre and have the focus in the right place. If you can unscrew it, or after gaining enough experience, take off both of the frames' sidebars, it will help to approach subjects more easily.
- 9 In contrast to super wide angle photography in which manual exposure definitely brings better results, macro TTL is the key to success! Everything fits perfectly to this electronically device—short distances and small picture angles. It does not matter how many strobes you've got, all the shots are properly exposed.
- 10 Using a modern SLR camera, auto focus can be used in 95 percent of all underwater photo situations—especially in macro where it works perfectly: Set your camera on “S” (servo autofocus); Let the camera focus on the subject; Hold the focus by keeping the shutter halfway down, or use the AFL key; Compose the picture; Shoot! ■

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three smaller macro strobes rather than one single industrial strength unit. The dedicated macro strobes come with the appropriate colour temperature of 5600K for accurate colour reproduction and

are much easier to handle and position. Wide-angle strobes are built for greater distances and have a lower colour temperature, which leads to orange/red hues on close range.

### Light and composition

The classic approach to macro lighting is full frontal. The strobe is mounted right above the camera, a position that assures perfect lighting for most situations. With two strobes, a combination of frontal and side lighting can be used to accent certain features, i.e. side lighting to accentuate the gills of a nudibranch, or frontal and top lighting to bring out the spines of a stone fish. To accomplish positioning, the strobe units need to be small and mounted to short double jointed arms.

As important as lighting is the isolation of the main subject. Macro photos that make the onlooker search for the main feature are usually boring. It is therefore important to emphasize the main feature by setting it apart from foreground and background. Patience is the main ingredient here as we can't direct the animals we're photographing. And sometimes you need quite a lot of it while waiting for a snail to arrive in that perfect spot... A keen eye can help, too, locating the single anemone in a reef that is perfectly

### *Two fingertips placed on a dead bit of coral should be all it takes to brace for camera positioning*

framed by blue water. (To keep it blue shoot up toward the surface and use long exposures—1/15" to 1/8")

### Etiquette

Even when shooting close-ups, environmentally conscious underwater photographers avoid any contact with reef or rock. Two fingertips placed on a dead bit of coral should be all it takes to brace for camera positioning while the diver rests suspended in the water. Good diving skills and fitness therefore are a

prerequisite for underwater photography. „Good behaviour” in the reef doesn't only benefit the environment but it'll make you popular with the dive guides. Remember, they all have special places away from the beaten track through the reef - places they only take divers they trust. ■



*As important as lighting is the isolation of the main subject*



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DivePhotoFest is proud to announce its inaugural photography contest. In partnership with its sponsors Ikelite and Scuba Diver Australasia, prizes range from underwater flashlights to magazine subscriptions. The contest is open to all amateur underwater photographers and to those who register as a member of the Dive Photo Fest website.

The first competition will not have a theme but will host only one category—Macro. Photoshop and image manipulation for any submitted image are acceptable.

**The closing date for entries is June 15th, 2007. Winners will be announced on June 25th, 2007.**

Check out the rules here: [www.divephotofest.com](http://www.divephotofest.com)

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### Custom Designed Protective Cases

For those who shoot topside as well as underwater—and that's most of us—there is an exciting new product on the market to protect your

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Seattle based Made Products has announced a new line of camera protection called Camera Armor. Made from a protective skin of silicone, this shield is bespoke engineered to fit a specific make and model of camera like a glove. Just like an underwater housing, it is made to fit a precise make and model of camera, so the same principles apply here.

Incorporating shock-absorbing materials, which fit over the most delicate parts of the camera and LCD polycarbonate shield, Camera Armor also sells the optional lens armor made from elastomeric materials, which are reversible and can fit over a lens up to 85mm in circumference. All controls are accessible through the protective shield, and ergonomic handling of the camera is not affected.

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Column by Cedric Verdier

# Safety Margins with a CCR



There used to be a time when there was no safety margin in any activity that the human being wanted to participate in. In a merciless prehistoric world, on a daily basis, the cave men were hunting with stones and sticks, a large variety of predators the size of a truck, expecting to feed a hungry family. Then, Winchester gave men the ability to kill wild animals while staying at a comfortable distance, without risking their lives. Safety margin was born.

As recreational divers, we were taught to plan for realistic safety margins. One of the first rules states that you should always start your final ascent with at least 50 bar/500 psi in your cylinder. As a technical diver, however, you suddenly discovered that this safety margin wasn't enough when doing deeper dives with required decompression, or even worse, when diving in an overhead environment. So, as rebreather divers, what kind of safety margin do we have?

## Rebreather diving is not an exact science

Let's put it this way—cooking pasta, launching sky rockets or diving with a rebreather all share a common point: **Nothing is ever guaranteed to work.**

### pO<sub>2</sub> readings are not accurate

Even properly calibrated, oxygen sensors fail to show the same oxygen content in a loop. Their age, their chemical properties or simply the humidity in the loop, all work to limit the accuracy of the pO<sub>2</sub> readings. Even the famous voting logic is a pathetic attempt to get a little closer to the exact pO<sub>2</sub>. And it becomes even worse when the calibration is improperly done.

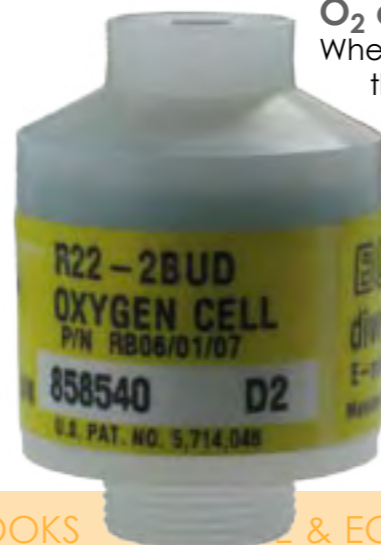


### O<sub>2</sub> exposure limits are variable

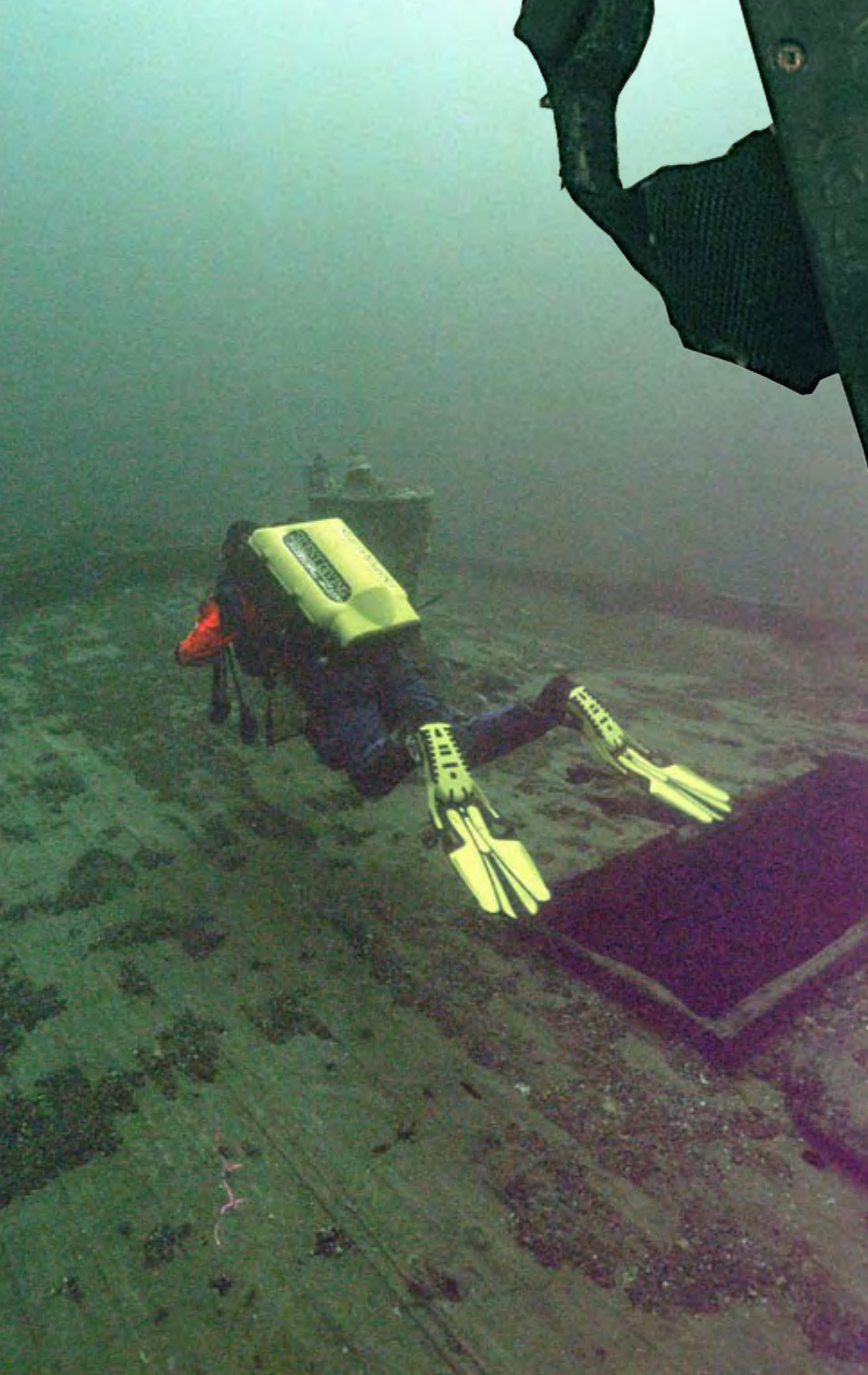
When dealing with oxygen exposure, the sources come across quite vague. The NOAA tables are based on empirical data. The calculations for repetitive oxygen exposures are more than unclear. Even the maximum pO<sub>2</sub> could change from one day to the next in the same person, as shown by Kenneth Donald during the Second World War.

### Decompression calculations are approximate.

In this area, the motto seems to be: "Nobody knows". Everything is as confusing as Sherlock Holmes and his riddles. A lot of theories, algorithms, procedures and decompression curves are discussed and experimented every day by "guinea pig" technical divers. During a dive at 60m,







## What could lead to oxygen toxicity?

When it comes to rebreather diving, hyperoxia is the bad guy—a kind of Darth Vader on steroids. The upper limit of  $pO_2$  is clearly more dangerous than the lower. People can fear hypoxia and its lethal consequences, but it takes time to happen. High  $pO_2$  is sometimes just a matter of seconds.

The three main reasons for having a high level of oxygen in a rebreather loop are:

### 1. A problem with the electronics

One of the causes is a bad calibration. It could be due to:

- A different level of humidity in the gas one uses for calibration, compared to what could be found in the loop during the dive.
- An incorrect ambient pressure when the sensors are calibrated in altitude, if the user indicates that it's done at sea level

### Terms:

DCS: DeCompression Sickness  
 PFO (Patent foramen ovale) is a persistent opening in the wall of the heart, which did not close completely after birth. Often goes unnoticed.

a friend of mine missed one hour deco and simply stayed at the surface, expecting signs and symptoms of DCS that never came. Is that individual variation luck, or a huge safety margin implemented in the decompression softwares?

### Offgassing could be impaired by a lot of factors contributing to DCS

Age, fitness level, illness, PFO, body fat or even history of DCS—pick your choice. How could a complex phenomenon like inert gas off-gassing could realistically be mimicked by a mathematical equation? Add one or all of these contributing factors, and you get something that looks as complex as understanding the graffiti made by a gang of drunken ghetto rappers on a wall just before a nuclear explosion.

So, if everything is so complex, how could we possibly understand what could happen to a rebreather diver from a physiological standpoint? If the  $pO_2$  in the loop is too high, how could we predict the threshold of the oxygen toxicity? If the  $pO_2$  is too low, will the decompression requirement planned be in accordance with what the diver actually experienced?

- An incorrect  $fO_2$  in the oxygen used for calibration
- An incorrect  $fO_2$  in the air used for calibration; in case of a two-point calibration, any excessive pressure in the loop during the calibration. This pressure is generally caused by an obstruction on the flow rate (closed mouthpiece, stuck OPV, backpressure caused by an analyzer connected to the loop, etc.)

But it could also be a *false  $pO_2$  reading* on the handsets. Most of the time, the problem seems to be an old cell or a current-limited cell.

### 2. An user error

- A fast descent will create an  $O_2$  spike
- A wrong setpoint will unnecessarily increase the  $O_2$  content in the loop, for instance, selecting a high setpoint before descending



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- An excessive manual pO<sub>2</sub> injection
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  - An oxygen exposure exceeding the physiological limits
- 3. A problem with the gas supply**
- Using a wrong gas, if the O<sub>2</sub> or diluent tanks haven't been analysed
  - An O<sub>2</sub> leak in the loop, either because of the solenoid stuck in an open position or because of a leaking schraeder valve

*Why do rebreather divers mostly use high pO<sub>2</sub> setpoints?*

One of these factors is Setpoint selection (user error). In technical diving, dive planning is all about safety margins. So, why don't we plan for some safety factors when we choose the Setpoint for deep CCR dives? Why do rebreather divers mostly use high pO<sub>2</sub> setpoints?

A poll on the Rebreather World forum showed that more than half of the CCR divers use pO<sub>2</sub> setpoints higher than 1.2 bar throughout the dive, sometimes increasing this setpoint during the

last part of the ascent.

The reason for such a practise could be found in the fear of hypoxia (solenoid stuck closed or rapid ascent). It could also be seen as a way to decrease decompression obligation. But the main reason may be the fact that 1.3 is the default setpoint on the Inspiration/Evolution, the most popular units on the market. For some divers, it's simply easier to use the default setpoint than modifying it every time the electronics is turned on.

### Poll Results: What's your pO<sub>2</sub> for deep dives?

Less than 1.0 for the bottom phase	0.00 %
1.0 for the bottom phase	3.39 %
1.1 for the bottom phase	3.39 %
1.2 for the bottom phase	14.41 %
1.3 for the bottom phase	41.53 %
More than 1.3 for the bottom phase	1.69 %
I use the same pO <sub>2</sub> for the deco phase	13.56 %
I use a higher pO <sub>2</sub> for the deco phase	21.19 %

On the other hand, a lower pO<sub>2</sub> setpoint gives a lot of benefits:

#### Lower Oxygen Exposure:

A low pO<sub>2</sub> in the loop during the working part of the dive helps to keep the oxygen exposure quite reasonable. Therefore, the body's natural ability to deal with high pO<sub>2</sub> levels will be saved for the latter part of the dive and the decompression stops.

#### Time to deal with emergency:

A lower setpoint gives more time to deal with an increasing level of oxygen in the loop. Whatever the cause of the problem (mechanical, electronics, user error), a rebreather will always take more time to go above 1.6 bar, if the starting point is 1.0 instead of 1.3. It provides the CCR diver with a buffer against major oxygen spikes.

#### Better PO<sub>2</sub> readings

The sensors give a more accurate reading when dealing with low

oxygen content. The user may not be aware that one of the O<sub>2</sub> cells is current-limited and has some difficulties reaching a high pO<sub>2</sub>. During the calibration process, all cells are supposed to reach 1.0, but nothing—except an O<sub>2</sub> flush at depth—proves that the cell can read a higher value.

So much for the benefits of using a lower setpoint, but what about decompression?

#### With air as diluent:

If your pO<sub>2</sub> is 1.3bar at 40m, the actual fraction of N<sub>2</sub> in the loop should be around 73 percent. If the setpoint is 1.0, this fN<sub>2</sub> becomes 80 percent.

For a 60-minute dive, the decompression requirement is (according to V-Planner):

Setpoint at depth	Setpoint during deco	Ascent time
1.3	1.3	48 min
1.0	1.0	86 min
1.0	1.3	60 min

**With trimix (Heliair 10/52) as diluent:** If your pO<sub>2</sub> is 1.3 at 80m, your fraction of inert gases in the loop should be around 86 percent. If the setpoint is 1.0, this fN<sub>2</sub> becomes 89 percent.

For a 30-minute dive, the decompression requirement is:

Setpoint at depth	Setpoint during deco	Ascent time
1.3	1.3	141 min
1.0	1.0	218 min
1.0	1.3	157 min

With the proper setpoint selection (low setpoint at depth and higher in the shallows) it's only a 16 minute longer ascent for an almost three hour long dive. So, we are speaking about a 10 percent increase in the decompression time. And deeper or for longer bottom times, this increase is even smaller.

## What is a reasonable safety margin?

When it comes to oxygen exposure, a rebreather diver should be well aware of the physiological limits to which he or she will be exposed. Safety margin is everywhere in technical diving, as it's everywhere in the daily life.

What kind of safety margins should we use for deep or extremely long CCR dives?

**1. For gas management,** we should use the rule of 1/3's. At the end of the dive, a CCR diver should still have at least 1/3 of the oxygen cylinder left.

**2. For decompression,** all seasoned technical CCR divers increase the conservatism level and try to modify the off-gassing curve with gradient factors or deeper stops.

**3. When it comes to hypercapnia,** we make sure that we stay well within the recommended duration of the scrubber.

**4. For narcosis management,** we should always make sure that the END at the maximum depth will

always be lower than 30 or 40 m (100-130 ft) depending on the environment (cave, wreck, current, etc.) and the mission.

**5. For the oxygen exposure,** a competent CCR diver should always stay within reasonable limits and should select a setpoint lower than 1.1 bar for the bottom part of the dive, maybe increasing this setpoint during the decompression phase.

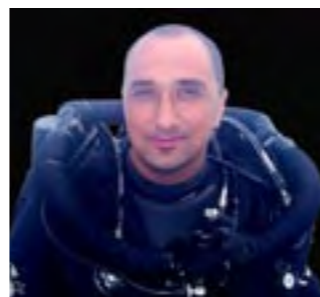
### Remember:

if the cavemen were able to survive in a very hostile environment, it's because they learned to implement some safety margins in their daily activities by designing appropriate tools and clever hunting strategies. A rebreather diver should do the same in order to survive deep and/or extremely long dives. Safety margin is a must when it comes to pO<sub>2</sub> setpoint selection. ■

And, oh.... this is, by the way, the Winchester rifle, that the cavemen did not have

### About the Author

Cedric Verdier is the founder of the TRIADE Project, established in 1999, discovering and exploring more than 20 virgin wrecks located in the south of France between 70 and 130m (230 ft) and 430 fsw. In 2002, he was the first diver to identify and dive the British cruiser *HMS Manchester* off Tunisia. Amongst other dive firsts, he pushed the limits of the Sra Keow cave in Thailand in May 2006, using his Megalodon Closed Circuit Rebreather, to an Asia-Pacific cave depth record of 201m (660 ft). He is currently planning the Yamashiro Project, an international expedition aiming to dive the Japanese battleship *HIJMS Yamashiro* sunk in the Battle of Leyte in the Philippines in November 1944 and resting at a depth of 200m (660 ft). Cedric is a PADI Course Director and a Trimix Instructor Trainer for IANTD, PSAI, ANDI, DSAT and TDI. He spends most of his time teaching cave and mixed-gas rebreather courses at the diver and the instructor level. He is a past Regional Manager for PADI Europe and DAN and has written five books and more than 150 articles about diving. As he is always travelling all over the world, you can mainly contact him by email at: [info@cedricverdier.com](mailto:info@cedricverdier.com) or visit his website at [www.cedricverdier.com](http://www.cedricverdier.com)



### References

*Oxygen and the Diver* by Kenneth Donald  
*Partial Pressures of Oxygen Selection in Closed circuit rebreathers* by Rod Nairne  
*Setpoint Selection* by Stephane Havard  
*Rethinking Oxygen Limits* by Dr. R.W Bill Hamilton  
*Oxygen exposure management* by Richard D. Vann  
*Physiology of Rebreathers* by Dr. David Sawatzky  
Chapter 17 and 17b of the *US Navy Diving Manual*

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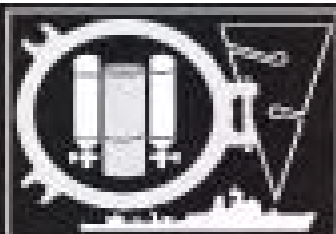
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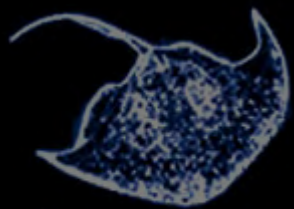
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## Loch Ness monster revealed... It's a toad

Researchers carrying out a sonar survey of Loch Ness have been amazed to find a common toad crawling in the mud 98m down. The Massachusetts Institute of Technology (MIT) has been attempting to unravel the mysteries of the loch.

However, MIT said it did not expect to come across the amphibian so far down.

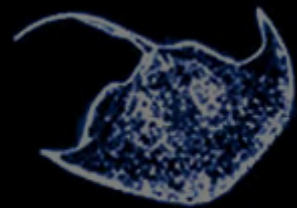
Professor John Watson, of the University of Aberdeen, said: "They were surprised to find a toad at that depth."

MIT said it had completed a side-scan sonar map of the entire length of the loch, which is about 228m at its deepest point. SOURCE: WWW.NEWS.BBC.CO.UK ■

### Wet & Weird



News edited by  
Willy Volk



X-ray mag

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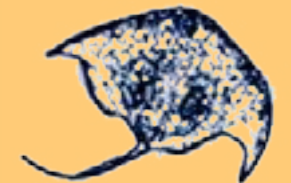
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### Wet & Weird



News edited by Peter Symes

Seattle, USA - From the News Tribune:

## Toy Submarine Holds Ferry Hostage

There was footage all over the TV news of a suspected explosive device at the Steilacoom ferry dock in Washington state, USA, complete with bomb squad guys dressed in their big pillow suits and remote control robots to examine the device, which sheriff's spokesman, Ed Troyer, said looked like a bomb.

It was a homemade submarine. Local residents who came to the dock area told authorities what had happened. They said they'd taped some plastic pipes together a few days ago but lost track of it. The toy apparently floated to the ferry dock and became lodged under an entryway. ■



FILE PHOTO OF AN UNRELATED TOY SUBMARINE AT SUBMARINESTORE.COM

Via New Scientist's News Service

## Penguins on Treadmills

Lewis Halsey and colleagues are taking a somewhat unusual approach to monitoring the effects of over-fishing and warming seas on Southern Ocean fish stocks. Instead of using trawling nets and counting the fish they bring up—a costly endeavour—the researchers have recruited king penguins to do the job for them.

The experiments are based on the theory that the fishing patterns of king penguins breeding on the Crozet archipelago—halfway between Patagonia and Antarctica—can be used as an indicator of the availability of

their favourite prey: lantern fish. If the penguins have to expend more energy catching fish, the likelihood is that there are fewer fish in the sea.

Since 2002, the researchers have implanted tiny computer chips into 50 king penguins on Crozet. The chips monitor the penguin's location, and the temperature at the back of its throat, telling the researchers when it swallows a (cold) fish. They also log pressure, which tells the researchers how deep the penguin is when it feeds.

Finally, the chip monitors the penguin's heart rate. This tells the

researchers how much energy the penguin is using. But how do the researchers know how much energy expenditure corresponds to different heart rates?

Enter, the treadmill.

Watch **this video** of a king penguin on a treadmill (3 MB, avi format) ■

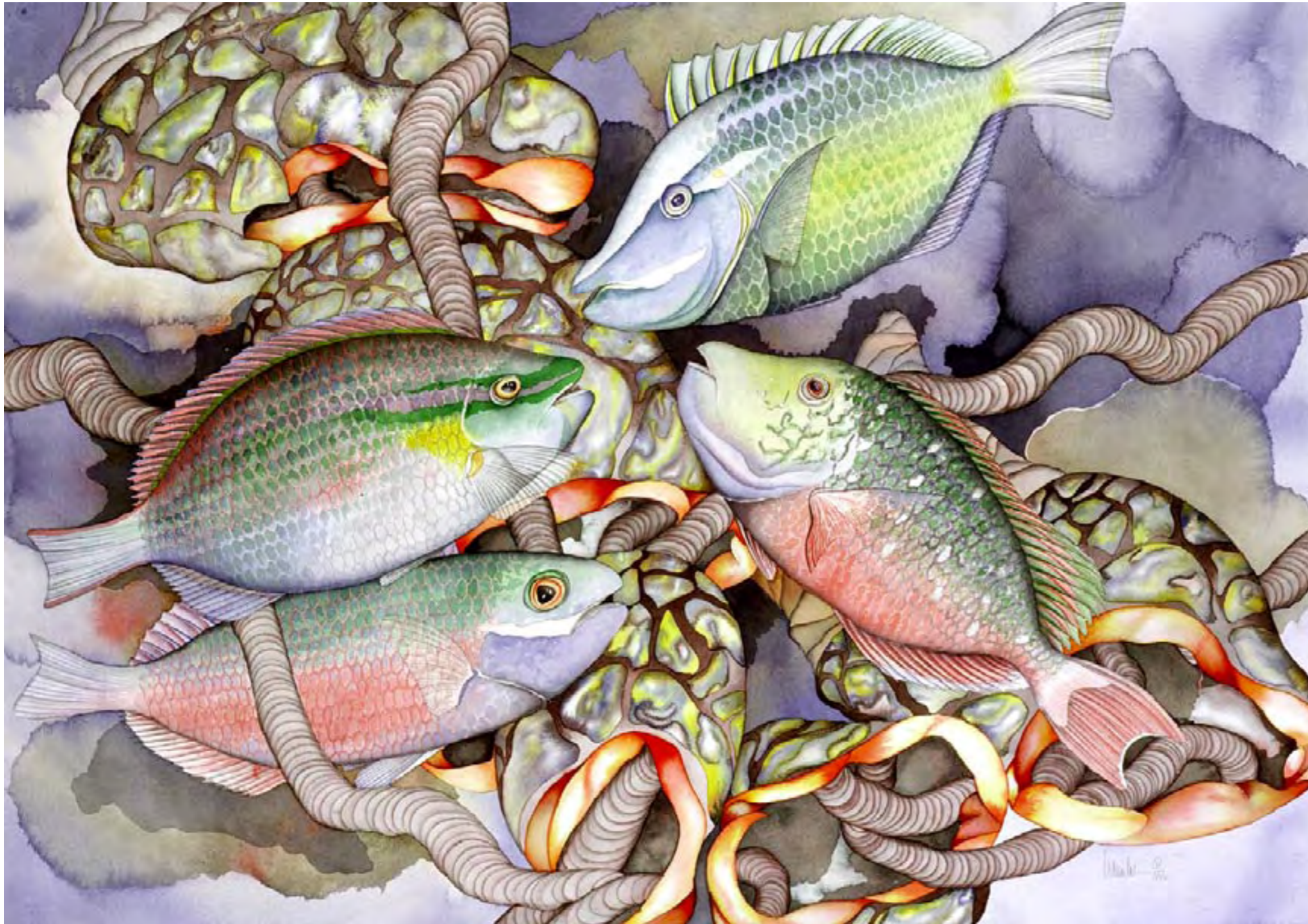


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# Liduline Bekman



P O R T F O L I O



*It was inevitable that the ocean became the main focus of my painting. I started diving, and over the years, the ocean became part of my soul. I am forever fascinated by the seemingly limitless variety and ultimate complexity of the sea creatures I encounter and never cease to be intrigued by the beauty of the colors and the many shapes—everything from soft and ethereal, to stark and threatening. Nature, once again, is perfection, and it is a true challenge to try and depict that.*

— Liduline Bekman

Text edited by Gunild Symes  
All images courtesy of Liduline Bekman

Artist and diver, Liduline Bekman, grew up in an artistic family. Her father was a writer and her uncle was a painter. From an early age, she was exposed to their work and began drawing, painting and making large fabric collages. Bekman said, "I was always fascinated by nature and its beauty. In my family, museum and gallery visits were common, and my family taught me to really see things through careful observation."

The ocean was very much part of Bekman's childhood. Growing up in the Netherlands, a country she said that over the centuries was partially built out of

*Parrot Play* by Liduline Bekman. Watercolor on paper (original sold). Limited edition print, 13x19 in. (33x48 cm), \$50 / €45

PREVIOUS PAGE: *Just Dreaming II* by Liduline Bekman  
Watercolor on paper (original sold). Limited edition print,  
13x19 in. (33x48 cm), \$50 / €45



*Manatee Medallion* by Lidvine Bekman. Watercolor on paper (original sold). Limited edition print, 19x13 in. (48x33 cm), \$50 / €45



*Medallion Series II* by Lidvine Bekman. Watercolor on paper (original sold). Limited edition print, 13x19 in. (33x48 cm), \$50 / €45

the ocean, Bekman lived within walking distance of the sea. She said that she “witnessed the North Sea in all its beauty, fury and bounty.”

Bekman went to art school and studied all the fine art disciplines from various drawing media to painting—first oils, then acrylic paints. She came to study water-

color in an effort to “loosen up” and work more spontaneously. Bekman said that the unpredictability of watercolor forced her to work less tightly controlled. “Initially, I found watercolor a difficult medium for this precise reason, but perseverance made me fall in love with it. I do like the medium because it often has a mind of its

own and makes decisions for you.”

Bekman said that she loves the fluidity of the medium and uses a lot of water in her initial washes. She said that large brushes also help in keeping the medium fluid while she builds up a painting with a series of layers.

“I like my work to look fluid, especially





*Ship Elements* by Liduíne Bekman. Watercolor on paper (original sold). Limited edition print, 13x19 in. (33x48 cm), \$50 / €45

because of the subject matter I paint. In my work, the ocean and watercolor become perfect partners," she said.

As for her source of inspiration, Bekman said that it comes from first-hand observation of the creatures in the sea. She had a love of nature right from the start since she was a child, she said. Bekman often wanted her father to "stop the car" so that she could get

a better look at flowers, animals and buildings. "He almost always willingly obliged," she said.

Throughout her entire life, Bekman lived close to the ocean—first, along the coast of the Netherlands, then by the Gulf of Mexico before a move took her to the coast of Florida with a return once again to the Netherlands shoreline where she currently makes her

home.

Bekman combines deliberate planning with the spontaneity of watercolor to create her epic underwater scenes.

"Before I start a new painting or series of paintings, I have a clear idea in my mind, not only what my particular subject matter is going to be, but in which manner I wish to portray it. In other words, my painting is largely worked



*Nautical Players* and *On the Reef* by Liduíne Bekman. Watercolor on paper (original sold). Limited edition print, 13x19 in. (33x48 cm), \$50 / €45



*The Couple* by Lidvine Bekman. Watercolor on paper (original sold). Limited edition print, 13x19 in. (33x48 cm), \$50 / €45

out in my mind before I start. I then do a minimalist sketch on the watercolor paper itself before laying in the initial very wet washes where I basically let the paint do the thinking for me."

Bekman said that since she already has a clear picture of what the end result of the painting will be, more or less, she can easily

reserve her lighter areas and whites to work on later in the creative process. Bekman works the painting further with many layers of paint. She said that she never uses paint straight out of the tube. Rather, she prefers to always mix her colors on her palette before applying them to a painting, she said.

Even before she started scuba diving,



*Cuttlefish, Anyone?*  
by Lidvine Bekman  
Watercolor on paper,  
22x30 in. (56x76 cm)  
\$600 / €500

*It's a Wonderful, Wonderful World*  
by Lidvine Bekman  
Watercolor on paper  
30x40 in. (76x102 cm)  
\$900/€750





*Garden of Eden* by Lidune Bekman. Watercolor on paper (original sold). Limited edition print, 13x19 in. (33x48 cm), \$50 / €45

Bekman was painting sealife as subject matter. She said that she did lots of snorkeling when the opportunities arose, but her desire "to see life *down there* closer up, to actually feel *one* with the world underwater" led her take up diving.

"Diving has only increased my curiosity about the creatures in the ocean," she said. "The complexity of their anatomy, the won-

derful colors, being part of an entire new world will make me continue to dive for as long as life will let me. Every time I go down, nothing is the same, and every time I surface, I cannot wait to *get to work* and let this wonderful world inspire my next piece of art."

For more information or to order original artwork and prints directly from the artist, please visit [www.lidunebekman.com](http://www.lidunebekman.com) ■

*Sea Turtles, Mum & Babe*  
by Lidune Bekman  
Watercolor on paper  
30x40 in. (76x102 cm)  
\$900 / €750

*Just Dreaming*  
by Lidune Bekman  
Watercolor on paper  
40x60 in. (102x152 cm)  
\$1500 / €1250





Two Parrots by Liduline Bekman. Watercolor on paper (original sold). Limited edition print, 13x19 in. (33x48 cm), \$50 / €45

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

## IN OUR NEXT ISSUE

*Socorro  
Saint Kitts  
Humboldt Squid*



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BARB ROY



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