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Edited by  
Arnold Weisz

POINT & CLICK  
ON BOLD LINKS



# Warp 10 Equipment

## Cressi Ellipse MC9

This regulator is a pairing of the balanced and adjustable second stage, Ellipse Balanced, with the hyper-balanced first stage, MC9. The Ellipse Balanced has a slightly larger casing, which is made from a sound absorbing material, and a new diaphragm to further improve the inhalation effort. Some of the features are: the user can adjust both the inhalation effort and the Venturi effect (dive/pre-dive) at any time during the dive; pneumatic balancing system of the piston allows for constant performance at any depth and with any air pressure in the tanks; and the standard release baffle can be directly replaced by the user for a larger model, supplied as standard, which pushes the bubbles further way from face. Read more about this regulator on [www.cressi.it](http://www.cressi.it)



## Seemann Vapor

The BCD from this German company allows for up to 9kg of weight in their SR weight pocket system and has rear trim pouches for 2.5kg per pocket, which is good news for those diving thick drysuits with a lot of undergarments in cold waters. Other features: hybrid aircell combines the advantages of a Wing and an ADV BCD; new material construction reduces wear and colour fading; complete padded harness with carry handle; tank loop and spinal support; large capacity zippered pockets; and pre-fitted rivets for BC knife attachment without damaging BCD. [www.seemannsub.de](http://www.seemannsub.de)



## Force Fin Wing

The Force Wings from Force Fin, are now offered in a new material. This new material feels as hard as steel and is 95 percent transparent, with new colors including: Diamond Clear, Amber Yellow, Sapphire Blue, Smoke Black, Emerald Green, Ruby Red and Amethyst Purple. Another new feature is the Individual Blade Control (IBC). IBC allows you to manage the water flow behind your fin blade and gives you varied control of power and speed, while increasing tracking, stability and maneuverability. Also available is a Launch Pad Kit that allows you to retro fit and turbo charge a wide variety of fins not made by or procured from Force Fin. [www.forcefin.com](http://www.forcefin.com)

## DUI Ultra Drysuit Hood

Their new drysuit hood is made with 7mm superior stretch neoprene that makes it easy on/easy off and comfortable to wear. Also important, the hood is vented to allow air to escape yet keep the water out. Other features are: larger face seal allowing for more face coverage for warmth; strategically placed seams for longer wear —no seam under the chin; tapered behind the head for a closer fit to reduce water flow; and 4mm neck skirt for easier tucking into neck collar. Available in warm neck and standard styles. [www.dui-online.com](http://www.dui-online.com)



# equipment



## Lomo Watersport

The Stinger fin features strong rubber side rails that give split fins their flexing strength, but the blade in the Lomo fin system is not split in the same way. Instead, it features a flexible rubber section that flows during the finning motion giving similar benefits. The Stinger is made from a multipart mould that uses different materials for different parts of the fin. The main body is made from a flexing plastic, whilst the foot pocket is made from a softer material that conforms better to the shape of your boot. The fin also features the 'drooped nose' shape, which, according to the producer, further improves efficiency and helps reduce cramping in the legs. Stinger fins are only available direct from Lomo through their website.

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



## Portable hyperbaric chamber

The new portable hyperbaric chamber from SOS Hyperlite is designed for advanced and technical diving, for emergency response units and especially for use in remote locations. The 2009 model is one-third lighter, more durable and packs into one case rather than two. It is fully operational within ten minutes, and the patient can be treated on-site, or be transferred under pressure during treatment to a nearby medical centre, depending upon circumstances. [www.hyperlite.co.uk](http://www.hyperlite.co.uk)

## Quick Fit Weight Pocket



The Quick Fit Weight Pocket is easy to fit to add weight for all requirements by attaching to Wings/BCD Systems and trimming equipment without fuss. The pocket has a maximum capacity weight of 2kgs block lead or shot. The system comprises of two pockets flaps, which are secured with strong Velcro and fastened together with a 25mm side release buckle. The weight may be quickly released by unfastening the side buckle and pulling down the lower flap of the pocket.

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

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# media

## Books & DVDs

Edited by Catherine GS Lim



POINT & CLICK  
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## SAFE DIVING

*A medical handbook  
for scuba divers*



Allan Kayle

Endorsed by DAN SA



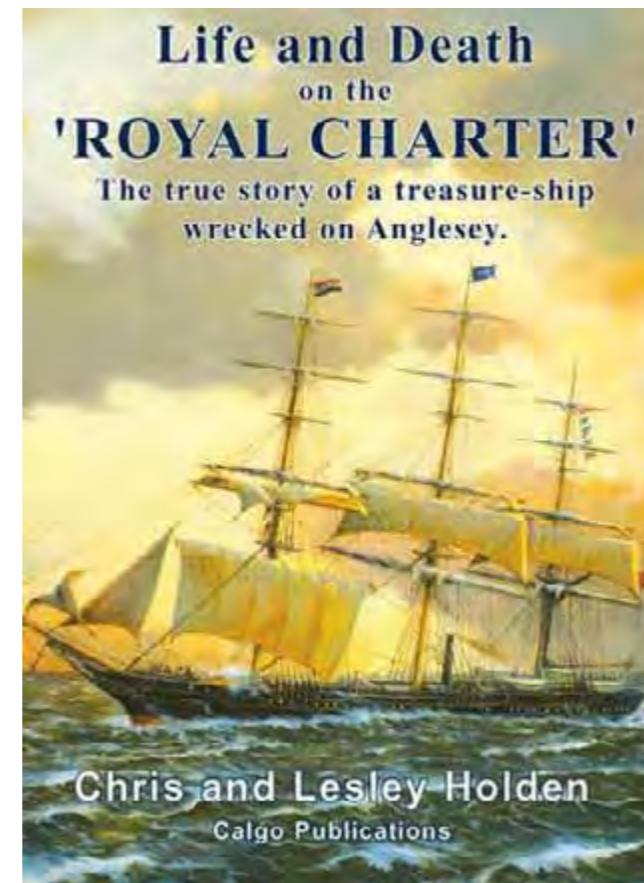
in your  
Written by diving medical officer  
board member Allan Kayle, this book highlights the many ailments  
that threaten divers above and below the water surface. These  
include nasty things like heatstroke, inhaled gas contamination, ani-  
mal bites, etc. Even unique situations like diving during pregnancy,  
deep diver rescue and emergency ascents are also covered.  
Endorsed by DAN Southern Africa.

Written by Allan Kayle. 368 pp, July 2009, ISBN 13: 9781770077539.

## Safe Diving

A diver must be reasonably fit before entering the water. But it's not enough to get an okay from your doctor. It's best to be aware of all the medical conditions and ailments that may afflict divers. While there's no need to get a medical degree, having this book hands is a good first start.

and DAN Southern Africa  
Written by diving medical officer  
board member Allan Kayle, this book highlights the many ailments  
that threaten divers above and below the water surface. These  
include nasty things like heatstroke, inhaled gas contamination, ani-  
mal bites, etc. Even unique situations like diving during pregnancy,  
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Endorsed by DAN Southern Africa.



## Life and Death on the Royal Charter

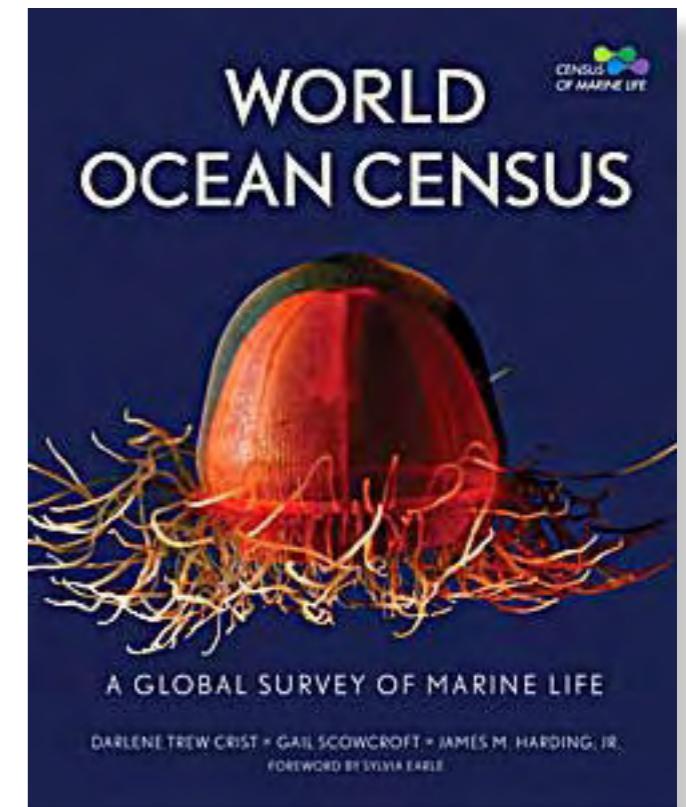
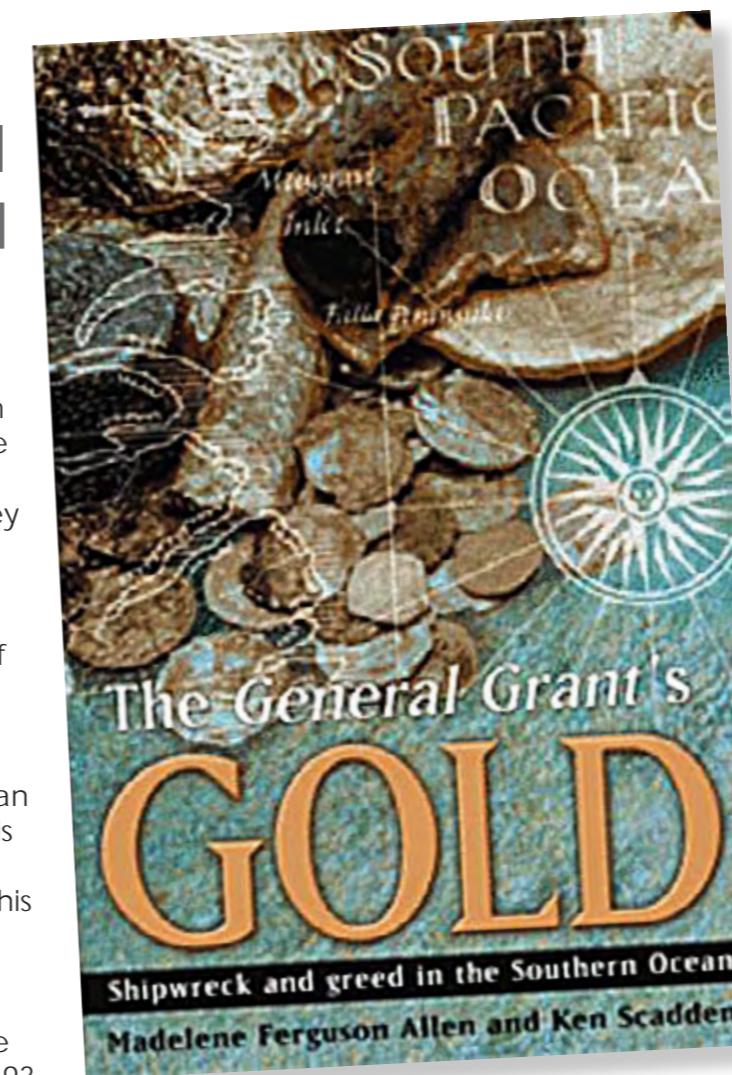
The Royal Charter was launched in August 1855, and met its demise on 26 October 1859. Much has been written about that fateful storm and the tragedy that followed, in which more than 400 people perished. Instead of focusing just on this one incident, this book relates the story of the *Royal Charter*, from her launch and maiden voyage, to her travels to and from Australia. It also takes a wide-angled look at the development of steamships and the gold rush in Australia during those times, all the way to the aftermath: the inquest, recovery of the bodies and the gold, and the new legislations that resulted from the sinking.

Written by Chris and Lesley Holden. Published by Calgo Publications. 288pp, August 2009, ISBN: 9780954506629

## The General Grant's Gold

The gold rush in the South Pacific has yielded tales of hard-working miners, dashed hopes, shipwrecks and sunken treasures. This book revolves around the bounty from one particular shipwreck, one in which the survivors were marooned on a deserted island for more than two years before they were rescued. Reminds one of Robinson Crusoe? Perhaps, but our childhood protagonist didn't have the misfortune of seeing their gold, fresh from the mines of Australia, go down with the ship. Since then, bounty hunters have tried without success to locate the sunken treasure from the ship, rumoured to be more than \$US10 million. If you're a history buff, this book is a gem for its indepth research and comprehensive fact-finding into this famous nautical mystery.

Written by Madelene Ferguson Allen and Ken Scadden. Published by Exisle Publishing. 192 pp, ISBN: 9781921497193



The Census of Marine Life was launched in 2000 with the goal of producing the first-ever ocean census by 2010. Two thousand scientists from 82 nations agreed to the mandate to answer three important questions:

- What once lived in the global ocean?
- What is living there now?
- What will live there in the future?

This book deals with the adventures and experiences of the Census of Marine Life and the process of gathering the data, revealing the stories behind the science. The authors detail the most fascinating findings and exciting discoveries—the thrills encountered and the difficulties overcome—all illustrated with fabulous images captured during the project's explorations.

The text readily engages the reader, and the photographs are as beautiful as they are accurate. The information is comprehensive, compelling and current, and it represents an enormous group effort by some of the world's leading scientists.

256 pages, 9" x 11"  
EAN: 9781554074341  
ISBN: 1554074347  
Hardcover with jacket  
40.00 CDN / 40.00 USD

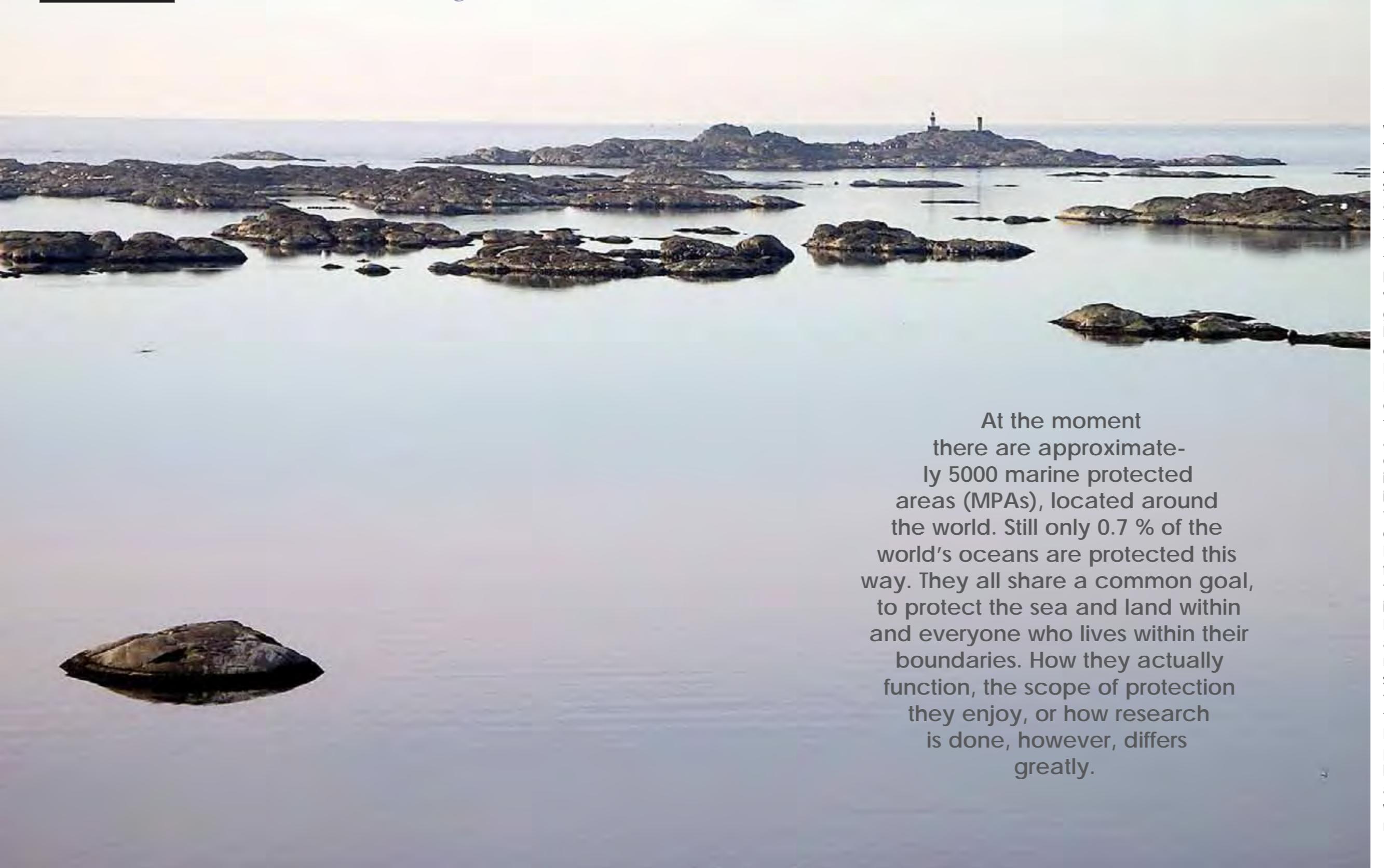
news

Edited by  
Arnold Weisz



Protecting our oceans

*"Ocean: A body of water occupying two-thirds of a world made for man —who has no gills." — Ambrose Bierce*



At the moment there are approximately 5000 marine protected areas (MPAs), located around the world. Still only 0.7 % of the world's oceans are protected this way. They all share a common goal, to protect the sea and land within and everyone who lives within their boundaries. How they actually function, the scope of protection they enjoy, or how research is done, however, differs greatly.

Text by Arnold Weisz

Whilst the largest marine park, The Phoenix Islands Protected Area is backed by institutions such as New England Aquarium and Conservation International, to protect some of the last pristine coral reefs on the planet, the tiny Brazilian state marine park Laje de Santos, relies mostly on volunteer work done by a small group of divers who run the NGO Instituto Viva Laje. Because of its close vicinity to Santos, one of the busiest ports in South America, this NGO is doing a vital job to educate the world on how to care of this little piece of ocean. Norway and Sweden are no strangers to creating protected areas, but this is the first time they venture out into the ocean. The new transnational marine parks are placed on popular tourist areas and near busy shipping lanes, with a rich fauna making them as important to protect as pristine coral reefs in the Pacific. Africa has mostly been known for its safari parks, as a way of protecting the environment. Now the continent may see the benefits of extending their conservation efforts beyond their beaches, in order to save both the marine fauna and the people depending on it. Namibia has launched its first marine park and entered the group of nations who take pride in protecting their marine heritage.

# The Goliath Amongst the MPA's

Text by Arnold Weisz

**The small Pacific Island nation of Kiribati has become a global conservation leader by establishing the world's largest marine protected area—an area the size of the state of California in the United States—within its boundaries.**

The Phoenix Islands Protected Area (PIPA) conserves one of the Earth's last intact oceanic coral archipelago ecosystems, consisting of eight coral atolls and two submerged reef systems in a nearly uninhabited region of abundant marine and bird life. The major concern for this vast ocean wilderness of pristine coral reefs and rich fish populations is the threat of overfishing and climate change.

## Historic proportions

Located near the equator in the Central Pacific between Hawaii and Fiji, the nearly uninhabited Phoenix Islands form an archipelago several hundred miles long. They are part of the Republic of Kiribati, which comprises three distinct island groups (Gilbert Islands, Phoenix Islands and Line Islands) with a total of 33 islands to make it the largest atoll nation in the world. On other hand, the total surface of land is only 726 km<sup>2</sup> (280 square miles) and the 410,500 km<sup>2</sup> (158,453 square miles) covers about 12 percent of the nation's exclusive economic zone. Countries like Kiribati have a self interest in slowing down climate change or global warming, as these low-lying islands would be some of the first to vanish into the ocean as water levels rise.

"The creation of this amazing marine protected area by a small

island nation in the Pacific represents a commitment of historic proportions; and all of this by a country that is under serious threat from sea-level rise attributed to global warming," said CI President Russell Mittermeier, as the MPA was formally established in January 2008.

## Joint efforts

Kiribati and the New England Aquarium (NEAq) developed PIPA over several years of joint scientific research, with funding and technical assistance from Conservation International's (CI) Global Conservation Fund and Pacific Islands Program. The CI support for PIPA is part of the Coral Reef Initiative in the South Pacific (CRISP).

"The new boundary includes extensive seamount and deep sea habitat, tuna spawning grounds, and as yet unsurveyed submerged reef systems,"

said Greg Stone, the NEAq vice-president of global marine programs.

As the MAP is a non-fishing area this could also aid in saving a shrinking tuna fish populations. Long-line fishing for yellowfin and bigeye tuna were amongst those who paid US\$26 million per year to use the country's Exclusive Economic Zone (EEZ). This takes a huge toll on a poor nations income, but with aid from other countries, Kiribati will survive both economically and environmentally. ■

## SOURCES:

The Phoenix Islands Protected Area (PIPA) [www.phoenixislands.org](http://www.phoenixislands.org)  
The New England Aquarium [www.neaq.org](http://www.neaq.org)  
Conservation International [www.conservation.org](http://www.conservation.org)



DAVID OBURA

CLOCKWISE FROM TOP LEFT: Schooling Baracuda; Table corals; Mating sea turtles



Edited by  
Arnold Weisz



The 247-meter deep fissure fault between the Koster Islands and the mainland is the only true oceanic environment in Sweden, with the highest number of marine species in Sweden



## New cross-border MPA's in Scandinavia

Norway recently inaugurated its first national marine park, and the Swedes will follow in September. The Swedish Kosterhavet national park will connect with the adjacent similar protected area around the Hvaler Islands in Norway.

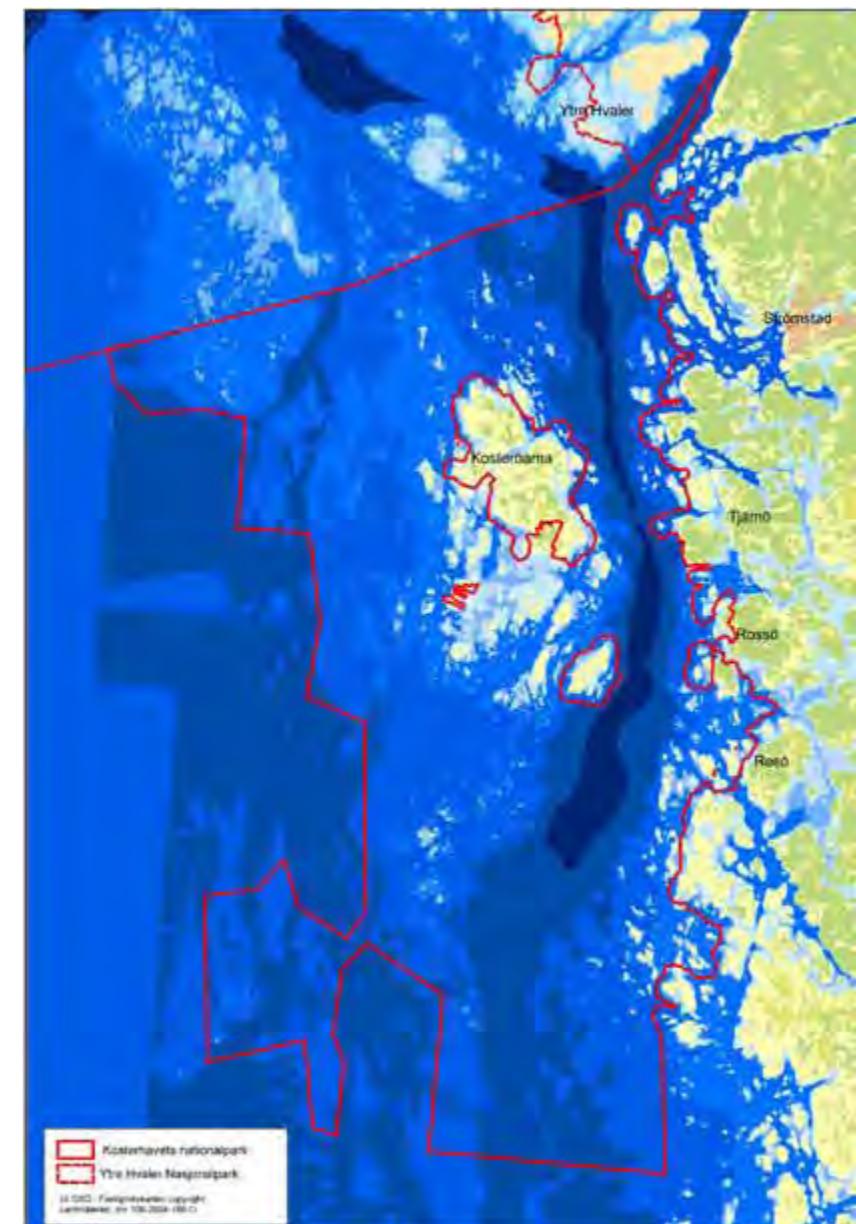
Although both these Scandinavian countries have numerous national parks, this is the first time they set aside large areas off their coasts for protection. Both Sweden and Norway have long coastlines, but until now, most of the environmental efforts have been focused on the inland nature. The new marine parks are set up in populated areas, which also are major tourist destinations, but also lie close to very busy shipping lanes. The area

is situated at the north-eastern edge of the Norwegian trench, which connects the Skagerrak with the Atlantic. The major part of the marine area is around 200 meters deep and features a high range of marine biotopes such as soft and hard substrates, kelp beds and shell gravel. The species diversity is considered very high, with more than 6,000 species discovered as yet. The Ytre Hvaler and Kostefjorden area is threatened by large scale impacts such

as eutrophication. Small scale threats for the areas include shipping, infrastructural development and fishing.

### Ytre Hvaler National Park

The Norwegian marine park covers an area of about 354 km<sup>2</sup> on the west side of the Hvaler archipelago close to the Swedish border, at the entrance of the Oslofjord. The marine park includes mostly ocean but also strips of coast on the islands.



The map shows the extent of the almost 400 km<sup>2</sup> marine park. North of the border with Norway, the Ytre Hvaler Marine Park extends another 354 km<sup>2</sup>. The two parks combined makes this one of the largest protected areas in Scandinavia



MATTIAS SKOLD

Hvaler is the sunniest geographical area in Norway, and combined with Østfold's long coastline, the population consists of mostly summertime vacationers. About 4,700 summer houses, an increasing fleet of leisure boats, and daily visitors contributes to giving Hvaler status as one of the biggest and most popular tourist destinations in the country.

## Kosterhavet National Park

The Koster islands, about 10km to the west of Strömstad, are noted for their beautiful scenery and the center for the new 400km<sup>2</sup> MPA. The islands of North and South Koster are Sweden's most populated westerly islands. About 1,000 people live in or immediately adjacent to the national park. Tourism is a major source of income for the 24,000 people living in the area. ■

They are surrounded by the Koster Archipelago —a large number of skerries and rocky isles. Kosterhavet (the Koster Sea) is in northern Bohuslän, on the west coast of Sweden bordering Norway. It is a valuable recreational resource and one of Sweden's most popular tourist destinations. Kosterhavet is also home to an important inshore fishery. The marine environment in Kosterhavet is influenced by the Atlantic Ocean and includes habitats and species unique to the area. This has made the archipelago a very popular destination not only for Swedish divers, but also for divers from Denmark, Norway and Germany. Of the 6,000 marine species that have been identified in Kosterhavet, about 200 are found nowhere else in Sweden. ■



BENGT FRIZELL

The 247 meter deep fissure fault between the Koster Islands and the mainland is the only true oceanic environment in Sweden, with the highest number of marine species in Sweden

The Swedish west-coast boasts a large common seal population, which often are seen sunbathing. They are a bit shy though, and not often seen under water

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Edited by  
Arnold Weisz

# Brazilians Tagging Manta Rays



Text by Arnold Weisz

## The Brazilian NGO Laje Viva is part of a world-wide manta ray tagging project by the Foundation for the Protection of Marine Megafauna. Together they are trying to get a better look into the hidden life of these gentle giants.

We met with Dr Andrea Marshall from the Foundation for the Protection of Marine Megafauna, the Manta Ray & Whale Shark Research Centre, Mozambique, and the Instituto Laje Viva in São Paulo,



RICARDO FERES

No mantas rays sighted on this trip, but everyone's still hopeful. From the right: Guilherme Kodja Tebecherani and Ana Paula Balboni Pinto both from Laje Viva, then Dr Andrea Marshall and Richard van Huissteen from the Manta Ray & Whale Shark Research Centre

Brazil during her three-week visit as a part of a world wide manta ray tagging project. In addition to diving at the state marine park, Laje de Santos, much time was spent exchanging information with the local NGO and doing presentations about manta rays both in Santos and São Paulo city.

### Cross continent cooperation

The Viva Laje Institute is run by a small group of divers who eventually have also become lay marine biologists, and are doing important work in the marine park on their free time. The Instituto Laje Viva did not hesitate when they got the opportunity to work with Marshall.

"We were looking for spots on four continents to tag mantas. Searching for suitable places, I came across a research paper made by a group of people at the Laje Viva. The site itself, but also the NGO, looked as if it could have a potential to study mantas," said Marshall.

The Brazilians had been studying their manta ray (*Manta birostris*) population for several years already and also produced a scientific paper, *Seasonal occurrences of Manta birostris (Chondrichthyes: Mobulidae) in southeastern Brazil*, by Osmar J. Luiz Jr., Ana Paula Balboni, Guilherme Kodja, Mauricio Andrade and Heloisa Marun.



DR ANDREA MARSHALL

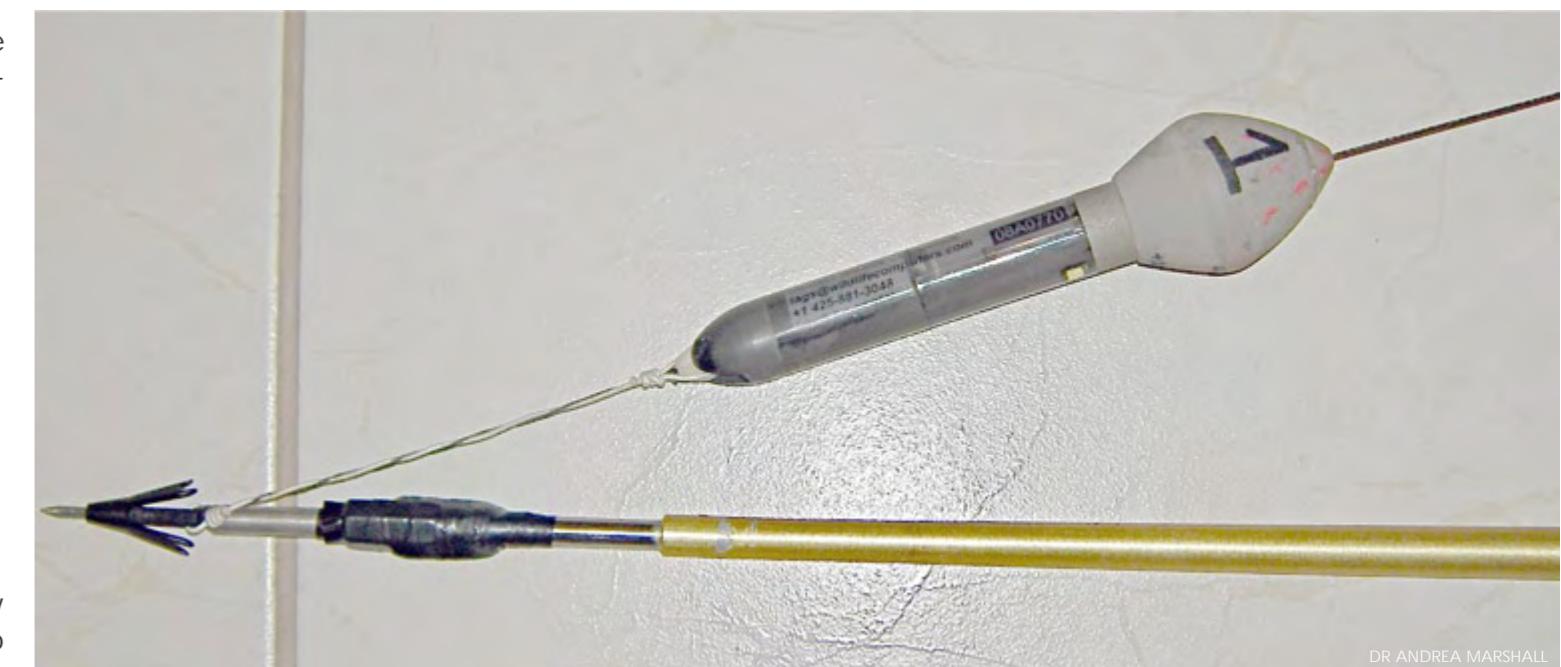
The first manta rays were tagged off Mozambique, and Brazil was the second location. Another two locations are also in planning.

"We are continuing our efforts to genetically sample and compare populations around the globe to better understand their movement patterns and relatedness," said Marshall.

### Tags waiting for mantas

Even though Marshall didn't encounter any manta rays during her stay in Brazil, the project will continue with the help of Instituto Laje Viva.

"I've received training and will try to attach the two tags allocated to us during this manta season," said Guilherme Kodja Tebecherani.



DR ANDREA MARSHALL

The satellite tags are completely harmless to the manta rays, and release themselves after 3-4 months

Manta rays are the largest winged creatures on the planet, but we know very little about their movements. The tags used in this project were developed by Dr Marshall and the Manta Ray & Whale Shark Research Centre

Manta with satellite tag (left)

There is an agreement in place for exchange of information on the manta rays between Mozambique and Brazil. The two tags are important in hope they can reveal some important information about the mantas that visit the small Brazilian marine park. Not only about the

local population in general, but also if these mantas are part of a wider population structure, and interacting with other manta populations.

"This is the first step. If it works well, we'll do more. The tags are programmed to record information from 100 to 110 days. And as soon as they detach from the mantas and return to the surface, they will upload info to us," said Marshall.

Tagging is not the only way to study and track manta ray populations. Non-intrusive underwater photography is being used for the majority of the study.

Each animal sighted on the local reefs is identified by a 'fingerprint' of markings on their ventral surface as well as by distinctive scars. Once an individual has been identified, their details are logged in a computer database, and their re-sightings tracked over time.

"We have taken a lot of photos over the years for our photo identification project," says Guilherme.

## Manta rays in Brazil

Manta rays are usually seen and photographed by recreational scuba divers

in south-eastern Brazil, especially in the Laje de Santos Marine State Park (Parque Estadual Marinho da Laje de Santos), a popular dive site from where most of the reports from Brazil about these rays originate. According to an analysis by Instituto Laje Viva of 79 underwater photographs, Manta birostris gathered over a period of nine years in a marine protected area in south-eastern Brazil suggesting a high predictability of manta ray occurrences in the region during the austral winter (June–September). The reasons for this are probably related to the seasonal

oceanographic conditions, as characterized by the presence of a coastal front at the study site in winter and consequent plankton enrichment, which provides a feeding opportunity for manta rays. In addition, a melanistic individual in the Atlantic Ocean that is similar in color to the Pacific Ocean's "black manta" was reported for the first time.

## On the web:

Manta Ray & Whale Shark Research Centre, Mozambique  
Instituto Laje Viva

Manta rays usually show up during the southern hemisphere's winter in June–September at the Laje de Santos state marine park, off São Paulo, Brazil



news

Edited by  
Arnold Weisz



UTE VON LUDWIGER/NAMIBIA TOURISM WWW.FOTOSEEKER.COM

# Namibia's first Marine Protected Area launched

Text by Arnold Weisz

The MPA's are going to be a part of the more extensive Namib-Skeleton Coast National Park (NSCNP). In total the NSCNP borders onto over 14,000 square kilometers of land and sea, which at is managed primarily for wildlife biodiversity, conservation and tourism.



The Namibian coastline is dominated by weather worn sandy beaches. Gale force winds and heavy surf are normal

DAV HUMPHREYS/NAMIBIA TOURISM www.FOTSEEKER.COM

The Namib-Skeleton Coast National Park (NSCNP) has an extension of about 1,570 km, from the Orange River in the south to the Kunene River in the north. The new Coastal and Marine Protected Area (MPA) off the Sperrgebiet and Namib-Naukluft areas, runs 400km up the coast and is about 30km wide. The MPA will cover an area of 12,000 km<sup>2</sup>, containing all of Namibia's ten islands. These are Hollamsbird, Mercury, Ichaboe, Seal, Penguin, Halifax, Possession, Pomona, Plumpudding and Sinclair. Also included in the MPA are Neglectus islets, Marshall, Boat Bay, Albatross, Staple, Dumfudgeon, and Ladies north and south rocks, as well as Long Island north and south. This enigmatic and poignant coast—the Coast of Skeletons—contains many shipwrecks, the bones of early mariners as well as those of whales and seals.

### Greatest conservation effort

The protection and regeneration of marine resources are priority issues for coastal states,

PREVIOUS PAGE: The Namibian coastline, known as the Skeleton Coast, holds many stories of human drama and shipwrecks. Remnants of these stories are still visible in the sands and sea

in particular, Namibia, whose marine resources contribute considerably to the socio-economic welfare of the country. Moreover, the global fish stock collapses and possible negative ecosystem effects from mining and fishing activities has resulted in steps taken to establish Marine Protected Areas in Namibia.

Besides keeping ecosystems like fish stocks intact, there is also the need to protect species that are not part of the commercial marine resources. Breeding in the waters of the Namibian Islands' Marine Protected Area are the Southern right whale and Heaviside's dolphin (Benguela dolphin), with the Humpback whale also migrating to the area. Also, dusky dolphin, mink whale and killer whale, or orca, can be seen here regularly.

The proclamation of this protected area represents one of Namibia's greatest conservation achievements since gaining independence in 1990, and one of the most exciting developments in the history of conservation in this country. ■

There are several large sea lion colonies along Namibia's Skeleton Coast. The Namibia colonies, being on land, they allow visitors a close-up look



DAV HUMPHREYS/NAMIBIA TOURISM - www.FOTSEEKER.COM



NAMIBIA TOURISM - www.FOTSEEKER.COM

# whale tales



Edited by  
Peter Symes

*Worldwide, the whale watching industry now generates about \$2.1bn per year*

**Whale-watching generates far more money than whale hunting, according to a report commissioned by the International Fund for Animal Welfare (Ifaw)**

The report follows on the heels of an analysis commissioned by another organisation opposed to whaling, WWF, which suggested that the Japanese and Norwegian hunts were a net cost to their governments.

"Whale watching is clearly more environmentally sustainable and economically beneficial than hunting, and whales are worth far more alive than dead," Patrick Ramage, director of Ifaw's whale programme, told BBC News.

Worldwide, the industry now generates about US\$2.1bn per year, it says in the report compiled by the Australian organisation, Economists at Large for Ifaw. In 2008, it concluded that 13 million people went to sea to watch cetaceans in 119 countries. ■

## Southern Right whales return to breed in Tasmanian waters

Scientists have confirmed that for the first time in 200 years Southern Right whales are again migrating to Australia to give birth in waters in Tasmania.

In mid August, a mother and newborn calf were spotted in Great Oyster Bay near Swansea on Tasmania's east coast. Scientists examined the photographs, and confirmed the calf was no more than two days old, which meant it had been born in local waters.

Marine biologist David Pemberton said the confirmation that the recently sighted calf was born in Tasmanian waters was critical to the ongoing recovery of the species, which became scarce after excessive whaling in the early 1800s. There are approximately 1,500 of these whales that migrate to Australia each year out of the estimated 60,000 in the world.

"There have been mother-calf pairs reported for quite a few years, but we needed scientific proof they were breeding in this area. We finally got that today, so it is very exciting," Pemberton told The Times.

Tasmanian waters were once a key breeding ground for Southern Rights during the early days of European settlement. However approximately 1,000 Southern Rights were killed in the island's bays every year during the early 1800s, and by 1842, they had become commercially extinct.

Pemberton said going by historical records, right whales preferred to congregate in large groups. He predicts that as numbers re-

cover, large gatherings in Tasmania's bays could become a major Tasmanian tourism asset.

"Now the calving pairs have been appearing here over several seasons we are happy to say, it's a regular occurrence," Pemberton added.

It is important for people not to get too near to right whale mothers who were shy at the best of times and tended to be nervous about their babies. ■

A mother and baby southern right whale off Swansea. Sightings of whales with calves have raised hopes that whales are returning to Tasmanian waters to calve



## A Percent for the Ocean

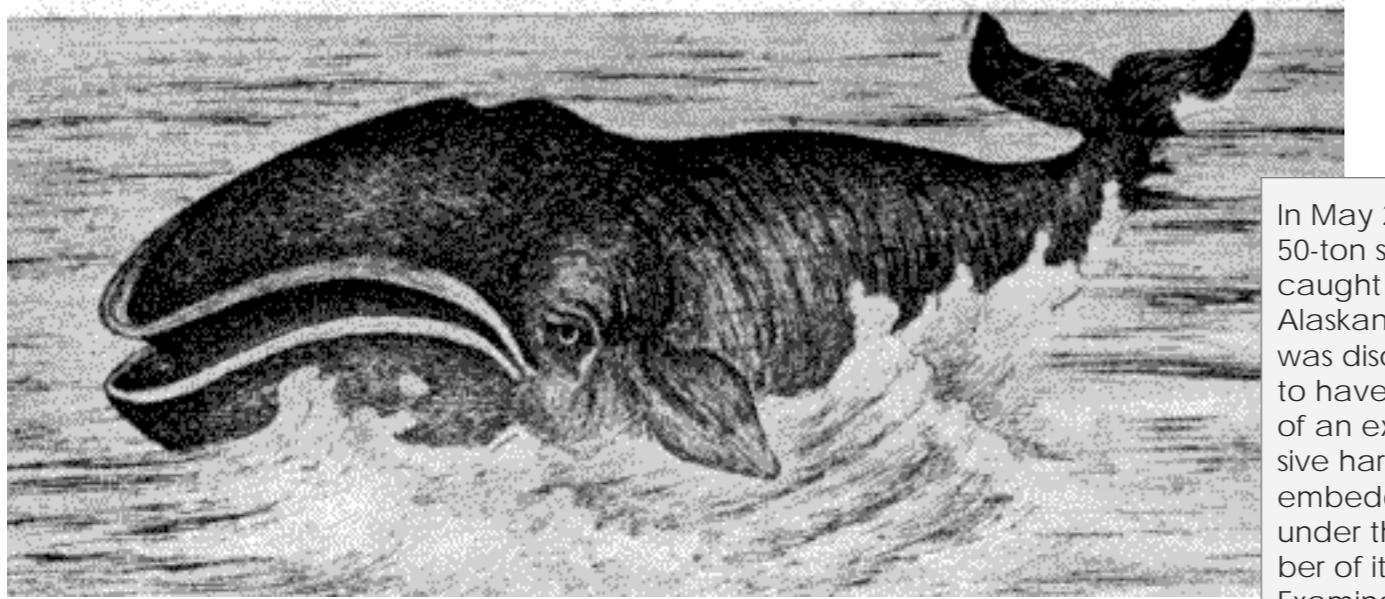
Carlos Hiller is a painter of ocean light and life



CARLOS HILLER

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[www.cafepress.com/xraymag](http://www.cafepress.com/xraymag)



## Atlantic and Pacific Bowhead Whales meet and mix

The Altantic population of Bowhead whales has pulled back from brink of extinction after establishing contact with their cousins in the Northern Pacific thanks to the opening of the Northwest passage, which for the first time in 125,000 years, is now ice free for part of the year.

Researchers from the University of Copenhagen doing field studies in the Bay of Disco on Greenland noticed that bowhead whale songs, which are

already more complex than that of other whales, had become 'bilingual' with elements of songs stemming from both the Pacific and Atlantic populations. Different songs or sounds get mixed together, which is a phenomenon not observed with other baleen whale. The bowhead whales change the songs from year to year and never repeat songs from earlier years, explains graduate student, Outi Maria Tervo, who is supervising the study. ■

In May 2007, a 50-ton specimen caught off the Alaskan coast was discovered to have the head of an explosive harpoon embedded deep under the blubber of its neck. Examination determined the 3 1/2 inch arrow-shaped projectile was manufactured in New Bedford, Massachusetts, a major whaling center, around 1890. This proof that it survived a similar hunt more than a century ago indicated to researchers that the whale's age was between 115 and 130 years old. ■

## Killer whales also visit 'social clubs'

**Killer whales create and visit social clubs just like people do, scientists have discovered. Orcas, which normally live in smaller groups, also form huge superpods in which the killer whales form and maintain social ties.**

Fish-eating killer whales (*Orcinus orca*) in the Avacha Gulf, off the coast of Russia live in stable

groups called pods that contain an average of ten individuals. But researchers have seen up to eight of these pods coming together to form large groups of up to 100 animals. These large aggregations of pods have also been observed in British Columbia, Alaska, Iceland and Antarctica.

It is unlikely that the whales gather for protection, as they have no natural predators, and researchers found that the whales rarely forage and feed when they gather into a much larger super-

pod.

However, the killer whales did interact much more during these large gatherings, which lasted from a few hours to almost half a day. When meeting killer whales from other family pods, they made contact with each other, swam in synchrony and rubbed flippers much more often, the researchers found. Sexual activity also increased, suggesting that these big aggregations provide a chance to assess potential breeding partners. ■

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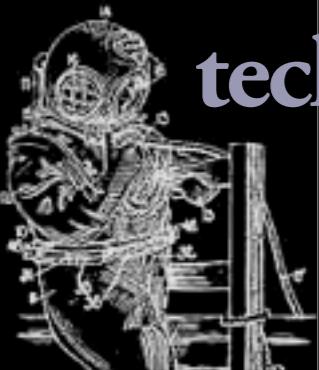


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tech talk



*The fine art of conducting*  
**Extreme Exploration Dives**

Text and photos  
courtesy of Pascal Bernabé  
Translation by Mathias Carvalho  
Edited by Peter Symes

## How to master the complexities of extensive explorations of underwater caves and other overhead environments

Our case story will be a recent actual exploration where the dive profile posed a few challenges:

- Distance of 700 meters from the entrance to the end point
- The depth of 164 meters at the beginning of the actual exploration and 186 meters at the end
- Duration of the dive, which including deco stops, required a run time 9 hours and 46 minutes submersed.

However, even if this specific dive profile presented us with some exceptional challenges, it wasn't fundamentally different from other technical dives in terms of safety and logistic considerations. We do our preparations and make plans in which we try to reduce the number of unknown factors as much as possible.

In technical diving "what if..." and "plan your dive and dive your plan" are all basic mantras. It is only the magnitude of the undertaking that changes as well as the levels of complexity. Even for a practiced tech diver, who routinely dives his twin 12-liters tanks and uses ready made tables, dives like this are much more complicated.

### Preparations

#### 1. Defining objectives and means.

In this case, the objective was to explore an underwater cave that would take divers beyond the depth of 164 meters before they made it to the end. In this case, we planned as if we were diving to

a depth of 200 meters and ranging more than 700 meters from the entrance. On the actual dive date, we may then find that these preset definitions of depth and time do not match up with the actual diving profile, mental and physical fitness, and the equipment at hand. This leads to postponements and delays, which may run into a year, or at least several months of waiting, which is often the case. It is thus necessary to stay fit and keep practicing all the relevant technical skills. In this case, I kept up a regular schedule doing many speleological/cave dives where I could rehearse practice stage and travel procedures as often as possible, as well as practicing deep and rebreather dive profiles.

In the beginning of May, we found ourselves in Egypt. After one week of diving between 50 and 100 meters deep with stage and trimix, I had also made five dives to depths between 65 and 180 meters on rebreather in order to build some routine with real deep dive profiles and to test the 150 meter barrier.

Physical fitness training was not an issue, as I practice every year around 4-5 times a week by running, swimming and bicycling, so I simply took a nice break the week before the actual dive.

### Knowing the location

This cave is quite the labyrinth and has several levels. So, it is a good thing I knew it rather well. A year ago, I first dived it to a depth of 60 to 90 meters before going down to 150 meters. And the week before the dive, I had returned with a rebreather,





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going to the 70-meter mark, just to memorize the route, using a scooter, to avoid wasting time when we were going to do our exploration. Needless to say, I had also gone over the available topographic information and reports from previous dives in order to get a clearer picture of equipment load during the dive, restricted passages, currents (what if it rains the preceding days?), visibility and necessary permits. In nature, it is not any different from when you check the weather forecast, prevailing currents and swell before you go on a dive in the ocean.

### 2. Choice of equipment

The choice of gear must reflect the depths and environmental hazards. For example, when I did my 330-meter dive, it was obvious to go with an open circuit system, since I had never been beyond 150m on a rebreather. And no one has ever gone deeper

than 270 meters on a closed circuit rebreather. On the other hand, the closed circuit system (or semi-closed circuit) is the latest trend amid serious underground exploration dives for a number of good reasons:

- greater autonomy
- greater gas economy
- breathing a much less colder gas
- less tanks to manage
- Possibility for using helium—in the form of heliox—for the entire dive, significantly improving the decompression profiles.

My Voyager dive computer has a battery life of at least seven hours, making it possible to complete the entire dive, starting from the entrance until the bell-area. My other technical option was to stick with the usual open circuit system with complete redundancy.

We had to bring a few 20-liter tanks inside the cave, between the depth of 110 meters, which was 600 meters

inside the cave, and the dive bell at 12 meters. It was a bit heavy, but in case of a complete failure of the closed circuit, it would have allowed me to make it back to the bell area from the deep end. This also permitted the team to familiarize themselves with the cave.

The scooter or, as it is appropriately termed, the Diver Propulsion Vehicle, was also a requirement because of the distance to be traveled. Several trips starting from the deep end, which was 500 meters from the entrance, helped me to select a model that can really tow, rather than a lighter one. The former, although a little less speedy, seemed to me to be more maneuverable inside that particular cave.

### The deco stations

The possibility of mounting a deco station was extensively used. The choice was between a mobile deco station—suspended between 11



and nine meters deep and then again at six meters—or a fixed deco station at six meters, which is much simpler. The mobile option was then chosen, as it was capable of staying dry and hot twice as long, which in this case, meant almost four hours instead of the two hours offered by the fixed option.

#### Decompression strategy

The dive profiles were simplified as much as possible, so we opted for a short one and a long one, for a depth of 180/200 meters at the bottom, which was already very complex with its several levels and a great end depth. As an additional option, we could use a set of a set of more conventional tables and two multi-gas computers, one connected to the rebreather to deal with all the intermediary situations.

Simplicity is preferred even if it

demands hours of calculations for different profiles and using different software. With the calculations for depth and time completed, we opted to go with the "full helium" option which only had 6% nitrogen without a second thought. Even the bailout plan an open circuit system had a maximum level of 30% nitrogen.

We had full sets of tanks with standard deco mixes 02/He 20/50, 40/30 and 60% O<sub>2</sub>, which were thoroughly analyzed, marked twice and pressure verified. Also clips sets, and speleological cable keepers for the ropes were checked.

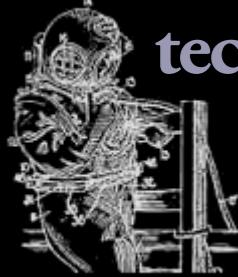
For the sake of safety, we also had to consider the situation where we had to perform the dive on open circuit systems and not rebreather. Did we have enough of each mix? For each depth, we had to calculate what was needed with an acceptable level of security.

Thermal insulation was taken care of

by a drysuit with Thinsulate 300 undergarment. The diving bell was mounted at 11 meters, and since the ambient temperature was 18°C, it wasn't necessary to heat the habitat.

#### Provisions

Dealing with dehydration is paramount to ensure proper decompression—we can never drink too much. Lots of water with a bit of fructose and an isotonic salt mixture is ideal. Fruit juices or energy drinks can also be used but with moderation, as the last thing you would want is nausea. Hot drinks such as light sweet teas or soups are also suitable. During long dives, it is also important to eat to keep up the energy. Energy bars are fine, also nut paste or cocoa, but go easy on the sweets. Put pastes and creams into tubes or syringes. And don't bring ham, or other meat products, into the dive bell.



*Stay with the same team if possible. It is important to know each other well and how you act under water.*

## Team

Stay with the same team if possible. It is important to know each other well and how you act under water. In our team, we are all multi-taskers, but each one of us is also a specialist on some area. For this specific dive, I had part of the team who assisted me at my record dive to 330 meters.

Each member dove both according to their qualification levels and their role in providing assistance during the dive such as:

- placement of safety and decompression tanks
- helping the deep divers get in the water
- assembly and handling of the diving bell

- deep diver assistance during decompression until the end of the dive (comfort, information assessment, food, re-hydration, photography, etc.)

During planning, we delegate roles and responsibilities and some will be tasked with very special roles, which they will focus entirely on throughout



the dive.

The person in charge of surface management has a lot of particular responsibilities:

- Make decisions.
- Manage the chain of support divers while keeping tabs on the deep diver. Each support dive will be planned according to each particular deco planning.
- Manage safety and possible variables, in case a problem should occur such as longer dive time than planned, evacuation, decompression, drifting in open sea drifts as well as having prepared or evaluated the weather forecast, communications, medical assistance and an evacuation plan.
- Manage the boats if the dive occurs at sea (crew, available anchorage, dif-

ferent types of vessels, etc.)

For that purpose, we used a list of participants and material, as well as the deep diver's runtime as planned.

*On the big day, having everything properly planned and rehearsed will pay off, help ease the stress, and aid the visualization during which we review all stages to be followed during the exploration.*

Managing it all is no mean task.

## During the dive

On the big day, having everything properly planned and rehearsed paid off, helped

ease the stress, and aided the visualization during which we reviewed all the stages to be followed during the exploration.

Once the process had begun, people were usually less stressed and always very focused on the different technical tasks ahead. All equipment was checked one last time, and after performing bubble checks at the surface, we commenced our descent.

We left the diving bell and its reassuring shape behind us, took up the safety tanks, and piloted the scooter. After 500 meters, we dropped the scooter and let ourselves glide along successive wells between 60 and 114 meters deep, taking the opportunity to descend a little deeper to the two remaining safety stations at 60 meters, 75 meters and 114 meters respectively.



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I appreciated Stéphane's re-equipment handwork while I appreciated my companions' work at storing the safety tanks.

After some 40 meters, it was then a great pleasure—and one that made all the preceding months of tedious preparations worthwhile—to go beyond 164m and enter the "terra incognita" as we went into the uncharted gallery. We frequently checked the rebreather's oxygen partial pressure, dive time and depth.

As we carefully reeled out our lines, we kept an eye out for the next opening. We passed 170 meters and went along a long ledge. We reached 180m and another flat surface that gradually

leads us up to a dead end at 168 meters. The next area would probably be at a much higher level. Next time perhaps...

Facing more than eight hours of deco time, we turned around and went back at a slow pace, taking the opportunity to scrutinize the fault with the powerful 21 watts HID Green Force torch, which made everything as bright as daylight.

Since we were still on the first stage of the return, we reduced our ascent rate even further to just three meters per minute when we reached 132 meters. Despite being 600 meters from the entrance, we felt as well as being at home. Our return was very slow, as it was sectioned into short deep stops and we

were busy going into all the nooks and crannies.

At 54 meters, we recovered the scooter and the third relay, then faced recompression ahead. A while afterwards, Fred was the first to return followed by David, Patrick, François and his equipment. Another 12 meters and it was already time to re-enter the diving bell. It was Marc, Josep, Henri and Michel who manned the relay, along with François and Tono, as always.

After four hours inside the diving bell, I surfaced an extremely happy man. The whole team was eagerly awaiting our accounts from the depths, my opinions and the prospects of going there themselves—because what their dive as well.

### After the dive

It is important to acknowledge and savor the accomplishment and never forget that it is the result of good teamwork. At this stage, we usually drift already into planning the next dive, even in the cases where we had a disastrous dive and had just been swearing to ourselves never to do it again. In any case, it is important to learn a lesson from each dive. In this case, for example, we felt afterwards that we could have done with a lighter load of equipment in the cave, in particular, the safety tanks.

### The downside

We didn't use the rebreather to its fullest potential. There were too many equipment pre-car-

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### WORLD DIVING RECORD

330M

Photos: François Brunel.com

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AUGUST 16<sup>TH</sup>- 22<sup>TH</sup> DEEP 120 AND DEEP 160M  
AUGUST 23<sup>TH</sup>- 28<sup>TH</sup> ADVANCED NITROX  
DECO PROCEDURE

SEPTEMBER IN TUNISIA TRIMIX  
AND WRECKS EXPLORATION 60 - 100M

OCTOBER CAVE COURSE IN FRANCE  
DEEP WRECKS 60-120M IN  
ANDALOUSIA LEBANON DEEP 140M  
ON VICTORIA AND SOME WRECKS.

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ryover dives, over the entry area, which was very easy to reach. We should have left some safety/deco tanks between 30 and six meters, which were very easily installed while setting up the diving bell—then, why burden the team?

The use of a dorsal redundant rebreather (two totally independent closed circuits) and a third side rebreather left safely, for example, with the scooter at 54 meters would have prevented long, deep and tiresome carryover dives, while allowing for a triple safety measure. And even more safety at every point along the way as we approached the exit.

The re-equipment dives were left in place, which, when needed, would be eventually used as an added safety measure.

## The positive

- We used only 60 bars of trimix during almost six hours of dive time, outside the diving bell (wings included). The rebreather option allowed for cutting down to half the number of carryover trips and tank loads inside the cave.
- The decision of using a mix close to heliox (only 6% nitrogen to counter the onset of High Pressure Neurological Syndrome) avoided having to pay a small fortune, and eliminated the fear of helium freeze, since the

gas breathed in the rebreather would be warm. Also, at 186 m, we could enjoy having completely clear minds and the total absence of narcosis as well as exiting the water in a refreshed state after a dive lasting nine hours and 46 minutes.

Going with the "full helium" option must therefore be considered for validation.

The usage of the mobile diving bell enabled us to stay warm, talk during decompression and eat proper food rather than sit with a second stage stuck in our mouths for four long hours.

The equipment was chosen for its performance characteristics and reliability. It was a key point for the success of this undertaking. The equipment included the high performance Apeks XTX 50, 100 and 200 regulators. An Aqualung Legend was on the rebreather (with oxygen, air and trimix diluent feed) and on the open circuit for the safety trimix. This setup is used by the majority of British cave divers and was used for my dive to 330 meters with no problems whatsoever.

The gear also included a very warm Arctic 330 Thinsulate under-garment. Credit also goes to the Green Force Tri star LED torch with its long lasting power, a 21-watt HID over the hand mount, and safety torches. The whole set was devel-

oped for a 500-meter beam and tested in a hyperbaric chamber at 350 meters. We used a D9 Suunto wristwatch, which matched our depth up to 200 meters and was ideal for a very precise runtime.

An unmodified Aquatek Voyager manual closed circuit rebreather was also an important piece of equipment. During the planning phase, I enquired with the manufacturer about the model's limitations—not only theoretical ones, but those tested in hyperbaric chambers and/or during assembly. It tested to at least 240 meters for the O<sub>2</sub> feed and 300 meters for the triple PPO2 electronic control.

Setting the limit for this dive to 200 meters left me a large margin. I have tested the equipment at progressively greater depths, 111 meters (wreck), 177 meters (reef), 150 meters (cave), 180 meters (at sea at Dahab), 186 meters (cave).

Thus, the next step will be using dorsally mounted redundant equipment with totally independent circuits giving ten hours of autonomous operation. Another laterally carried set will be carried clipped on, so it can be left behind as a safety set for the return trip.

## Acknowledgements

A thousand thanks go to the great team members (well-known folks!) Fred Badier, Henri Benedittini, David Bianzani, Philippe Bompa, François Brun, Christian Deit (Northern Catalan), Stéphane Girardin (Swiss), Josep Guarro (Southern Catalan), Sophie Kerboeuf, Kristian Rouannet, Jean Luc Soulaires, Marc Thène, Patrick Tonolini, and Michel Ruiz. ■



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