

Inspiring People to Care About our Oceans Since 1995

# DIVERS FOR THE ENVIRONMENT

WWW.EMIRATESDIVING.COM | MAGAZINE | MARCH 2017 | VOLUME 13 | ISSUE 1

## WHALE SHARK SPOTTING IN DJIBOUTI

DIVE MIDDLE EAST EXHIBITION • MEMBER BENEFITS • FIRST ARABIAN REGION IUCN RED LISTING • ANGELSHARKS • SEASNAKES • DIGITAL ONLINE COMPETITION • EQUIPMENT REVIEW





# DIGITAL ONLINE

جمعية الإمارات للغوص  
EMIRATES DIVING ASSOCIATION  
PHOTOGRAPHY AND FILM COMPETITION



# DIGITAL ONLINE 2017

EDA'S 9<sup>th</sup> ANNUAL UNDERWATER PHOTOGRAPHY AND FILM COMPETITION

#### COMPETITION OPENED:

Sunday, 8<sup>th</sup> January 2017

#### SUBMISSION ENTRIES CLOSE:

Sunday, 23<sup>rd</sup> April 2017 @ 11:59 PM (GST)

#### AWARDS & EXHIBITION NIGHT:

Wednesday, May 31<sup>st</sup> 2017 | 19:00-21:00 | AUD

#### EVENT BY EDA



#### EXHIBITION HOST

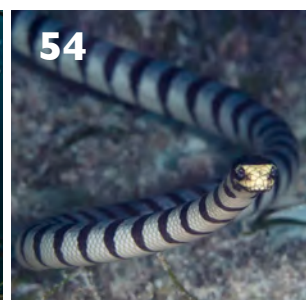
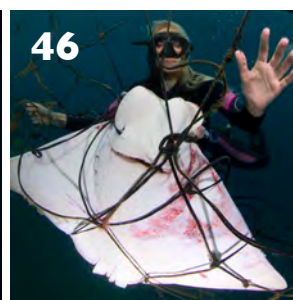
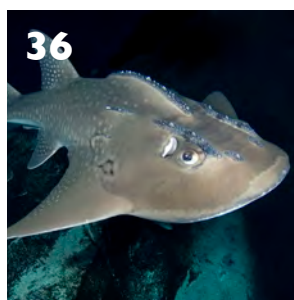


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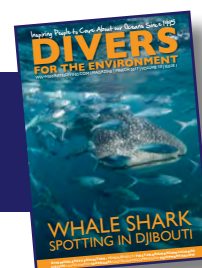
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## DIVERS FOR THE ENVIRONMENT

Please note that EDA's magazine, "Divers for the Environment" includes articles written by individuals whose opinions, whilst valid, may or may not represent that of EDA. It is hoped that the magazine can become a platform for individuals to voice their opinion on marine and diving related issues. You are welcome to suggest an article for the next issue of "Divers for the Environment" released in June 2017. Send all articles, feedback or comments to: [magazine@emiratesdiving.com](mailto:magazine@emiratesdiving.com)

## COVER

PHOTO BY SIMONE CAPRODOSSI  
Whale Shark (*Rhincodon typus*) in Djibouti



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### KIDS CORNER – FONT USED: DYSLEXIE FONT

Dyslexie font has developed a typeface especially for people with dyslexia called Dyslexie. People with dyslexia have problems distinguishing some letters. They sometimes turn, mirror and switch letters whilst reading. The Dyslexie typeface targets these problems by altering the shape of the letters so they are clearly different from any other letter. As well as this, the spaces between the letters are improved and capitals and punctuation are bolder so people with dyslexia don't read words or sentences together anymore. Representative research among many dyslexics has now shown that the font actually helps them with reading texts faster and with fewer errors.

### EDITOR & DESIGNER

#### ALLY LANDES

As EDA's Project Manager, Graphic Designer, Writer, Editor, Photographer and Videographer, Ally created and introduced 'Divers for the Environment' back in December 2004 as an educational tool to share information by conservationists, scientists and enthusiasts from all over the world looking to learn from and protect our underwater world.



### THE QUARTERLY CONTRIBUTORS

Meet the regular quarterly magazine contributors who share their passions, interests and the expertise of their fields for our readers of, 'Divers for the Environment'.

Want to contribute? Email: [magazine@emiratesdiving.com](mailto:magazine@emiratesdiving.com)

#### SIMONE CAPRODOSSI

Simone is an Italian underwater and travel photographer with a passion for diving and the sea. Simone uses his photography to support environmental initiatives and is heavily involved in local shark and turtle conservation projects.  
[www.simonecaprodossi.com](http://www.simonecaprodossi.com)



#### PATRICK VAN HOESERLANDE

Diving opens up a whole new world. Being a writer-diver and co-editor of the Flemish divers magazine Hippocampus, I personally explore our underwater world and share it through articles with others, divers and non-divers. You'll find a collection of my articles on [www.webdiver.be](http://www.webdiver.be)



#### PAUL WARWICK

Born and educated in the UK, leading to a career as an officer in the British Army. Now a specialist consultant for the UAE Government inbetween his other interests and passions, which are family, scuba diving (A PADI IDC Staff Instructor), conservation and marine management.



#### NICO DE CORATO

Blogger, marathon runner, triathlete, divemaster and heli rescue swimmer with Bergamo Scuba Angels. You can check my website [www.dubaiblognetwork.com](http://www.dubaiblognetwork.com), contact me on social networks or via email at [admin@dubaiblognetwork.com](mailto:admin@dubaiblognetwork.com) for information about my articles or just to say hello.



#### PHILIPPE LECOMTE

Having followed in his father's and brother's love for the sea, French diver and underwater photographer Philippe, took to underwater photography in 2006 after having moved to Abu Dhabi in 2003 and now seldom travels without his camera.  
[www.plongee-passion-photo.over-blog.com](http://www.plongee-passion-photo.over-blog.com)



#### DR. ADA NATOLI

Ada is a specialist in population genetics applied to conservation of species. Having been involved in whale and dolphin research since 1992, she is a member of the IUCN Cetacean Specialist List and founder of the UAE Dolphin Project.  
[www.uaedolphinproject.org](http://www.uaedolphinproject.org)





# THE YEAR OF GIVING



**IBRAHIM AL-ZU'BI**  
EDA Executive Director

I would like to welcome you all to the March issue of 'Divers for the Environment'. 22 years of marine conservation and voluntarism. Years spent protecting national treasures so that others may be able to enjoy them. That is what EDA stands for. By giving his blessing to establish this organization in February 1995, the late Sheikh Zayed bin Sultan Al Nahyan, not only placed conservation as a priority for us to uphold, but inspired us to bring about change ourselves. I want to take this opportunity to show my appreciation to all our members and staff for the dedication, loyalty and enthusiasm that they've demonstrated throughout this journey. Of course, none of what we have accomplished so far could have been possible without the leadership and visionary thoughts from our Board of Directors. I'm confident that the next 22 years will hold even more achievements we can be proud of.

The UAE's President, His Highness Sheikh Khalifa bin Zayed Al Nahyan has declared 2017 as the Year of Giving. 'Giving' is a value that we all cherish and saw personified in the UAE's Founding Father Sheikh Zayed. We continue to see this philanthropic legacy embodied by his sons and ingrained in the DNA of our society. I personally believe giving is not limited to monetary donations. Rather, "giving" is defined by the differences we make: the differences in someone's life, in a society, or in a nation. The goal for the Year of Giving – to make a difference in the lives of those we care for, and in ourselves.

To achieve this, the first step is to ask ourselves exactly how we can make a difference. Every father, mother, son and daughter can ask him or herself how they can contribute to the advancement of their families and communities. All of us have the capability and capacity to make a real difference in the lives of those around us. There are so many ways to give. We can give back to our environment – to clean beaches and deserts, to care for trees and to be kind to all inhabitants on our earth. "Giving" is easy and abundant. It is feeding a bird, smiling at your neighbours, or going above and beyond at your job. If you are a person with power and responsibility, "giving" is making your people happy, and being kind to them when you implement laws.

Volunteerism is another way to give: volunteer an hour, a day or a week of your time; volunteer your skills, your knowledge and your energy. Volunteer and make a difference in your society. When people spend their lives accumulating material assets and wealth, they quickly learn that there is no meaning in life unless they share their wealth in the service of others. No one can feel fulfilled until he or she starts "giving" to make a difference.

As this is our first issue for the year, I would like to take this opportunity to thank our sponsors, we are grateful for the financial support they have given EDA to enable us to continue our mission of conserving and protecting the UAE marine resources. We salute them for being environmentally responsible organizations and we hope that our partnerships will last a long time.

March is the month of DMEX – The Leading Diving Exhibition in the region, where the diving community of the UAE and the region meets alongside the Dubai International Boat Show to discuss diving updates and share the latest gear in equipment. I have been asked in an interview prior to DMEX about the future of the diving industry in the UAE and if this sport will continue to boom in the region. My answer was clear; diving is a passion and the sport of diving and the diving industry in the UAE and the region will strongly continue, not only because the people of the UAE are people of the sea, but also because of the amazing infra-structure that we have in this country and the long term development goals that the government has for the UAE as an international tourism destination.

I am looking forward to this year's Digital Online – EDA's Underwater Photography and Film Competition with all the underwater photography and film gurus participating and sending in their amazing works of the varied marine life from all the places our members have dived. I want to thank the members of the jury and wish them luck in their tough job when they come to judging all the underwater photos and videos from our members, and I am very much looking forward to the Awards Night.

I also want to take this opportunity to thank our EDA members who continuously share their insightful diving experiences and underwater pictures with us. Your insights and articles are imperative in recommending when and where to go diving, as well as what to look out for on your trips. We hope your passion and enthusiasm continues and you send us news from your next diving adventures. We look forward to seeing your next batch of underwater world snaps!

I do hope you enjoy reading this issue of 'Divers for the Environment'. We have a busy year of activities and events planned for you. The EDA team is working tirelessly to have another successful year and we're looking forward to seeing you all at the next event.

Happy reading and dive safe!

*Ibrahim Al-Zu'bi*

Ibrahim N. Al-Zu'bi

# DIVE MIDDLE EAST EXHIBITION DMEX 2017 COMMEMORATES 11<sup>th</sup> YEAR

From exciting educational activities aimed at children and beginners, to information on new diving pursuits for the enthusiastic and advanced divers, DMEX gives you the opportunity to experience live and interactive presentations from the industry professionals, find dive shops from around the region in the PADI Village, network with industry leaders in the diving community and gain valuable industry knowledge while discovering the latest and greatest in diving equipment.



**28 Feb - 4 March 2017 | 3pm - 9:30pm**  
Dubai International Marine Club, Mina Seyahi

DMEX has something for everyone. Founded in 1988, the Dubai International Marine Club is one of the most established marina and watersports clubs in the region and has become the diving force behind the growth of national and international water sport events in the Middle East. Located on Dubai's rapidly developing waterfront, next to the Le Meridien – Mina Seyahi and the iconic Palm Jumeirah, DIMC is the ideal venue partner for the Dubai International Boat Show.

## SCUBATEC DIVING CENTER STAND NO: D-118



Scubatec Diving Center LLC is a 5 Star IDC Center licensed by the Professional Association of Diving Instructors (PADI), established in 1993 and based in Dubai.

Scubatec prides itself on the personal touches, preferring smaller dive trip groups so the dive masters/instructors can dedicate more time and attention to individuals. We also feel the same way about diving courses, smaller numbers ensure that you get the best of our time. We will fit timings around your work schedules, enabling you to do the courses at your own comfortable pace. Allow us, at Scubatec to show you the magic and thrill that the underwater world has to offer. With Scubatec you can be sure to have a memorable & exciting underwater experience.

We also teach AIDA free diving courses.

### We sell the following brands:

Oceanic, Mares, Atomic, Bare, Sharkskin, Scubapro, IST, Suunto, Seac, Epsealon, Riffe, Loksak, Sealife and Gopro.

### We Offer:

Full-time Repair Workshop, Air and Nitrox filling, Hydrostatic Test and Visual for scuba tanks, Scuba & Snorkeling equipment rentals and dive trips in the UAE & Oman.

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

## DELMA MARINE STAND NO: D-126



Delma Marine was established in 1976 under the name of "Delma Industrial Supply & Marine Services" (DISMS), making it one of the oldest marine companies in the UAE.

We're proud to offer our customers a variety of products from well known international brands such as: Beuchat (diving equipment); Mercury Outboard, Stern Drive and Inboard Engines; Lewmar (marine accessories); Boston Whaler, Bayliner and Quicksilver Boats; Ultraflex (steering systems); Marlow (marine ropes); Bob's Machine Jack Plates; and International (marine paints).

For DMEX 2017, we are going to highlight and showcase the latest Beuchat products. Delma Marine is the official supplier of Beuchat in the UAE, which is an international and well reputed diving brand that was born in 1934 in Marseille, France. Beuchat has evolved for the diving market and is currently working with a huge range of products: scuba diving, snorkeling, free diving, spear fishing, triathlon wet suits and sports wear clothing.

Freediving is becoming increasingly popular as more and more new and experienced divers join the sport every day. Because of this, we'd like to offer you the opportunity to win a brand new Beuchat ZENTO freediving suit! Upon your purchase, you may be eligible to receive a voucher to spend on any Beuchat product during your next visit. After using the voucher, you'll automatically enter our raffle box, and the winner will be announced on the 1<sup>st</sup> of July 2017!

## DEEP BLUE SEA DIVING STAND NO: D-52



Deep Blue Sea Diving is one of the leading diving companies in the UAE. We have been in the business industry since 2008 and the first dive center approved by DMC, Dubai Marine City Authority.

Deep Blue Sea Diving hold the exclusive dealership for X-Jetblade, X-Jetpack, Jetovator, Shred Sled, Freedom Flyer, SUUNTO, OTS (Ocean Technology System) & Mares equipment. We are also the distributor of Seabreacher and Airwheel in the UAE, the exclusive dealer of Seabreacher in Saudi Arabia, and the Flytronics in the Middle East.

We are the regional representative for IDEA Middle East and authorized to issue diving certificates by various global diving organizations such as PADI, CMAS & SSI. We offer a range of courses from beginner to instructor and First Aid. Our facilities include dive shop, classrooms, equipment rentals and reservation office in partnership of various corporate clients providing recreational and professional diver training.

Our main focus is to deliver a variety of activities such as diving, water sports and hydro Jet activities. Over the years, Deep Blue Sea Diving has expanded to Dubai Creek Marine Club, Ras Al Khaimah and Al Khan Sharjah and launched a new device for firefighting with the collaboration of Dubai Civil Defense.



**EMIRATES DIVING ASSOCIATION  
STAND NO: D-121**


Inspiring People to Care About our Oceans Since 1995!

EDA is a non-profit voluntary federal organization accredited by UNEP as an International Environmental Organization. Our mission is to conserve, protect and restore the UAE marine resources by understanding and promoting the marine environment and promote environmental diving. Divers can prove extremely utile in conserving the marine environment through observing, reporting & preventing environmental abuse.

Come on over to say hello to the EDA team and collect a copy of EDA's March magazine issue, 'Divers for the Environment'.

For more information about EDA, go to [www.emiratesdiving.com](http://www.emiratesdiving.com)

**EARTHTRACE CONSERVATION  
STAND NO: D-128**


Captain Pete Bethune founded Earthtrace Conservation and is the Executive Producer of The Operatives, a television show about wildlife crime which airs in over 85 countries.

His current focus is assisting countries in Asia, Central America and Africa with fisheries enforcement and anti-poaching.

He is the holder of the world record for circumnavigating the globe in his original powerboat Earthtrace, a trihull wave piercer vessel powered with biofuels.

At present, Earthtrace Conservation are developing Earthtrace-2 an amazing 60 foot tri hull wave piercer to be used for filming, research, and Earthtrace-2 have a shared ownership component.

For more information about Earthtrace Conservation, go to: [www.earthtraceconservation.org](http://www.earthtraceconservation.org)

**BLUE COAST DIVE CENTER  
STAND NO: D-70**

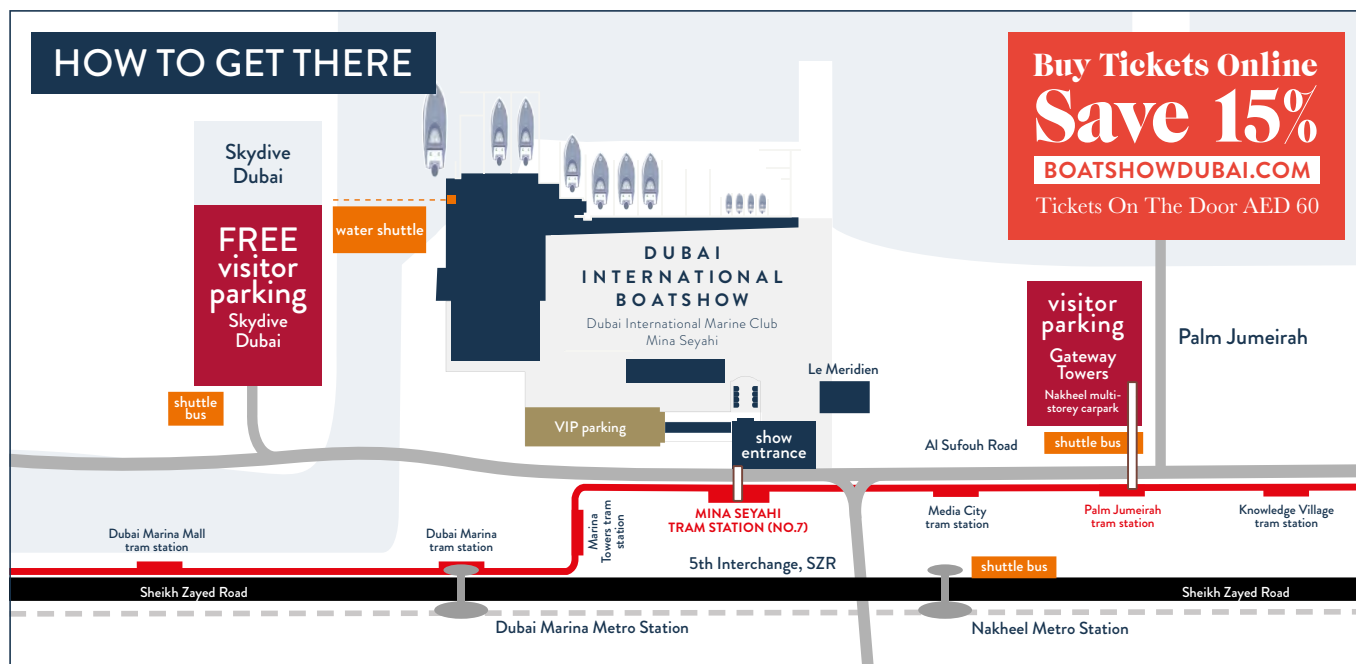

Blue Coast Dive Center provides quality Scuba Diving and PADI courses. We are a PADI 5-STAR Center located in Aquaventure, Atlantis the Palm.

- We offer PADI diving courses, Shark Lagoon dives, dive charters and snorkeling trips.
- We have supreme standard training rooms and have the biggest training pools in the UAE.
- Our International staff caters to multiple nationalities.
- We provide a wide array of Scuba diving equipment from the famous American Brand, ScubaPro.
- We have a variety of diving accessories to choose from for men, women and children.

[www.bluecoast.ae](http://www.bluecoast.ae)

**Dubai  
International  
Boat Show**

**28 Feb - 4 Mar 2017**  
Open 3:00pm - 9:30pm daily



- Skydive Dubai - water shuttle
- Nakheel & Dubai Marina Metro station - shuttle bus
- Gateway Towers (Nakheel Multi-storey car park, at the entrance to Palm Jumeirah) - shuttle bus
- New Dubai Tram line - Disembark at Mina Seyahi Tram Station for show entrance

## SEAOMAN DIVE ACADEMY STAND NO: D-70

**SEAOMAN**  
Discover, Explore, Experience



SEAOMAN Dive operates from two superb locations: Al Mouj Marina in Muscat and The Millennium Resort in Mussanah. Each Dive Centre is open seven days a week and is run by a team of highly experienced dive professionals certified by the internationally recognized Professional Association of Diving Instructors (PADI). The team will ensure that you enjoy a unique dive experience with advice and instruction to the required level. For those who prefer to stay above the water, snorkeling is available at all the dive sites and is supervised by the dive team. All activities, courses, customer service and safety procedures meet the highest of international standards.

### Millennium Resort, Mussanah

Enjoy a luxurious adventure of discovery with one of our year-round dive and snorkel packages. Staying at the fabulous Millennium Resort Mussanah, you can marvel at the delights of the beautiful Daymaniyat Islands, which are located just 45 minutes away. The dive centre is located at the heart of the Millennium Mussanah, a superb seafront beach resort that boasts a spa and fitness centre, beach club with pool bar, swimming pools and tennis courts. Catering for all types of divers, SEAOMAN's centre is fully equipped with two L&W compressors and a Nitrox compressor.

### Al Mouj, Muscat

Located 10 minutes away from Muscat International Airport and 20 minutes from the centre of Muscat, SeaOman's dive centre at Al Mouj is ideally positioned to provide diving for tourists and local divers. The Damaniyat Islands are just a 35 minute boat trip away. Oman's premier lifestyle destination, Al Mouj, boasts a variety of cafés, restaurants, a shopping mall and hotels. The dive centre has one L&W compressor and, Cressie dive equipment.

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

## PREMIERS FOR EQUIPMENT STAND NO: D-104



A 100% local establishment based in Abu Dhabi, in the UAE. Founded in 2001 to be sole agents dealing with

Government Authorities, Municipalities, Oilfield Companies, Divers & Diving Centers.

We are committed to provide a first class service to complement our quality products, and to offer our clients strong, local support along with the latest technology in the field of diving. Our main aim is to make diving easier and more enjoyable to discover the pleasures of the underwater world by offering you a complete range of reliable, top quality gear.

We are the dealer for Oceanic, OceanPro and Hollis-USA for sports, recreational & technical diving, Ocean Reef-Italy for full face masks & underwater telecommunications, Explorer Case for durable waterproof cases, Picasso-Portugal for spearfishing and Tovatec for diving torches, Lavacor-USA and TeknoDiver-Italy for thermal protection & custom-made wetsuits.

## DEEP TREKKER INC. STAND NO: D-112



Take control of your very own underwater drone at stand D-112.

Deep Trekker's Remotely Operated Vehicles provide live HD footage of what is below the water's surface; all viewable from the handheld controller.

Now anyone can dive deep into the ocean to discover marine life, treasure, sunken ships, and more.

Learn more at [www.deeptrekker.com](http://www.deeptrekker.com)

## HYDRO WATER SPORTS STAND NO: D-119



Hydro Water Sports L.L.C is based in Dubai in the United Arab Emirates and they strive to provide, "The Ultimate water sports Experience in Dubai" for their customers with new and amazing water jet technology.

The company was founded in 2015 by Captain Karim El-Gendy and his team of experienced water sports instructors.

Since, they have:

- Served more than 4,600 customers.
- Partnered with a number of leading companies such as Emirates Airlines, Fly Dubai, DEWA, Dubai Marina Yacht Club, World Trade Center (Dubai International Boat show).
- Got sponsored by Yamaha UAE, Alyousuf Motors, Jobe Sports wear USA.
- Become the authorized dealer for Power Fly Products USA.
- Dealer for all Zapata Racing Products such as Flyboard, Jetpack & Hoverboard.

Hydro Water Sports Dubai offers experiences in the new generation of water sports such as:

- Flyboard sessions
- Jetpack sessions
- Jetovator sessions

Hydro Water Sports aim to give an experience that provides excitement and enjoyment to others. "It is an amazing feeling to see one of our customers with a huge smile on their face after they have successfully learned to fly on their chosen device".

When you fly with Hydro Water Sports you are guaranteed that the professional and friendly instructors will ensure that your experience is safe and unforgettable.

[www.hydro-watersports.com](http://www.hydro-watersports.com)

**28 Feb - 4 March 2017 | 3pm - 9:30pm**  
**Dubai International Marine Club, Mina Seyahi**



**PADI**  
**STAND NO: D-70**

**PADI®**  
**padi.com**

PADI, the world's largest recreational diver training organization has issued over 25,000,000 certifications. PADI Members, comprised of approximately 6,300 dive centers and resorts and 136,000 dive professionals worldwide, issue nearly one million certifications each year, making underwater exploration and adventure accessible to the public while maintaining the highest industry standards for dive training, safety and customer service.

Need diving information on the move? Download the awesome PADI App!

Not been diving for a while? Come to the PADI stand (D-70) and ReActivate™!

Want to experience the silent world of freediving? Come and speak to one of our staff. Book onto a PADI course at DMEX 2017 and receive a free PADI gift!

PADI Europe, Middle East and Africa  
**Email:** customerservices.emea@padi.com  
**Website:** www.padi.com

**DIVERS DOWN UAE**  
**STAND NO: D-15, D-70, D-129**


Divers Down UAE is the only PADI Career Development Center in the UAE, GCC and Northern Africa and meets the highest requirement for training PADI professionals. Located in Dubai and the East Coast, inside the 5 star Miramar Al Aqah Beach Resort and Spa, Divers Down UAE has a fleet of 3 boats which can accommodate any PADI courses and customer needs. We also train divers beyond recreational limits with PADITEC and CCR.

Divers Down UAE is proud to be the Distributor or Dealer for some of the best recognized products and manufacturers in the world. These include – Dive Rite, Waterproof, TUSA, Shearwater, Fourth Element, Deep Blu and Dive Alert, as well as representing others. The shops and the online shop are the largest and best equipped in the GCC.

Divers Down UAE offers a full workshop facility for all of your diving equipment. In their specialized Dive Lab, they can repair regulators, wetsuits, drysuits and anything else that you have that is related to diving. With over 25 years of experience, their technicians can get you back in the water, with no delay.

**ROYAL DIVING CENTER**  
**STAND NO: D-70**


Scuba Diving is our Passion.

Yes, this is our view of the life changing experience with Royal Diving Center and our team which has over 10 years experience in scuba diving. We are offering to share our passion and dream with everyone. Our passion is to offer a diving experience for beginners and qualified divers. We are committed to providing you a high standard of customer service and professionalism with the best experience, whatever your involvement with us.

Diving is a fantastic experience that will add a whole new dimension to your life. It is an exciting sport but you don't have to be an Olympic athlete to take part. People of all ages, shapes and sizes can dive!

When looking to learn to scuba dive, it is important you choose the right location and a professional center that will ensure your diving is safe and enjoyable. Our center is staffed by fully qualified professionals, with many years of experience in teaching those new to diving.

**DUBAI CREEK MARINA**  
**STAND NO: D-51**


Situated along the banks of the Dubai creek, the Dubai Creek Marina offers protected moorings for vessels from 25 to 165ft.

Facilities include a well stocked Chandlery, Fuel station, Charter and the region's best pleasure boat repair facility with a 50 ton travel lift. With connections to many top international boat manufacturers and dealers, we offer the very best warranty and service support available.

**AMIT**  
**STAND NO: D-30, D-40, D-111**


مؤسسة عبد الله محمد إبراهيم للتجارة العامة  
 Abdulla Moh'd Ibrahim Gen.Trdg. Est.

AMIT was established in 1981 with the sole intention to cater for the growing demand of two important aspects of the Middle Eastern society, the love of "Bahar" & "Barr" (Sea & Desert) as people call them. The company import, export, distribute, supply and carry after sale services of underwater diving equipment and special equipment, providing clients the finest international brands, latest products and superior services.

**SEA @ DEEP**  
**STAND NO: D-105**


Sea @ Deep is the first UAE Marine inspired jewelry and accessories online store, designed and handmade to reflect your passion of the ocean's treasures and sea life. Using silver and gold parts with original marine rope, bracelet rope or leather, makes your piece as authentic and unique as our original designs. Sharks, starfish, anchors, hooks, shackles and whale tails are a few from our wonderful collection. Visit our website to view all the collection and select your unique design. [www.seaatdeep.com](http://www.seaatdeep.com)

## FUN FUN BOATING STAND NO: D-122



Fun Fun Boating Club LLC is a registered club in Dubai – the land of stunning waterfronts, canals and islands. Our main and only focus at the club is to provide our clients with fun without any stress – mental or physical. At Fun Fun Boating, club members have the luxury of not having to ponder on things like maintenance of the boat, insurance, hefty marina fees etc. All you have to do is register, reserve your slot and hop on the boat. The boat of your choice will be waiting for you with everything you need to have a good time, including ice box, fishing equipment, water sports accessories or any other special request you make in advance.

As a marine company who have been building boats for many years, we understand the issues that clients may face and we ensure services of the highest standards to our members.

Our motto is, "Enjoy boating and leave the rest to us!"

## SCUBA MARINE EQUIPMENT STAND NO: D-60



**SCUBA MARINE  
MARINE EQUIPMENT**

Scuba Marine Marine Equipment have strongly established themselves across the UAE by providing top-notch marine equipment and a reliable service to their valued customers.

As a diving equipment company, we market a wide range of marine products for our customers through understanding the growth and essential marketplace needs, and by continuously striving to provide the best quality products and services for our clients which in return provide complete customer satisfaction.

Our company envisions itself to become a leading diving equipment specialist to the whole of the UAE. We aim to expand our products and service range to our existing and future clients by setting up stores in all the major cities in the UAE.

## EURO DIVERS WORLDWIDE STAND NO: D-70



Euro Divers Worldwide (AG) is a company which started up its operations 41 years ago and presently have dive and water sports operations in 9 countries in 24 locations. Euro Divers headquarters are based in the Maldives and operates in Oman, Japan, Spain, Croatia, Thailand, Indonesia, Egypt and Mauritius.

Euro Divers Oman dive center is located at Marina Bander Al Rowdha, Sidab, Muscat. We offer a unique and thrilling dive experience with our daily dive trips to various dive sites in and around the Muscat area and to the famous National Park, Daymaniyat Islands. We also offer PADI courses from beginner to Instructor level. Safety comes first and all our equipment is well maintained to offer the best service to our guests. We are a team of fun loving, jovial instructors who speak English, German, Swiss, French, Italian and Arabic who all help to make your dive experience a memorable one. In addition to diving, we also offer snorkeling and dolphin watching trips. Transport and hotel booking are organized on request.

For more info, contact us at: [oman@euro-divers.com](mailto:oman@euro-divers.com) or our global office at: [office@euro-divers.com](mailto:office@euro-divers.com).

## SCUBA SHADE STAND NO: D-70



Scuba Shade is a fully serviced diving center and scuba equipment retailer providing complete services to all divers in the UAE. We operate in Dubai, Fujairah and the Musandam providing a wide range of PADI courses and experience programs from beginner to professional levels. We continually seek new and better ways to serve our clients, and aim to anticipate their future needs. We are committed to providing dive experiences that enhance our customer awareness, appreciation and understanding of the local aquatic environment.

## AL BOOM DIVING STAND NO: D-10



**Al Boom Diving**

Dive into adventure with Al Boom Diving, the leading diving and watersports specialist in the GCC. Come and visit us at DMEX – D10 and discover our best ever deals on the latest and greatest diving equipment from world-class brands including Aqua Lung. Test drive the revolutionary Aqua Lung Instrumentation line which delivers on the promise of 'Complex made easy'. See for yourself why these Dive Computers have caused such a stir in the diving community.

Find out about our daily diving and snorkeling trips and PADI courses. Our multi-lingual team of PADI Dive Instructors will be eagerly waiting to answer your questions. Al Boom Diving operates dedicated dive centers in some of the most prestigious locations in the UAE including the spectacular Dubai Aquarium and Underwater Zoo. We also run dive centers in the very best hotel resorts, including Le Meridien Al Aqah Beach Resort, which offers unrivalled diving and snorkeling in the region.

## AEROTECNICA COLTRI STAND NO: D-20



Coltri Compressors are manufactured at our headquarters in Italy. The Coltri family has been producing high pressure compressors and scuba diving equipment since 1954 when Carlo Coltri and his father, Giuseppe, first constructed a high pressure compressor to enable him to fill his own scuba tank and dive in Lake Garda.

Aerotecnica Coltri S.p.A was established in 1982. The company designs and produces high pressure compressors for breathing air and technical gases.

Low and high pressure compressors for:

- Pure Breathing Air
- Natural Gas (Methane)
- Nitrox (O<sub>2</sub> Enriched Air)
- Industrial Air
- Technical Gases (Nitrogen, Helium)
- Paintball and Air Guns

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



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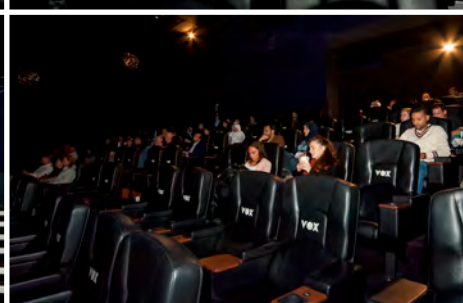
[boatshowdubai.com](http://boatshowdubai.com)

Join us:





# AN EDA MOVIE NIGHT WITH VOX CINEMAS A PLASTIC OCEAN



Back on the 24<sup>th</sup> of April 2013, EDA had the pleasure of hosting a sneak peak of the documentary 'Plastic Oceans' in which Jo Ruxton, one of the documentary's producers gave a presentation on plastic and how it affects us and our environment.

Four years later, on the 15<sup>th</sup> of February, EDA screened the finished product – A Plastic Ocean – with supporting partner, VOX Cinemas in Mercato Mall and a very powerful message was delivered to our members.

A Plastic Ocean is an epic global adventure following a documentary filmmaker and a world record free-diver as they travel the earth discovering the shocking impact plastic is having on our oceans and the marine animals that live there. The film investigates how our addiction to plastic is impacting the food chain and how that is effecting every one of us through new and developing human health problems. The expedition leads the two adventurers to unusual scientific discoveries, heart-breaking truths and important solutions to one of the biggest problems confronting mankind.

#### FILM SYNOPSIS

Thirty miles from land, off the southern coast of Sri Lanka, where civil war has kept the oceans and beaches pristine, a global expedition led by documentary filmmaker Craig Leeson is searching for one of the world's most elusive animals. Blue whales are on the edge of extinction but what the expeditioners find in these remote waters proves heart breaking.

The shock of finding vast quantities of floating plastic in this pristine location forces the filmmaker to think: If plastic is lurking in this remote pristine area what is happening in oceans around the globe? So begins a global odyssey to find the answer to this question. Teams of scientists from around the world are engaged to analyse and report on the expedition's findings as the filmmakers embark on a discovery that reveals the consequences of our disposable lifestyle. The results will astound viewers – just as it did our adventurers – who capture never-before-seen images of marine life, plastic pollution, and its ultimate consequences for human health.

A Plastic Ocean is filmed in 20 locations around the world in beautiful and chilling detail to document the global effects of plastic pollution and introduce workable technology and policy solutions that can, if implemented, begin to change one of mankind's most destructive inventions.

Plastic is indestructible and this year we will manufacture 300 million tonnes of it, half of which will be used just once before being discarded. We can no longer afford to treat plastic as disposable. But can we change our lifestyles in time to save ourselves? The message from this film is that change is possible and it starts with us.



#### DIRECTOR'S STATEMENT

##### Why did you want to get involved?

Growing up on an island off Australia, the ocean was as home to me as any place on land. The creatures that inhabited the sea became a source of intrigue and study, the waves my playground. From an early age, I noticed the severe effects industrial pollution was having on the Coastal waters where I grew up and also the effect it was having on me personally. That interest was the impetus for a lifetime's journey to discover the effects our species has on other species we share the planet with, what drives us as humans and how we can co-exist sustainably to ensure the future survival of all earth's inhabitants. Six years ago, I became aware of one increasing source of pollution, which had until then escaped my notice. It was something I'd been told and taught was disposable. Plastic. I had grown up in a world of plastic and as such had never questioned

its effects on the environment. That was until friend and marine biologist, Jo Ruxton, told me about her experience in the north pacific gyre investigating a massive build up of micro plastics. From that moment, I noticed plastic everywhere and began to study intensely its effects on marine life and humans. In 2010, there was little in the way of scientific research or public understanding of the issue. But the research Jo had done, and what I was starting to see in the oceans around me, shocked me. This was a global disaster that very few people knew about. To prove this however we needed to gather evidence. And to do that, we had to begin a global journey of discovery.

##### Why is it important to you? To the world?

Plastic is a man-made substance. It isn't supposed to be in the environment and the environment has no way of dealing with it, so it is building up and poisoning our earth like





a disease. All life on planet earth is precious and remarkable. The ecological balance of the biosphere we live in has been developed over millennia and sustains us. But we are throwing this machinery off balance. We seem to have a collective view that earth's resources are infinite. But the reality is we live on an island and we are using up those resources faster than is sustainable. In doing so, we are polluting and poisoning our biosphere. Very few of us are taught that our oceans keep us alive. As Dr Sylvia Earle says, "without the blue, there is no green." Our weather systems, oxygen, clean water, food sources, medicines, come from the oceans or are sustained by

them. Yet we know more about the moon than we do about what's beneath the waves. We are the only species that knowingly and willingly pollutes our food and water sources. This confounds me. If we do not move to a sustainable lifestyle, there will be nothing left for future generations.

### What do you hope to accomplish with the film's release?

If you do not know, then you cannot care. With knowing comes caring. By raising this issue we hope to begin a discourse on the problem that will promote and invoke change. We need to recognize solutions that work and

come up with others that solve the problem of plastic that is already in the environment. Only through the sharing of information on this issue and public will to change policy on how we treat plastic, will we rescue ourselves from the human health catastrophe that is developing as a result.

### What was most challenging during filming?

Undertaking a global filming expedition is no easy task. Logistically, moving a quarter of a tonne of equipment and a team of filmmakers and scientists around some of the world's most remote and challenging locations was hard enough. There was the risk of animals and





events not showing up when we anticipated, governments and customs people making life difficult, collecting the science in a way that would make peer review possible, and presenting our findings to the world on an issue very few people knew anything about in a way that would prove engaging enough for a general audience to want to view it. Collectively, these made for challenges that seemed like we were climbing Mount Everest on a daily basis.

#### How have you changed since this project?

I've become more self aware of the impact I'm having on the world around me. Directly,

I've become a megaphone for campaigning against single use plastic. I find myself lecturing supermarket check-out people, takeaway servers, café owners, bankers, politicians and anyone who will listen, about the evils of single use plastic. My office and home have become recycling havens, I drink from water sources other than plastic bottles and refuse single use plastic in my life. This has affected me in other areas. For example, I now compost all of my food waste and grow vegetables from the compost, even though I live in an apartment block in the world's most crowded city. I look for producers and products that have inbuilt sustainability, long life and re-usability. I look

at all manner of "rubbish" and wonder how I could repurpose it. I champion restaurants and supermarkets with zero waste policies. And I have developed a keen interest in green and sustainable financial funds and businesses where profit is based on sustainability and environmental responsibility.

**VOX**  
 صوت  
 vox cinemas



# EDA MEMBER BENEFITS

If you need to Renew your Membership or Become an EDA Member, go to: [www.emiratesdiving.com/eda\\_membership\\_form](http://www.emiratesdiving.com/eda_membership_form)

## NOVOTEL, IBIS & ADAGIO FUJAIRAH

**NOVOTEL**  
HOTELS & RESORTS



The Novotel Fujairah, ibis Fujairah & Aparthotel Adagio Fujairah are offering EDA Members a special corporate rate.

Please show them your EDA Membership Card on arrival to receive the discount. The offer is not valid during public holidays.

### Booking instructions:

- Reservation requests should be made to the Reservation Department  
Emails: H6822-RE@accor.com and H8639-RE@accor.com
- Send a copy to: H6822-SL7@accor.com

### Reservation requests should include the following information:

- Guest's Name
- Dates of Stay
- Room Type and Occupancy
- Reference: Emirates Diving Association Corporate Account

Valid until the 3<sup>rd</sup> of December 2017!

### Guest Benefits include:

- Complimentary 24 hour WIFI in the entire hotel.
- Complimentary use of the swimming pool and gym.
- Complimentary buffet breakfast for Novotel, Ibis guests.

## RADISSON BLU RESORT, FUJAIRAH



The Radisson Blu Resort, Fujairah are offering EDA Members a special rate on their hotel and diving facilities.

Please show them your EDA Membership Card on arrival to receive the discounts.

### Special Hotel rates for EDA Members:

- 10% Discount on Room Rate.
- 10% Discount on Food and Drink in all outlets – room service not included.

### Special Diving rates for EDA Members:

- 20% Discount on all diving services except PADI materials:
  - 20% on Pleasure Diving
  - 20% on Snorkeling
  - 20% on PADI Courses

### To make an online booking:

[www.goo.gl/XHHwpe](http://www.goo.gl/XHHwpe)

### Website:

[www.radissonblu.com/en/resort-fujairah](http://www.radissonblu.com/en/resort-fujairah)

### Facebook:

[www.facebook.com/RadissonFujairah](https://www.facebook.com/RadissonFujairah)

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[www.instagram.com/radissonblufujairah](https://www.instagram.com/radissonblufujairah)

### Twitter:

[www.twitter.com/radblufujairah](https://www.twitter.com/radblufujairah)

## PADI RNLI SEA SURVIVAL COURSE



The PADI RNLI Sea Survival course was developed by the Royal National Lifeboat Institution (RNLI) in partnership with the British Diving Safety Group (BDSG) with the help of the Professional Association of Diving Instructors (PADI) in order to better prepare divers to deal with any emergencies they might find themselves facing while enjoying the underwater world. The purpose of the PADI RNLI Diver Sea Survival Specialty Course is to cover the knowledge and skills to enable divers to be better prepared and skilled to dive in case of an emergency.

### RNLI Diver Sea Survival training goals:

1. Pre-dive planning (site conditions, tides & appropriate exit & entry points).
2. Reinforce buddy procedures and additional considerations when diving in low visibility.
3. Diving equipment checks appropriate for local environment (including inspection for wear and tear and servicing requirements).
4. Emergency equipment orientation (location of emergency oxygen and first aid kit, emergency equipment to alert RNLI – visual and audible).
5. Practice diving with a surface marker buoy and deployment of delayed surface marker buoys.
6. Demonstrate effective emergency surface positions to maintain position, diver contact and warmth (group huddle, contact with a stationary object and crouch position).

### Course Details:

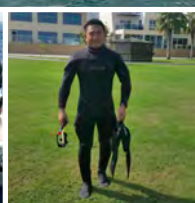
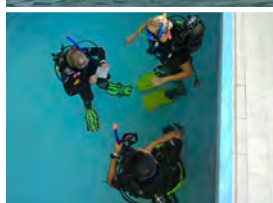
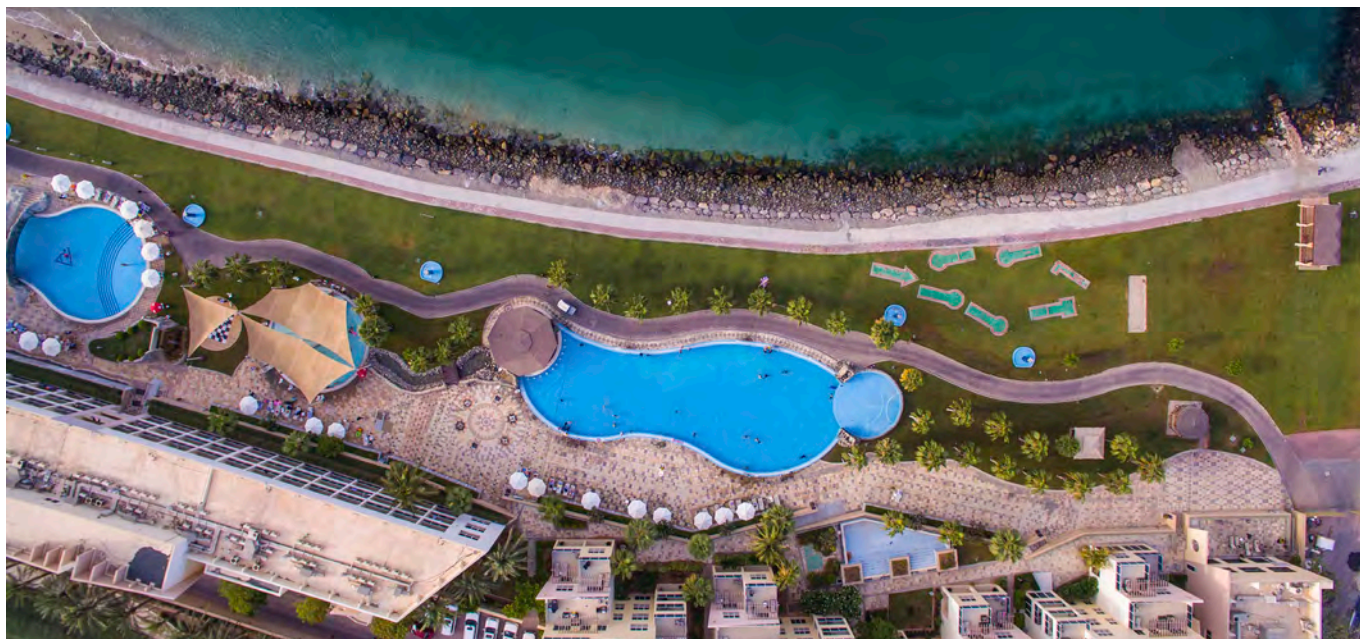
- Open Water Divers are eligible to take the course.
- Course includes 2 open water dives.
- The course retails for AED 2,000.
- 25% discount for EDA members at AED 1,500.
- The course price includes all materials, dives and certification costs.

**Register with:** Hassan Khayal

**Phone:** +971 50 868 5324

**Email:** [Hassan@FantasyDiving.ae](mailto:Hassan@FantasyDiving.ae)

# THE PALMS DIVE CENTER



The Palms Dive Center is a spacious and well equipped dive center located at the Radisson Blu Resort, Fujairah, which is perfectly situated with the stunning turquoise Indian Ocean inbetween Musandam Oman and the UAE's east coast.

As our guests take a PADI course at The Palms Dive Center, we focus on high-quality service in a friendly environment. You can enjoy classroom sessions in air-conditioned comfort with the latest PADI materials available for your viewing, in addition to an on-site training pool within the dive center. All of our courses are available for all diving levels, from entry level to professional training.

Our equipment is well-maintained and available

in a wide variety of sizes, with a full range of tanks from 8 litres up to 13 litres to suit your requirements. The dive sites we visit in Dibba Fujairah can be reached by a short boat ride and all dives are guided in small groups for your maximum enjoyment.

Our dives include a trip to Dibba Rock, which is best known for its colourful corals, clown fish, blacktip reef sharks and its high population of green turtles. Dibba Rock has something for every diver.

Our professional team of multilingual instructors and dive masters look forward to meeting with you and are always ready to answer any questions or queries you may have about our dive sites and courses.

راديسون بلو

**Radisson** BLU  
RESORT, FUJAIRAH

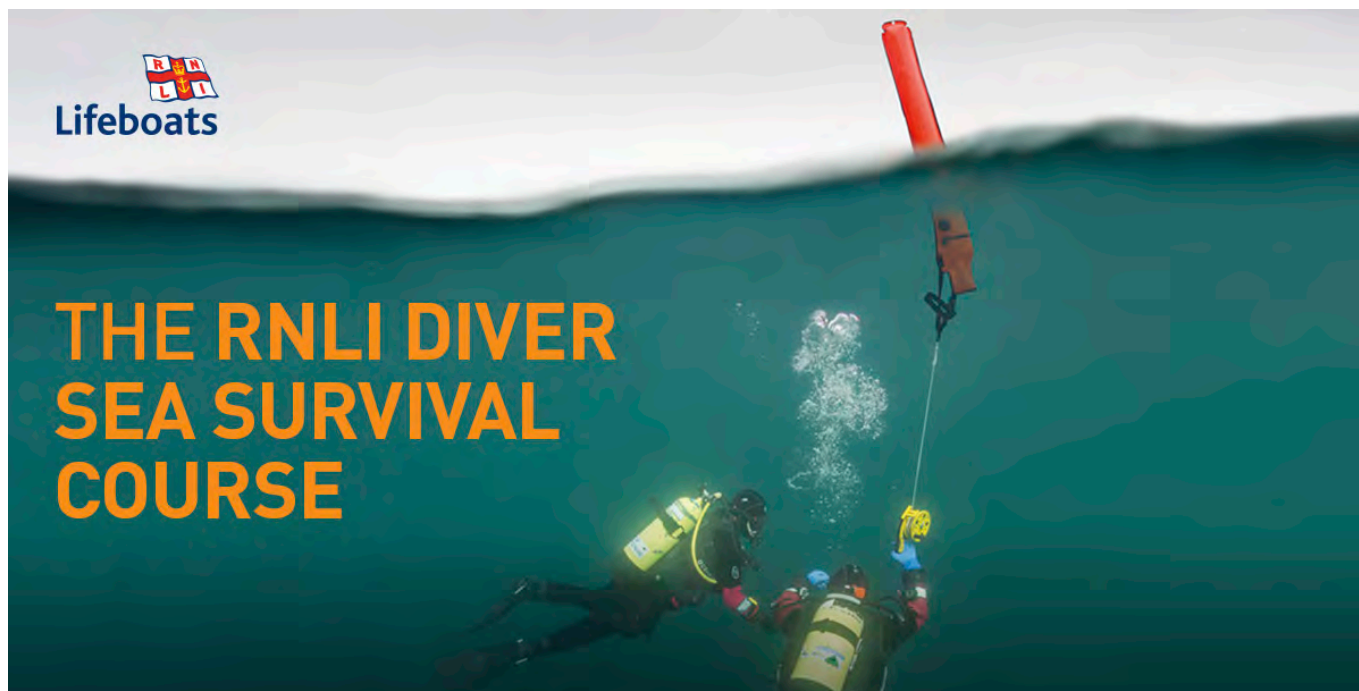
  
**DIVE CENTER**  
THE PALMS

**OPENING HOURS:**  
09:00 - 17:00 (Daily)

**CONTACT:**  
JEFFREY CATANJAL  
Dive Center Manager  
The Palms Dive Center, Fujairah, UAE  
**Tel:** +971 9 204 3233  
**Email:** jeffrey.catanjal@radissonblu.com



# THE BRAND NEW PADI RNLI DIVER SEA SURVIVAL COURSE



In association with the Royal National Lifeboat Institute (RNLI), and in partnership with the British Diving Safety Group (BDSG), the leading organization in diving education, the Professional Association of Diving Instructors (PADI) has introduced a new course to increase the level of diver's safety and knowledge, the brand new PADI RNLI Diver Sea Survival course.

It is important to do this course to make sure that your diving skills are up to date if the worst was to happen, and you find yourself separated from your buddy and group. The PADI RNLI Sea Survival course prepares you for worst case scenarios. Accidents do happen, that is a fact of life, but another fact is that, more often than not, most accidents are avoidable if those involved have the right set of skills at hand as the number one cause of a diving accident, is human error. Everything from dive planning, how to call for help, as well as how to increase your visibility for search and recovery is covered in case you do need rescuing.

The PADI RNLI Sea Survival course includes knowledge development sessions as well as two dives which cover key diving skills, as well as the basics of sea survival techniques. The course does not only work as a reminder of key safety aspects, but also works to teach you new safety skills.

It is essential to plan every dive as tides and weather affect water in different ways and conditions change every day. When planning a dive, there are several factors that need to be considered such as the tides strengths and directions, whether its high tide or low, wind speed and direction, and the mutual or

combined forces of the winds and tides. An example of a basic diving action that is strongly affected by these factors is entry and exit techniques. It is important to determine both whether it is safe to get into the water, and safe to get out. Rough conditions can lead to a situation that forces the unexperienced or uneducated diver to become lost. All of this and more is covered in the PADI RNLI Sea Survival course in order to ensure that divers are all that more safe and qualified while in the water, which will contribute to making their dives all that more enjoyable.

There are a number of conditions that need to be assessed and which will lead to the correct conclusion of abandoning a dive if need be. Weather forecasts and tidal charts are amongst those recourses. This is topped off by the single most important planning element, which is the diver's personal experience and assessment. Preventative measures such as appropriate planning for buddy teams, as well as diving records are included as a primary concern to prevent issues from arising in the first place.

It's important for all recreational divers to maintain an appropriate level of fitness. An annual health checkup is not only important for divers, but for all individuals, as it helps them make certain that they are in a fit condition for any activity they take on. It is also important to take care of one's gear and maintain it appropriately, as any potential equipment problems can lead to incidents. The main things to watch out for are signs of excessive wear and tear or misuse, worn webbing and poorly maintained regulators, look for cracked or bulging hoses, or corroded connectors, check the buckles and clips and check the seals

on the wetsuit. This is especially important if you are renting equipment. It is important to remember that this is your safety, so never feel awkward checking the equipment or pointing out any potential flaws, and rest assured that the staff at any professional dive shop will be happy to have such issues brought to their attention. Complacency is amongst the leading causes of diver error, make it a habit to always check your equipment, even if it is your personal set.

These are just the headlines that all divers know about from entry level courses, such knowledge is readily available to all divers, but without emphasis and repeated reminders, it is harder to retain such knowledge, this is where the PADI RNLI Sea Survival course comes in handy. Not only does it cover all of the above, but it also puts emphasis on appropriate safety kits, navigation techniques, low visibility conditions, which are a major factor for divers here in the United Arab Emirates, especially on the west coast of Dubai, Sharjah, and Abu Dhabi, as well as other practices such as out of air emergencies, use of surface marker buoys, making oneself visible at the surface, and appropriate responses to emergencies.

The PADI RNLI Sea Survival course has recently made its way from the UK to the UAE and is now being offered by instructors in selected UAE dive centres. To top it off, EDA Members can avail an exclusive 20% discount on the course!

For more information on the course, please email Hassan directly at [hassan@fantasydiving.ae](mailto:hassan@fantasydiving.ae)

# SHARKS EDUCATIONAL INSTITUTE REPRESENTATIVES VISIT EDA IN DUBAI

BY **FERNANDO REIS, FOUNDER AND EXECUTIVE DIRECTOR OF SEI**



Last December, a delegation of the associations, 'Sharks Atlantic Platform' and 'Canary Islands Shark Alliance' headed by Mr. Fernando Reis, Founder and Executive Director at the 'Sharks Educational Institute' (SEI), and Ms. Manuela Domingues, paid a visit to the Emirates Diving Association's Dubai headquarters in Jumeirah in their Al Hudaiba Awards Buildings offices. During this visit, the representatives from these associations were welcomed by EDA's Project Manager, Ally Landes.

The Sharks Atlantic Platform is an international base, unified as an "action group" for the education, vigilance, monitoring and conservation of the *Chondrichthyan* in the Atlantic Ocean that aims to promote efforts between the associations, researchers, and other stakeholders. The Canary Islands' Shark Alliance (Alianza Tiburones Canarias) is a Spanish association that works to bring together the people and organizations that promote shark conservation in the Canary Islands' waters.

During this visit, there was the opportunity to exchange some shark diving experiences and talk about different shark species. Fernando Reis and Manuela Domingues presented some of the future plans of their

organizations, such as the preparation of an International Underwater Film Festival dedicated to shark awareness on a worldwide marine conservation environmental front, co-organized by the SEI.

The SEI – Sharks Educational Institute – is an international non-governmental organization dedicated to promoting shark conscientiousness at a global level through the organization of creative educational events offering environmental marine awareness to everyone, in cooperation with other organizations and their stakeholders, and based on the active participation of the public involved.

Knowing that EDA is committed to marine conservation, supports divers, scientists and activists on developing knowledge and taking on ethical action on environmental protection, it was a perfect match to SEI's goals. In fact, it has been a pleasure to know they are available to strengthening forces at an international level in the fields of education on shark conservation and underwater film festivals since one of the major objectives of the SEI Executive Director's visit to the UAE is to call for an underwater film festival to help raise awareness of the decline of shark species.

At the end of the visit, both Fernando and Manuela were very happy to hear about the diving and conservation activities that EDA host and gained great insight from all the recreational divers, professional diving instructors, underwater photographers, and filmmakers that they met during their visit to the UAE. There is no doubt that cooperation between individuals and organizations with the same interests and values in environmental conservation is always a positive facet and adds more value to our oceans' health and our planet's welfare.

If you would like to support or collaborate with the Sharks Educational Institute on diving conservation and/or marine environmental education, or if you wish to know more about shark diving in general, please email [sharksinstitute@gmail.com](mailto:sharksinstitute@gmail.com).

For receive information about Sharks Educational Institute's future events, please visit and follow us at: [www.sharkseducational.simplesite.com](http://www.sharkseducational.simplesite.com) and [www.twitter.com/sharksinstitute](https://www.twitter.com/sharksinstitute)



# DIVERS DOWN: A DIVE RITE DISTRIBUTER



Lamar Hires second from left having successfully completed these students' O2ptima course in Fujairah.

Divers Down have been a Dive Rite distributor for many years. Dive Rite was founded by Lamar Hires and Mark Leonard in 1984. The brand was created by cave explorers for technical divers and cave divers.

Dive Rite created their own rebreather which recycles the air that you would normally breathe out, creating a "closed circuit" which has many advantages. It is a quiet system as it creates no bubbles and you can stay underwater for a lot longer. It makes gas planning easier and cheaper for technical divers doing deep dives, as the amount of gas needed is very little, compared to that of "open circuits".

Diving with a rebreather used to come with many risks as recycling gas that we breathe out is not an easy science. But lately, most of those risks have been eliminated by the new technology available. More and more recreational divers are switching to a rebreather system. As a CDC and TecRec centre, Divers Down jumped on the rebreather trend when Dive Rite launched the newly updated Dive Rite O2ptima 2015, now powered with Shearwater electronics.

Lamar Hires is a good friend of Divers Down and when we wanted to start introducing rebreathers to our divers, Hires came over to help us get everything set up and start the training. During the Dubai International Boat Show in 2016, Hires came to partake alongside Divers Down to talk to people about his unit.

The O2ptima caught a lot of people's attention due to its sleek look, durability and of course that it looked pretty awesome.

The new O2ptima has many features that really makes the rebreather stand out on the market today. This piece of equipment has the shortest loop for a rebreather, which means that the unit has a superior system for breathing due to the reduced distance the gas needs to travel. The focus being, as "unbreakable" as possible. The unit is designed to be super simple, rugged and strong with multiple water traps in case of rupture and flooding due to harsh cave/wreck environments.

It has multiple configurations that can be altered in a matter of minutes to suit the diver. From back or front mounted lungs, wing and weight positioning and cylinder type and size – it is made easy to find your optimum set up. It is one of the only rebreathers that can easily take standard granular sorbs (CO<sub>2</sub> scrubber) or an Extendaire Cartridge which has an unbeatable breathing system and CO<sub>2</sub> scrubbing ability compared to the standard granular scrubber.

After the boat show, Hires stayed on for another week to train staff and divers on the unit. Everyone had a great time and learned a lot from his experiences with the unit and from his diving over the years.

Now we have fully qualified instructors ready

to teach students how to use the unit at Divers Down. The units are also available for rental afterwards.

Try dives and courses are available to anyone with the following prerequisites:

- Minimum age is 18 years old;
- Must be an Open Water Diver or above;
- Must have 20 logged dives;
- Must be an Enriched Air Nitrox Diver.



For more information on courses and prices, contact Divers Down:

## DIVERS DOWN FUJAIRAH

Fujairah, UAE

Tel: +971 50 553 1688

Email: info@diversdownuae.com

## DIVERS DOWN DUBAI

Dubai, The Palm Riva Hotel, UAE

Tel: +971 55 988 8687

Email: dubai@diversdownuae.com

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

# DIVING IN SABAH, MALAYSIA

BY **SABAH TOURISM BOARD, MINISTRY OF TOURISM, CULTURE AND ENVIRONMENT**  
 PHOTOGRAPHY **IYAD SULEYMAN**



**TOP:** Digital Online 2016 – 3<sup>rd</sup> Place Winner. Taken in Sipadan, Malaysia. **BELOW:** Digital Online 2016 Black and White entry, taken in Sipadan, Malaysia.

Sabah is blessed with a long coastline of white sandy beaches and turquoise, crystal clear water, as well as islands accessible by boat. These islands are well-known for diving, water sports, snorkeling or just plain relaxing. Some have even planned destination weddings by the beaches, against a backdrop of the famous Sabah sunsets.

Diving is a major market for Sabah and their jewel, Sipadan Island, is one of the top-rated diving spots in the world. Nearby islands such as Mabul, Kapalai and Matakang, all guarantee to show their large marine life as well as the tiny sea creatures amongst the colourful coral reefs.

On the islands, high to medium range resort facilities await. But don't wait till the last minute to go to Sipadan and the famous Big Brothers, as they have limited diver-per-day regulations to maintain the sensitivity of the rich marine biology. Head over to Pom Pom and Si-Amil Islands nearby and make your own discoveries. Mabul and Sipadan now have newly established turtle hatcheries that allow you to participate in their turtle conservation programs.

Si-Amil Island is a forested island about an hour away from Semporna. This island with a steep hill has a historical background as its beach landing was where Japanese forces had built a fish factory as a cover for surveillance activities during WWII. Bamboo sharks are seen at night here.

There is also The Semporna Islands Park with the mysterious and legendary Bohey Dulang, a trademark of the Semporna seas. There are plenty of areas to explore.

Semporna is accessible by road from Tawau, about an hour's drive away. There are direct flights connecting Kota Kinabalu and Kuala Lumpur to Tawau.

To complete your diving trip in Sabah, a visit to the Kinabalu Park to view the iconic and mystical Mount Kinabalu standing tall at 4,095.2 meters, is highly recommended. It is a UNESCO World Heritage Site gazetted in 2000, for its bio-diversity. This area houses an astonishing array of all sorts; the highest plant diversity globally per unit, per area, the world's largest flower, the Rafflesia, and even

the world's largest leech! Mount Kinabalu is still one of the youngest mountains in the world (between 7-8 million years old) and this granite mountain still grows.

For activities besides diving, Sabah's tropical eco-treasures range from mountain high to ocean deep. The diverse cultural heritage and breathtaking landscapes create the perfect cocktail for a fun-filled getaway. Sabah is a 6-7 hours flight from Dubai via Kuala Lumpur or Bandar Seri Begawan in Brunei. Sabah is the complete destination for business and leisure, for honeymooners and couples' getaways. There is much of Sabah to experience!

[www.sabahtourism.com](http://www.sabahtourism.com)  
[www.malaysia.travel/en/intl](http://www.malaysia.travel/en/intl)





# FIRST IUCN RED LISTING ASSESSMENT OF SHARKS, RAYS AND CHIMAERAS IN THE ARABIAN REGION



The Environment Agency-Abu Dhabi (EAD), in collaboration with the International Union for the Conservation of Nature (IUCN) Shark Specialist Group, organized a Red Listing Assessment workshop from February 5<sup>th</sup> to 9<sup>th</sup> in Abu Dhabi to evaluate the conservation status of sharks, rays, and chimaeras found in the Arabian Sea and the adjacent waters.

Twenty-two participants attended the workshop from a number of countries including the United Arab Emirates, Saudi Arabia, Sudan, Oman, India and Pakistan as well as experts from the US, Canada, the UK and Australia, and observers from national competent authorities. The workshop outcome contributed to the UAE National Plan of Action for the Conservation and Management of Sharks, which will be published as a joint document between EAD and the Ministry of Climate Change and Environment imminently.

Sharks, rays, and chimaeras are one of the world's oldest and most ecologically-diverse groups of animals. Yet, according to the IUCN Red List of Threatened Species™, a quarter of the world's species are threatened with an elevated risk of extinction; ray species are found to be at an even higher risk than sharks. Overexploitation, from targeted, as well as incidental take (or bycatch), is the main threat causing declines in species worldwide. Results from scientific studies undertaken in the UAE and the broader region also suggests that several species of sharks and rays face

high levels of exploitation with declines in population numbers over the last decade.

An assessment of the status of sharks, rays, and chimaeras in the region has not been previously undertaken. Globally the IUCN Red Listing Assessments are the model commonly used for evaluating the conservation status of animal, plant and fungi species. Over 870,000 species have been assessed so far.

This workshop was the first step in understanding the regional status of species. Participants will assess approximately 160 species occurring in the Arabian Gulf, Sea of Oman, Arabian Sea, Gulf of Aden, and Red Sea using the IUCN Red List approach.

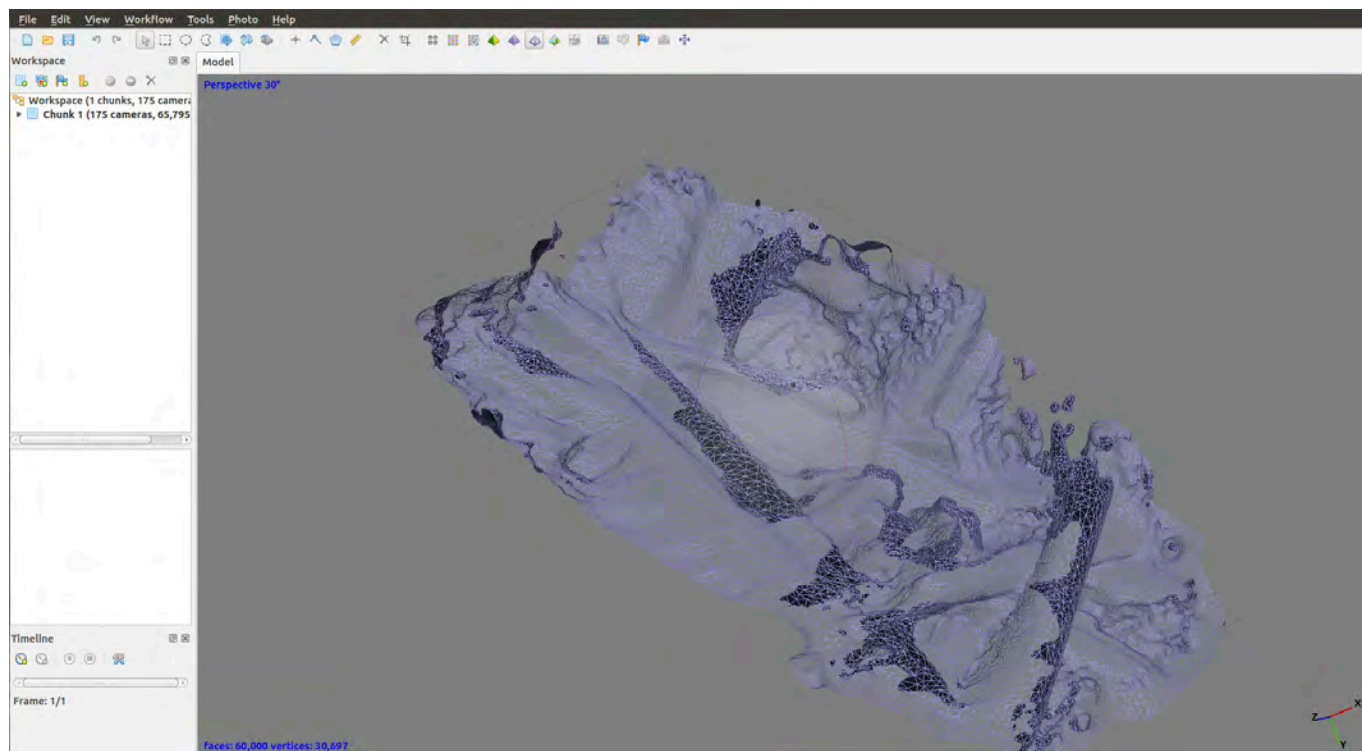
Commenting on the Red Listing Assessment workshop, Dr. Shaikha Al Dhaheri, EAD's Executive Director, Terrestrial and Marine Biodiversity Sector, and IUCN Regional Councillor for West Asia, stated, "While there have been significant regional policy efforts over the last five years, effective conservation requires a better understanding of the threats species face in our region and their conservation status. We are pleased to be leading the way in enhancing our understanding of the status of sharks and rays in the region and look forward to engaging with leading shark scientists and fisheries managers to assess the vulnerability of species occurring in these waters which will establish an important baseline for monitoring them moving forward".

Dr. Nick Dulvy, IUCN SSG Co-Chair and Canada Research Chair at Simon Fraser University in British Columbia, says, "Sharks and rays are facing an elevated risk of extinction worldwide and we are concerned about the long-term survival of these species. Most species tend to grow slowly and produce few young, leaving them particularly vulnerable to overfishing."

"This workshop is an excellent opportunity for local experts to be involved in developing Red List Assessments that will help inform the management and conservation of this important group of ocean predators within the region", stated Dr. Colin Simpfendorfer, IUCN SSG Co-Chair and Director of the Centre for Sustainable Tropical Fisheries and Aquaculture at James Cook University in Queensland, Australia.

The workshop was hosted by EAD and has been generously sponsored by the "Save Our Seas Foundation" with additional support from the International Fund for Animal Welfare and Sharks MoU under the Convention of Migratory Species (CMS). The outcome from the workshop is a regional report that include status assessments identifying species most at risk as well as recommendations for conservation actions, a first for the UAE and the broader region. These assessments will form a baseline for future work in the region, some of which is urgent.

# NAUI FINLAND DEVELOPS AND INTRODUCES 3D PHOTOGRAMMETRY SPECIALTY COURSE



TAMPA, FLA., (JANUARY 10, 2017)

The National Association of Underwater Instructors (NAUI Worldwide) is proud to announce its new 3D Photogrammetry Specialty Course, designed to provide an advanced level of understanding of the more visual aspects of scuba diving.

The latest addition to NAUI's lineup of Instructor Specified Specialty courses – NAUI 3D Photogrammetry – comes from NAUI Finland and is representative of NAUI's flexible and comprehensive approach to training.

NAUI has long understood that divers crave deeper exploration and unspoiled aquatic life available beyond the recreational discipline. Photogrammetry fulfills this craving by taking multiple overlapping photographs (of still images) and deriving measurements from them to create 3D models of objects.

"Modern technology with its computers, advanced software, high powered lights, high capacity batteries and high resolution cameras, offers possibilities to bring these hidden treasures out from the depths and show

them to the world. Over the past two years, I have been involved in expeditions to create 3D models of numerous underwater sites," said NAUI Finland Recreational and Technical Representative Pasi Laine.

The NAUI 3D Photogrammetry course, initiated by Pasi Laine (NAUI 42324) and Pasi Lammi (NAUI 57705), includes eight hours of 3D Photogrammetry basics and hands-on land training to understand what kind of issues affect the end result. The course discusses the required software and hardware and how the resulting models can be utilized. The course also includes a dive to document a site of one's choice to record material for model rendering.

One of the hallmarks of NAUI is that it allows its instructors, who have a particular area of expertise, the academic freedom and opportunity to develop and teach their own Instructor Specified Specialty courses, as well as share those courses with the NAUI Membership.

## ABOUT NAUI WORLDWIDE

Founded in 1960, NAUI Worldwide is the scuba industry's largest not-for-profit agency whose purpose is to enable people to enjoy underwater activities as safely as possible by providing the highest quality practical education, and to actively promote the preservation and protection of the world's underwater environments. As a pioneer in diving education, NAUI has developed many of the programs and concepts accepted throughout the diving industry. NAUI: The Definition of Diving!



## FUTHER INFORMATION

To read more about 3D Photogrammetry, subscribe to the NAUI Sources magazine at: [www.goo.gl/xj1RwS](http://www.goo.gl/xj1RwS).

To participate in the NAUI 3D Photogrammetry course, contact NAUI Finland Representative Pasi Laine directly at: [pasi.laine@naui-finland.com](mailto:pasi.laine@naui-finland.com).

Contact the NAUI Training Department at: [training@naui.org](mailto:training@naui.org) to find out more about becoming a NAUI Instructor and developing NAUI Instructor Specified Specialty courses.

To read and see more about NAUI Worldwide and what they offer, please visit the website: [www.naui.org](http://www.naui.org).



# KIDS SCUBA CAMP MABUL & SIPADAN 2016 AT BORNEO DIVERS MABUL RESORT

FEATURE **HJ. SYED ABD RAHMAN**



"I saw a couple of "Nemo" clownfish, a puffer fish and a school of squid!" shouted a young PADI Seal Team boy while pointing to the underwater camera. It seems that nothing in this world excites a young child more than seeing magnificent marine sea creatures while snorkeling right off the Borneo Divers Mabul Resort jetty.

I have been educating young children from the ages of 8 to teens about scuba diving and the marine environment since 2004, with the start of Kids Scuba in Malaysia. There is nothing more rewarding than seeing young kids and teens doing their PADI Junior Open Water courses feeling enlightened by the magical world of our underwater garden and spectacular marine life. I am proud to be a Scuba educator as Malaysia is situated in the middle of the coral triangle which brings me great pride to point out some of the best dive sites to the younger generation, especially on Mabul and Sipadan Islands.

Kids Scuba Camp Mabul/Sipadan 2016, held at the well-known established PADI 5 Star

Borneo Divers Mabul Resort, was a truly special Marine educational camp. Our Kids Scuba team conducted the Project AWARE beach and underwater cleanup with the assistance from the friendly Borneo Divers Divemasters. The Dive Manager from Borneo Divers, Mr Steven, took the time to personally explain and educate all the kids, teens and parents participating in the camp on the importance of a marine environment cleanup. This is truly amazing as taking part as an eco-diver with the right education, instills the values of assisting others in protecting and conserving the underwater marine environment.

One of the highlights of this year's Kids Scuba Camps was when Borneo Divers Resort invited 40 local children from the Mabul Island primary school to take part in one of our programs and our Kids Scuba team shared and extended 40 sets of goodie bags filled with school stationary and snacks to start their school sessions for 2017. The efforts were carried out together with Kids Scuba PADI Rescue Diver Student, Ilyas Zorin and his Mother, Ms NurChahya which

brought wide smiles to the children.

As quoted by one of the participants, Ms Marissa, PADI Advanced Open Water Diver, "Diving makes me appreciate the flow of life. Sometimes you ride the currents, sometimes you need to swim against it hoping that you get to see beautiful things along the way. I had so much fun on this trip, Scuba Camps such as this makes it even more essential for us to live sustainably so that our future generations will be able to experience the Marine Magic too."

Borneo Divers Resort Dive Manager/ Instructor, Mr Eljer Aranjuez quoted, "My heartiest congratulations on the efforts by Kids Scuba Camp on Mabul Island. Although I was not diving with them, I was completely overawed by the excitement and passion!

Syed, your dedication to giving the kids a truly invaluable experience and lessons for life is very inspiring. The PADI Dive Professionals direct involvement and interaction with the kids, teens (and us too) on the theory and practices of Scuba Diving brought a real-world example of





*marine conservation to the fore. It was a magic experience which I will never forget."*

During the camp, the involvement of family members participating in activities such as evening marine educational video presentations, followed by quizzes, beach games and pool parties after the dives, in turn will strengthen the bonds between family members as well as among different families. From my observations, children who are introvert or shy to speak up in public, tend to "loosen up" and force themselves to push their boundaries and eventually have the courage to talk freely. We observed that new friendships are made because their schoolmates or friends are not around them; therefore they have no other choice but to befriend other children at the camp.

In addition, part of the Kids Scuba Camp program along with the PADI Seal Team and the PADI Junior Open Water Diver courses are about discipline and being responsible towards the underwater marine environment while using diving equipment with the correct

procedures. Having these course outlines will hopefully ease our environmental problem such as global warming and teach our future generations to be more responsible towards the marine environment and conservation.

Kids Scuba Camp Mabul/Sipadan 2016 was made possible with the support from close friends and associates of Kids Scuba, Borneo Divers Mabul Resort, PADI Asia Pacific, DiveLog Magazine Australia, Emirates Diving Association's magazine, 'Divers for the Environment', and other personal contributions.

Malaysia is known for its beautiful islands Marine Parks and magnificent underwater "rainforests". Some of them are rated as world class dive sites and are unique in their own way. By keeping this in mind, I sometimes tell the kids that we actually are blessed to have some prominent dive sites that are as good as any other place in the region. We should be proud of what we have and infuse them with that kind of feeling.

To sum up, scuba diving with family, in a broader

perspective brings so many advantages which go beyond imagination. These are some of the key highlights that I have personally seen through my experience as Founder and Instructor with Kids Scuba from diving as a family in Malaysia and what it means to an individual. Personally, when I'm looking at them, it actually makes me want to do more in terms of informing other families and kids on how important educating the younger generation is, as well as transcending into a deeper understanding of what marine conservation and the marine environment is all about.

#### **HJ. SYED ABD RAHMAN**

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# CORAL: THE THIN SKIN

FEATURE **CHRIS JONES** PHOTOGRAPHY **GYN BARRETT**

That coral may look hard, but it ain't nearly so tough as it thinks it is. The weird and wonderful coral structure is built of thousands of dirham-thick tentacled creatures named polyps. Each one armours itself with limestone (calcium carbonate), anchoring itself to any substrate it can find, up to and including the dead skeletons of its brethren.

Whereas the soft coral merely absorbs and secretes enough calcium from the seas water to form spiracles to attach it to its neighbour, the hard coral forms hard stony cups around each and every polyp, forming a seemingly formidable fortress to defend these little filter feeders.

Soft corals are soft. Most divers tend to get that one, assume that the coral is vulnerable and steer clear. However, hard corals are made of rock aren't they? So surely you can give it a bit of a prod and a poke...

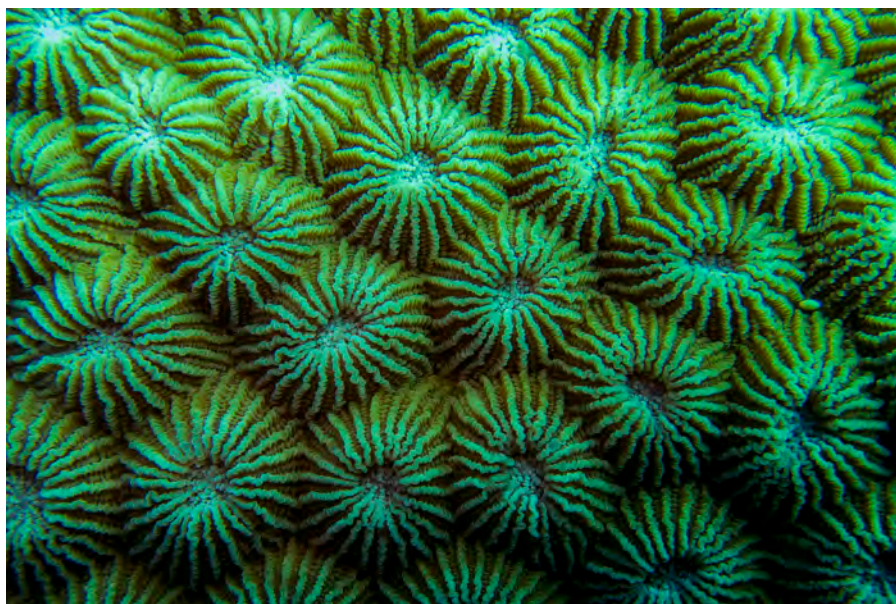
In fact both hard and soft corals are covered by a fragile protective layer properly known as the surface mucopolysaccharide layer, or SML. The SML ranges from 1mm thick in some hard corals and up to a full centimetre in certain soft corals. This mucousy protein and sugar rich goop contains a fantastically diverse array of micro-organisms including fungi, algae, bacteria and archaea. This 'skin' protects the coral from disease carrying pathogens, mediates the cycling of nutrients, and helps the coral adapt to changes in the environment.

Breaking this skin, by a careless fin or enquiring hand perhaps, is all too easy and leaves the little polyps exposed to a myriad of nasty diseases like white plague and yellow blotch. The result of this is generally dissociation between the coral and symbiotic zooxanthellae; the photosynthesising algae that provide sugars to the coral and gives them their colour; leading to coral bleaching and death. Reason enough to hang back.

These diseases are on the rise even without the help of inquisitive scuba divers. Over the last 20 years, drastic (>50 percent) loss of coral cover has occurred on the Yucatán Peninsula, even in pristine areas, due to disease. Research suggests that this is linked to increases in sea temperatures reducing the effectiveness of coral SML's.

Temperatures of water in the UAE, and indeed the majority of the globe, are on the rise. This is exacerbated in the emirates by deluges of heated water being pumped into the oceans by electrical and desalination plants.

So next time you go diving, remember that some physical insults go more than skin deep.



**TOP:** A close-up of hard coral. **MIDDLE:** Soft corals using their tentacles to filter feed. **BOTTOM:** Whitebar Filefish, a coral eating species that, like the parrot fish, breaks the microbial skin of the coral and allows the introduction of disease.



# MY DIVING JOURNEY

FEATURE & UNDERWATER PHOTOGRAPHY **KAYLA SOCKETT**



My journey began when my mum (Louise Sockett) and stepdad (Jason Sockett) bought me my PADI Open Water course for my 10<sup>th</sup> birthday...

I have always had a love for the ocean, and getting my open water gave me the opportunity to explore further. Luckily for me, Jason was able to teach my mum and I, he was a huge role in why I decided to make this a choice of life.

My first dive was on the 13<sup>th</sup> of February 2015 and I was a little nervous but also excited! Unfortunately my mum was sick so she couldn't dive, so I went with Jason. As we descended, I heard the life on the reef and it sounded like an orchestra! That was the moment diving transformed my life.

When I started to dive on a regular basis, I realized that being an Open Water diver was not enough and I decided to start my Junior Adventure diver. One of the funniest moments was when a triggerfish attached itself to my new shiny fins!

One of the most frustrating things for me was having to wait until I was 12 to unlock more experiences. However, every cloud has a silver lining and having been too young to continue with more courses gave me the opportunity to start underwater photography with my mum and dive with my family. This helped me to improve my photography on land, with my brother as my very eager 'model'.

After that, my 12<sup>th</sup> birthday came around very quickly. I completed my PADI Advanced Open Water, which was a lot of fun. My favourite dive by far was the deep dive! It was one of

the best experiences and something not many 12-year olds get to do!

One of the most fun, but also most challenging courses I did, was the PADI Junior Rescue Course. It was the next step towards becoming a PADI Master Scuba Diver, which was my goal. Luckily I completed my Emergency First Responder training in 2013 (aged 8) and renewed it last year, aged 11. It was especially hard for me, considering my age and size, as the Rescue course is very physical.

It was especially challenging for me as my mum pushed me both mentally and physically. She was my instructor. The biggest challenge was the studying and effort that was put into where I am today. The physical challenge was the final rescue scenario. I had to walk down to the beach with my kit on, find the victim on the sea floor using the navigation skills, tow them to the shore whilst doing rescue breaths and getting their kit off, to then finally take them up the beach to provide oxygen and CPR (which was done on a dummy named Bob).

This was a big challenge for me, but I now know that I am able to handle any emergency scenario with confidence.

Doing the 5 specialities, Night Diver, Peak Performance Buoyancy, Project Aware Turtle, Shark and Surface Marker Buoy was so much fun! It was easy to do and the best part for me was learning more about sharks and turtles, my two favourite sea creatures.

Now I'm a PADI Master Scuba Diver, aged 12! I will continue with my diving and can't wait to do my PADI Sidemount when I'm 15! Next I'm doing my Nitrox Speciality and then all I'm



going to do for the next three years is dive and explore with my family, learn as much as I can, and also educate as many people as I can about the importance of our beautiful oceans!

I want to be a marine biologist when I'm older, and what better way to prepare for that than to start educating people now!



# THE FIN KICK

STORY BY PATRICK VAN HOESERLANDE ILLUSTRATION PETER BOSTEELS

Today Skubba would test his homemade foot triangles. 'Fins', Fred had called them.

Fins. The word sounded special and that made Skubba feel even more like a fish. He now had fins like them. And because he felt like a fish, he was confident that he would succeed this time.

He stepped into the old sandals that were attached to the fins. He fitted them properly and checked everything one more time just to be sure that they would stay on his feet. He shook a foot. The triangle did not fall off. Good.

After he had checked the other one, he made his way over to the waterfront. Well, walking on land was not easy. He waddled like a duck and had to be very careful where he landed his fins. He almost dropped his mask into the water in doing so.

"I think you had better walk backwards," Fred said smiling.

"Backwards?" wondered Skubba, as he did not understand why.

"I think that when you go backwards, it will be easier to walk with your fins on. That way they'll easily drag over the ground without bothering you too much or making you fall."

When Fred suggested something, Skubba had learned to try it. And it worked quite well. Walking backwards went smoothly. He just had to look over his shoulder from time to time to see where he was going.

Having arrived at the water's edge, he carefully stepped into the lake. When he thought he was deep enough, he let himself fall over. He had already learned to hold on tight to his mask so that he would not lose it. He looked around and dove.

Although diving was his plan, he seemed

to be going nowhere, no matter what he did, he barely moved at all. Maybe he would succeed if he tried breaststroke?

Wow, that was hard. He really had to work hard with his legs to move forward. Maybe Fred would know what to do?

"You have to move with your legs!" he heard when he surfaced.

"I'm doing just that!"

"No, don't swim breaststroke, only use your legs."

"I already did that, but that didn't work either," replied Skubba.

"Yes, I saw that, but you're bending your knees. It's like you're trying to ride a bicycle underwater."

"What should I do?"

"Can you swim in front crawl?"

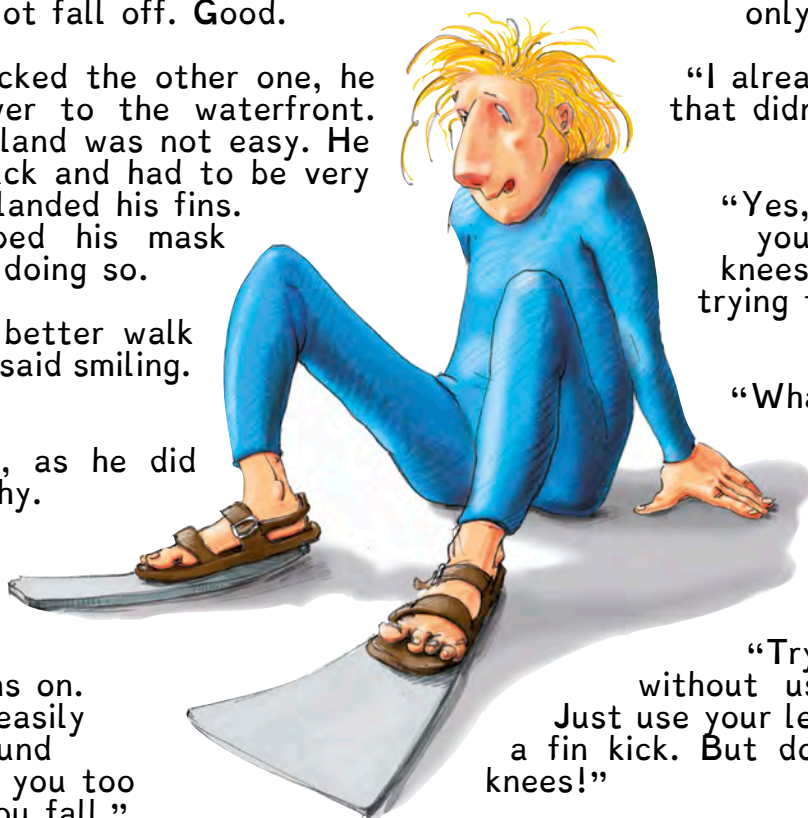
"Yes!"

"Try doing that, but without using your arms. Just use your legs and you'll do a fin kick. But do not bend your knees!"

Skubba focused on his legs and began to move. Hey, it seemed to work. The harder he kicked, the faster he went.

Bang! Skubba hadn't been paying attention to anything else other than his legs and he smashed his head against a tree root hanging in the water. The pain did not lessen the joy he felt though. At last, he had now come up with how to swim in water. A pair of fins and the right way of moving. He felt ready for some real diving.

Here comes Skubba...!



# REAL FINS

STORY BY PATRICK VAN HOESERLANDE ILLUSTRATION PETER BOSTEELS

Skubba had nicely developed his way of swimming underwater in his homemade fins, and could now swim with the fish.

When his mother asked him and Fred to accompany her to the dive shop, they proudly showed their set of fins off to the owner of the store. With a smile on his face, he told them the story of his first pair of fins. Their eyes sparkled when he told them that his homemade fins were nowhere near as good as the ones that he now held in his hands. According to him, they were well made and probably the best that could be tinkered together.

There were of course better fins in his shop, but these were made in large factories with special, expensive and complex machines, and not with materials found in daddy's garden shed. Their design was the result of years of study by a team of engineers. And don't forget, perfected after months of testing in special laboratories. But even so, he would have to do his best to find a type of fin that was better than the one made by Skubba and Fred. Might they be interested in designing and selling diving equipment when they are grown up?

Before they could answer, the owner had disappeared. After a while, he came back with a pair of yellow fins. Fred noticed that the rear end of the fins were open. Skubba's feet would be exposed at the back and the fins would fall off.

"This is an open water fin," explained the shop owner. You use these kinds of fins with booties. When you go dive in open water..."

"What's open water?" asked Fred.

"Uh, open water, uh, water without a roof above it. A lake, a pond, the sea... You understand, not a pool."

"Ah yes, I understand."

"Well, a diver in open water wears a neoprene suit and booties to protect himself against the cold."

"Yes, water can be cold sometimes," agreed Skubba already holding a fin in his hands.

"Because a diver wears booties, the feet are bigger. Therefore, the back of these fins are open. There is a strap to put around your heel and tighten it."

Skubba was already fiddling with the strap. By doing this, he discovered how to tighten and loosen it. When he wanted to try the fin on, the owner stopped him.

"What is your shoe size?" he asked. "You need the dive boots first to put the fins on."

He gave Skubba a pair in his size and said it could be a bit tricky to put them on. It would be easier with a zipper, but that kind of dive boot gets broken faster. You can also use old nylon stockings to slip into the booties. Skubba knew exactly where he could find those...

Skubba waddled proudly showing off his new diving equipment and the man from the store asked Fred if he also wanted a pair of fins.

"No, thank you," replied Fred briefly.

Then the shop owner turned to Skubba's mom and asked how she wanted to pay for the items.





# 2016 YEAR IN REVIEW

BY REEF CHECK



With your help, 2016 marked Reef Check's 20<sup>th</sup> year of education, research and conservation. It has been wonderful to celebrate this anniversary with Reef Check teams from Hong Kong to the Dominican Republic.

Sadly, the loss of the northern third of the Great Barrier Reef this year, and perhaps 15% of reefs globally due to the 3<sup>rd</sup> Global Bleaching Event, reminded us that our fight to save coral reefs is facing its most serious challenge yet. There is still time. But if this dramatic loss of the world's most iconic reef is not a wake-up call, then I don't know what is.

If we don't reduce the blanket of greenhouse gases that trap heat on earth, many of our favourite tropical coral reefs will be killed off during the next two El Niños over the next 15 years. While we are pleased to have helped push a coral reef agenda at the COP21 climate change negotiations, let's not wait for governments to solve this. Let's all work hard to reduce our carbon footprints and save our reefs.

We would like to thank all of our supporters for contributing to Reef Check successes in 2016.

## TROPICAL PROGRAM HIGHLIGHTS

- Reef Check is the only standardised method used to track the health of coral reefs at a global scale. Our teams tracked the Global Bleaching Event and damage due to

hurricanes based on over 500 reef surveys.

- Certified 529 new EcoDivers and 32 new EcoDiver Trainers.
- Distributed emergency relief supplies to residents of the devastated southwest peninsula of Haiti in the wake of Hurricane Matthew.
- Co-organized a special Town Hall Meeting on the 3<sup>rd</sup> Global Coral Reef Bleaching Event at the 13<sup>th</sup> International Coral Reef Symposium, and co-chaired the scientific sessions on bleaching.
- EcoExpeditions to Oman, the Maldives, Malaysia, and Indonesia.
- Training Workshops held around the world including the launch of Reef Check in São Tomé and Príncipe (in the top 20 smallest countries) and the re-launch of Reef Check in Grenada, Taiwan, China and Iran.
- Co-organized a training program for new ocean conservation leaders in China at Beijing University.

## CALIFORNIA PROGRAM SUCCESSES

- Launched red abalone monitoring program with abalone divers in northern California.
- Designed intertidal monitoring program with Sherwood Valley Band of Pomo Native Americans.
- Launched the Student Ocean Scientist (SOS) STEM program for 500 Los Angeles middle school students with Alta Sea and Los Angeles Maritime Institute tall ships.
- Trained and certified over 250 volunteer

citizen scientists for California.

- Expanded Marine Protected Area (MPA) monitoring network joined state-funded long-term MPA monitoring program.
- Trained fishing collaborative in monitoring its MPAs in La Bocana, Baja California, Mexico.
- Completed MPA baseline monitoring in northern California.

## REEF CHECK GOALS FOR 2017

- Launch new climate-change monitoring program by equipping monitoring sites in California and globally with sensors to monitor physical and chemical indicators, especially temperature.
- Use our fish data to help manage low-data fish stocks.
- Expand our community, school and student outreach programs.
- Hold regional meetings to better collaborate in each region.
- Grow MPA monitoring network in northern California.
- Integrate kelp forest monitoring across the California-Mexico border.

Now more than ever, we all need to do what we can to continue Reef Check's global efforts to monitor, conserve, and educate. Your generous contributions make all that we do possible. Please consider ending 2016 on a positive, proactive note and make your tax-deductible contribution at:

[www.reefcheck.org/make-a-donation](http://www.reefcheck.org/make-a-donation).



# FIRST REEF CHECK TRAINING CONDUCTED ON PRÍNCIPE ISLAND

BY **REEF CHECK ECODIVER COURSE DIRECTOR RITA BENTO & REEF CHECK ECODIVER AN BOLLEN**

PHOTOS BY **RITA BENTO & FUNDAÇÃO PRÍNCIPE TRUST**



Reef Check just conducted its first-ever training on the beautiful island of Príncipe, on the western equatorial coast of Africa. São Tomé and Príncipe is a small country, in the Gulf of Guinea, composed of two main islands: São Tomé, where the capital is located, and Príncipe, where the Reef Check training was conducted. Príncipe Island is a hidden treasure, with dense green virgin forests broken by dark imposing mountains and surrounded by intense blue waters. It is impossible to feel like anything more than a mere visitor to these purely natural 142 square kilometres, and as good guests we have to respect mother nature's local rules.

With this in mind and with the aim to both conserve local biodiversity and support local livelihoods, the Fundação Príncipe Trust (FPT) was created over a year ago. This non-profit organization works on both marine and terrestrial conservation, agro-ecology, and sustainable forestry practices, as well as education and small-scale community development projects. In addition, the FPT

also works in close collaboration with the Biosphere Management Unit to protect both the natural and cultural heritage of the island. The entire island of Príncipe was nominated as a UNESCO Biosphere in 2012. As for marine conservation, the Trust focuses on sea turtle conservation, working closely with community fishermen on promoting sustainable artisanal fishing practices, while also mapping the marine and coastal habitats and documenting their biodiversity. Raising awareness through environmental education campaigns is another aspect of their work, crucial to long-term changes in mentalities and bad practices.

As the marine world is not yet very well known, the Trust decided to use Reef Check surveys to obtain insight into the biodiversity of Príncipe's reefs, assess human impacts, and monitor both metrics across seasons, years and sites. This will then enable us to better target marine conservation actions.

From November 28 to December 3, eight people from FPT, including six marine guards,

received Reef Check training in Portuguese by our long term United Arab Emirates trainer from Portugal, Rita Bento. For the first time these local staff, fishermen and freedivers were taught how to identify and distinguish the different organisms that they are accustomed to routinely seeing. Although already very familiar with all the different fish species, being able to look carefully at and identify each substrate and invertebrate, and to understand their roles in the marine environment, opened the trainees' eyes to a different magical world. It was gratifying to see their eyes shining when they could describe each organism. Their passion for the protection of the marine environment grew even stronger, and their commitment to the project will guarantee the continuous collection of important local and regional data.

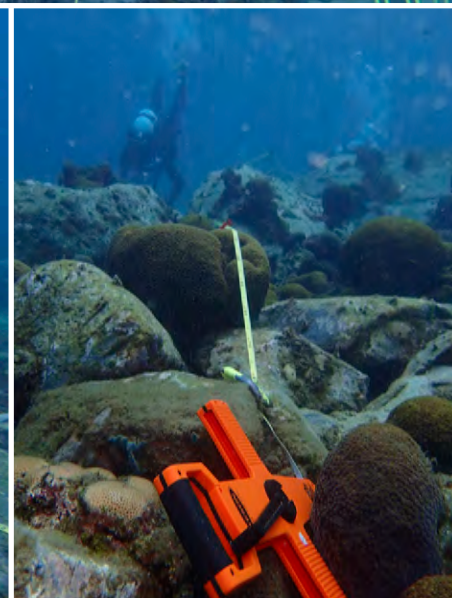
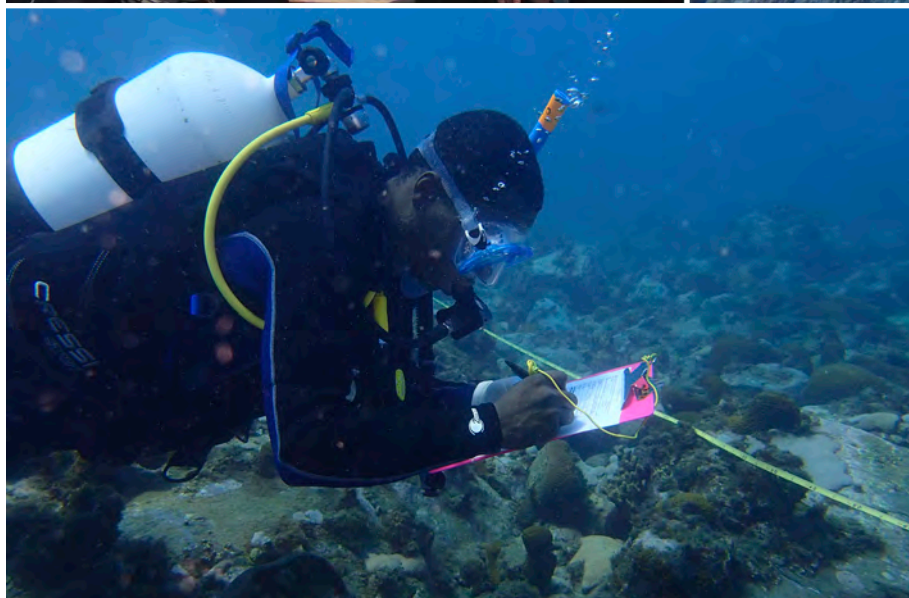
The underwater world of Príncipe Island is still mostly pristine. The coast around the island is characterized by rocky patchy reefs and the hard corals *Montastraea* and *Tubastrea*, surrounded by mats of zoanthids and many



# REEF CHECK

coralline algae. Uniquely characteristic to some of the sites are the vast beds of coralline red algae called rhodoliths, providing habitat for numerous associated species, such as different algae, invertebrates and burrowing fish, as well as providing important nursery grounds for diverse species. Different schools of fish joined in our dives, and parrotfish and grouper were a constant presence, although the latter were mostly smaller than 30cm. There are some indirect signs of overfishing of demersal fish, as large fish species are either rare or very timid due to lots of spearfishing on several reefs. Although almost no bleaching or diseases were visible during the training, some direct human impacts could be seen, such as anchor damage and abandoned fish gear. Other concerns are the periodic harvest of sea cucumbers by São Tomé fishermen for international trade and the historical use of dynamite fishing, which has left its mark on several sites.

The reefs of Príncipe Island are home for most of the important food fish and shellfish for all local families, with local fish consumption per capita being one of the highest in the world. On such a small island, it is mandatory that these reefs are kept pristine, and that local fishermen are informed about best sustainable artisanal fishing practices. Reef Check together with FPT is working on achieving that. Seja lovadu Príncipe! (bless you Príncipe).







## 2017 BIOSPHERE EXPEDITIONS TRIP DATES ANNOUNCED

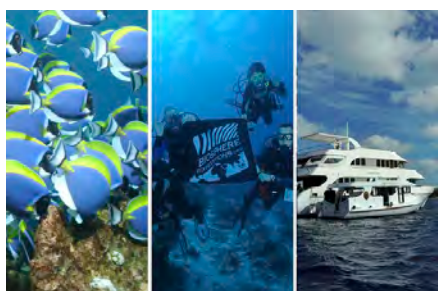
BY **BIOSPHERE EXPEDITIONS**

2017 dates for Reef Check/Biosphere Expeditions EcoExpeditions are now available. This year, a second week has been added to the Maldives trip exclusively for divers certified as Reef Check EcoDivers for the Indo-Pacific. Sign up today! For more information on these and all the EcoExpeditions Reef Check offers, please visit <http://reefcheck.org/eco-expeditions>

**ECOEXPEDITION: MALDIVES**  
July 15-21 and July 22-29, 2017

**ECOEXPEDITION: MALAYSIA**  
August 15-22, 2017

**ECOEXPEDITION: MUSANDAM, OMAN**  
September 24-30, 2017



This marine volunteering expedition with SCUBA diving will take you to the beautiful 26 coral atolls that make up the Republic of Maldives. Based on a very luxurious and modern liveaboard yacht, you will help marine biologists study and protect the Maldives' spectacular coral reefs and resident whale shark population. All this because the Maldives government identified a need for further research and monitoring work as far back as 1997. Biosphere Expeditions is addressing this need with your help and will train you as a Reef Check EcoDiver. With this qualification you will then gather important reef and whale shark data. The July 15-21 group is open to all divers and Reef Check training is included as part of the expedition. The July 22-29 group is only open to certified Reef Check EcoDivers for the Indo-Pacific.

For more information about the Maldives EcoExpedition and how to sign up, please visit:  
[www.biosphere-expeditions.org/maldives](http://www.biosphere-expeditions.org/maldives)



This SCUBA diving expedition will take you to Tioman, the Malaysian island named by Time Magazine as one of the world's most beautiful. Working with a small group of fellow divers and volunteers in Malaysia, and based on a very comfortable and modern liveaboard yacht, you will assist the local researcher to study and protect the local Marine Park's beautiful but fragile coral reefs. The expedition includes training as a Reef Check EcoDiver; with this qualification you are eligible to apply for the PADI or NAUI Reef Check Speciality Course certification after the expedition. Please note that you need to be a fully qualified diver to take part in this expedition (minimum PADI Open Water or equivalent). A typical day will be taken up by diving, resting and entering data you have collected from conducting two to four dives per day, and in the evenings, relax.

For more information about the Malaysia EcoExpedition and how to sign up, please visit:  
[www.biosphere-expeditions.org/malaysia](http://www.biosphere-expeditions.org/malaysia)



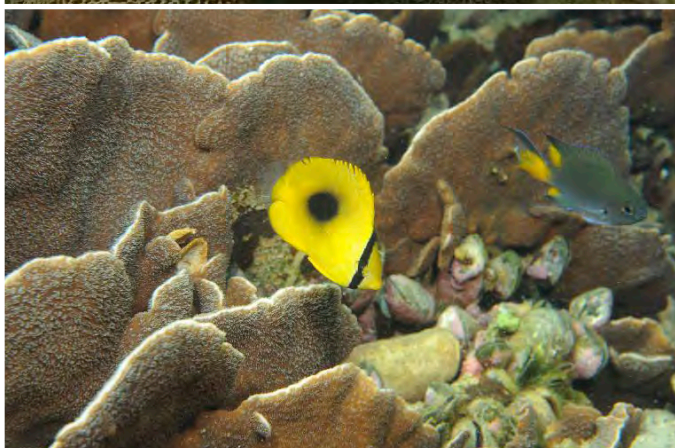
This SCUBA diving citizen science expedition will take you to the United Arab Emirates and from there to the remote and mountainous Musandam peninsula of Oman. You will study the diverse coral reefs fringing the areas where the spectacular mountains plunge into the Arabian Gulf and the Gulf of Oman. These reefs boast a rich mixture of beautiful corals and a multitude of fish and other animals. This pioneering study to map this unique underwater environment has already led to the creation of two protected areas. But more data on the biological status of the reefs and of population levels of key indicator species are needed for educational purposes and to be able to put forward further ideas for more and larger marine protection areas. Data will also be used to make informed management and conservation decisions within the area. The expedition includes training as a Reef Check EcoDiver.

For more information about the Oman EcoExpedition and how to sign up, please visit:  
[www.biosphere-expeditions.org/musandam](http://www.biosphere-expeditions.org/musandam)



# REEF CHECK HONG KONG CELEBRATES 20 YEARS

BY REEF CHECK HONG KONG



To mark the 20<sup>th</sup> anniversary of Hong Kong Reef Check, the Agriculture, Fisheries and Conservation Department (AFCD) announced the results of Hong Kong Reef Check 2016 and presented specially designed commemorative trophies to participating teams and scientists at a December 3 ceremony, in recognition of their efforts and contributions to the success of the program.

The first Reef Check survey was carried out by the Hong Kong Reef Check Foundation in 1997. The AFCD began collaborating with the Foundation in conducting the survey in 2000.

The number of participating volunteer divers and teams has continued to increase over the years. This year, 68 dive teams comprising more than 750 volunteer divers from different sectors of the community took part in the Reef Check surveys.

Hong Kong Reef Check 2016, a four-month exercise that started in June, covered marine areas in the eastern part of Hong Kong extending from Tung Ping Chau in the north to the Ninepin Group in the south, including a number of sites of ecological importance. Among the 33 survey sites, nine were within the Hoi Ha Wan, Yan Chau Tong and Tung Ping Chau marine parks.

The results this year showed that local corals are generally in a healthy and stable condition and exhibit a rich diversity of fauna species. Coral coverage ranged from 9.3% to 82.8% among the survey sites. Nineteen sites recorded high coral coverage (above 50%). This is above the Indo-Pacific average! Among all sites, Sharp Island North recorded the highest coral coverage of 82.8%.

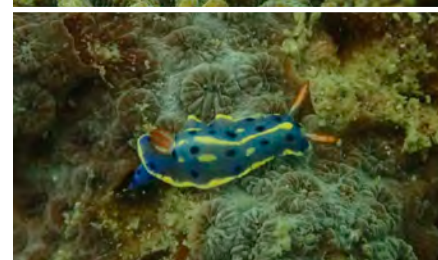
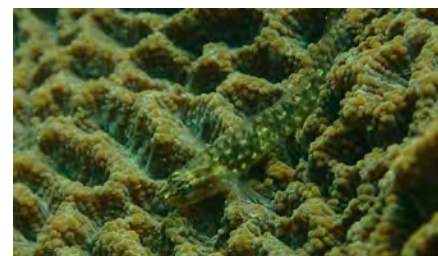
A notable decrease in coral coverage was observed at Moon Island, Hoi Ha Wan, while minor coral bleaching was noted at a few sites, but the impact was localised. "In view of the situation of the coral community at Moon Island, the department has commissioned coral experts of the University of Hong Kong to study the cause of the incident and to conduct a research study on restoration of corals," reported an AFCD spokesman.

Reef Check 2016 also assessed the condition of corals at eight sites using the Coral Watch tool. By measuring the colour intensity of the coral using a specially designed Coral Health Monitoring Chart, the health condition of corals can then be determined. The average health index of the sites was 4.11 (ranging from 3.65 to 4.67), which was similar to last year's figure (4.23). The average health index is well above the general average value (3),

indicating the corals are in a healthy and stable condition.

Most of the survey sites were found to have a high species diversity. All of the 20 assigned indicator species were recorded in the survey sites, with wrasses, groupers, butterfly fish, sea urchins, sea cucumbers and cowries commonly found.

For more information on Hong Kong Reef Check, please visit: <https://goo.gl/VEPeO3>.





# CAMPAIGN LAUNCHED TO RESCUE CORAL

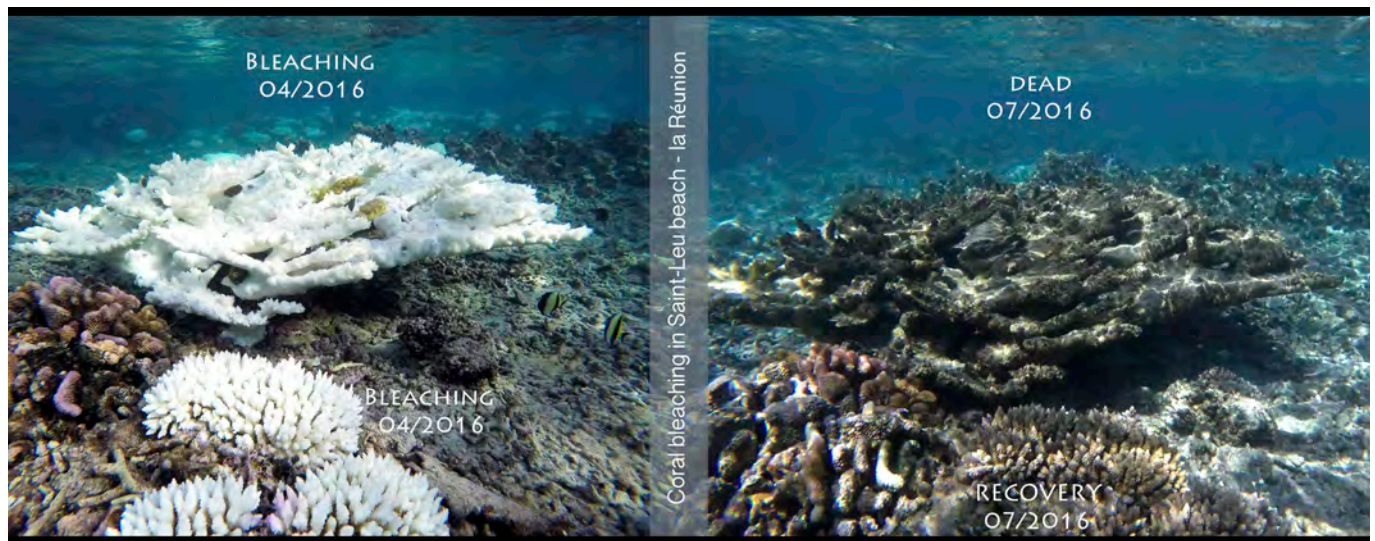


Photo by Reef Check France

As you may know, 2016 was the hottest year in recorded history, and our, and others' reef surveys have shown that about 30% of the Great Barrier Reef and perhaps 15% of the world's coral reefs were killed due to high temperatures. Aside from being beautiful to look at, attracting vast numbers of tourists, and protecting the coast from stormy waves, coral reefs are a huge storehouse of potentially life-saving genetic biodiversity. For example, the most powerful drug (Ara-C) used to fight childhood leukaemia was derived from a Caribbean sponge.

However, there is hope! Some corals are adapting faster than others, and in some areas such as the Red Sea, they survived very high temperatures - 95°F (35°C). How can we use this natural adaptation to help remaining corals survive increasing temperatures? To do this, we need to know at exactly what temperatures different species of corals in different locations are bleaching and dying. If we can locate the most resistant corals, we can use them to help reefs in other areas survive through methods such as transplantation, assisted reproduction, aquaculture, and introduction of microscopic algae that live inside corals.

We thus need super-accurate thermometers that can be placed next to the corals in key reef areas that are threatened by over-heated waters. How accurate? The thermometer on an expensive dive watch may give a reading of 70°F, yet the real temperature could be anywhere between 68° and 72° F – not accurate enough to be useful for science, and most divers don't want to leave their dive watches on the reef for weeks at a time. We need special thermometers that are accurate to at least 0.02°C and also have a recording device called a data logger, allowing them to be left on the reefs for years while hourly water temperatures are recorded. Fortunately, scientists from the University

of Miami and the US National Oceanic and Atmospheric Administration have developed a very inexpensive and yet highly accurate data logger. In partnership with them, we will provide the labour – our teams of volunteer divers are willing to place these thermometers on designated reefs, and then later retrieve them by hand, download the temperatures, and place them back.

To fund this worthwhile endeavour, we have launched a campaign on **Generosity.com**. Your donation of any amount will help us to purchase 500 data loggers at only \$10 per unit (much cheaper than commercial loggers), so that our volunteer Reef Check EcoDivers can immediately get to work and

start tracking the temperatures accurately in places where reefs are likely to bleach again. Once we know where individual corals have adapted to overheating, our teams will collect tissue samples and begin to experiment with reef-saving techniques. For most of us, coral reefs are far away. But for about 500 million people, they supply food on a daily basis. The reefs are dying and many scientists predict most coral reefs will be dead within a few decades. This will cause a loss of food for children in places like the Philippines and Haiti, where life is already a struggle. Please donate, share our campaign on your social media, and help us solve this urgent problem. As always, we greatly appreciate all of your support!

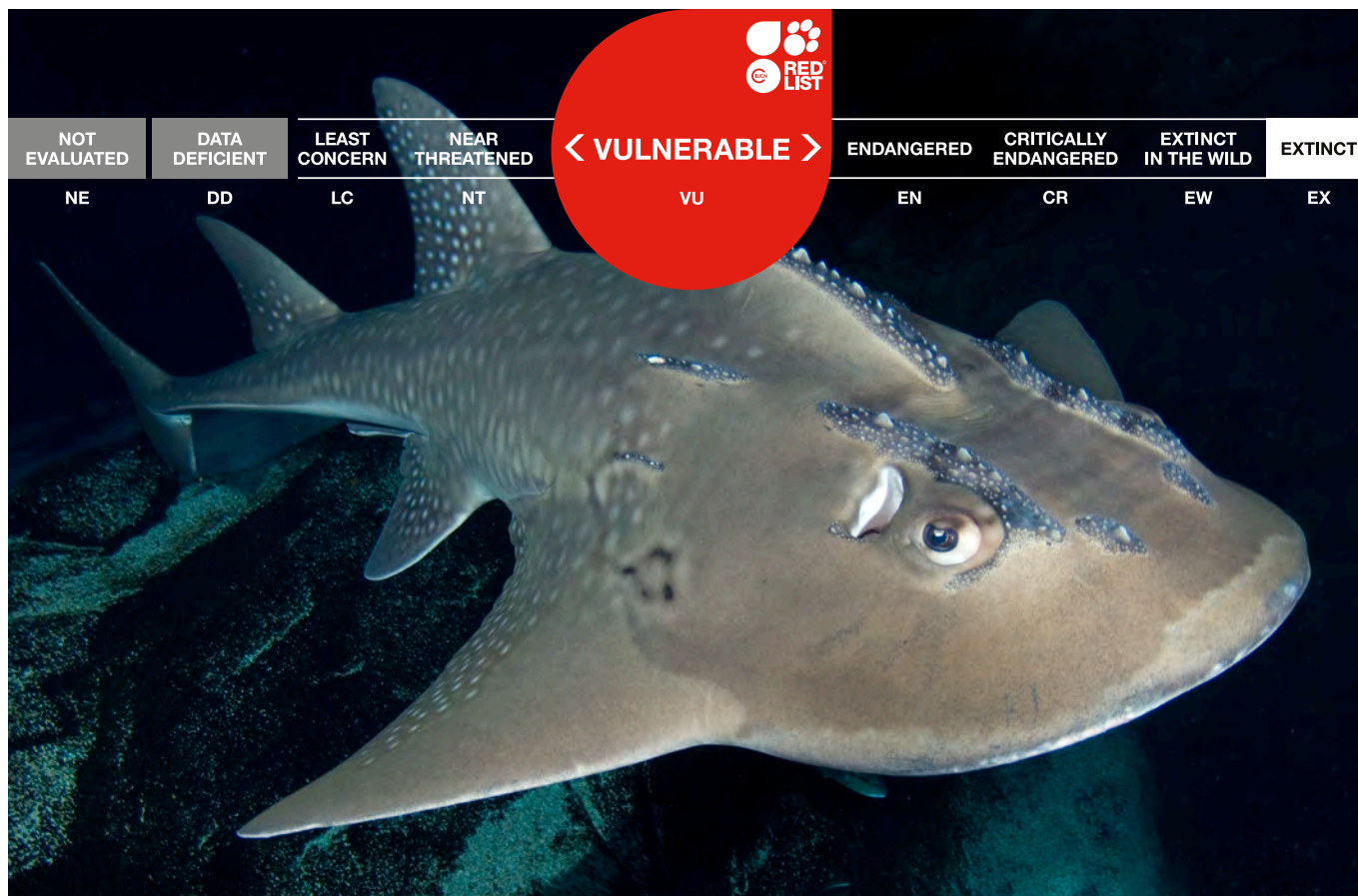




# FEATURE CREATURE

## BOWMOUTH GUITARFISH (*RHINA ANCYLOSTOMA*)

FEATURE **IUCN RED LIST 2016** PHOTOGRAPHY **ANDY MURCH** | [WWW.ELASMODIVER.COM](http://WWW.ELASMODIVER.COM)



### RED LIST CATEGORY & CRITERIA: **VULNERABLE**

**Scientific Name:** *Rhina ancylostoma*

**Common Name(s):** Bowmouth Guitarfish, Shark Ray, Mud Skate

**Taxonomic Source(s):** Last, P.R., Séret, B. and Naylor, G.J.P. 2016. A new species of guitarfish, *Rhinobatos borneensis* sp. nov. with a redefinition of the family-level classification in the order Rhinopristiformes (Chondrichthyes: Batoidea).

**Justification:** The Bowmouth Guitarfish (*Rhina ancylostoma*) is a widely distributed inshore species of the Indo-West Pacific. This species is taken by multiple artisanal and commercial fisheries throughout its range, both as a target species and as bycatch. Flesh is sold for human consumption in Asia and the fins from large animals fetch exceptionally high prices, creating a significant incentive for bycatch to be retained.

Very little is known about the biology or population status of this species, but it appears not to be common anywhere. Estimated generation length (7.5 years) is moderate but this is based on proxy data and needs to be

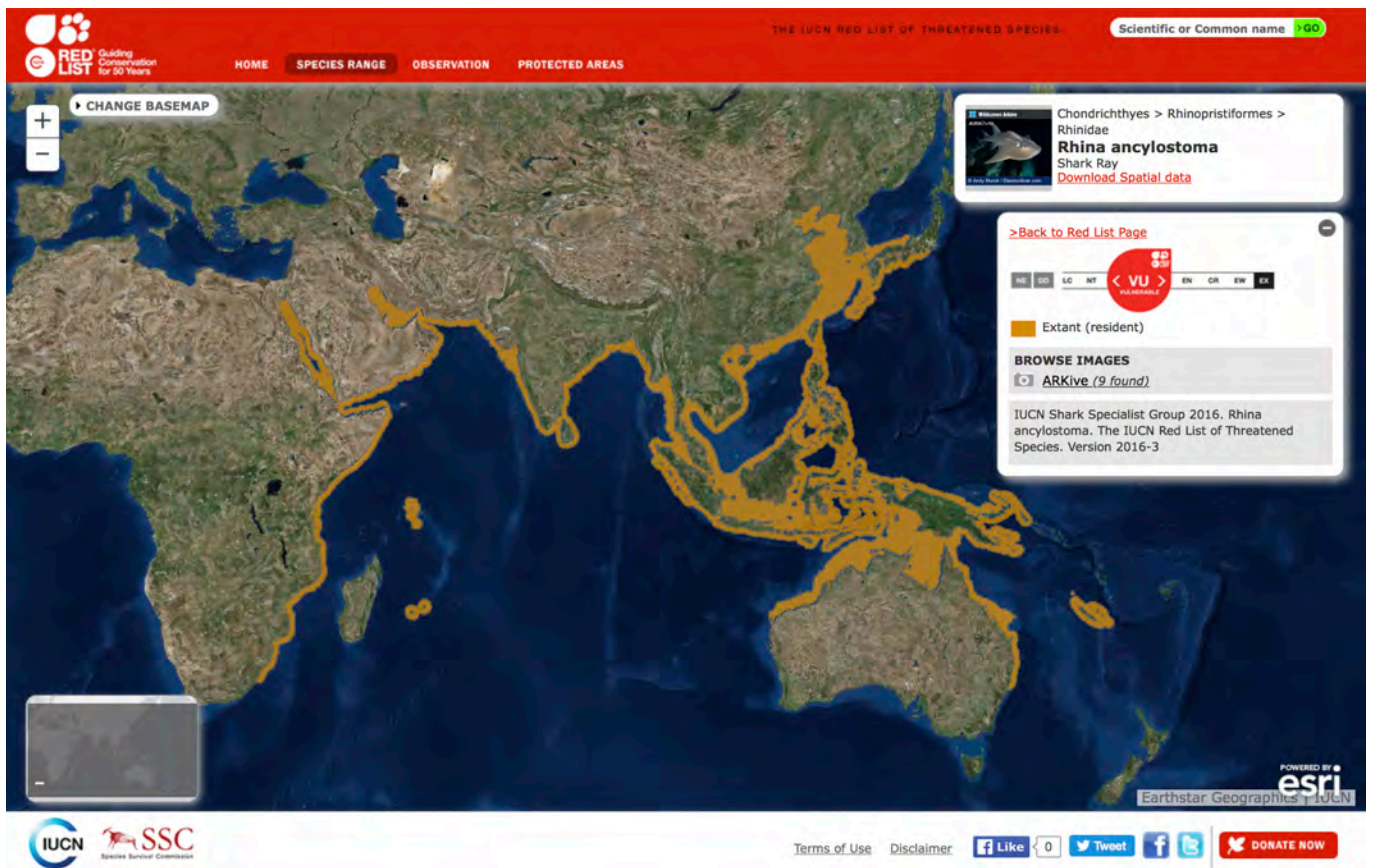
verified. Given its susceptibility to capture by multiple fishing gear types, including trawl nets, gillnets and hooks, and its high value fins, it is inferred that numbers have been locally reduced by fishing throughout its range. Local population depletion can be inferred from Indonesia where the target gillnet fishery fleet for rhinids and rhynchobatids has declined significantly, reportedly due to declining catch rates (>50% over 3 generations). It is probable that the population will continue to decline, at least, until target fisheries become uneconomical. Habitat destruction is also thought to pose a significant threat to the Bowmouth Guitarfish throughout much of its range.

Based on its shallow water habitat preferences, its susceptibility to capture, high value fins, continual fisheries pressure placed across most of its range, global declines in chondrichthyan landings of at least 20% over the past 12 years, and the fact that the Indo-West Pacific is a region with some of the most poorly managed and intensely fished waters, a population reduction of greater than 30% over three generations is inferred for the Bowmouth Guitarfish, resulting in an assessment of Vulnerable.

In Australian waters, this species is classified as Near Threatened (close to meeting VU A2c+A3c). There are no target fisheries for the Bowmouth Guitarfish in Australia but it is a known bycatch species in demersal trawl fisheries. The introduction of turtle exclusion devices (TEDs) in Australian trawl fisheries and the implementation of various elasmobranch-finning prohibitions has probably led to a recent reduction in captures by this sector. However, the lack of information about the species, suspected longevity and low reproductive rate, and high economic value support an assessment of Near-Threatened, and the situation should be monitored due to the suspected vulnerability of this species and the high value of its fins.

**Previously published Red List assessments:** 2003 – Vulnerable (VU)

**Range Description:** The Bowmouth Guitarfish is wide-ranging in the Indo-West Pacific from East Africa (Red Sea to South Africa) to Papua New Guinea, north to Japan, across northern Australia from Shark Bay in Western Australia to Sydney in New South Wales, and east to New Caledonia (Last and Stevens 2009, Fricke et al. 2011).



**Countries occurrence:** **Native:** Australia (New South Wales, Northern Territory, Queensland, Western Australia); Bahrain; Bangladesh; China; Djibouti; Egypt; Eritrea; India; Indonesia (Java, Kalimantan); Iran, Islamic Republic of; Japan; Kenya; Korea, Democratic People's Republic of; Korea, Republic of; Kuwait; Madagascar; Malaysia; Mozambique; New Caledonia; Oman; Pakistan; Papua New Guinea; Philippines; Qatar; Saudi Arabia; Seychelles; Solomon Islands; Somalia; South Africa (KwaZulu-Natal); Sri Lanka; Sudan; Taiwan, Province of China; Tanzania; United Republic of; Thailand; United Arab Emirates; Vietnam; Yemen.

**FAO Marine Fishing Areas:** **Native:** Indian Ocean – eastern; Indian Ocean – western; Pacific – northwest; Pacific – western central; Pacific – southwest.

**Lower depth limit (metres):** 90

**Population:** Globally, shark and ray landings have declined by at least 20% since 2003, but the Indo-Pacific is amongst the regions where this decline has been more severe (Dulvy et al. 2014). Catches of sharks and rays in Southeast Asia are very high but are declining and fishers are travelling much further from port in order to increase catches (Chen 1996). Net and trawl fisheries in Indonesia (especially the Java Sea) and elsewhere are very extensive and as a result, many shark and ray species are highly exploited and stocks of most species have declined by at least an order of magnitude (Blaber et al. 2009). Batoids are heavily exploited (White and Dharmadi 2007) and datasets from as early as 1963–1972 show

the considerable decline in batoids in the Gulf of Thailand (Pauly 1979). Trawl and gill net fisheries are also moving further afield. For example, in Jakarta the gillnet fishery at Muara Baru travels to waters around Kalimantan due to the decline in local populations (W.T.White, unpubl. data).

While species-specific data on long-term declines in elasmobranchs in the Southeast Asian region are lacking, declines of the Bowmouth Guitarfish in Southeast Asia and elsewhere in the Indo-West Pacific are inferred given the widespread historical and continuing declines of demersal fisheries in this region (Stobutzki et al. 2006). Furthermore, the extensive loss and degradation of habitats such as coastal mangroves are another key threat to coastal and inshore species; Southeast Asia has seen an estimated 30% reduction in mangrove area since 1980 (FAO 2007, Polidoro et al. 2010).

**Current Population Trend:** Decreasing

**Habitat and Ecology:** The Bowmouth Guitarfish has a coastal distribution throughout its range, generally occurring close inshore and around coral reefs to about 90m (Anonymous 2003, Fricke et al. 2011). It occurs on or close to the seabed, mainly over sandy or muddy substrates. Very little is known about the life history characteristics of this species. However, it is a large species growing to at least 270cm total length (TL) and is lecithotrophic viviparous (Compagno and Last 1999).

Males mature between 150 and 175cm TL, and one pregnant female was recorded with 9

mid-term embryos ranging between 27–31cm TL (Last and Stevens 2009). A single new born individual of 51cm TL has been observed (Last et al. 2010). Further research on the biology, life history and exploitation of this species is needed.

Generation length is unknown. The Giant Shovelnose Ray (*Glaucostegus typus*) grows to a similar size and is a related species and using it as a proxy species, generation length is estimated to be 7.5 years which is moderate compared to other elasmobranchs (White 2014). However, this must be applied with caution as Bowmouth Guitarfish is in a monophyletic family with no co-generic species.

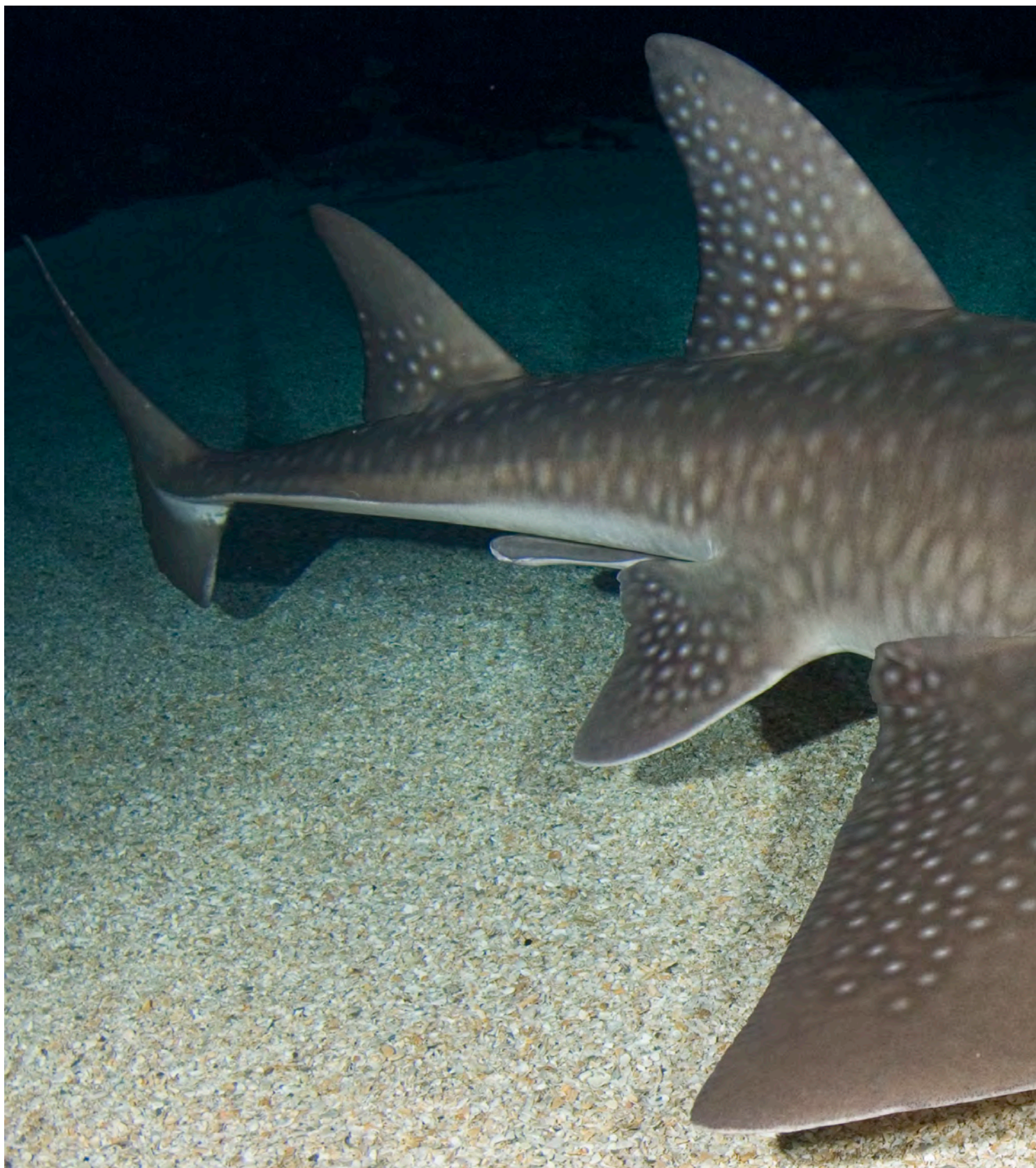
**Systems:** Marine

**Generation Length (years):** 7.5

**Use and Trade:** When caught in Asia, it is often marketed locally for fins which are very valuable. This species is landed in Madagascar and Saudi Arabia but appears to be a very minor component of the catch (Robinson and Sauer 2013, Spaet and Beruman 2015). It has also been recorded in catches in India (Theivasigamani and Subbiah 2014) although the number taken in Indian fisheries is unclear. This species is a popular display animal in commercial aquaria (Last and Stevens 2009).

**Major Threat(s):** The Bowmouth Guitarfish is one of the target species of Southeast Asian rhinid and rhynchobatid gillnet fisheries (W.T. White, pers. comm., 2003), which are generally unregulated and catches are thought to be poorly recorded (Chen 1996). The target





gillnet fishery fleet in Indonesia declined from 500 boats in 1987 to 100 boats in 1996, reportedly due to declining catch rates (Chen 1996). Flesh is sold for human consumption in Asia and the fins from large animals fetch particularly high prices. Demersal fisheries in Southeast Asia have experienced significant declines from overfishing and it is suspected that these declines will have affected this species (Stobutzki et al. 2006).

Habitat degradation is also likely to be a threat to this species, particularly in Southern and South East Asia. Habitat destruction and pollution are thought to pose a significant threat. Specifically, dynamite fishing, coral bleaching and siltation caused by deforestation may be reducing available habitat.

There are no target fisheries for this species in Australia. It is also taken as bycatch in

numerous non-target fisheries due to its vulnerability to multiple gear types, including trawl-nets, gillnets and hooks (Stobutzki et al. 2002, Stephenson and Chidlow 2003, McAuley, unpubl. data). However, with the introduction of turtle exclusion devices in northern Australian prawn trawl fisheries, it is likely to significantly reduce this species' mortality rate in trawl fishing gear (Zhou et al. 2008).





**Conservation Actions:** The introduction of turtle exclusion devices (TEDs) in trawl nets of some Australian fisheries, has significantly reduced their capture of large elasmobranchs (Brewer et al. 1998). The introduction of TEDs in northern Australian fisheries and the Great Barrier Reef is likely to significantly reduce mortality of this species in these fisheries (Zhou, et al. 2008). Large marine parks such as the Great Barrier Reef that exclude

trawling from large areas may further reduce mortality, however the effects of marine parks are uncertain as the species' movement and habitat use patterns are unknown.

**Citation:** McAuley, R.B., Compagno, L.J.V. & Chin, A. 2016. *Rhina ancylostoma*. The IUCN Red List of Threatened Species 2016.

[www.iucnredlist.org](http://www.iucnredlist.org)





# DIVING WITH ANGEL SHARKS

FEATURE **FERNANDO REIS** PHOTOGRAPHY **PEDRO SARMIENTO**

With the decline of more than 80% of the original population of angel sharks in a little more than 30 years – during which both its abundance and its range decreased – in 2006 this species was declared Critically Endangered by the International Union For the Conservation of Nature (IUCN).









We all know that sharks are very special animals. At present, there are more than 500 different species of this group of fish scientifically identified, but there is still very little known about them. The image of sharks as dangerous and threatening monsters that often reaches public opinion, is mainly based on the myths of fear of the unknown, which most commercial thrillers like to exploit in many dramatic ways.

According to various studies from several international organizations dedicated to environmental conservation, it is estimated that about one-third of all the shark species are considered Vulnerable, Threatened or at risk of Extinction. And within all the marine fish species, the family – *Squatinaidae* – of angel sharks is one of the most Threatened.

In this space dedicated to information for scuba divers concerned with sustainability of the marine environment, I would like to call your attention to some of the truer aspects of this rare angel shark (*Squatina squatina*), which is still observed in the Atlantic waters of the Canary archipelago.

Indeed, it is still possible to see this angelfish in the Canary Islands, but we are facing the most Endangered shark species worldwide, according to the IUCN Species Survival Commission For the Conservation of Nature and the Zoological Society of London (ZSL). Four and half years ago, in December 2012, this Society published a report with the 100 most threatened species of extinction on our planet and the angel shark (*S. squatina*) was the only shark species on this critical short list that included plants, fungi and animals in imminent danger of extinction, and where only eleven fish species were included.

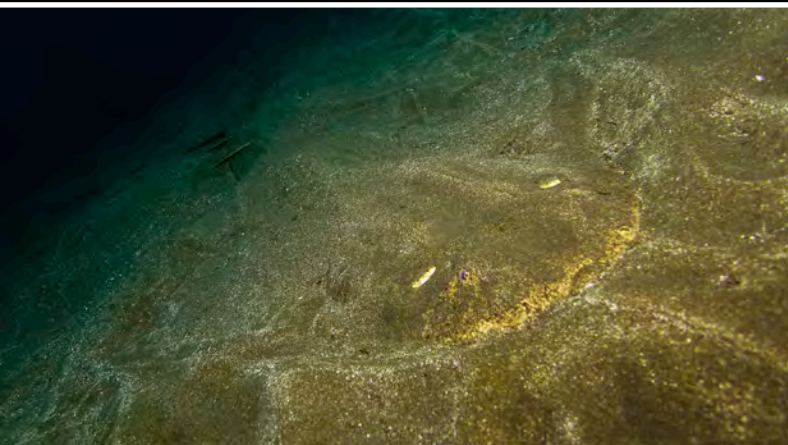
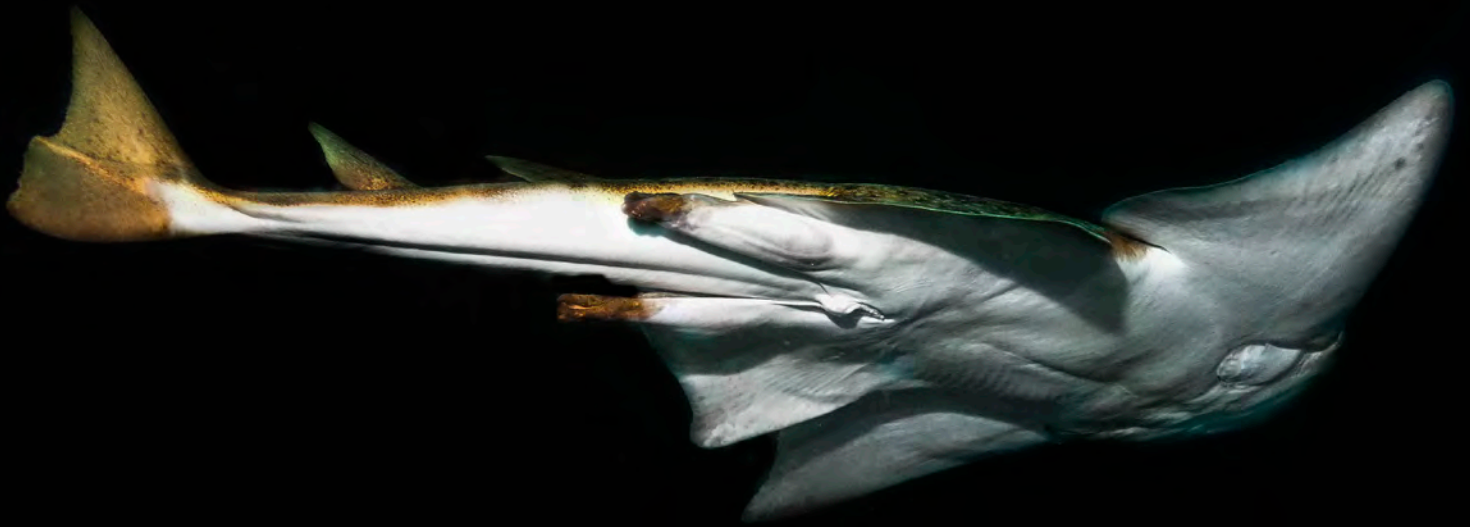
Let's see if we can understand a little more with regards to the reasons behind this critical classification through the knowledge we have today about the angel shark. It is a benthic shark which lives on the bottom of the sea and normally close to the shore and continental shelf (5-150m). It has a flattened body perfectly suited for camouflage on the sandy bottoms, and endowed with broad pectoral and pelvic fins in the shape of wings, used mainly to slip unnoticed within the aquatic environment.

It has two small dorsal fins without spines, posterior to the pelvic fins and has no anal fin. Unlike many other shark species, the caudal fin of the angelfish has a slightly larger lower lobe compared to the upper lobe.

The pigmentation of angel sharks (*S. squatina*) is characterized on its back by colours that can vary from grey to reddish or greenish brown and greyish brown, presenting small points of dispersed black colour: Its ventral side is all white.

More than twenty-five to thirty years ago, its habitat stretched from the coasts of Norway, the North Sea, along the British Isles, around the Iberian peninsula, and the coasts of the Mediterranean and Black Sea, around the Canary Islands and down the western coast of Africa, practically reaching Mauritania. Unfortunately, due to more intensive trawling practices, this species has suffered a great pressure in recent years from the fishing industries, from which it can only timidly recover. By chance, due to a timely regional prohibition of this less selective fishing act, the





Spanish Canary Islands in the Atlantic Ocean now offer an opportunity for all divers who wish to discover the world's rarest shark.

With the decline of more than 80% of the original population of angel sharks in a little more than 30 years – during which both its abundance and its range decreased – in 2006 this species was declared Critically Endangered by the International Union For the Conservation of Nature (IUCN) (Hammond and Ellis, 2002; Cavanagh and Gibson, 2007) and it is inferred that almost all of the remaining populations are found around the Canary Islands. In addition, the "Convention for the Protection of the Marine Environment of the Northeast Atlantic", also known as "OSPAR commission", also considered this species to be "Critically Endangered" since 2008 and they have also been included in the "List of species and/or species Threatened habitats of OSPAR". In addition, the angel shark (*S. Squatina*) is included in Annex III of the Berne Convention on the Conservation of Wildlife and Natural Environment in Europe (OJ 746, 1998). Finally, it is also included in Annex II of

the Barcelona Convention, which includes the recommendation (Recommendation GFCM / 36/2012/1) indicating that this species can not be retained onboard, transhipped, landed, transported, stored, sold or put on sale, and if captured should be released unharmed and alive, as far as possible.

Nowadays it seems easy enough to find varied information on the internet about this rare shark, but to save you the time we have broken down some of the essentials of the biology of this beautiful animal. Although there is still much to be discovered about this species, the angel shark is an ovoviviparous shark (the young feed on their yolk-sac inside the maternal uterus), which reproduces in cycles of up to 2-3 years after an internal gestation period of 8-10 months. The females reach sexual maturity after 100 or 110cm in length and can have between 6 and 25 pups per litter, giving birth to small sharks between 18 and 26cm in length. Females can reach adulthood at 160cm in length, males about 10 or 20cm less, although there are records of individuals reaching more than 2.40m in length, whereas

on dives it is not frequent to see specimens more than 150 to 160cm.

As I said before, we still need to find out a lot more about these critically endangered animals in general and about the angel shark *S. squatina* in particular. For example, there is not much certainty about their maximum life span. What we know scientifically is that there is a different angel shark species in the Pacific Ocean (*Squatina californica*) that is estimated to live up to 30 or 35 years. So, as this North Eastern Atlantic angel shark (*Squatina squatina*) can reach lengths greater than its cousin of the Pacific Ocean, we may imagine hopefully, that it could live a little longer than its cousin. At this point almost everything is speculation and until now, there is no scientific evidence that it is so.

Anyway, there are some details that we have been discovering concerning this rare kind of shark. One of those details is its ability to fully adapt to its method of ambush hunting. We know today that the angel shark camouflages itself on the sandy bottom basically for two



# FEATURES







reasons: first, because it is an opportunist and buries itself under the sand where it lies in wait for its prey to pass by in front of its very wide mouth in which it can project itself up to about 30 or 40cm high, swallowing its victims. The second reason is mainly associated with protection and safety since it stays in this same position camouflaged to hide from its predators and to rest or digest a greater prey that may require a longer digestive period. So perfect is its hiding place, that on one occasion we were able to observe one of these animals buried under the sand, in the same place, without moving a centimetre, for a whole 21 days.

This sweet angel shark has shed some of its little secrets. We have learned that it is a perfect predator of ambush with hunting habits more nocturnal than diurnal, being particularly active in the change of luminosity, that is to say, mainly at dusk and dawn. In addition, ambushed hunting episodes have been observed and recorded during the day.

But during night dives, we were also able to discover that this smart shark uses another technique, we call prospecting. However, this hunting technique is much faster and equally difficult to observe. It is an activity based on swimming along the bottom by touching with the tip of one and alternately another pectoral fin on the surface of the sand, where sometimes some smaller fish are hidden. This very light brushing of the fin on the sand makes the most unsuspecting fish jump right in front of his mouth, making it easier for our smart angel shark to ingest its dinner while perfectly swimming.

To be able to immerse yourself in the waters of the Canary Islands and discover the charms of these wonderful sharks is a rare privilege that everyone defending the marine environment should have the chance to try one day. The angel shark (*S. squatina*) is probably one of the most important treasures of our animal kingdom today in the Atlantic Ocean.

Fernando Reis is a Shark Advocate, the executive director of the Sharks Educational Institute, a member of the Canary Islands Shark Alliance, and a board member of the Sharks Atlantic Platform.

This article reflects the author's point of view as a shark diver with a special dedication to the study and conservation of the living shark species in their natural environment. Thus, it is based on the author's studies and diving experiences with these angel shark species, the *Squatina squatina*, in the Spanish Atlantic waters, as well as the knowledge of the importance of the species within its ecosystem, its habits, customs, and curiosities.

For more information about angel sharks and sustainable shark diving, please email: [sharksinstitute@gmail.com](mailto:sharksinstitute@gmail.com) or visit the Sharks Educational Institute at: [www.sharkseducational.simplesite.com](http://www.sharkseducational.simplesite.com)



# WHAT'S LURKING BENEATH THE GREAT BARRIER REEF

FEATURE **NATALIE BANKS**



**L-R:** Great Barrier Reef by Kyle Taylor; Black Tip Reef Shark by Daniel Kwok and a dead cownose ray caught in a shark net at Scottburgh beach on the KwaZulu Natal South Coast in South Africa in 2012 with snorkeler Olivia Symcox in the background by Allen Walker.

As avid Australian scuba divers, my husband and I always end up in discussions about the best places to dive in our home country. Without a doubt, the Great Barrier Reef in Queensland, a World Heritage Area, will always come up in our discussions as one of the most popular "wish list" destinations for fellow scuba divers, both throughout Australia and internationally. I have to admit, throughout the past 10 years, diving the Great Barrier Reef has not been on my wish list, instead I have been to the Red Sea twice, Cyprus, the Maldives, Neptune Islands in South Australia (three times), Byron Bay, to Micronesia and of course, dived multiple times in my home state of Western Australia at Rottnest Island as well as what I believe is the Great Barrier Reef's biggest and secretive rival; the Ningaloo Reef.

It has sadly become global news that the Great Barrier Reef, the world's largest reef, is dying at unprecedented levels. Corals in the remote far north of the reef have had up to 50% mortality rates with the finger being pointed at rising temperatures in the ocean, farming run-offs, development, and the crown-of-thorns starfish. But there is something that very few people are talking about that also has played a role in the destruction of the reef; a popular diving and tourist destination that contributes more than \$3 billion annually to Australia's economy, and it is the shark attack mitigation measures put in place to protect the tourism dollar.

Within the Great Barrier Reef Marine Park, there are around 190 baited hooks called drum lines and three shark nets installed in an attempt to catch and kill sharks and reduce unwanted shark encounters. These measures were introduced in 1962 even though there had only been one recorded shark incident within the Marine Park, back in August 1949. The majority (93%) of drum lines within the Great Barrier Reef are situated at locations where no shark encounters have ever occurred.

Despite this, hundreds of marine animals, mainly those loved by tourists, but considered by-catch, are entrapped within these shark control measures within the Great Barrier Reef every year.

At least twenty-eight different shark species have been caught and killed within the Great Barrier Reef – the majority of which are non-dangerous to humans and have never caused a fatality such as the near-threatened black tip reef shark, killed by their thousands, despite being known to assist in keeping coral reefs healthy, and therefore keeping the iconic Great Barrier Reef healthy. This goes completely against the reef management plan of the Great Barrier Reef.

A recent study by Queensland's James Cook University's Australian Research Council Center of Excellence for Coral Reef Studies led by Dr Ashley Frisch stated that, "Coral reef ecosystems are very complex. The more we

look, the more we realise that each and every species plays an important role. Sharks are no exception. They help to keep coral reefs healthy and should be managed wisely."

Yet, the Queensland Government has killed tens of thousands of sharks (59,427 between 1962-2016 to be exact) through the use of shark nets and drum lines within the state. Since 1962, the average sharks killed per year is approximately 1,100. And it's not just sharks that are being killed. Tens of thousands of rays have also been mistakenly trapped, along with thousands of turtles, dolphins and fin fish, as well as hundreds of dugongs and whales. From 1962 to 2016 over 86,000 marine animals had been caught within shark nets and drum lines within Queensland, of which nearly 27,000 animals were non-shark species.

There are major conservation concerns for several marine species caught. Many of them are listed as Threatened (Critically Endangered, Endangered or Vulnerable) by the International Union for Conservation of Nature and Natural Resources in 2015 IUCN Red List of Threatened Species. "For example the grey nurse shark (*Carcharias Taurus*), spartooth shark (*Glyphis glyphis*) and all four species of sawfish occurring in the Great Barrier Region are listed as Critically Endangered."

In fact, of the sharks caught within the Queensland Shark Control Program, 97% are considered to be at conservation risk. According



to the IUCN, four species representing 5.2% of the catch are "Endangered"; nine species (9.6% of the catch) are "Vulnerable"; and 15 species (80.6%) are classed as "Near Threatened". Only six species (1%) are considered to be of "Least Concern", while one species (2%) is considered "Data Deficient".

At least 30 species of shark and rays in the Great Barrier Reef are known to be at risk to climate change and 11 species are assessed as being at high risk to the Queensland East Coast Otter Trawl Fisheries. These species are particularly vulnerable as they tend to exhibit the life-history traits of slow growth rate, low reproduction rate, late maturing, are found in low abundance and are relatively long-lived (population not adapted to early mortalities).

It could be argued that the drum line program in Queensland is successful due to the low number of shark fatalities in the Great Barrier Reef Marine Park. However, this argument ignores the important ecological roles that sharks play in our oceans as well as the extremely low encounter and risk rate of a shark bite.

Moreover, the decreases may simply reflect broader declines in shark populations, driving down encounter rates despite the increased human presence in the ocean. Or the bites may simply be random. The argument that drum lines are successful in reducing shark encounters is also negated by the fact that Hawaii, which caught and killed over 4,600 sharks, most of which were tiger sharks, between 1959 and 1976 by using drum lines without "measurable effects on the rate of shark attacks in Hawaiian waters."

Finally, there are various non-lethal techniques that can potentially achieve much better outcomes such as eco-friendly barriers used successfully in Western Australia and in Hong Kong, as well as personal electronic devices such as the Shark Shield. It is noted that the Department of Fisheries Queensland is seeking permissions to trial new technologies (e.g. sonar, radar and electromagnetic devices), apparatus locations, bait and hook types for the purposes of improving target shark catch, reducing by-catch and improving safety of beach users. Further information has been sought regarding this, however, the Queensland Government has stated that they are currently awaiting the results of a \$16 million (AUD) non-lethal trial currently taking place within its neighbouring state, New South Wales before they will remove their shark control measures.

Humans, the marine life the health of the Great Barrier Reef and Queensland's \$3 billion tourism industry could all benefit from an approach that embraces new technologies rather than ones that have produced little measurable effect in half a century, other than to kill threatened species and damage a United Nations Economic, Scientific and Cultural Organisation World Heritage site.



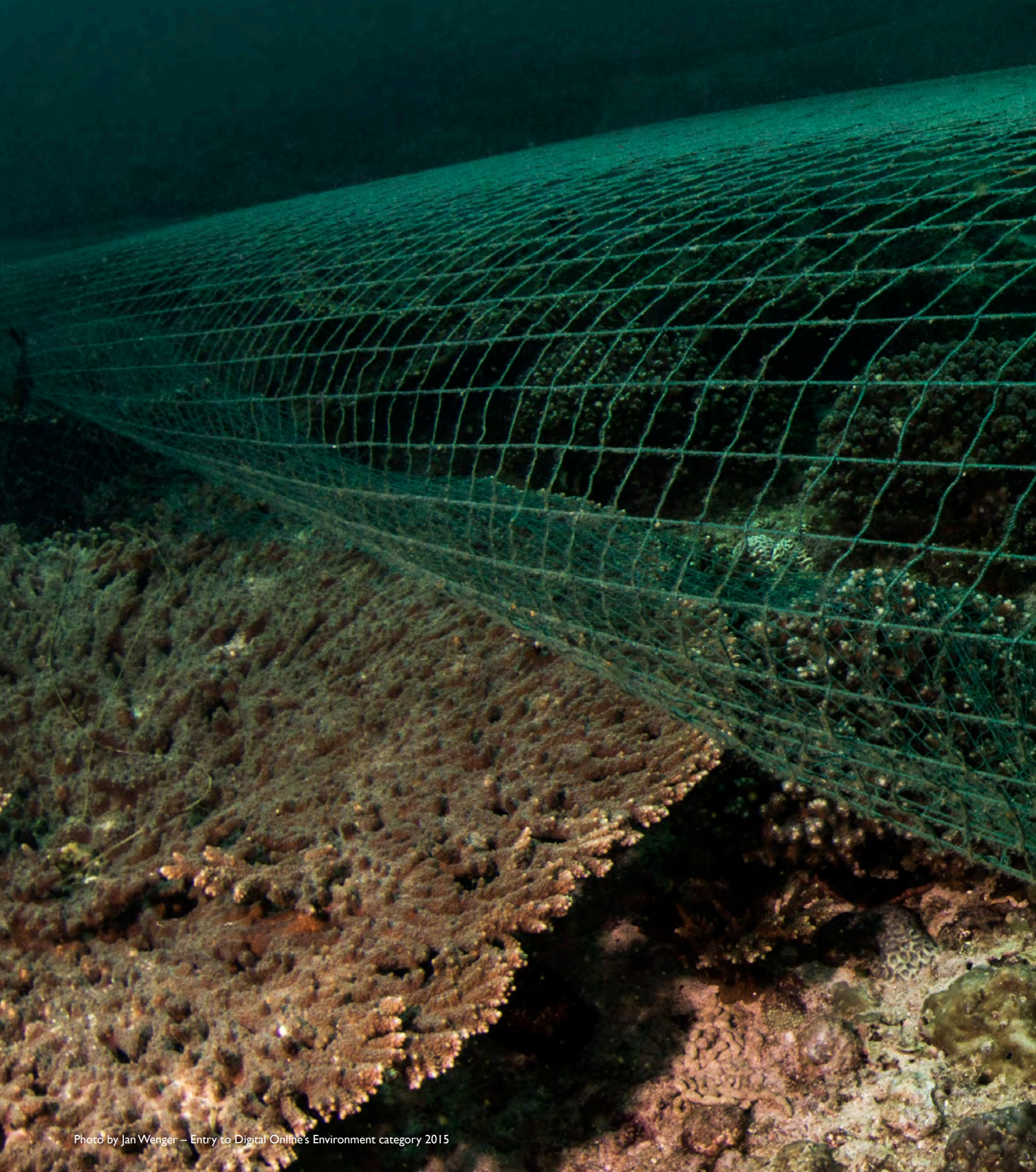
Natalie Banks was the instigator of worldwide rallies against the Western Australian shark cull and is the Founder of No Shark Cull Inc. She is also the chief adviser for Sea Shepherd's Apex Harmony Campaign and President of Sea Shepherd Dubai. She can be reached via [dubai@seashepherdglobal.org](mailto:dubai@seashepherdglobal.org).



# WHAT ON EARTH ARE WE DOING AND ARE YOU PLAYING YOUR PART?

FEATURE **PAUL WARWICK**

We are at a critical juncture in man's existence on this, our irreplaceable and unique Water World.









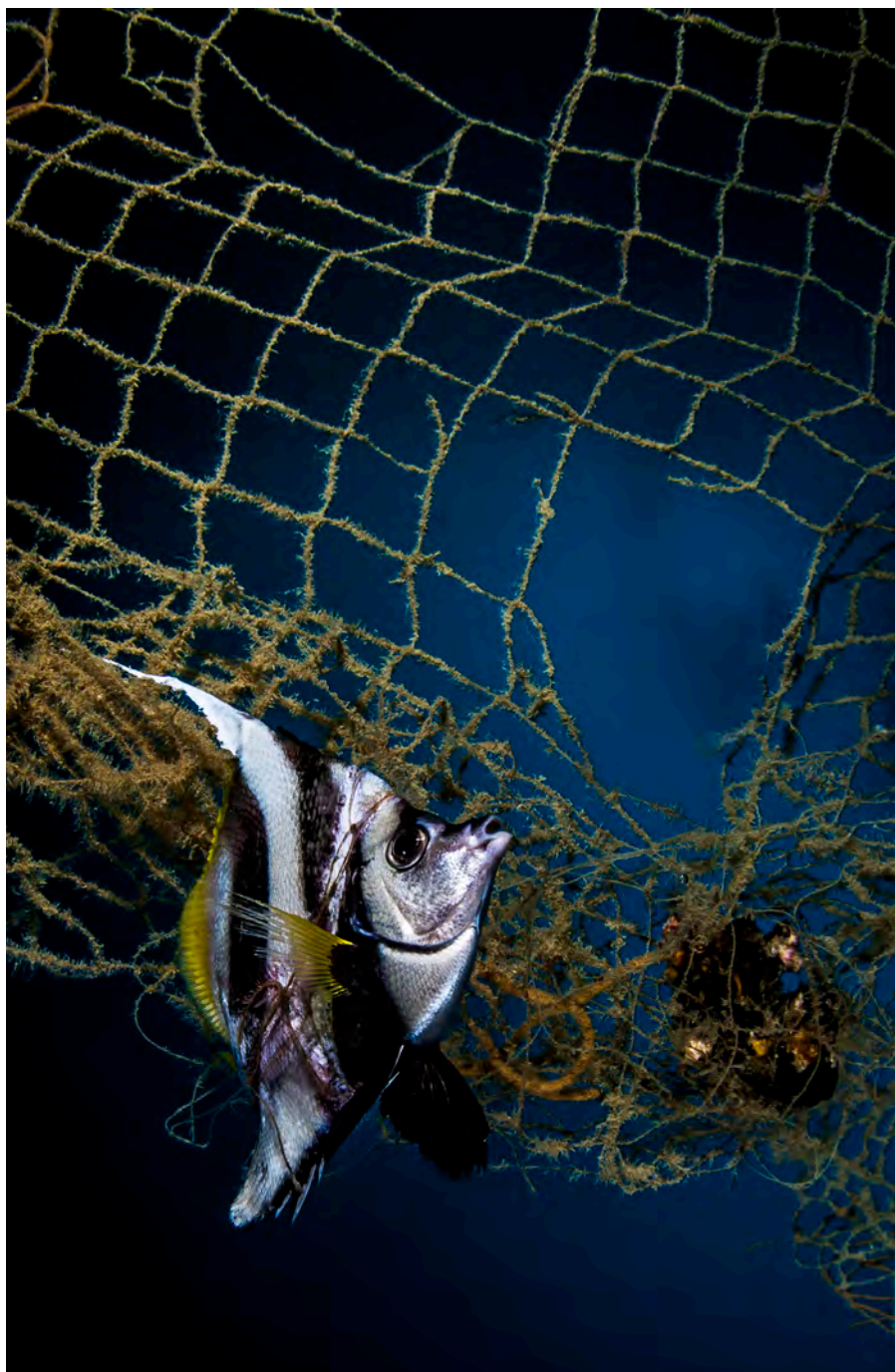


Photo by Mohamed Abdulla – Entry to Digital Online's Environment category 2015

We are at a critical juncture in man's existence on this, our irreplaceable and unique Water World. A point where decisions need to be taken and actions initiated before we are dragged headlong into a world that is thus far only portrayed in the more morose, cataclysmic or apocalyptic science fiction/fantasy movies. The time for rhetoric, brinkmanship and power brokering is over and until we realise it, we are heading uncontrollably into the "gaping abyss" (metaphorically, physically and perhaps even religiously?) where climatic change develops severe damaging weather patterns, the air we breathe becomes either polluted or lacks enough oxygen to sustain life, and the resources from our oceans and seas are depleted to the point of exhaustion. 2016 is set to be the warmest year on record – ever – and the resulting reduction in Arctic

ice coverage, the highest on record.

Glaciers are retreating at rates which are becoming exponentially faster with each passing year. These impacts are not just regional, but global as well. The impact to the local flora and fauna is self-evident and we see this in the health, welfare and behaviour of arctic species of animals and the diet on which they survive. However, this is also being exacerbated by man's increasing encroachment into this region for resources, which hitherto were inaccessible, as a result of the reduction in the size, depth and coverage of the ice fields. Globally there are arguments that the reducing ice mass may affect the "spatial stability" of our planet, reducing the "natural cosmic tilt" and so its aspect to our life giving sun. Geo-physically, could this change in mass

also affect the rotational speed of planet earth which in turn would affect seasons, daily cycles and the gravitational pull". Coming "down to earth" the melting ice is also releasing a huge amount of fresh water into our northern oceans and seas, the consequences of which are not fully understood but will undoubtedly affect global climate, weather, currents and oceanic chemistry.

The scope and diversity of science available to us (physical, biological, chemical, marine, terrestrial and sociological) is expanding new horizons all the time and is providing us all with the information we need to make life changing decisions and perhaps even generational decisions now. But it is our morality and sense of responsibility which actually makes us take those decisions, to enact and enforce them and most importantly live by them. So perhaps it is not the science about our Water World that is conflicting, but our own sense of morality that is failing us, either through ignorance, arrogance, complacency or greed. Is the current generation "living for today", gorging on excess and polluting, poisoning and stripping our oceans and seas of their resources, knowing that they will not be alive to "reap the whirlwind", nor be accountable for any legacy they leave behind? Future generations are not here to make decisions about the quality of the life they wish to lead or the natural inheritance (or lack of it) they will be left to manage. But at least, let us give them a "fighting chance" at managing a world which is still a good and healthy place to live; vibrant, colourful, full of diversity and environmentally self-sustaining.

Where do you sit on this argument about our future...perhaps "on the fence" to use the vernacular... "It doesn't really affect my day to day life", or "I have to see it to believe it", or "It is all just scaremongering"? The world is an ever changing place and evolution a natural phenomenon in which species become extinct, whilst others evolve to meet the ever changing conditions and new species develop. But we are losing both species and ecosystems at rates which are unparalleled in not just human history, but the natural history of our planet. Can this "environmental blitz" be directly attributed to man's activities, lack of respect for our environment and flora and fauna, poor management and husbandry and perhaps even a distorted sense of morality?

Some of the scientific community argues quite convincingly that we sit precariously on the precipice of a global natural catastrophe, brought about by "human induced" climate change and the systematic destruction of both terrestrial and marine habitats and ecosystems. Marine and terrestrial species are either hunted to extinction or hunted to the point where recovery is almost impossible all in the name of avarice, power and money. Just look at the current plight of the world's sharks, rays, sea turtles and other large ocean predators such



as tuna that are being systematically hunted to extinction with no control. Historically, look at our hunting of whales and other large marine mammals, which had action not been taken, could have resulted in a man-made "mass extinction event". Still in spite of us, "coming back from the brink", advocates of whale hunting use euphemisms such as "scientific research" as a cover for continuing to hunt whales for their meat and other products – "shame on you Japan!"

Others say that the global changes which we are experiencing are part of the normal geophysical cyclic nature of our ever evolving world and that the impact of man's activities is just a "drop in the ocean", to use a poorly worded pun. Perhaps they are correct, however it could be argued whilst man's activities may not be responsible in full, it is certainly contributing to the pace and extent of geophysical change. As much as Oxygen and Nitrogen are essential to all life, so is the "friend and foe" of our WaterWorld – Carbon.

### **CARBON (CARBON DIOXIDE) – ONE OF THE MANY GREENHOUSE GASES**

Carbon (Number 6 on the Periodic Table) is a naturally occurring element which can exist in gaseous, liquid and solid form, which readily "binds" with other elements/substances and is "locked" into others (such as hydrocarbons) and only released during a reaction. Our world contains an enormous amount of Carbon and scientific estimates vary depending upon what source you use, especially regarding the volume of man-made Carbon Dioxide (CO<sub>2</sub>).

**So in order to provide some degree of scale to the issue and without boring the reader with science, it is estimated that:**

- The oceans contain over 37,400 billion tons (Giga Tonnes) of suspended Carbon;
- The entire terrestrial biomass has between 2,000 - 3,000 Giga Tonnes;
- The atmosphere contains 720 Giga Tonnes of CO<sub>2</sub> at any one time;
- Human activities currently contributes only 29 Giga Tonnes of additional CO<sub>2</sub> annually (which according to estimates could rise to 50-55 Giga Tonnes by 2050 if no action is taken).

So you can see statistically, it looks like human activities only account for a small percentage of (CO<sub>2</sub>) in the world's Carbon Cycle, but that is not strictly true – it is a case of those lies, bigger lies and statistics. The oceans and seas, land and atmosphere exchange CO<sub>2</sub> on a continuous basis at an estimated rate of approximately 750 Giga Tonnes each year; both through terrestrial mass and biological processes and also through our oceans and seas. However, that is not the entire picture, there is some limited spare capacity in the annual natural Carbon Cycle, but this can only account for less than 40% of the additional man made CO<sub>2</sub> which we currently pump into the atmosphere each year from burning fossil fuels



Photos by Ian Trebinski taken in Ras Al Khaimah, UAE 2012

etc. This means we are effectively pumping an additional 17.5 Giga Tonnes of CO<sub>2</sub> into the atmosphere annually which the planet cannot recycle or clean up and yet it is planned to become even worse! As a consequence, atmospheric CO<sub>2</sub> is at its highest level for the last 15 to 20 million years. A natural change of 100ppm would normally take 5,000 to 20,000 years, however the recent increase of 100ppm has taken just 120 years and the next increase will take less than 30 years. Not only that, we are destroying and devastating the very natural systems which underpin the effectiveness of the Carbon Cycle: our terrestrial forests, green areas, coral reefs, seaweed forests, healthy oceans and seas – what are we doing?

### **BALANCE**

Everything in our natural geophysical world

is about sustaining an effective balance in order to assure the cyclic processes continue to feed our climate, weather, oxygen and carbon cycles as well as our natural world. So irrespective of the arguments or nuances of how we interpret the science, we are incrementally adding to the problem of increasing CO<sub>2</sub> levels on an annual basis. This in turn is upsetting the delicate balance of our WaterWorld, from rising global temperatures, to melting ice caps, to climatic changes and increasingly severe and destructive weather patterns, as well as reducing marine stocks of the phytoplankton which underpins the global marine food chain.

What we can all agree upon, is that man's impact upon the planet is profound and measurable. The carbon emissions from



naturally occurring events such as volcanic activity, seismic and natural geological events represents the largest contributor; however we continue to add to the global carbon burden. Despite international conventions and agreements, our approach to these issues is still piecemeal. Why set targets on the reduction of greenhouse gases whilst at the same time, custodians of our natural assets (such as rain forests, jungles, temperate forests, coral reefs healthy and vibrant oceans and seas) continue to pillage, harvest, reduce and destroy the very systems which are actually saving our planet and ultimately, us!

**Some of our major actions which are impacting our natural world globally and reducing the ability of Gaia (Mother Earth) to regenerate and restore are:**

- Reduction in terrestrial bio mass (deforestation) reduces the ability of our world to effectively process CO<sub>2</sub> and other carbon products;
- Huge reduction in extent, depth and numbers of coral reefs and sea grass beds – which process the CO<sub>2</sub> in water;
- Acidification of the oceans and seas through pollution, run offs and poor waste and water management;
- Reduction in marine and terrestrial biodiversity which supports ecosystems;
- Destruction of entire ecosystems and habitats;
- Over exploiting the natural resources of our oceans and seas including the harvesting of seaweeds, marine plants and the various phyto and photo planktons which underpin the marine food chain and the krill upon which the pesciary (fish) food chain really starts.

Remember our Water World depends upon balance. We depend upon maintaining this balance for our own existence, so why are we always at odds with nature when we should be working and living in harmony with it? The "incident pit" is a term well known by scuba divers from all agencies where something happens and instead of acting straight away, the situation develops in an exponentially downward spiral until you are trapped – that is what is and has happened to us! Picking away at the issues "piecemeal" is no solution because as we have found out at great costs, this only produces problems elsewhere in our natural world. There has to be a sustained effort to tackle all the issues on a global scale and more importantly, put in place mechanisms to enforce it.

**That said there have been some real strategic success stories for conservation and marine management. A couple of more notable examples are:**

- The Australian Government have now reviewed the number and extent of marine sanctuaries and there has been much pressure brought to bear to ensure that pure economics do not drive through

long term environmental common sense. However iconic areas such as the Coral Sea, the Kimberley, Geographe Bay, Lord Howe Island and the Great Australian Bight still remain under threat, leaving our incredible marine life unprotected and local businesses and communities still facing an uncertain future. The Coral Sea, the cradle to our Great Barrier Reef remains most at risk, even though its protection is crucial to the future of both these icons, science shows sanctuaries help reefs to recover from coral bleaching which has affected huge swathes of the Barrier Reef over the last two years as a result of "El Nino".

- As a result of the sustained efforts of Doctor Sylvia Earle and her team from the State of Hawaii, the USA has established the largest MPA in the world around the Midway Islands in the Pacific in order to protect those vital ecosystems and reef complexes which support marine procreation.
- The very recent establishment of a huge Marine Protected Area (MPA) in the eastern Antarctic around the Ross Sea will provide a safe haven for a huge number of species of marine and terrestrial animals, as well as preserving stocks in the marine food chain from plunder and pillage by industrial scale fishing. Whilst this only represents a small section of the Antarctic at large and a small step forward, much more is needed to secure the future of our arctic environments, they along with the coral reefs and sea grass beds are the cradle of life in our oceans and underpin the marine food chain.

## WHAT IS HAPPENING IN OUR REGION

The Gulf Region and the UAE is not immune to the current and potential effects which this global problem is generating, nor are they completely blameless in contributing to the problems.

## CARBON EMISSIONS

The UAE makes its contribution to the global "Carbon Bill".

- **Cars:** Despite advances in automotive technologies, the UAE continues to run large powerful cars which consume vast quantities of fossil fuels releasing CO, CO<sub>2</sub> and NO (All Greenhouse Gases) as well as other particulate pollutants into the atmosphere.
- **Power Consumption:** Per capita, power consumption in the UAE is almost 80% higher than any other country in the world and steadily growing each year. Currently these power requirements are met through the use of fossil fuel burning power plants, although this is gradually changing, this will be the norm for the foreseeable future, despite advances in cost and effectiveness of alternative technologies and an abundance of sunlight which could power solar or photovoltaic panels.
- **Water:** The global resource for the 21<sup>st</sup> Century. On the global consumption rate

monitor, the UAE consumes more than twice as much fresh water as the next nearest country. All this in a country which is a Desert Kingdom and whose flora and fauna are adapted to this environment. However this water is not sourced naturally, it has to be produced.

- **Desalination:** Desalination of sea water to produce fresh water uses an incredible amount of energy which is currently provided through the burning of fossil fuels. Huge water requirements means huge energy requirements, huge energy requirements means more burning of fossil fuels!
- **Aircraft:** The UAE collectively has the largest commercial aircraft fleet in the world and whilst almost all the aircrafts are modern, have in-built fuel regulation systems and are as fuel efficient as current technology allows, they still produce about 10-30kgs of carbon per kilometre of flying.

## NATURAL ENVIRONMENT CHANGES

As the UAE has grown and developed, so have the effects on the natural environment:

- **Coastal Development:** Most of the development within the UAE has taken place along the coastal littoral, however this has had consequences:
  - Destruction of unique habitats such as the mangroves and sea grass beds upon which the Dugongs depend;
  - Destruction of what minimal natural coral reefs there were;
  - Increased turbidity in the water affecting indigenous marine species;
  - Changes to natural currents and waterways which have affected tidal estuaries, breeding grounds, sea grass meadows, mollusc beds etc;
  - Increased salination of Gulf waters resulting from increased desalination operations and returning the residues back into the sea thus increasing salinity which affect corals, marine life and fauna which are sensitive to such changes.
- Over fishing and reducing fish stocks due to higher demand changes the balance of the overall ecosystem, resulting in invasive species and disproportionate distributions of marine animals lower on the food chain.
- Effects of uncontrolled marine recreational activities on marine life and ecosystems.
- Uncontrolled pollution, contamination and waste deliberately or accidentally entering the marine environment and adversely impacting upon ecosystems.
- We now find out that noise pollution (as in the terrestrial environment) also extends into the marine environment and our constant activities may be affecting everything from migration patterns, to intra-species communication, to breeding patterns and even the sterility of some species. The Gulf is relatively shallow and if this is the case, then the constant marine traffic transiting through the region must be affecting indigenous and migratory marine species.





Photo by Simone Caprodossi – Entry to Digital Online's Environment category 2015

## WHAT WILL UNCONTROLLED CLIMATE CHANGE MEAN FOR THE UAE?

As with many other places around the world, the Gulf Region and the UAE will not be immune to the direct effects of climate change nor the "side effects" brought about by international reactions to "geophysical events". These effects could be geophysical, social, cultural or economic or a combination of all and more.

**Physical Effects:** The primary effects of climate change will undoubtedly be geophysical:

- A great deal of the coastal areas on the western side of the country within the Gulf is just above sea level, any increase in sea levels across the globe of more than a few feet could result in widespread flooding and loss of developed as well as undeveloped land. The UAE may have to adopt the same approach as the Dutch and the USA in protecting areas of vital interest by establishing a system of dykes and levees.
- Climate change could affect the weather patterns upon which the UAE relies. Playing with the weather in order to combat changes or improve the conditions in the UAE could have even more dire consequences – not necessarily for the UAE, but for other areas within the weather's normal pattern who could be deprived of essential rains or sunshine or cool weather. Irrespective, we could see more severe storms, even hurricane strengths, higher winds and stronger seas due to an increase in daily temperature inversions.

**Social Effects:** Any climatic changes which affect either the geography or the wealth of the UAE will undoubtedly have impacts upon coastal conurbations, services and facilities (power, water and food, air and sea ports, industry and social structure, and cohesion). It will be a battle to maintain the balance between the changes in nature and the UAE

geo-economic needs.

**Cultural Effects:** The UAE's culture is based around its marine and desert traditions. Global climate changes could physically affect both of these taking away the environments and conditions that allows and supports cultural activities.

**Economic Effects:** The economic effects of climatic change will impact upon the economics of the UAE whether this is through loss of land mass due to flooding, or a weakening reliance on fossil resources:

- As the world "wakes up" to changes affecting our Water World there is the possibility of much reduced consumption of fossil fuels, meaning reduced revenues for the UAE.
- The UAE may have to invest in, promote and develop great reliance on alternative and renewable energy sources to support the country's growing needs – perhaps not just nuclear.
- The UAE may have to look at alternative revenue sources to generate the funding needed to support the nation.
- The loss of land mass and effects on the coastal cities will also effect tourism, foreign investment, mobility and security.

## UAE RESPONSE

Having said all this, the UAE is making great strides in tackling regional environmental issues as well as promoting and supporting those alternative sciences and technologies which may help us "climb out of the hole we have dug ourselves into" globally. They are also providing leadership to the rest of world environmental management, conservation and reducing the consumption of natural resources.

**Globally:** The UAE is at the forefront of the sponsorship and development of:

- Alternative energy sources;
- Energy reduction technologies;

- Water reduction technologies;
- Carbon controls;
- Alternative transportation technologies.

**Nationally:** At a national level the work is more focused, aimed at reducing the overall carbon footprint of the UAE, managing energy requirements and water requirements and the impact development whilst maintaining social mobility which is essential to the continued growth of the UAE. Some specific examples of this work are:

- Improving public transport services to reduce reliance upon individual motor vehicles.
- Developing infrastructure links with other Gulf States to reduce reliance upon trucks and road transport to support the national and regional economy.
- Establishing nuclear power as an alternative to fossil fuel power plants.
- Attempting to reduce both personal and collective power and potable water consumption.
- Designing more environmentally effective buildings which use less power to light and cool/heat.
- Reducing the acreage of grassed areas in and around public and communal facilities to realistic levels and replacing them with natural desert plants and stonework.
- Reducing reliance on imported products and developing capabilities to produce their own in everything from engineering to food production.

## SO WHERE DO WE GO FROM HERE

That really is the "\$50 million question"! National commitment to the reduction in carbon production and the slowing of climate change can only go so far and even international efforts often reach an impasse when national interests or aspirations are concerned. We either "all play the game" or we all do not, there is no middle ground where the Third World gets a "bye" on agreed limits because they are still developing. First World (G20) and Emerging Market economies should assist the Third World develop in such a way as to embrace the changes that are required to meet climate change objectives and incorporate them into their social, business and development models. Politicians play a fine balancing act between global social responsibility and economic expediency. We the people need to put pressure on Governments and Corporations to take a responsible approach to the way in which they conduct business and how that business affects the geophysical world in which we live. If you just don't care, then that is your prerogative, but most of us do and want to see real action across the entire gambit covering climate change. So where do you stand in this future battle to save our Water World, to save our children and their inheritance? Time to get "off the fence" and do something about it!

"Always Keeping the Fun in Diving"



# SEA SNAKES

FEATURE **PAUL WARWICK** PHOTOGRAPHY **SIMONE CAPRODOSSI**

Cold blooded limbless reptiles that inhabit almost every corner of our earth from the scorching deserts, to the highest mountains, to the deepest jungles, even our oceans and seas. They account for over 86% of all marine reptiles alive in our oceans and seas today.











All photos of Ringed Sea Snake (*Laticauda colubrina*) in Malapascua, Philippines by Simone Caprodossi.

Cleopatra, Queen of all of Egypt and the Lower Nile Kingdoms, ceremonially killed herself with 'one' upon learning of the untimely death of Mark Anthony. The Garden of Eden was allegedly lost forever to mankind because of 'one' and Mowgli's (Jungle Book) greatest enemy after "Shere Khan" was 'one' (Kaa) – a snake. Cold blooded limbless reptiles that inhabit almost every corner of our earth from the scorching deserts, to the highest mountains, to the deepest jungles, even our oceans and seas. They account for over 86% of all marine reptiles alive in our oceans and seas today. Other marine reptiles which include the seven species of Sea Turtles, Saltwater Crocodiles and the various species of Marine Iguanas, do not even collectively come close to the estimated numbers of Sea Snakes, but like all other marine species, they are under threat.

Slithering, sliding, jumping, swimming and even flying, snakes have evolved into one of the most successful reptiles on our planet despite being perhaps the youngest (in terms of evolution) of all of the species of reptiles. They have adapted to the full spectrum of environments our planet has to offer and to a widely varied diet using their impressive "arsenal" of weaponry, as well as a dietary tract of which even the harshest of acids and alkalis would be envious. However, to most people they instill a basic primordial fear – perhaps it is their cold lifeless eyes, the flickering tongue tasting the air (or water), the dislocating jaws consuming prey or the musculature of the flexible tapering body. Whatever the reason, they like sharks (which also incidentally have a frighteningly "gaping maw" hold a very special place in all but a few people's darkest psyche.

There are over 3,000 varieties of snakes and serpents in the world, almost all of which are purely terrestrial. However, there are some semi-aquatic species of snakes, such as the Anacondas of South America, some Pythons across Africa and Asia and the North American Water Moccasins (or Cottonmouths) etc, but only approximately 60 species of snakes are truly classified as Sea Snakes. Sea Snakes generally are closely related to Cobras, even though they are aquatic rather than land dwelling snakes. True Sea Snakes only live in water and have adapted to a life in water both physiologically and practically. Their physical shape has altered to make them more hydrodynamic having smaller flattened heads that minimise water resistance when they swim. Their bodies are also compressed as an adaptation for swimming and Sea Snakes are so thoroughly aquatic that when they are proverbially "out of water", they are either really clumsy or extremely slow, but nevertheless just as dangerous.

## EVOLUTIONARY HISTORY

Snakes are the most recently evolved group of reptiles. They evolved from lizards, probably around 135 million years ago. These first snakes probably started life in our primal oceans and seas and then migrated to the land in much the same way as the great lizards, mammals and other animals. However the Sea Snakes that we see today have evolved much more recently. Indeed, the snakes inhabiting our modern oceans have arisen as the result of invasions into the marine environment by five different groups of Terrestrial Snakes, giving rise to five evolutionary distinct families of marine snakes.

## THE FAMILY CLASSIFICATIONS

Whatever the evolutionary path that all snakes (terrestrial, aquatic and marine) as a species took, they now fall into one of five classifications:

**Elapidae – Elapid Snakes:** These snakes are generally found in the Indo-Pacific Region and have fixed hollow fangs in the upper jaw producing a deadly neurotoxic venom which can cause fatalities in humans if not treated correctly and in time. Some species even cause the victims to effectively begin "rotting" so as to make them easier to digest having been eaten. It is this family of snakes that cause most of the estimated 100,000 "snake bite" deaths each year worldwide.

**Viperidae – Viperid Snakes:** These snakes are generally found in The Americas, Africa and Eurasia and possess retractable or folding fangs which fold into the roof of the mouth and are only exposed prior to a strike. Again their venom is highly neurotoxic and can cause massive tissue damage, hemorrhaging and blood clotting as well as shutting down the victim's central nervous system.

**Colubridae – Colubrid Snakes:** This is the largest family of snakes with a worldwide distribution, most of which are not venomous at all and those that are have a very weak neurotoxic venom which is sufficient for their dietary prey and not normally fatal to humans. Unlike Elapidae and Viperidae, the fangs are also located at the back of the mouth and have "grooves" through which the venom runs during an "invenomating bite".

**Boidae – Boa Snakes:** This snake family can









Arabian Gulf Sea Snake (*Hydrophis lapemoides*) in Abu Dhabi, UAE by Rima Jabado.

be found in America, Africa, Europe, Asia, and some Pacific Islands and comprises of only nonvenomous snakes. That said, they are counted amongst their number as some of the biggest snakes in the world. They don't have fangs to inject venom, but instead kill their prey by constriction. They have rows of sharp teeth in their upper and lower jaws with which to hold prey, they then squeeze the life out of them until they are ready to eat.

**Pythonidae – Python Snakes:** Just like the Boidae family, the Pythonidae family also comprises large nonvenomous snakes, which kill their prey by constriction. To most people it's very easy to be confused between pythons and boas. While some of them have a very similar look and have almost the same feeding habits, on a closer inspection there are a number of unique characteristic features that set them apart.

## AQUATIC SNAKES

There are in effect Five Families (or Radiations) of Aquatic or Sea Snakes:

**Marine Hydrophiines – True Sea Snakes:** The largest group of Sea Snakes are the marine Hydrophiines or True Sea Snakes. There are approximately 60 species of Hydrophiine Sea Snakes covering 16 genera (genus). They evolved originally from Australian Terrestrial Elapids. Conversely and rather confusingly, Australian and Melanesian Terrestrial Elapids also belong to the Subfamily Hydrophiinae. Thus, the subfamily Hydrophiinae includes all Australian and Melanesian Terrestrial Elapids, as well as all True Sea Snakes. The subfamily Hydrophiinae also includes the

genus *Laticauda* or Sea Kraits. The remaining "old world" elapids found in Asia and Africa, such as cobras and mambas, belong to the subfamily Elapinae. Together, the Hydrophiinae and Elapinae make up the Elapidae family. All very confusing isn't it? Suffice to say, the largest grouping of Sea Snakes originates from the Southern hemisphere but then extended their coverage in our oceans and seas.

In the main, all Elapidae and Hydrophiine are venomous, however there are one or two which have a weaker venom. For example, Turtle-headed Sea Snakes (*Genus emydocephalus*) feed exclusively on fish eggs, thus, do not need a strong venom to subdue or immobilise their prey. The venom of Turtle-headed Sea Snakes is far less toxic than the venom of other species, including Sea Snake species which are closely related to Turtle-headed Sea Snakes.

**Laticauda – Sea Kraits:** The genus *Laticauda*, or Sea Kraits, comprise of approximately seven species, six of which are marine. Sea Kraits also evolved from Terrestrial Elapids, however, they evolved separately from the Marine Hydrophiines. In fact, the genus *Laticauda* evolved much earlier than the Marine Hydrophiines. The exact date when this lineage evolved is also uncertain, however, it is likely that they evolved around 15-20 million years ago.

**Acrochordidae – File Snakes:** The family Acrochordidae or File Snakes is the oldest of the Sea Snake lineage, having evolved over 40 million years ago. There are three extant

species in this family and two of these species are marine. File Snakes are not venomous and they give birth to live young.

## Homalopsidae – Mangrove or Mud Snakes:

The family Homalopsidae comprises of 34 species of aquatic or semi-aquatic snakes. Approximately 10 species occur in aquatic habitats such as mud flats, mangroves and estuaries across Southeast Asia and into Northern Australia, however only three species are fully marine. This family belongs to the superfamily Colubroidae and evolved some 15-25 million years ago. Homalopsids are venomous but they are rear-fanged. They also give birth to live young.

**Natricinae – Salt Marsh Snakes:** The Natricinae also belong to the superfamily Colubroidea and are confined almost entirely to salt marsh environments. Three species occur in marine habitats and they are confined to temperate and subtropical North America. They are not venomous. It is thought within the scientific community that the marine Natricine species might be in the early stages of evolving further adaptations to pure marine rather than aquatic environments.

## PHYSIOLOGY

**Size:** Sea Snakes are only moderately large compared to some of their terrestrial cousins and rarely exceed 2 metres in length, often with peculiarly small heads for their body size. There are however two species of open water Sea Snake that have been known to grow up to three metres.



**Body:** Only the genus 'Laticauda' (Sea Kraits) has the typical broad ventral scales seen in terrestrial snakes and it is often considered the least evolved of the Sea Snakes. Sea Snakes have laterally compressed tails that act as paddles to move them through the water. Some Sea Snakes also have heavily keeled ventral surfaces adding to their efficiency in moving through the marine environment. Most Sea Snakes have a pair of small fangs at the front of their jaws sporting a highly specialised neurotoxic cocktail (venom).

**Respiration:** Sea Snakes breathe through a pair of valved nostrils on the front of their upper jaws that keep water out when the snake is submerged. Unlike eels, Sea Snakes lack gills and similar to cetaceans (whales, dolphins and porpoises) they need to surface occasionally to breathe. Sea Snakes also get some oxygen directly from the water through their skin, which allows them to dive for greater lengths of time. Sea Snakes like warm, tropical waters, however, when the water gets too warm, they swim down to cooler temperatures. Recent research has shown that Yellow-Bellied Sea Snakes can dive to almost 150 feet and can stay underwater for more than three hours.

**Salt:** Like seabirds and Sea Turtles, Sea Snakes have special glands that collect extra salt from their blood. The Sea Snakes' salt glands lie beneath their tongues. Each time a Sea Snake flicks its tongue, it is ejecting salt back into the ocean.

**Sea Snake Venom:** Sea Snakes may not be "the most venomous in the world" however, their venom is still more toxic than that of the Mojave Rattlesnake and the King Cobra. Sea Snake venom contains some of the same chemical cocktail found in Cobra venom, only in more concentrated form thus a bite from a Sea Snake is nevertheless serious and requires immediate specialised treatment. Sea Snake venom is extremely toxic and one drop is said to be enough to kill three adults.

**Sea Snake Reproduction:** One of the main differences between Sea Snakes and Sea Kraits, is their mode of reproduction. The Sea Kraits are oviparous (egg laying) and lay their eggs on land, while the True Sea Snakes are ovoviviparous and give birth to live young without leaving the water. Because of this, Sea Kraits rely on land for part of their life cycle, but Sea Snakes do not and are restricted to the sea. Most of the species in the species found in the Indo Pacific region are True Sea Snakes and give birth to live young. Gestation periods are short at around five to six months after which females give birth to 2-6 young. Some species like the Bar-Bellied Sea Snake (*Hydrophis elegans*) which also coincidentally happens to be the longest species of Sea Snake, have larger clutches of up to 12-23 live young.

**Age and Growth:** Most Sea Snakes do not grow longer than two metres, but some species

such as the Yellow Sea Snake (*Hydrophis spiralis*) Bar-Bellied Sea Snake (*Hydrophis elegans*) and the Blue Banded Sea Snake (*Hydrophis cyanocinctus*), may grow up to three metres long. Most species are about 25cm long when they are born and must reach at least one metre in length before they reach sexual maturity, which normally takes two to three years. Mortality rates amongst Sea Snakes is high, especially in juveniles, but some Sea Snakes found on the Great Barrier Reef have been known to live for up to 15 years.

## DISTRIBUTION AND HABITATS

Sea Snakes are cold blooded reptiles and are found primarily in warm tropical waters of the Indo-West Pacific, although a few species have been known to find themselves venturing to the Eastern Pacific. They are not found in the Atlantic Ocean or Caribbean Sea. The areas of highest species diversity is Indonesia and Northwest Australia. Each of these regions has more than 20 species, however, many species that occur in Indonesia and other parts of South East Asia do not occur in Australia and vice versa. Most of Australia's tropical coastal waters have a high species diversity, which ranges from 17 to 21 species. The Great Barrier Reef has 14 species of Sea Snakes alone. Although Sea Snakes need warm tropical waters to survive, they are occasionally blown south by storms and have been recorded as far south as Sydney Harbour.

Sea Snakes inhabit shoals, reefs, mangroves, sand flats and seagrass beds. Only one species is known to venture into deeper waters, the Yellow-bellied Sea Snake, and it can be found in flotsam and sargassum weed rafts. The five species of Sea Kraits have somewhat of a smaller distribution in the Indo-Pacific region including the northern coastline and north east waters of Australia.

## BEHAVIOUR AND DIET

**Behaviour:** Sea Snakes are not territorial animals like some of their terrestrial cousins, even those that inhabit relatively isolated reef complexes in the shallower waters of the Indo-Pacific. Thus they are not naturally aggressive animals unless provoked by the ignorant, ill-informed or unwary, or if they are made to feel threatened. Sea Snakes whilst shy in nature are very curious creatures and they become fascinated by elongated objects such as a diver's high pressure hoses or torch if seen at night. The key here is to relax and not to panic (easier said than done I hear you say), they will interact but do not touch them and avoid panicked actions or rapid movements. Often the snakes show their natural curiosity whilst on the surface and can be seen raising their small heads up to two feet above the water to eye the surface surroundings as well as directly approaching a stationary craft.

The only time this behaviour changes is during the mating season which is normally in the winter or if they become stressed due

to changes in their immediate environment or feel threatened. Sea Snakes use a great deal of energy to produce their venom and therefore use it very sparingly. If a Sea Snake does attack, it will be a defensive reaction to what it perceives as an immediate threat and they will quickly swim away from the danger. Therefore, not every bite results in automatic "envenomation" often the strike is just a defensive bite, although the intended victim may not realise this at the time.

Sea Snakes are highly intelligent animals and model their behaviour based upon their environment, the threats and their experiences. For example Bar-Bellied Sea Snakes tend to be very specialised in their diets, eating burrowing snake eels almost exclusively. These snakes are often found in shallow waters near the coast, but rarely venture onto the sandy habitats where their prey is common at high tide because that is when they are at risk from Tiger Sharks. Because their prey burrows into the sand and the snakes poke their head into the sand to find them, they are easy prey for the Tiger Sharks. Instead, they wait until low tide when the sharks cannot get into the shallows.

**Diet:** The Sea Snake's favourite food is unsurprisingly – fish. Sea Snakes prey on fish (including smaller eels that they can easily swallow) and also some of the smaller less feisty crustaceans. A couple of species of Sea Snake are highly specialised eating only fish eggs. Others are specialised in only eating particular species of fish, although this seems to be restricted to specific ecosystems around Australia. Their two short fangs are used to inject neurotoxic venom that quickly paralyses their prey. Sea Snakes voluntarily inject venom into their prey and when they do they control how much using only enough to immobilise their prey. This allows the snakes to save huge amounts of energy in venom production.

## THREATS

Because of the changing nature of oceans and seas and the changing chemistry brought about by both natural events and man's unrestricted and uncontrolled interaction, the threats to Sea Snakes are no different to those faced by other marine reptiles. That said, because the majority are born, live and die in the oceans and seas, the threats are predominantly marine and not terrestrial:

### Natural Disasters and Extreme Weather:

Being air breathing animals Sea Snakes can drown, especially if they are caught out in the open oceans when extreme weather strikes. Sea Snakes in coastal areas can also be washed ashore by extreme weather and as they are not "designed" for terrestrial living, they cannot effectively or efficiently articulate on land and make it back to the safety of the water. As a result, they dehydrate in the sun and die.

**Fishing:** Sea Snakes are often caught in fishing nets, especially the small gill nets used across



the regions where they live. Depending on how long the nets are deployed, Sea Snakes can drown only being able to stay submerged for periods of up to three hours. Often fishermen do not know they have been caught until they empty the nets and whilst it is preferable to put them back into the oceans this is not always the case, after all "protein is protein" to a poor sustenance level fisherman who is trying to feed his family or make some money.

**Marine Pollution:** Marine pollution is affecting all marine life and Sea Snakes are not immune to the effects. When pollution enters the water, it contaminates and kills aquatic animal life that is often food for Sea Snakes. Oil spills, urban runoffs from chemicals, fertilisers and petroleum all contribute to water pollution. Because the ocean is so large, many incorrectly assume that pollutants will be diluted and dispersed to safe levels, but in reality, the toxins released from these pollutants become more concentrated as they break down in size. As a result, these smaller, more toxic particles become food for many links in the marine food chain, which unfortunately includes Sea Snakes. Constant consumption of infected/affected prey means that Sea Snakes accumulate increasing doses of the toxins in various organs and tissues in their bodies resulting in physical, psychological and behavioural impacts and eventually death.

**Predators:** You would think that Sea Snakes would have few natural predators, however they are quite vulnerable being air breathing animals and relatively slow swimmers. Apart from man whose interaction is generally accidental, there are a plethora of animals which view Sea Snakes as "legitimate prey", for example, large seabirds (especially the raptors), some large species of fish, large eels, certain species of "larger sharks" and crocodiles. How they catch and eat them without being bitten is not fully known, but nature has a way of equipping predators with the "tools and techniques" and behaviours to take on such worthy opponents.

## SEA SNAKES IN AND AROUND THE UAE

Sea Snakes occur throughout the coastal areas of the UAE and the rest of the Gulf Region. There are at least seven species, all of which belong to one family, the Hydrophiidae. They are all excellent swimmers and the laterally flattened tail makes them easily recognisable and distinguishes them from the extensive family of marine eels which also inhabit the region, such as the harmless "Yellow and Black-Banded Snake Eels" that often feed in sandy sea beds in UAE waters, but are rarely seen on the surface alive. Sea Snakes are most abundant in the warm shallow seas of the Arabian Gulf, where they are frequently seen resting motionless on the sea's surface. The striking bright yellow and black bands of the Arabian Gulf Sea Snake (*Hydrophis lapemoides*) catch the eye against a sea of turquoise blue and draw a cautious curiosity among on-looking boaters and fishermen.

The seemingly unmistakable pattern of the Arabian Gulf Sea Snake is in fact shared by a number of other species which can easily be confused. The Annulated Sea Snake (*Hydrophis cyanocinctus*) is very similar and both the Yellow Sea Snake (*Hydrophis spiralis*) and Shaw's Sea Snake (*Lapemis curtus*) could be mistaken for either. The first two are generally fairly large and bulky, reaching lengths of over a metre, but not as large as the Yellow Sea Snake which can easily exceed 2 metres. Confusingly, the colour varies among them from yellow to green to grey, and the black banding too is variable in extent and shade. In Shaw's Sea Snake, the bands often take on a rough diamond shape, thicker over the spine and converging to points at the flanks. The Yellow-Bellied Sea Snake (*Pelamis platurus*) is one of few that is easily recognisable being uniform brown above and yellowish on the undersides with the black tail bearing a bold yellow pattern.

## ARE THEY DANGEROUS?

Sea Snakes are some of the most venomous of the world's snakes. One drop of sea snake venom is reputed to have the potency to kill three to five men. This high toxicity enables them to disable their cold-blooded prey, such as fish, crabs and squid on which they feed. Even young Sea Snakes, that are born alive at sea, have venom as potent as a fully mature adult.

People are rarely bitten by Sea Snakes and their small fangs make it difficult for them to bite through a wetsuit or other kind of exposure suit. Their apparently docile nature largely precludes the chance of a deliberate Sea Snake attack and they are anyway generally recognised as dangerous and avoided. The small mouth restricts their ability to bite any but the smallest appendage, such as a finger, although the gape can be greatly extended. Fishermen in the UAE are sometimes struck, having unintentionally angered a Sea Snake by hauling one into a boat in a fishing net. One of the first signs of the venom acting on a victim is a difficulty in breathing and swallowing, aching muscles and drooping eyelids. Although undoubtedly very dangerous, Sea Snakes, like all snakes, do not necessarily inject venom at each bite and symptoms of shock are often misidentified as serious snake bite cases.

It is not uncommon to find a live Sea Snake washed ashore, or left stranded on the beach by a rapidly falling tide. Unable to move, they must wait for the high tide in order to return to their watery world as they cannot wriggle overland like their terrestrial cousins. A Sea Snake lying motionless on a beach may appear dead, but it is wise to resist any temptation to handle such specimens, for they could well be alive and often feign death to put off would be attackers. Although not aggressive, unwanted handling may provoke an attack.

## WHAT SHOULD YOU DO?

If you or anyone with you are bitten by a Sea Snake, the bite will not normally be painful, but

look for symptoms such as:

- The site of the bite may show only a small pin prick where the bite occurred without pain. Sea Snake bites could show anywhere from 1 up to 20 "fang" marks.
- The site of the bite rarely shows a reaction. The person who was bitten by the Sea Snake won't usually see redness, bruising, or other signs at the location of the bite, even if venom was injected.

Make the victim comfortable and contact Emergency Medical Services (EMS) or get them to a medical facility as quickly as possible:

- Isolate the bite zone (not necessarily with a tourniquet);
- Keep the bite zone below the heart;
- Keep still to prevent the rapid transmission of any venom through the blood stream;
- Calm Patient, keep warm and treat for shock with fluids.

If at all possible without endangering others, try to kill or capture the Sea Snake as identification of the species will assist in ensuring the correct medical treatment is used for the Sea Snake specific venom. If not try to note the key features and colouring of the Sea Snake – this will also assist in identifying the most appropriate anti venom treatment.

Like most creatures in our oceans and seas, they are just as wary about us as we are about them. Interact with them at a distance if at all possible and do not touch. If in doubt err on the side of caution and avoid any unnecessarily uncomfortable altercation which may leave you either injured or at worst dead. Sea Snakes are fantastically beautiful creatures and although naturally placid and inquisitive, do not underestimate their danger. They have an arsenal of weaponry that "packs a dangerous punch" if they feel threatened or provoked. Messing with them is neither bravado, nor sensible – you will always come off worse and it may also result in the loss of another marine creature through no fault of theirs.

That said, apart from producing the anti-venom needed to treat bite victims, the potential medicinal uses of Sea Snake venom are still being fully explored by pharmaceutical companies. The chemical concoction that could kill you, could well in the future be part of the solution to some cancers, heart conditions, debilitating diseases and even post-operative treatments such as blood clotting agents or accelerated tissue repair. Our oceans and seas hold vast potential which we have yet to explore, but this wealth can only be accessed from healthy marine environments and abundant marine flora and fauna from which to draw the true wealth that is knowledge.

Respect our underwater world, respect the creatures that live there and respect their right to life as well.

"Always Keeping the Fun in Diving"





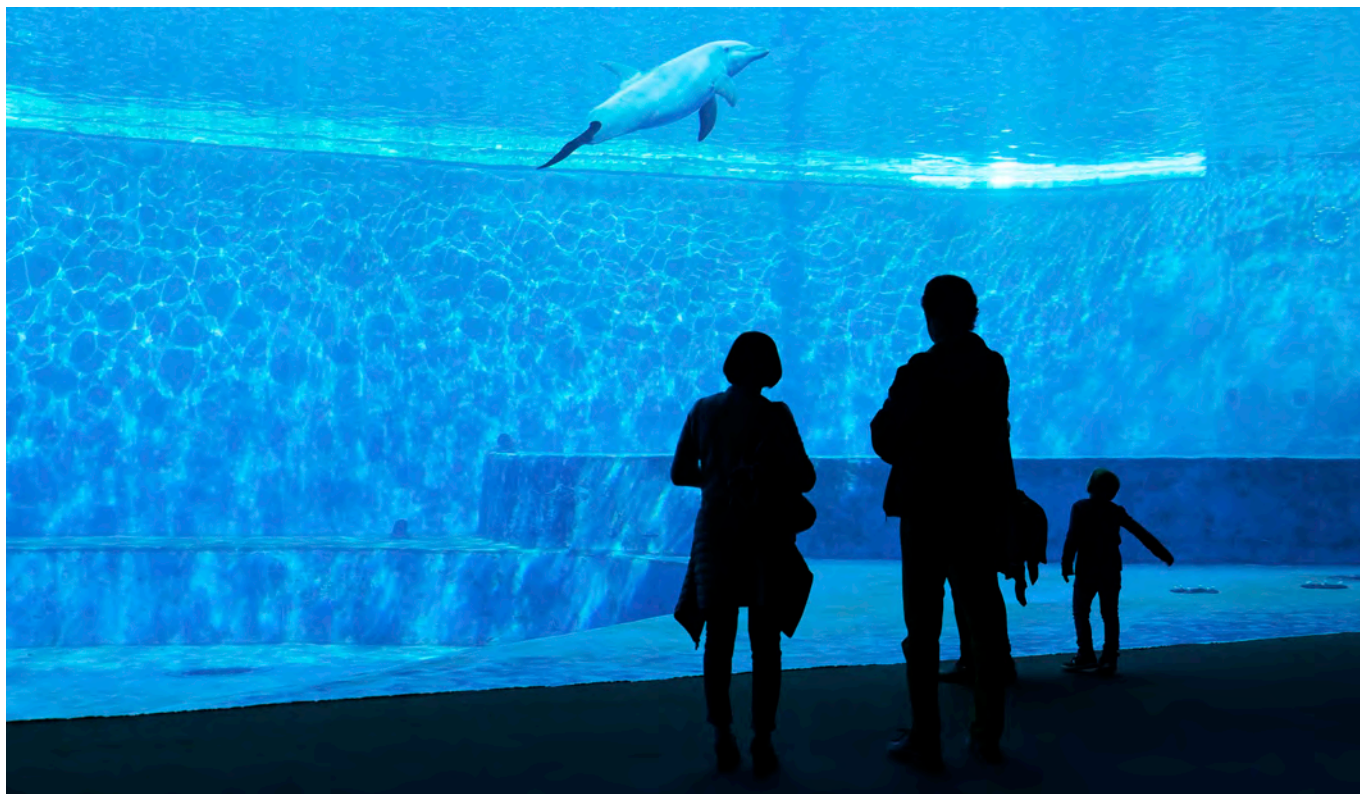


# LET'S VISIT THE ACQUARIO DI GENOVA

ACQUARIO DI GENOVA IS THE AQUARIUM THAT HOSTS THE MOST EXTENSIVE RANGE OF AQUATIC BIODIVERSITY IN EUROPE

FEATURE **NICO DE CORATO – ADMINISTRATOR OF DUBAIBLOG**

PHOTOGRAPHY **VALENTINA NANNI FOR DUBAIBLOG & PROVIDED**



On November 6, 2016, I had the great pleasure of visiting the Acquario di Genova (Genoa Aquarium) in Italy and got to ask some questions I had to Giuseppe Costa, the President and CEO of Costa Edutainment, the managing society of the aquarium, and Claudia Gili, the Scientific Director.

Designed by Italian Architect, Renzo Piano, the exhibition gallery consists of over 70 exhibits and about 12,000 specimens of 600 species that come from all the seas of the world. From the rarest species, such as manatees – marine mammals that may be at the origin of the legend of mermaids – to the most famous ones, such as dolphins, penguins and sharks – the great predators of the sea; but also jellyfish, seals and multi-coloured tropical fish. I asked Giuseppe Costa about his thoughts on the state of the oceans and how aquariums can get involved in conserving oceans.

**NICO DE CORATO:** Oceans face a host of serious pressures and conservation challenges today. What worries you most? Are you optimistic about the long-term health of our ocean environments?

**CLAUDIA GILI:** I share your feelings about the human pressure and the serious conservation challenges faced by the oceans and the earth in general. We are all part of the same planet and all our daily activities affect our lives with

direct consequences, but many people do not know or realise this. Moreover, the current contingent, human problems and survival perspectives, often guide the governments into different urgent emergencies, leaving the environmental needs behind.

In order to maintain optimism and address this in a proactive and sustainable way, we need to understand the origins and the mechanisms of the different problems (such as pollution and fishing pressures), and support constant specific research and evaluations of the consequences to suggest and follow the actions to be taken.

The aquarium's role is to show habitats and species which most people would not normally be able to reach, and engage every citizen by increasing their emotions and understanding of the environment. In this sense, all aquariums of the world work within a strong network. Our pathway throughout the exhibits is an educational opportunity that allows us to share our knowledge with the general public, involving scientific and cultural institutions, together with governing authorities, a way to change lifestyles with sustainable daily actions that will help preserve threatened species and habitats.

"Irreplaceable jewels that belong to our future generations".

**NDC:** Could you tell us the story of the Acquario di Genova?

**GIUSEPPE COSTA:** The Acquario di Genova was built on the occasion of the Expo in 1992, a celebration of the fifth centenary of the discovery of the New World by Christopher Columbus, with the intention of restructuring and enhancing an area full of history and traditions, located in the heart of Genoa's historic centre: the Porto Antico (the old port). The project and the aquarium is by Genoese Architect, Renzo Piano, whereas the interior design is by American Architect, Peter Chermayeff.

It is one of the main Italian cultural attractions. It boasts over one million visitors per year and over 27 million since its opening. It is managed by Costa Edutainment S.p.A., an Italian leader in the management of great structures; it develops educational, recreational, cultural, and scientific research activities.

Since 1992, the facility has grown and is now the largest aquarium in Europe. In spring 2016, on the occasion of its 25<sup>th</sup> anniversary, Acquario di Genova has undergone a massive renovation to assert its leadership as the largest and most amazing aquarium in Italy and in Europe, with its capability of arousing surprise and excitement thanks to new visiting experiences.





Since the 23<sup>rd</sup> March 2016, Acquario di Genova presents a brand new exhibition gallery thanks to cutting-edge exhibit designs, digital installations and an extensively renovated light and sound design.

A tight schedule of daily speeches – 48 weekly presentations – allows the visitors to interact with the staff in 6 different marine areas in order to learn and uncover secrets and facts of the biology and habitats, understanding the beauty of a life that blooms over and over again.

**NDC:** What is the relationship between the aquarium and the local people of Genova?

**GIUSEPPE COSTA:** Acquario di Genova is a facility which has a central role for the city and the scientific world, offering extraordinary opportunities and services including fun and leisure. Since the aquarium's opening, several cultural tourist offers have been put together, expanding the concept of the visit as fascinating experiences, linking together the whole cultural exhibit world managed by Costa Edutainment in Genova.

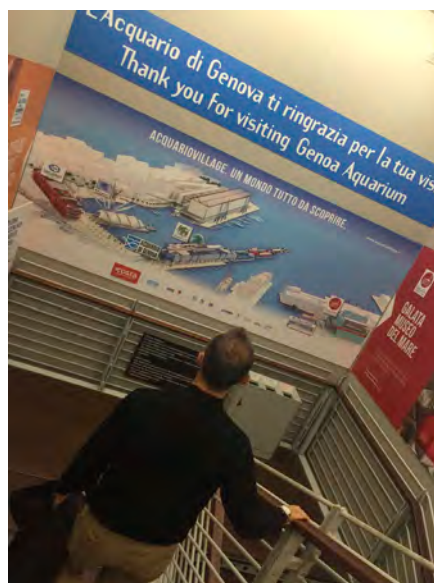
The so called "Acquario Village" world is in fact a new proposal of enthralling, highly added valued experience which unites Acquario di Genova, Galata Museo del Mare with the submarine Nazario Sauro, the Biosfera and the Bigo panoramic lift.

Genoa used to be an industrial city. Since 1992 it began to change towards becoming a touristic town. This is a long process that is still ongoing and requires team work from the public, private facilities and stakeholders of the city. Most of the citizens living in Genova appreciate the aquarium even if they only make up 10% of our visitors. We are working hard to have them become the best promoters not only of the aquarium, but of all the city's cultural heritage.

Costa Edutainment has been a member of the "Associazione Festival della Scienza" (Science Festival Association) since 2004, which runs the scientific exhibition that takes place each year in Genova.

In 2008, Costa Edutainment S.p.A. also became part of "Genova Palazzo Ducale Fondazione per la Cultura" (Genoa Palazzo Ducale Culture Foundation) as a share holding partner, with the objective of actively contributing to the heritage enhancement and promotion of the initiatives and cultural networks of the Genoese territory.

**NDC:** Getting in touch with animals and wildlife can be important to educate people about the risks of extinction.



**CLAUDIA GILI:** The mission of the Acquario di Genova is to inform and raise awareness among the public towards the preservation, management and sustainable use of aquatic environments, in order to promote positive behaviours. This has always driven the actions and the commitment of our institution.

Since its opening, numerous efforts to involve, not only the visitors of the Acquario, but also the schools and ordinary citizens have been made; each initiative is always aimed at building up a more responsible human relationship with the environment and to stimulate activities, particularly to preserve the aquatic fauna.

The main tool of this mission is the visit of the exhibition path, which through the

emotional involvement of the public aims to communicate important messages towards environmental conservation.

Since its opening, Acquario di Genova maintained a rigorous representation of the habitats and the careful choice of the scientific information to be transferred to the public. In order to support this effort, several activities have been devised and developed according to the edutainment style, which combine information focused on the aquatic ecosystems with entertainment and emotional fun. Arousing visitors' curiosities and interest expands their knowledge and stimulates the public towards the preservation of the environment.

This model of activity is based on the concept of a unique and distinctive experience, focused on the thrill of learning while having fun.

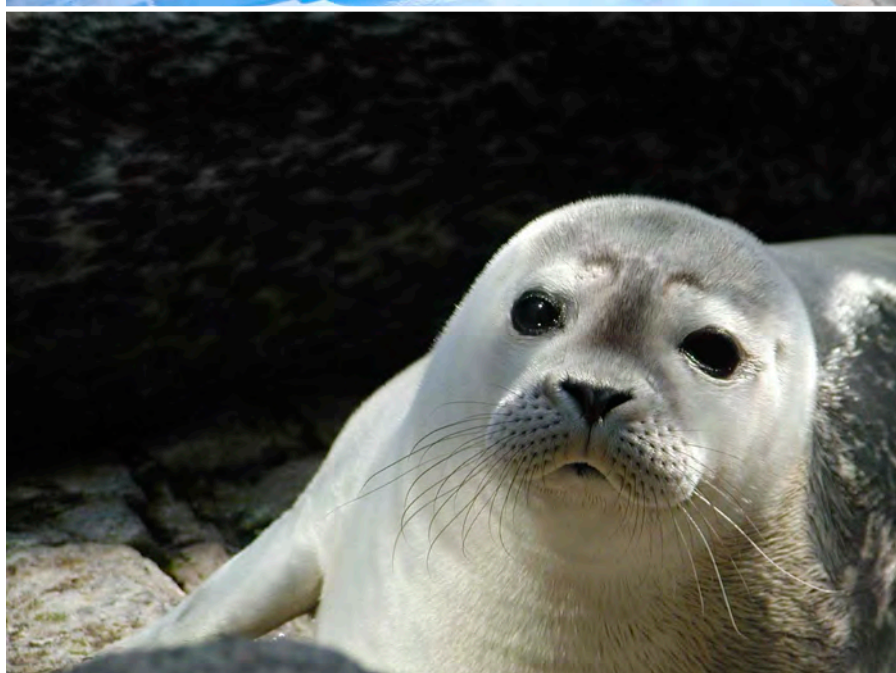
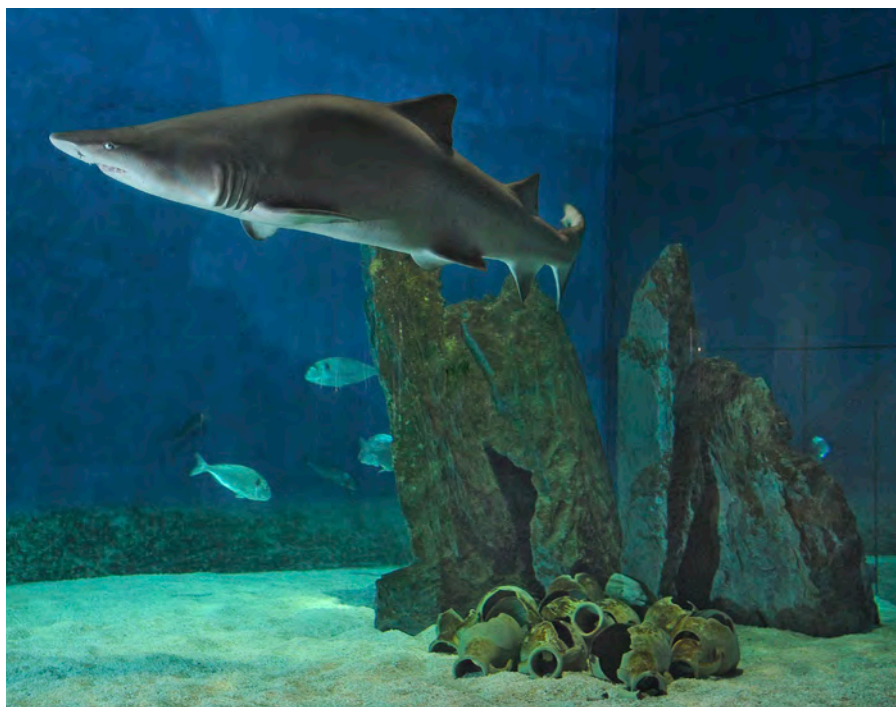
**NdC:** What do you feel is the role of the aquarium in the conservation of oceans?

**CLAUDIA GILI:** Acquario di Genova has a central role in the conservation of oceans. First of all, thanks to its dissemination efforts, it is able to reach more than 1 million people each year and more, counting on website, social profiles and other communication tools. We are also engaged in European and international specific dissemination projects covering several topics such as responsible fishing, protection of cetaceans in the Pelagos Sanctuary and active conservation efforts on local fauna.

A very important aspect is also the direct engagement in research and conservation projects. For example: the Emys project for the preservation of a local subspecies of the European pond turtle of the Piana di Albenga, the project "Delfini Metropolitani" (metropolitan dolphins), that studies the presence and habits of the coastal dolphins and their relationship with human activities, and the cooperation with the "Servizio Cites" of the State Forestry Corps for the fostering of endangered protected species.

**NDC:** What is the most critical part in managing an Aquarium?





**GIUSEPPE COSTA:** Aquariums are very complex facilities with various needs. We need to care about animal welfare, considering that each one has very different and specific needs. We need to care about our clients, giving them all the services they require; we have to accomplish our dissemination mission and always be updated in terms of technological devices and high quality standards; we need and want to be responsible towards the environment and also towards society. The most critical part is to match all these goals up.

**NDC:** How do you see the future of the Acquario di Genova?

**GIUSEPPE COSTA:** In 2016 we launched a 2-year renovation project to reassert the "Aquarium Leadership" in Italy and Europe, together with new partners. In the last few months, the number of visitors have risen, together with the overall visit satisfaction. Thanks to this, our dissemination engagement has also increased. The future of Acquario di Genova seems to be positive!

**NDC:** Have you ever been to Dubai? Did you ever visit the aquariums over there?

**GIUSEPPE COSTA:** I was in Dubai not so long ago and visited both aquariums. I found them to be very interesting. They are amazing and big facilities.

**CLAUDIA GILI:** I have not been to Dubai yet, but have heard from colleagues who work there, that they are enthusiastic about the management and the future developments of these facilities. We know that the so-called "aquarium worlds" share the same goals, and we therefore count on these aquariums to act as an example towards environmental preservation and to expand and unite our mission to all their visitors as well.



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[www.acquariodigenova.it](http://www.acquariodigenova.it)  
 (The website is only available in Italian)



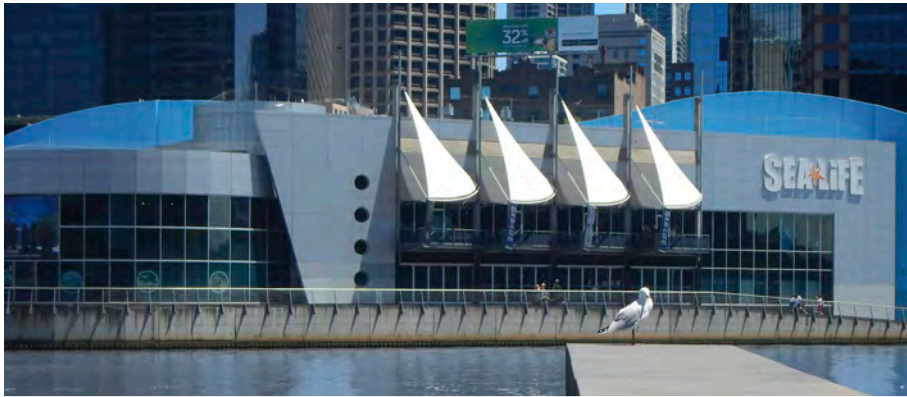
# SHARK TALES IN MELBOURNE

## SHARK DIVE XTREME AT SEA LIFE MELBOURNE AQUARIUM

OFFERS A UNIQUE OPPORTUNITY TO COME FACE-TO-FACE WITH HUGE SHARKS, STINGRAYS AND MORE

FEATURE **NICO DE CORATO – ADMINISTRATOR OF DUBAIBLOG**

PHOTOGRAPHY **VALENTINA NANNI FOR DUBAIBLOG & PROVIDED**



I had the lucky chance to spend the end of 2016 in Australia. With the occasion, I visited the Sea Life Aquarium and decided to go for a Shark Dive. What a great way to celebrate New Year's Eve! Sea Life Melbourne Aquarium, located on the Yarra waterfront opposite the Crown Casino, is one of Victoria's leading visitor attractions and a great outing for the whole family.

Since its inception, shark diving in a closed and controlled environment has revolutionised the world of scuba diving, letting divers with any kind of experience get in touch with these creatures. Shark dives are some of the most coveted experiences in the underwater world. Dive destinations, operators and sites around the world offer consistent close encounters. Strong situational awareness is essential to ensure your safety and enjoyment.

If you have never dove with sharks before, an aquarium could give you the opportunity to experience your first time to become confident with the situation, to learn some skills (what to do, what not to do), to recognise their behaviour and become prepared for an open water shark dive. Of course a wild animal that is not used to this kind of repetitive interaction, will be in a natural scenario. Things to look out for as an example are, quick movements such as sudden changes of direction, a rapid drop of the pectoral fin or any other fast action, which all indicate an uncomfortable animal. Also,

when the inquisitive nature of some sharks – such as blue sharks and oceanic whitetips – intrudes on your personal space, it might be time to get out of the water. In open water you have to be aware of everything around you – the sharks, the boat, the current, the other divers, whether you are drifting. If you're a photographer, take your eye away from the viewfinder every once in a while and look at the whole scene.

You do not face those situations in an aquarium; because sharks are such dynamic swimmers. Diving with them is a 3D safe experience, it's the best way to start.

The experience lasts an hour and 30 minutes, consisting of briefings, in-water training and more than 30 minutes in the water with the sharks and other amazing marine animals.

No scuba diving experience is required. A smart scuba training is provided (a sort of Discover Scuba Dive) so that you can delve into the underwater habitat with deep-sea friends, with no experience necessary whilst your friends and family watch from the underwater viewing tunnel. Also before going underwater, instructors require you to practice with the basic skills expected in the DSD itself: removing the regulator and clearing the mask.

### ABOUT THE AQUARIUM

After my dive experience, I went on to visit

the aquarium. With 12 amazing habitat zones to discover, it is home to thousands of animals, including sharks, turtles, stingrays, sawfish, tropical fish and much, much more.

Take a fascinating journey from the coast to the ocean depths, where you will also see one of the world's largest Saltwater Crocodiles residing in the state-of-the-art Croc Lair exhibit. Don't miss Australia's most interactive rainforest, get up close to 10,000 creatures including Australia's largest collection of Sub-Antarctic penguins, the world's largest collection of seahorses and the only Elephant Sharks (*Callorhynchus milii*) in captivity.

Find out how it feels to touch a starfish and the other creatures living in the interactive rockpool.

I can't wait to be back in Australia and dive with sharks in open water.

### SEA LIFE MELBOURNE AQUARIUM

Cnr King and Flinders Streets  
Melbourne  
Victoria 3000  
Australia

### General Enquiries:

Tel: 1800 026 576 (9am to 5pm)

Email: [info@melbourneaquarium.com.au](mailto:info@melbourneaquarium.com.au)

[www.melbourneaquarium.com.au](http://www.melbourneaquarium.com.au)



# HOW TO TRAIN YOUR FISH

FEATURE **PATRICK VAN HOESERLANDE** PHOTOGRAPHY **AMBER VAN HOESERLANDE**



During a training event for volunteer divers, we were given a presentation on how the Virginia Aquarium & Marine Science Center staff trains a cobia. The cobia is a fast, aquatic predator that is not situated at the top of the marine food chain. Regardless of the relative position in that chain, it surprised me that you could train a fish. How do you train a fish? Is that possible with all fish? Why would you do that? Time to dash off in search of answers.

Working as a volunteer in the Virginia Aquarium & Marine Science Center has the advantage of quick access to specialists that I can address for some answers. In a short span, I successively interviewed Lori Semple, Michelle Coley, and Betty Alexander. All three are animal trainers in the public aquarium that attracts many visitors each year. Michelle is an aquarist and responsible for training fish like sturgeon, cobia and rays. Lori, also an aquarist, specializes in the training of sea turtles, while Betty takes care of training the seals. All three get to answer my questions about training. The conversations lead me through a path of more questions and surprise.

## WHY DO YOU TRAIN ANIMALS?

My question erroneously gives the impression that all animals must be trained. However, this is not always the case. Only animals that are expected to remain in human care are trained. Turtles or seals that are rehabilitated, and therefore expected to be released, should never receive training. Through the process of training, they will get used to human interaction, something that wild animals should not be taught. If an animal, due to injury or deformity, can never survive in the wild, or was born in human care, it is a candidate for training.

Almost all animals can be trained, but for some species, it is very difficult or too time-consuming. Schooling fish respond better to triggers produced by other fish in the school, rather than external stimuli from the trainers. These species require a very long time to train with meagre results; therefore the investment usually does not outweigh the potential benefits. An example in this aquarium was the training of a barracuda. There was some success after intensive training, but as soon as the individual fish was placed in a large exhibit, he quickly preferred following other fish over reacting to the trainer.

Solitary hunters have the best chances of success. They are, after all, used to responding to external stimuli and are less prone to being distracted by peers. Additionally, turtles and marine mammals are very receptive to training.

Just because an animal can be trained, does not mean that it has to be. Training is very labour intensive, and before starting with it, both the institution and the animal need to benefit from it. Large animals that need special, individual care are prime candidates for training, especially, when they represent a great financial or reputational investment for the institute. Animals that need variation in their environment to prevent boredom are also candidates to be trained.

The decision to train an animal may be from a combination of reasons. The animal may need a customized diet, necessitating managed feedings. This can be a certain amount of food per day, but also a certain kind of food. It may also be that the fish is so fast that it pilfers food from other fish, causing stress and loss of dietary control.

Another reason is the daily task of mental and physical enrichment. This is especially the case with intelligent animals like seals, who require enrichment to thrive. Although the public enjoys it, the purpose of these trained behaviours is not to give a show. Rather, the spectacle of learned exercises simulates natural behaviour and contributes to the welfare of the animals.

The human care for the wellbeing of animals is also the basis for the reason why an animal receives training: the need for medical treatment and transportation. Even animals in an aquarium must visit the vet from time to time. Such visits and associated examinations, are not normal situations for a fish. These are a source of stress that can affect its wellbeing. To limit the consequences of a medical examination, the fish must first learn that being touched by people should not cause stress. This is also the reason why an animal should be prepared for future transportation. To catch a fish in an aquarium is more difficult than one can imagine. The procedure differs greatly from catching a fish in a small bowl. In an exhibit, the whole exercise is tiresome for the divers, and very stressful for the individual fish. It's much easier for all if the fish itself swims into the net.

## BUT HOW DO YOU TRAIN ANIMALS?

With patience and a positive attitude. The first challenge to overcome is finding the right external stimulus. It is not exactly known what kind of stimulus certain species best respond to: is it colour, contrast, or shape? The right 'target' is one of trial and error. The target should not only attract a specific individual, it must also be different enough to not distract other trained animals. A while ago, after a fish had been trained, it no longer responded as



it was taught. Something in the environment had changed. After thoroughly searching, the animal care team discovered that the fish was distracted by the colour of the T-shirt the new intern was wearing. The T-shirt, although above water, was a better target and caused confusion about where the fish should react.

Once the target has been identified, the training begins by encouraging good behaviour. The first step is to submerge the target during feeding, so that the fish connects food with the proximity of the target. Then, animal care staff begin connecting 'seeing the target while eating', to 'coming to the target to get food'.

The animal must stay connected during training with the target for as long as the trainer expects. With turtles and seals, this is real physical contact with the target, while with a predator, contact means swimming around it. The desired behaviours is further stimulated by 'bridges'. These bridges, such as a click sound (clicker) or a whistle, make it clear to the animal that it is on the right track and indicates the exact moment that it has done something correctly, signifying that it has earned a reward. The bridges make it obvious for the animal that it is still on the road to success, and towards a reward, encouraging the animal to watch what it's doing in order to get more bridges from the trainer. It bridges the moment of demonstrating the right behaviour with the moment of receiving the reward. After a while, the bridge will be received as a 'secondary reward', substituting the food reward. The learning process is extremely fast because the signals help the animal to remain on the right track. Through this method, complex activities such as permitting an examination, injecting drugs, or transportation are taught step by step.

Finding a good bridge is not easy because, a bit like determining the right target, the bridge may only work for one animal. The effectiveness of a bridge depends strongly on the memory span of the animal. The time between a secondary and the actual reward must not be too long for a fish because it may forget the association, while with seals that time can be longer. Indeed, fish tend to behave a bit like Dory in the Disney movie, *Finding Nemo*, although there is proof of a lasting memory too.

#### WHAT DOES A TRAINER DO WHEN AN ANIMAL IS NOT COOPERATING?

The rule is to not punish, just ignore the negative behaviour. This is accomplished by simply removing the target from the water and doing nothing for 3 seconds. In that short time you can lean back and relax. After months of training it can be frustrating when the animal refuses to cooperate, so cooling down before reacting might be a good thing. It also gives the animal a signal that it has done something wrong. Offering the target again, and acting as if nothing has happened, will usually encourage the animal to cooperate.



My interviews are followed by a few live training sessions. During such a session, I see how turtles and a cobia respond to their targets while there is food for other fish thrown into the water. Without training, the predator would hunt the other food and make it impossible to control its intake. It would also increase the stress level of the prey fish. Even if the urge to steal the food from the turtles is large, the moment the target plunges into the water, the cobia goes for it. When one of the turtles does not properly respond to a signal, the trainer stops

all activity. After resuming the session, the animal responds immediately and correctly.

I should not have been surprised to learn that fish can be trained. There are unfortunately dive sites where you, as a diver, are almost immediately welcomed by hungry fish expecting an easy meal. This unnatural behaviour is an involuntary trained response to visiting divers distributing food to attract fish and it is a bad habit, because wild animals should not get used to people, but it provides clear evidence that a whole host of fish can be trained.



# DIGITAL ONLINE 2017

EDA'S UNDERWATER PHOTOGRAPHY AND FILM COMPETITION  
OUR FAVOURITE EVENT IS JUST AROUND THE CORNER

SUBMISSIONS OPENED: SUNDAY, 8<sup>th</sup> JANUARY 2017 | SUBMISSIONS CLOSE: SUNDAY, 23<sup>rd</sup> APRIL 2017 @ 11:59 PM (GST)

AWARDS NIGHT: WEDNESDAY, 31<sup>st</sup> MAY 2017 | 19:00-21:00 | AUD

EXHIBITION OPEN FROM: 1-7 JUNE 2017 | AUD



## DIGITAL ONLINE

جمعية الإمارات للغوص

EMIRATES DIVING ASSOCIATION  
PHOTOGRAPHY AND FILM COMPETITION

### DIGITAL ONLINE'S MAIN OBJECTIVES ARE:

- To develop the human interaction with the underwater environment and highlight the beauty of its flora and fauna.
- To gather information on the number of underwater photographers in the UAE (both professional and amateur).
- To discover new promising underwater photographers in the UAE.

Digital Online is open to all photographers and videographers of all skill levels with a valid EDA membership status. EDA membership must be renewed if expired or acquired in order to take part.

### EVENT BY EDA



### EXHIBITION HOST



### PRINTING SPONSOR

PRINT WORKS

### PRIZE SPONSORS



### ABOUT DIGITAL ONLINE

Digital Online was realised in 2009 by Marcelo Mariozi, a professional underwater photographer who had previously been involved in the organisation and set up of underwater photography competitions in his native country of Brazil.

As there were no other underwater photography competitions existing in the UAE at the time, Digital Online was introduced by EDA for resident photographers to develop a relationship and human interaction with those unfamiliar with the underwater world and environment. The film category was introduced as an extension to the competition in 2012 to share our underwater world through motion pictures.

The event, coming up to its ninth year, has seen the steady growth of underwater photography participation, the enthusiasm, and the passion step up to another level. The event has attained equal success with the non-divers who come to support the participants at the Awards and Exhibition Opening night.

### THE SPONSORS

We would like to thank all our devoted and new sponsors for taking part in Digital Online 2017's upcoming event, for without them, the competition would not take place. We will announce the prizes in the March issue.

Thank you to BFC Travel Management, Tourism Malaysia, Philippines Department of Tourism, Al Marsa Musandam, The Dive

Centre, Canon, Grand Stores Digital, Le Meridien Al Aqah Beach Resort Fujairah, Al Mahara Diving Center & Anantara Sir Bani Yas Island Al Sahel Villa Resort, Millennium Resort Mussanah Oman & Oman Sail, Nomad Ocean Adventures, Freestyle Divers, Al Boom Diving, MTM Marine LLC, Divers Down and QVolution Sports Wear Trading LLC.

### THE JUDGES

We would also like to thank Andy Murch, Simon J Pierce, Imran Ahmad, Jonathan Ali Khan and Christophe Chellapermal for being Digital Online's asset guest judges.

We are privileged to have such talented photographers/film makers volunteer their time to take part in this event.



# THE DIGITAL ONLINE RULES AND GUIDELINES 2017

## RULES AND GUIDELINES

- Digital Online is open to all photographers and videographers of all skill levels with a valid EDA membership status. EDA membership must be renewed if expired in order to take part.
- Each competitor can only win one prize or prize package.
- Winners will choose their own prize.
- Participants are obligated to follow environmental conservation regulations and to respect the underwater world during the process of taking their stills and video. Be advised that any damage to the protected underwater world, including the disruption of the natural habitat of the marine life, provocation through touching, displacing, feeding or annoying, is prohibited and will disqualify the images or the photographer/videographer.

## ADDITIONAL RULES

- By entering the competition, entrants declare that they own copyright of the submitted photographs and films and it entails an automatic acceptance of all the rules. EDA reserves the right to publish images in the 'Divers for the Environment' magazine, EDA's social media pages and on the EDA website. Images will also be used in any future promotional material for EDA events and competitions royalty free, but copyright remains with the photographer. Use of images or video will require no additional written or verbal permission from the photographer or videographer.
- Competition organizers will take the utmost care in handling digital files submitted to the competition. However, competition organizers will not be held responsible for any loss of the submitted material at the

time of uploading images. No media such as CD's, DVD's, memory cards and sticks will be returned to the participants.

- Images (photos or videos) must not have already been submitted to previous Digital Online Competitions.
- Photos and videos must be taken underwater unless specified in a category description.
- Manipulation is restricted to colour correction, brightness, contrast, sharpening and cropping. The Digital Online judges reserve the right to examine untouched images if requested.
- Removing backscatter is allowed to an extent, this does not include the removal of subjects such as fish or divers or cutting and pasting sections of images from one to another.
- The deadline for all entries is Sunday, 23<sup>rd</sup> April 2017, at 11:59pm (GST – Gulf Standard Time).
- The finalists will be announced and their work displayed at the Awards Night on the 31<sup>st</sup> of May 2017 at the American University in Dubai. Participants who do not make it to the evening of the event will be asked to collect their prizes from the EDA offices.
- Prizes are announced in this issue.
- We pledge to run this photography and video competition ethically and with integrity. Our judges have volunteered their time to help. The photographers' details remain hidden to the judges during the judging process.
- All judge's decisions are final.

## REGISTRATION AND UPLOADING ENTRIES

- Registration and submission entry was open from Sunday, 8<sup>th</sup> January 2017 and the final deadline is on Sunday, 23<sup>rd</sup> April 2017, at 11:59pm.

- The participant must be a valid EDA member. Submit entries via email to [photo@emiratesdiving.com](mailto:photo@emiratesdiving.com) with the requested category detail information.
- File names should include photographer's name and the category. (e.g. TSmith-Macro.jpg, TSmith-WA.jpg, TSmith-BestofUAE.jpg, TSmith-B&W, TSmith-Compact.jpg).
- Photo entries must be saved in jpeg format and should be sized between 2000 and 6000 pixels in the longest dimension. Please limit your images to a maximum file size of 5MB. Images will be viewed on a monitor and should be in the AdobeRGB 1998 or sRGB colour space.
- Video submissions must be in mp4 format and can be sent via e.g. We Transfer or Dropbox with file name of the Videographer.
- The preferred method of entry is electronically, however, if this method is not possible due to slow internet connection, you are able to submit via DVD, memory card or stick. Please note, media will not be returned.
- You will receive an email to confirm your registration and photo/video upload. If you do not receive one within 24 hours, your email may not have come through and you may need to try again.

Good luck to everyone taking part in Digital Online 2017! Dive safely and have fun!

### \*NOTE: HOW PRIZES ARE AWARDED

Once the judging is complete, the winners will be able to choose a prize available to them on the list they will receive via email. Digital Online Judges award a 3-way point system to each photograph/video consisting of Technique, Composition and Impact which is added to give the photograph's or video's total grand score. Best of show with the highest points will get first choice. 1<sup>st</sup> place winners by highest score will choose a prize before all other winners, 2<sup>nd</sup> place winners before 3<sup>rd</sup> place winners, etc. Please note, each individual can only win one prize or prize package.

## PHOTOGRAPHY CATEGORIES

Photographers may enter one photo per category.

Details to include with each photo submission:

- Photographer Name
- Category
- Location
- Story Behind the Shot
- Camera Gear
- Settings

### 1. MACRO (DSLR/MILC ONLY)

**Definition:** Photographs taken with close-up equipment, portraying underwater flora and/or fauna. The photographer may not crop the original more than 20%. The original image may be requested.

### 2. WIDE ANGLE (DSLR/MILC ONLY)

**Definition:** Photographs taken with a wide-angle lens (or adapters that provide an equal field-of-view), with or without human presence, portraying the natural beauty of the underwater environment.

### 3. BEST OF THE UAE (DSLR/MILC & COMPACT)

**Definition:** Any underwater subject taken in the UAE and the Musandam.

### 4. BLACK & WHITE (DSLR/MILC/COMPACT)

**Definition:** Black & white photography is timeless and elegant. Focus on tonal contrast, shapes and textures and the composition of the shot.

### 5. COMPACT CAMERA (COMPACT ONLY)

**Definition:** Point & shoot photographers only.

## VIDEO CATEGORY

Title: THE BIG BLUE

**Definition:** Looking for films of all genres – documentaries, narratives, shorts and animation films. Film subject must focus on all aspects of our underwater world including but not limited to, ocean exploration, wildlife, environmental, conservation and oceanography. Lengths including credits: 5 minutes or less.

- All film genres will be accepted.
- Content must focus or relate to the ocean.
- Non-English films must have subtitles.
- If music is used, it must be from a public domain or royalty-free.
- Film length should be 5 minutes or less, including credits.
- Winning films will be chosen on the basis of creativity and the ability to tell a story that leaves the audience better informed and/or moved about the ocean.



## DIGITAL ONLINE 2017 PRIZES AND SPONSORS



Digital Online's 21 Prize Sponsors are giving this year's lucky winners 27 prizes to choose from!

NOTE: Participants are only able to win one prize each. Entrants with multiple winning entries will be given priority in the points awarded.

### 1. BFC TRAVEL MANAGEMENT

1. Destination Package – 5 days/4 nights in Bali, Indonesia.
  2. Destination Package – 4 days/3 nights in Terengganu, Malaysia.
  3. Destination Package – 4 days/3 nights in Aqaba, Jordan.
- Includes accommodation, breakfast, diving (2 days), airport transfers and transportation between dives for one person.

### 2. TOURISM MALAYSIA

Destination Package – 5 days/4 nights to Sipadan, Sabah, Malaysia. Includes one domestic return Economy Class ticket for KUL/Tawau/KUL, accommodation on full board basis, return ground & boat transfers (Tawau/ Semporna/Mabul), and 2 days of diving excursions for one person. Does not include, weight belt and tank rental, or the Sipadan permit fees.

### 3. PHILIPPINES DEPARTMENT OF TOURISM

#### 1. AZURE DIVE & YOGA RESORT

Destination Package – 4 nights/5 days accommodation in a Superior Deluxe Room for 2 persons in Dauin, Philippines. Includes round trip transfers, complimentary breakfast for 2 persons and 6 fun dives for winner only. Valid from 1<sup>st</sup> June 2017 to 30<sup>th</sup> May 2018. [www.azurediver.com](http://www.azurediver.com)

#### 2. MARCO VINCENT DIVE RESORT

Destination Package – 6 days/5 nights with breakfast and 12 guided dives for one person in Puerto Galera, Mindoro, Philippines. Not included: nitrox use, equipment rental or transfers to the resort. [www.marcovincent.com](http://www.marcovincent.com)

### 4. AL MARSA MUSANDAM

2 Night Liveaboard Trip in the Musandam. Includes all meals, tea, coffee, water and soft drinks, 6 dives, tank and weights, diving equipment, kayaking and fishing.

### 5. CANON

1. Prize TBC
2. Prize TBC
3. Prize TBC

### 6. GRAND STORES

1. [Qudos] Action Light by Knog  
Waterproof up to 40m, 3 light modes with 70-400 lumens. Pairs with GoPro and comes with a cold shoe accessory for DSLRs.
2. Rollei Actioncam 430
  - 4K Video Resolution (3840x2160 pixels/30 fps)
  - 2K Video Resolution (2560x1440 pixels/60 fps)
  - Full HD Video Resolution (1920x1080 pixels/120/60/30 fps)
  - 170° Super Wide Angle Lens
  - Loop function
  - Burst photo, photo time lapse
  - Integrated WiFi with up to 10m range

### 7. ANANTARA SIR BANI YAS ISLAND AL SAHEL VILLA RESORT AND AL MAHARA DIVING CENTER

Two nights stay at Anantara Sir Bani Yas Island Al Sahel Villa Resort in a deluxe seaview room for 2 with sumptuous breakfast in the Savannah Grill restaurant and 2 dives (tank & weights included). Valid from 1st of July to 20th of December 2017.

### 8. LE MERIDIEN AL AQAH BEACH RESORT & SPA

1. One night stay in a Superior Room inclusive of Breakfast Buffet at Views Restaurant for two persons.
2. 2 night Summer Promotion stay in a Superior Room inclusive of Breakfast Buffet at Views Restaurant for two persons.

### 9. MILLENNIUM RESORT MUSSANAH AND OMAN SAIL DIVE CENTRE, OMAN

2 nights stay for two adults in Superior Room, with breakfast basis and 2 days diving package for two persons valid until 30<sup>th</sup> December 2017.

### 10. NOMAD OCEAN ADVENTURES

1. TDI Advanced Nitrox IANTD Diver Course in Musandam, Oman, excluding certification fees and accommodation.
2. TDI CCR Air Diluent 30m Diver Course in Musandam, Oman, excluding fees and accommodation.
3. 2 days/2 nights, chalet package (4 dives) for 2 in Musandam, Oman.

### 11. THE DIVE CENTRE

Two dives for two people at The Dive Centre – Sandy Beach.

### 12. MTM MARINE LLC

1. MARES XR Single Tank BCD.  
Includes: 16lb Lift Donut, Aluminum Backplate and Harness.
2. MARES Smart Dive Computer.
3. MARES XR Power Plana Fins.

### 13. DIVERS DOWN

Rebreather Course on Dive Rite O2PTIMA CCR Unit

### 14. AL BOOM DIVING

2 dives in Fujairah with full equipment for 2 divers.

### 15. FREESTYLE DIVERS

A weekend of East Coast diving for 2 people combined with an introduction to wreck hunting and wreck surveying techniques. (Accommodation not included)

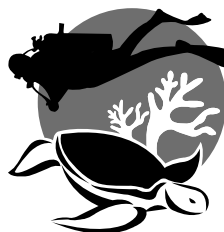
### 16. EMIRATES DIVING ASSOCIATION (EDA)

Capture Lens Canon EF-Mount by Peak Design. To carry and change lenses with ease.

NOTE: For Canon users only.

### THE PEOPLE'S CHOICE AWARDS PRIZE SPONSOR

17. iQ-UV (3 prizes sponsored) UV Protection youWear | [www.iq-uv.com](http://www.iq-uv.com)



**DIGITAL ONLINE**  
جمعية الإمارات للغوص  
EMIRATES DIVING ASSOCIATION  
PHOTOGRAPHY AND FILM COMPETITION



# THE DIGITAL ONLINE JUDGES

**ANDY MURCH** | BIG FISH EXPEDITIONS  
Wildlife Photographer



Andy Murch is an award winning wildlife photographer and the founder of Big Fish Expeditions. Specialising in images of marine predators over the last two decades, he has probably photographed more shark species than any other diver. Andy's images and shark stories have appeared in hundreds of books and magazines around the world from titles as varied

as Scuba Diving, FHM, the New York Times, Digital Photography Magazine and the Journal of Zoology. Andy is the creator of the ever expanding Shark and Ray Field Guide on Elasmodiver.com and the driving force behind the Predators in Peril Conservation Project.

**Elasmodiver Shark and Ray Picture Database:** [www.elasmodiver.com](http://www.elasmodiver.com)

**Marine Life Images:** [www.marinelifepics.com](http://www.marinelifepics.com)

**Predators in Peril Project:** [www.PredatorsInPeril.org](http://www.PredatorsInPeril.org)

**WEBSITE:** [www.bigfishexpeditions.com](http://www.bigfishexpeditions.com)

**FACEBOOK:** Big Fish Expeditions

**SIMON J PIERCE** | MARINE MEGAFAUNA FOUNDATION  
Marine Conservation Biologist & Underwater Photographer



Simon is a marine conservation biologist and a Co-Founder and Principal Scientist at the Marine Megafauna Foundation. Most of his work focuses on the world's largest fish: the whale shark. He also works with other threatened species, particularly sharks, rays, sea turtles, and for the protection and management of important marine habitats. He acts as a science advisor for the Wildbook for Whale Sharks global

photo-identification library, and also a Director of Wild Me, the non-profit organisation which oversees it's development. Finally, he's a Member of the IUCN Shark Specialist Group, an invited group of experts that synthesises scientific knowledge and assists in the development of global conservation strategy for these fish. Since 2012 he has become increasingly interested in photography as a way of documenting his work, and for communicating his enthusiasm for nature and wildlife in general. His photographs and videos have been published by a wide variety of media outlets, including New Scientist, the Washington Post, Scientific American, BBC Wildlife, Discovery, Earth Touch, Huffington Post, Yahoo, Rough Guides, and Sport Diver.

**WEBSITE:** [www.simonjpierce.com](http://www.simonjpierce.com)

**FACEBOOK:** Simon J Pierce Photography

**IMRAN AHMAD** | ESCAPEINC. DIVE & PHOTOGRAPHY  
Professional Photographer



Imran Ahmad has been capturing the magnificence of life both above and below the water's surface for over 20 years. A celebrated and internationally published professional photographer, Imran is committed to showcasing, preserving and protecting the ocean's environment and its surroundings. Clients can find photographic solutions for corporate, commercial,

wildlife, creative arts, publishing, photo clinic and underwater projects. A graduate from Middlesex University with a Bachelor of Arts in Film making, he is the brand ambassador for RGB Lights (Japan), and a member of the Ocean Artist Society.

#### PUBLISHED BOOKS

- Seychelles Unexpected Treasures (Underwater Photo Art)
- Ocean Tapestry (Underwater Photo Art)
- Hidden Sanctuary (Mabul & Sipadan Underwater Look Book)
- PURE Series

**WEBSITE:** [www.escapeinc.com.sg](http://www.escapeinc.com.sg)

**FACEBOOK:** Imran Ahmad Photography

**CHRISTOPHE CHELLAPERMAI** | NOMAD OCEAN ADVENTURES  
PADI, TEK TDI & Rebreather Instructor



Christophe Chellapermai arrived in the United Arab Emirates when he was 7 years old and has been living in the Middle East region ever since. His love of water started as a young child and he has been a diver since he was 12 years old.

Chris became a PADI Scuba Instructor in 1998 and with 25 years of diving experience and 17 years of teaching experience, he has gained much knowledge in the aquatic realm. He is a TEK TDI Rebreather Instructor with Submatix and can teach CCR up to 60m. Founder and owner of Nomad Ocean Adventures since 2004, he loves the ocean and the planet and does all he can to involve Nomad Ocean Adventures with environmental conservation. Being a photography and nature lover, he spends hours in the water taking photos of his underwater adventures.

**WEBSITE:** [www.discovernomad.com](http://www.discovernomad.com)

**FACEBOOK:** Nomad Ocean Adventures Musandam

**JONATHAN ALI KHAN** | WILD PLANET PRODUCTIONS  
Managing Director



JAK is a topside wildlife and underwater cameraman, producer, director and editor with a strong passion for the natural world having worked on a wide range of unique projects in the region and is recognized as an authority on environmental, conservation and diving related issues. His fascination with filming all started after years of working as a photojournalist and

shooting underwater stills. His primary interest is in marine subjects that led to the creation of Ocean World Productions in 2003. In 2008, JAK left Ocean World Productions in order to focus entirely on natural history TV development, leading to the recent creation of Wild Planet Productions.

**WEBSITE:** [www.wildplanetfilms.org](http://www.wildplanetfilms.org)

**FACEBOOK:** Wild Planet Productions

**ALLY LANDES** | EMIRATES DIVING ASSOCIATION  
Project Manager, Graphic Designer, Writer, Editor, Photographer & Videographer

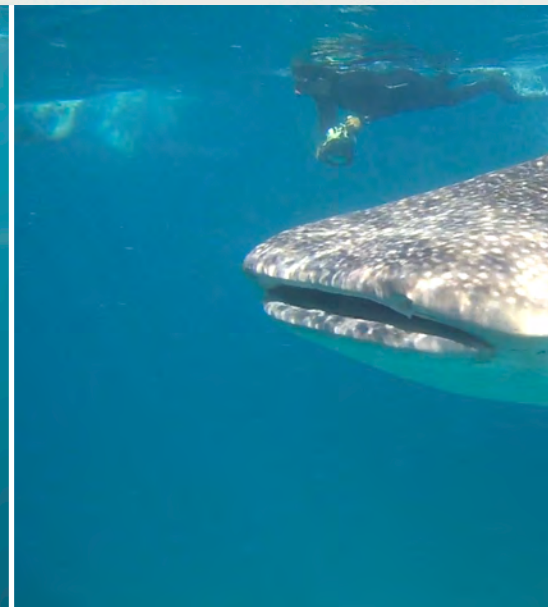


Ally has worked with EDA since December 2004 when she created and introduced the quarterly magazine, 'Divers for the Environment', as magazine Producer, Editor and Designer. She branded and helped foresee the development of Digital Online – EDA's Underwater Photography and Film Competition from its launch in 2009 and has since managed the event. Ally keeps busy within her fields of passion, always looking to fill gaps with improvements, developing EDA's brand, designs and managing all the EDA social media and FAM trips. As a qualified PADI Instructor, she utilizes the experience within everyday life at EDA.

**WEBSITE:** [www.emiratesdiving.com](http://www.emiratesdiving.com)

**FACEBOOK:** Emirates Diving Association





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# EQUIPMENT REVIEW

## ROLLEI ACTIONCAM 430

FEATURE AND PHOTOGRAPHY **ALLY LANDES**

The film quality is very good. The overall motion is very smooth and proves a good amount of detail.  
Could this be the Action Cam for you?









Comparing the GoPro Hero4 Black and the Rollei Actioncam 430 side by side. My GoPro 4 generation does not have a screen built in as can be seen, but it is an LCD Touch Screen where the Rollei's screen is not.

As an avid GoPro user for its quality and compact size, I was a little nervous when Grand Stores Digital asked me to try out and review the new Rollei Actioncam 430 – knowing all too well what the new GoPro Hero5 Black has to offer. Rollei's most powerful camera offers complete 4k video resolution with an image rate of 30fps and I decided to test it out on a recent whale shark expedition in Djibouti which I've covered in our Diving Destinations section.

This little camera is exactly the same size as my GoPro Hero4 Black and I can use the same underwater housing and accessories – which in my book is a bonus – the batteries however, are not compatible, but then again, why would they be?

I have to say, the Rollei is incredibly easy to use, but I wasn't impressed with the screen not being a touch screen like the GoPro. A force of habit is hard to break. Starting it up is very slow and you cannot press the shutter button and expect it to automatically start filming like the GoPro's QuikCapture. You have to switch the Rollei on first, losing yourself about 10 seconds in the process.

The film quality is very good. The overall motion is very smooth and proves a good amount of detail. I felt the contrast and the tone fluctuated quite a bit in 1080p, which I was set on for the mornings I was out to film the whale sharks as I wanted the battery to last and I didn't want massive sized files filling up the microSD memory card as the Rollei only takes 32 or 64GB cards.

The lens does suffer from flare when pointed directly into sunlight or at a light coloured surface reflecting light, but it generally produces good, clean footage. I hadn't realised that the menu has a 'Snow Mode' for this exact purpose.

The photo time lapse option is great! For this though, I would have needed to set the camera up on a tripod and leave it for the amount of time I needed captured, but I was only testing the camera out for the water action. Sadly, I had to abandon it on several occasions due to it freezing over, and the only option available in that situation was to pull the battery out and reset it. Not at all what you want when you're in water and there are whale sharks all around you just waiting to be captured on film.

To play it safe on my dives, I went back to my GoPro and paired it with the [Qudos] Action Light by Knog which are both also available from Grand Stores Digital. These little [Qudos] light beauties are a must for loss of light and colour at underwater depths and mounts snugly alongside your GoPro or Rollei with the Action Camera Mount included.

## ROLLEI ACTIONCAM 430

- 4K Video Resolution (3840 x 2160 pixels/ 30fps)
- 2K Video Resolution (2560 x 1440 pixels/ 60fps)
- Full HD Video Resolution (1920 x 1080 pixels/ 120/60/30fps)
- 170° Super Wide Angle Lens
- Loop function
- Burst photo, photo time lapse
- Integrated WiFi with up to 10m range
- Simple camera access via App (iOS/ Android) from your Smartphone or Tablet
- Includes wireless remote control for wireless shooting up to 10m distance
- Includes underwater/protective case for depths up to 40m
- Battery run time up to 90 minutes (without WiFi, 1080p/60fps)





Rollei camera setup with [Qudos] Action Light by Knog.



Still taken from video footage (1080p) with no flare.



Still taken from video footage (1080p) with flare.

#### DIMENSIONS

Width: 5.9cm  
Height: 4.1cm  
Depth: 2.1cm  
Weight: 66g

#### ACCESSORIES INCLUDED

Rollei provides the Actioncam 430 with a GoPro compatible accessory package. Two different back panels (1 x diving to a depth of 40 metres and 1 x splash protection for better sound recording), an ergonomic remote control device for the wrist (with strap) with a range of 10 metres and the safety pads with the secure release system (SRS) that have been recommended by experts.

#### THE GOOD

- Easy to use and filter through menu.
- Can use GoPro accessories.
- Good overall film quality.

#### THE BAD

- Slow startup.
- The camera does not sit tightly in the underwater housing. Rattled when shook.
- Often freezes. The only solution is to pull out the battery (once out of water and

with dry hands) to reboot the camera and you must then remember to reset the date and time.

- Time stamp is on as default, much to my disappointment of later playing back video from a full morning with whale sharks to find the bottom right corner of screen taken up by offensive date and time countdown. You cannot see this when playing back directly from the Rollei.
- Takes 3 hours to fully charge the battery.
- Wide angle is the only option.
- Not a touch screen.

#### OVERALL

When competing with giants such as GoPro, I envisaged a GoPro 4 look-alike's price to be more competitive than it is. The all new GoPro Black Hero5, with built in advanced video stabilisation, voice control and now waterproof up to 10m without external underwater housing, is priced at AED1,599. The Rollei Actioncam 430 is set at AED1,299, but there is an EDA member discount on offer.

If you're a complete novice to video, then by all means, the Rollei is a great and simple camera choice! But if you're looking for that

little bit extra and you know your way around video, this little gadget may not be for you.

DESIGN ★★★

FEATURES ★★

PERFORMANCE ★★★

IMAGE QUALITY ★★★★★



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**EDA MEMBER DISCOUNT**  
**ROLLEI ACTIONCAM 430**  
 (Includes 21639 Rollei Zubehor Outdoor Set)  
 Original Price: AED 1,299  
**10% DISCOUNT FOR EDA MEMBERS**  
**TOTAL: AED 1,170**



# WHALE SHARK

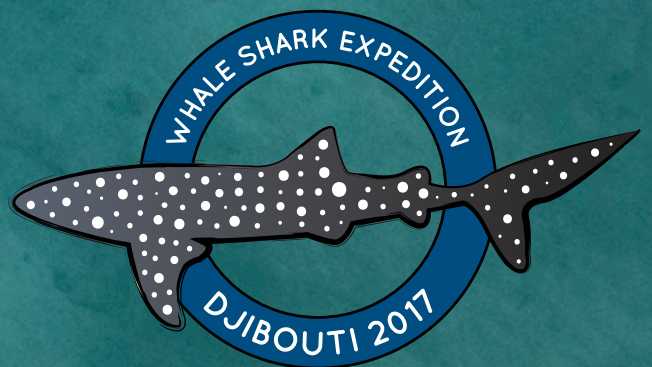
## SPOTTING IN DJIBOUTI

FEATURE **ALLY LANDES** PHOTOGRAPHY **SIMONE CAPRODOSSI**

Djibouti is the perfect location to come face to face with whale sharks during their migrational period. Getting in to swim with these gigantic fish is an experience one is not soon to forget. They are one of the world's coolest and very sadly now, officially Endangered globally.











Livaboards are definitely the way forward. What better way is there to enjoy a week of diving and snorkelling with a purpose – other than on a large, comfortable boat, on location, with good food, good company, pure pleasure... and some research.

## THE RESEARCHERS

Eleven of us headed out to Djibouti in January in search of the seasonal whale shark aggregation with team leader, Marine Biologist – David Robinson, Ph.D. who is also the Chief Scientist with Sharkwatch Arabia.

Sharkwatch Arabia is a database that aims to collect sightings on whale sharks throughout the region. The initiative was started as a tool to collect information on shark abundance and their movements. The information collected is used in investigating the ecology of whale sharks in the Arabian Gulf and the Gulf of Oman.

Also part of the research team, Jennifer V. Schmidt, Ph.D. – Director of Science & Research at The Shark Research Institute and Rima W. Jabado, Ph.D. – Founder and Lead Scientist of the Gulf Elasmobranch Project.

Jennifer is an Associate Professor in the Department of Biological Sciences at the University of Illinois in Chicago. She is a molecular biologist using genetic analysis to

study the reproduction and development of a variety of organisms, from sharks to mice to humans. Dr. Schmidt's laboratory has worked on whale sharks since 2001, using species-specific molecular markers to study their breeding and reproduction.

Rima is a fisheries scientist at the Environment Agency Abu Dhabi and also acts as the IUCN Regional Co-Chair for the Indian Ocean for the IUCN Shark Specialist Group. She works on sharks and rays across the Arabian region with a focus on fisheries and trade. The Gulf Elasmobranch Project is a non-profit initiative based in the United Arab Emirates. Its mission is to advance research, education and conservation of elasmobranchs (sharks, rays, guitarfish and sawfish) in the Arabian Seas region.

## DOLPHIN SERVICES

This trip consisted of a week aboard the Dolphin Services livaboard – the Deli – a Turkish Gulet run by Diving Instructor, Riccardo Marchetto and manned by their super Djiboutian crew members. The boat is fully equipped for divers with dive tank compressor and 2 skiffs to run the dives from. There are 6 ensuite rooms with bunk beds to comfortably accommodate 12 guests, a large deck with sun beds is situated out on the bow, there is a large galley below for all your digital camera charging needs and the breakfast/

dining area is out on the stern where the Cook serves up some fantastic meals!

Dolphin Services is a PADI 5 Star Dive Centre in Eastern Africa and they offer the whale shark cruises that we have come especially to Djibouti for. Dives are done between the Indian Ocean and the Red Sea. Our adventures were based in the Ghoubet Strait where whale sharks migrate and claim their feeding grounds of plankton between the months of October and February.

## THE SNORKELLING & THE DIVES

In all, I only did nine dives during our week amongst the whale shark snorkelling action, choosing to take on a more relaxed approach to the trip as this was a vacation after all and I wanted to get equal amounts of time doing everything. That included putting my feet up and chilling out on the Deli!

Diving in Djibouti won't have you raving about the exotic marine life, because it's not as lively an underwater world compared to its neighbour's untouched Red Sea in Sudan, but the dive sites along the Ghoubet Strait are a little less known and it's all about the adventure, the underwater architectural landscapes, topography, the stunning coral reefs and you guessed it, the whale sharks (*Rhincodon typus*).





The coral monuments are a big wow factor and they are plentiful, colourful and they are healthy. You can spend all your days snorkelling without having to get in to dive if you so wished. With water temperatures of 27°C at depths, a rash vest was all that was needed at the surface amongst the hustle and bustle of all the reef fish. There are some amazing photo opportunities for photographers (both above and below water) with those colourful backdrops, and some fun to be had with split levels. We had the most perfect clear blue skies throughout and the sunsets were a show stopper themselves. Getting comfortable on the boat in the early evenings ready to watch the sunset is a must.

The main purpose of our trip was of course to see and get in the water with the world's largest fish, the whale shark! Djibouti is the perfect location to come face to face with them during their migrational period. Getting in to swim with these gigantic fish is an experience one is not soon to forget. They are one of the world's coolest and very sadly now, officially Endangered globally.

## SNORKELLING: RAS CORALI ★★★★★

Our first day was all about snorkelling with whale sharks and it was a great day for shark spotting. We must have seen 6 or 7 individuals as they fed relaxingly amongst us snorkellers

with our cameras pointed directly at them. On a few entries, we had 2 and 3 whale sharks feeding in the same vicinity which is quite rare, but the plankton was abundant this day and the water, calm. This really triggered off a great start to the action we had come to seek. Some of the team were lucky to witness some vertical feeding.

The aim of those with cameras was to get identification photographs of the sharks' spot patterns on both right and left flanks as they are unique to each individual, very much like a fingerprint is to humans, and estimate the whale shark's length. If it was also possible, do a freedive and get a photograph of the sex of the animal. If these are yearly recurring sharks to the area, the information helps the researchers learn about their growth rates and behaviour, and know what these animals do over their life span.

Jennifer took water samples over different days of when sharks were feeding and when they weren't in order to get a better understanding of what keeps these filter feeders in the area.

## DIVE 1: DE BUTRA ★★ ★

Time In: 9:09

Depth: 27.8m

Temp: 27°C

Total Time: 44 mins

- Hawksbill Turtles (*Eretmochelys imbricata*)
- Cownose Rays (*Rhinoptera javanica*)

- Napoleon Wrasse (*Cheilinus undulatus*)
- Bluestripe Snapper (*Lutjanus kasmira*)
- Arabian Angelfish (*Pomacanthus asfur*)
- Yellowfin Hind (*Cephalopholis hemistiktos*)

This was a devastating day for the Critically Endangered Hawksbill Turtles as we came across three dead ones in a fishermen's net. A cheerier sight was from the very large school of Cownose Rays, all for a very short moment as they passed us by. This dive site constituted more rock than coral and the fish population was sparse. The Napoleons scarpered if you tried to get close, but we noticed that they are quite common on the dive sites and if they are there, you'll see more than just the one.

Once back on the Deli, your breakfast awaits and plans are made for the rest of the day. We decided to dedicate it to snorkelling with the whale sharks at Ras Corali. The waters were again rich with plankton enticing sharks in large numbers, more than one shark at a time on a couple of entries. One individual we saw on more than one occasion was easy to identify from the other sharks as he had a white marking on his left pectoral fin. It was also becoming more apparent that most of these young sharks were all male.

It can get very tiring and some level of fitness is required to keep up as you constantly roll in













backwards from the skiff to follow a shark, and then haul yourself back into the skiff once you have fallen behind to go and find another. Within minutes, you find one and you start the process all over again. You definitely get a workout from it and an overall satisfaction like no other:

## **DIVE 2: ISLE DE BUTRA ★★★★★**

**Time In:** 9:23

**Depth:** 33.4m

**Temp:** 27°C

**Total Time:** 46 mins

- Bluespotted Ribbontail Rays (*Taeniura lymna*)
- Bluesripe Snapper (*Lutjanus kasmira*)
- Yellowfin Hind (*Cephalopholis hemistiktos*)
- Arabian Angelfish (*Pomacanthus asfur*)
- Hooded Butterflyfish (*Chaetodon larvatus*)
- Redcoat Squirrelfish (*Sargocentrum rubrum*)
- Summan Grouper (*Epinephelus summana*)
- Coral Grouper (*Cephalopholis miniata*)
- Yellowtip Soldierfish (*Myripristis xanthurus*)
- Red Sea Raccoon Butterflyfish (*Chaetodon fasciatus*)
- Tailfin Batfish (*Platax teira*)
- Sergeant Major (*Abudefduf vaigiensis*)
- Moon Wrasse (*Thalassoma lunare*)
- Bluecheek Butterflyfish (*Chaetodon semilarvatus*)
- Masked Puffer (*Arothron diadematus*)
- Blue-Green Chromis (*Chromis viridis*)

The coral reef near the surface of this dive is simply stunning. You could just snorkel here with all the colour and life present at 5m. Some of the table corals are huge and in

perfect condition. We had expected to see lots of moray eels lurking out of holes, but we surprisingly didn't see any.

Overall, this is a really nice site to dive. The light plays beautifully with the corals and all the elegant fish making it a great location for photographers. The juvenile Tailfin Batfish made good subjects.

## **DIVE 3: LA PASSE ★★★**

**Time In:** 13:23

**Depth:** 37.4m

**Temp:** 27°C

**Total Time:** 22 mins

- Giant Grouper (*Epinephelus lanceolatus*)
- Sailfish (*Istiophorus*)
- Eagle Ray (*Myliobatis*)

This has to be an incredibly well timed dive and one for experienced divers only due to the unpredictable force of the currents. It is known for its down currents and by what we've been told, has posed threat to several others before. This dive has the potential to show some very unique and very large marine life, which is why it creates such a fascination. There is only a half hour window in which to descend and hold onto the rocks to watch for passing fish before letting go, and safely drifting back up to the surface.

You really do have to keep your eyes open or whatever is down there, will be quick to miss.

We wanted to experiment with this dive site and created a project in the hope to capture the different species of marine life that may travel through La Passe. Equipped with 2 GoPros, zip tied to a 50m rope – to be released down to 40m – with a 30kg weight tied to the end in the hope it would hold the line down in the current for the purpose of filming stability.

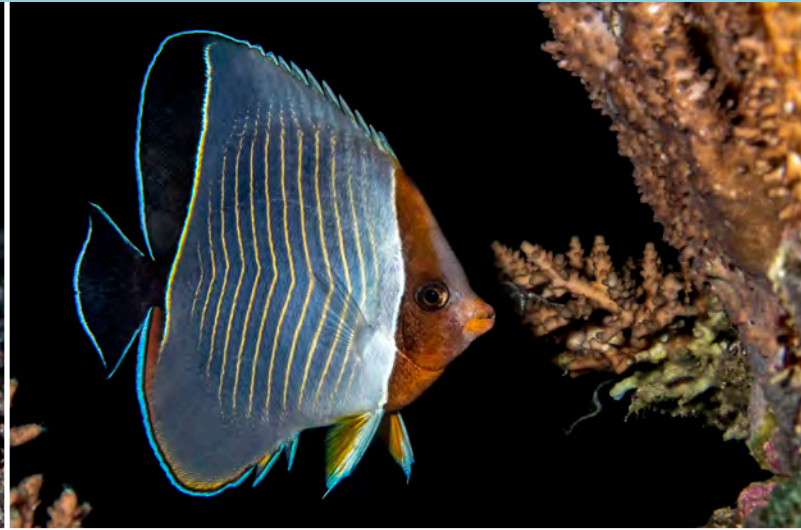
Aboard one of the skiffs, we headed over into the turbulent waters of La Passe and hauled our experiment overboard for 20 minutes. Despite the weight, the line was brought up mid water by the strengths of the currents heading in all directions, and looking back through the footage, we caught nothing on film much to our disappointment.

Having seen the motion and strengths of the water from the surface, you can understand how dangerous this dive can be for divers. Although our experiment didn't have the outcome we had hoped for, we are convinced with more time (which we didn't have) and more thought, we could have made it a success and satisfied our curiosity.

We spent the rest of the afternoon back in with the whale sharks, the numbers still high and revving, but with a lot less feeding action, requiring more swimming to keep up with them.



## DIVING DESTINATIONS



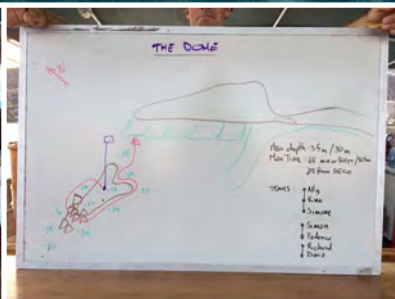
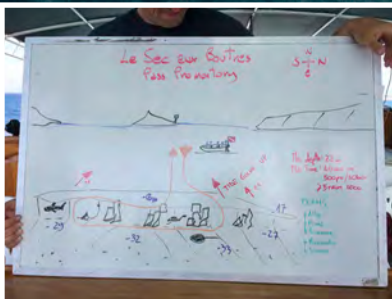
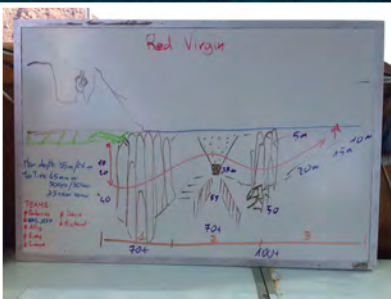
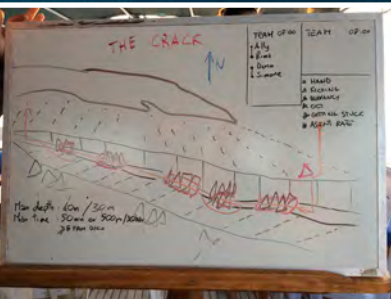












#### DIVE 4: THE CRACK ★★★★★

**Time In:** 8:37 **Depth:** 40.1m  
**Temp:** 27°C **Total Time:** 40 mins

- Masked Puffer (*Arothron diadematus*)
- Sergeant Major (*Abudefduf vaigiensis*)
- Hooded Butterflyfish (*Chaetodon larvatus*)
- Red Sea Bannerfish (*Heniochus intermedius*)
- Moon Wrasse (*Thalassoma lunare*)
- Blackspot Snapper (*Lutjanus ehrenbergii*)
- Gulf Parrotfish (*Scarus persicus*)

This dive will have you bragging to everyone that you've experienced diving between two continents! The walls of this underwater crack (which can also be seen on land up to the Rift Valley) are two tectonic plates that continuously move apart, separating Africa and Asia. You must be fully confident in your buoyancy here as you need to make a few ascents and descents in this dive as this crack extends itself to some very narrow canyons and caves amongst dark volcanic boulders. It's a good fun dive and you just need to make sure you don't get yourself stuck in the passages.

The water was full of tiny particles when we came up to the coral reef to do our safety stop, (I got the occasional sting) and it turned out the corals were actually spawning. It was quite an exciting event to witness.

The Deli was moored up alongside a gorgeous coral reef that was worth snorkelling, so we had our breakfast overlooking the picturesque bay and plunged in. The different earth tone

colours with the contrasts of the blues, greens and purples were striking amongst the families of brain, stony, table and staghorn corals. This is a beautiful spot!

#### DIVE 5: RED VIRGIN ★★★★★

**Time In:** 15:19 **Depth:** 27.9m  
**Temp:** 27°C **Total Time:** 46 mins

- Hawksbill Turtle (*Eretmochelys imbricata*)
- Arabian Angelfish (*Pomacanthus asfur*)
- Sergeant Major (*Abudefduf vaigiensis*)
- Blue-Green Chromis (*Chromis viridis*)
- Blackspot Snapper (*Lutjanus ehrenbergii*)
- Gulf Parrotfish (*Scarus persicus*)
- Sohal Surgeonfish (*Acanthurus sohal*)
- Twoband Anemonefish (*Amphiprion bicinctus*)

The topside of this dive site is called the Red Virgin because a figurine actually appears to be carved into the red rock face looking out over the water.

The topography of this dive site is very unique with its deep wall and pillars of red rock, making it both eerie and majestic. You end up heading over into a shallower dive for your safety stop, surrounded by a healthy and colourful coral reef where our last 20 minutes were spent with a juvenile Hawksbill who allowed us to tag along with her up until we surfaced.

#### DIVE 6: LE SEC AUX BOUTRES PASS PROMONTORY ★★★

**Time In:** 15:14 **Depth:** 25.2m  
**Temp:** 26°C **Total Time:** 42 mins

- Tailfin Batfish (*Platax teira*)
- Whitebar Surgeonfish (*Acanthurus leucopareus*)
- Coral Grouper (*Cephalopholis miniata*)
- Yellowbar Angelfish (*Pomacanthus maculosus*)
- Arabian Angelfish (*Pomacanthus asfur*)
- Red Sea Bannerfish (*Heniochus intermedius*)
- Redtooth Triggerfish (*Odonus niger*)
- Blue & Gold Fusilier (*Caesio caerulaurea*)
- Yellowfin Hind (*Cephalopholis hemistiktos*)

A very simple little dive site, but enjoyable. Nothing special was seen here and it was the only dive where we felt the chill of thermoclines and the temperature dropped by one degree.

#### DIVE 7: THE DOME ★★★★★

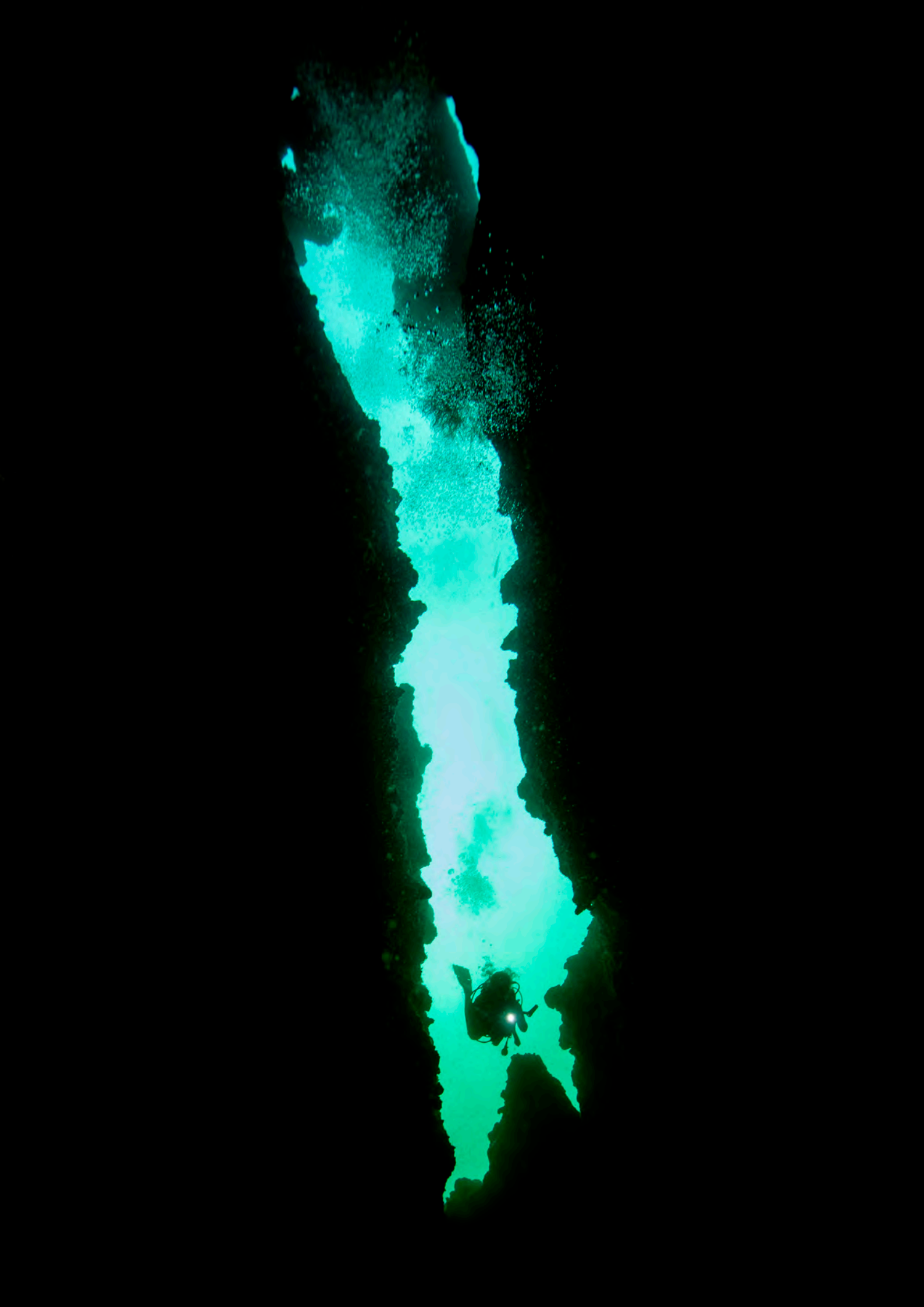
**Time In:** 9:03 **Depth:** 26.1m  
**Temp:** 27°C **Total Time:** 44 mins

- Bowmouth Guitarfish (*Rhina ancylostoma*)
- Bluespotted Ribbontail Rays (*Taeniura lymna*)
- Gulf Parrotfish (*Scarus persicus*)
- Twoband Anemonefish (*Amphiprion bicinctus*)
- Arabian Angelfish (*Pomacanthus asfur*)
- Summan Grouper (*Epinephelus summana*)

This was an amazing dive, for the pure joy of seeing my first ever Bowmouth Guitarfish. It was actually everyone's first time, so it was a pretty special day! There were 5 in total in which I saw 3. These rays are so much bigger in person than I had imagined.

This ray really does look like a shark, making it difficult to believe it's not! It's almost as









though these animals heads are crowned with scattered rows of knobby jewels and dressed in spotty pajamas. They are majestic and they are huge and quite possibly now my favourite ray!

After breakfast, we went off to do some more whale sharking but our skiff spotted just the one. The water's surface was choppy and this could have played a part in the sharks decline in numbers this day which was a shame as it was my last shark snorkel. But I have all the other days recorded on video to remember and know that they'll be back as soon as the conditions are right for them. This is after all their home for the duration of the season.

## DIVE 8: TURTLE POINT ★★ ★

**Time In:** 17:12 **Depth:** 18.4m  
**Temp:** 27°C **Total Time:** 46 mins

- Green Turtles (*Chelonia mydas*)
- Bluespotted Ribbontail Rays (*Taeniura lymma*)
- Bluespotted Stingray (*Neotrygon caeruleopunctata*)
- Bluestripe Snapper (*Lutjanus kasmira*)
- Blackspot Snapper (*Lutjanus ehrenbergii*)
- Moon Wrasse (*Thalassoma lunare*)
- Arabian Angelfish (*Pomacanthus asfur*)
- Yellowbar Angelfish (*Pomacanthus maculosus*)
- Whitebar Surgeonfish (*Acanthurus leucopareus*)
- Sohal Surgeonfish (*Acanthurus sohal*)
- Gulf Parrotfish (*Scarus persicus*)
- Redtooth Triggerfish (*Odonus niger*)
- Red Sea Bannerfish (*Heniochus intermedius*)
- Sergeant Major (*Abudefduf vaigiensis*)

- Coral Grouper (*Cephalopholis miniata*)
- Common Humbug (*Dascyllus aruanus*)
- Bluecheek Butterflyfish (*Chaetodon semilarvatus*)

This is a nice and easy dive site, known for its Hawksbill and Green turtle sightings, but I missed the 3 Greens that were spotted.

## DIVE 9: THE DOME ★★ ★★

**Time In:** 8:40 **Depth:** 23m  
**Temp:** 27°C **Total Time:** 42 mins

- Bowmouth Guitarfish (*Rhina ancylostoma*)
- Bluespotted Ribbontail Rays (*Taeniura lymma*)
- Twoband Anemonefish (*Amphiprion bicinctus*)
- Red Sea Bannerfish (*Heniochus intermedius*)

We requested to do this dive site again to see the Bowmouth Guitarfish one last time. It's an incredibly simple dive site to navigate and there really is nothing more to see here, but the anticipation of seeing this species makes this dive site all that more special and it's a good dive to end the adventure.

## WHALE SHARKS

The whale shark (*Rhincodon typus*) is a slow moving filter feeding shark and the largest known fish species.

The sharks can be seen in Djibouti all year round, but they are seen in larger numbers from mid October to February as plankton 'blooms' develop in the enclosed bay called the Goubet al Kharab (the Devil's Cauldron) in the Gulf of Tadjoura. Research has recognised the particular

importance of the bay in the development of juvenile whale sharks, which stay within the safe confines of Djibouti's coastline.

## SIZE

Whale sharks can grow up to 14m long, weighing up to 15 tons. The average size is 7.6m long. It is the largest fish in the world and females are larger than males (like most sharks).

## TEETH

Whale sharks have about 3,000 very tiny teeth but they are of little use. Whale sharks are filter feeders who sieve their tiny food through their large gills.

## DIET

They have a huge mouth which can be as big as 1.4m wide. There are five sets of filtering pads in their mouths and the pads filter the plankton out of the water; and then the filtered water passes out through the gill slits where oxygen is extracted through the gill filaments.

Their prey includes plankton, krill, small fish, and squid. The shark can process over 6,000 litres of water per hour.

## HABITAT

The whale shark inhabits all tropical and warm-temperate seas. The fish is primarily pelagic, living in the open sea but not in the greater depths of the ocean, although it is known to occasionally dive to depths of as much as 1,800 metres.









### SWIMMING

Whale sharks are slow swimmers, with speeds of no more than 5kph. They swim by moving their entire bodies from side to side (not just their tails, like some other sharks do).

### REPRODUCTION

Recently, research found pregnant females containing hundreds of pups, making whale sharks viviparous, giving birth to live young. Newborns are over 60cm long. Whale sharks

are sexually mature at 30 years old which is when they begin to mate and reproduce.

### LIFE SPAN

It has been estimated that whale sharks can live up to 100-150 years of age.

All the sharks we came across were juvenile, between 3-6 metres and they all seemed to be male. In order to better understand the purpose of this trip, I've asked David and

Jennifer to explain in their own words, what it is they contribute to science with their research on the whale sharks, and Rima on her research on the other elasmobranchs we encountered.

### THE RESEARCH

**DAVID ROBINSON, PH.D.**

For a few years now I have been supporting the research trips made by the team at the Marine Conservation Society Seychelles





(MCSS). The team led by Dr David Rowat have been collecting demographic and individual identification data on the whale sharks in Djibouti to build up a picture of occurrence and to keep an eye on the population.

The data we collected on our trip was focused on identification of individuals and the size and sex of the animals we encountered, this was sent to the MCSS

team for analysis and will hopefully help to support their data collection.

**JENNIFER V. SCHMIDT, PH.D.**

I am a geneticist by training, not a marine biologist, so I bring a different perspective to shark research other than some of my colleagues. I spent years researching human diseases, but was also interested in conservation genetics, using genetic tools to study wild populations.

About 15 years ago I partnered with the Shark Research Institute where I now work as the Director of Science & Research, to initiate a large genetic study of whale sharks. While conventional animal monitoring can answer many questions about shark biology, particularly for long-lived animals like the whale shark, it can be difficult to understand their behaviours over a lifetime. Genetics can capture movements throughout the life of an animal by recording where and with



## DIVING DESTINATIONS





whom that animal breeds. My work analyses genetic markers in whale sharks around the world, including Djibouti, and compares how similar the markers in each group are. Shark populations that are genetically very similar must have a history of interacting over time, through migration and interbreeding, while populations that are more different have fewer interactions. We find that whale sharks from the Pacific and Indian Oceans are genetically indistinguishable – these animals migrate and interbreed often enough that their markers do not vary.

Conventional tagging has not been able to demonstrate these movements, but genetics tells us that they occur. Atlantic Ocean animals we find to be somewhat different from the Pacific-Indian sharks – these animals interact less often. This data is important because it helps determine the best way to conserve whale sharks. While many countries have laws that protect whale sharks, other countries do not. The genetic similarity in particular between Pacific and Indian Ocean sharks says that national regulations are not enough to protect this species, whale shark conservation requires international protocols.

## RIMA JABADO, PH.D.

Around the world, many populations of sharks and rays have declined because of human induced pressures including overfishing as well as habitat destruction and degradation. Except for a few well known areas, it is becoming increasingly difficult to find 'hot spots' where live sharks or rays can be seen and enjoyed while diving. My work is mostly in fisheries and unfortunately it means that I mostly encounter dead sharks and rays. Because of that, and my complete fascination with them, when I travel to diving destinations, I am always on the quest to find live sharks and rays so I can enjoy their beauty and grace underwater. So our trip to Djibouti was a very pleasant surprise and definitely did not disappoint. We expected and hoped we would see whale sharks but we were also lucky enough to see various species of rays (including over 50 schooling cownose rays while diving). Our encounters with several bowmouth guitarfish two days in a row were amazing and quite unique. Unfortunately, we did not see any other species of sharks but having the option of going 'whale sharking' at any time of the day in great visibility was an exceptional experience. This allowed us to collect data on these gentle giants that will help whale shark scientists identify the individuals occurring in Djibouti waters and hopefully better understand their behaviour in the region.

## BACK TO DRY LAND

That ends our livaboard adventures. You spend the rest of the time rinsing off your dive equipment and cameras, pack up the rest of your belongings and enjoy the last lunch aboard the Deli before heading back to Djibouti Port for around 3pm.

We set to stay overnight at the Sheraton Djibouti Hotel as some of our flights were not until the following day and we did not have to be at the airport until 11pm. This enabled us to get used to our land legs again, go out for an evening meal together before splitting to go off onto our separate ventures, and get a good night's sleep in a real bed.

We did a quick trip into the city centre in the afternoon to visit the market and one major thing to point out, is that photography is frowned upon. Djiboutian's just don't like it and even if you ask for their permission to take their photo, they will say no (including the photography of their animals) with the exception of only a few, but mainly the younger generation. You will get a few individuals latch on to your group during your walk in the expectation that you will pay them as your city guide. They can be quite difficult to fend off, but it is advised to persist or you may experience unpleasanties.

In the morning, after breakfast, 3 set off to do some bird watching and catch a glimpse of the endangered Djibouti Francolin in the Djibouti mountains, 2 hired a 4WD to go off on a 3 day camping trip to discover a bit more of Djibouti, and the rest of us set out on a day's excursion to Lac Assal.

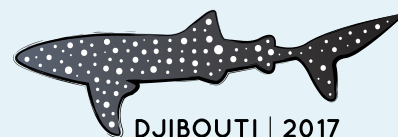
## LAC ASSAL

As is customary when in Djibouti – and you've not done it before – you can spend the last day visiting Lac Assal with your group to complete your surface interval before the flight home. Dolphin Services can arrange this for you.

Lac Assal is a crater lake located 120km west of Djibouti city in the central-western part. It is a saline lake which lies 155m below sea level, making it the lowest point on land in Africa and the third-lowest point on Earth after the Sea of Galilee and the Dead Sea. It is the world's largest salt reserve and due to its high evaporation rate, the salinity of its waters is 10 times that of the sea, making it the saltiest in the world after the Don Juan Pond. It's worth a visit.



Photos by Ally Landes



**DJIBOUTI | 2017**  
WHALE SHARK EXPEDITION

**FOR MORE INFORMATION:**



**SHARKWATCH**  
ARABIA

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



**SHARK RESEARCH INSTITUTE**

[www.sharks.org](http://www.sharks.org)



**GULFELASMO PROJECT**

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



**Planning your Trip and Accommodation:**

## DOLPHIN SERVICES

**SONJA KARJALAINEN**

Dive Ops and Tourism Manager  
PADI Five Star Dive Centre S-3736  
Haramous (opposite to Pizzaiolo)  
B.P. 4476, Djibouti

**Email:** [excursions@dolphinservices.com](mailto:excursions@dolphinservices.com)

**Mobile:** + (253) 7701 5446 (Sonja)

**Mobile:** + (253) 7710 3395

**Office:** + (253) 2134 7807

**Facebook:** Dolphin Excursions Djibouti

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

## THINGS TO BRING

### FOR DJIBOUTI AIRPORT ARRIVAL:

- Print out a copy of invitation letter.
- Have exactly \$90 for the visa on arrival.
- A pen.
- Your UAE ID Card if a resident.
- Flight boarding card(s).

### CURRENCY TO HAVE WITH YOU:

Euros or American US Dollars

### EXCHANGE RATES:

- \$1 USD = DJF 175-179
- €1 = DJF 190-200
- You can exchange money either at the Sheraton or at the exchange shop at the Menelik square.

### CREDIT CARDS:

- Credit cards are not widely accepted.
- You can pay with a credit card at the Sheraton and Kempinski Hotels and the Casino supermarket.
- Mainly Visa card is accepted (not Mastercard)

### ATMS:

- There is an ATM at the airport, at the Sheraton and Kempinski Hotels and in the city centre.



# THE EFFECTS OF CO<sub>2</sub> IN SCUBA ACTIVITIES

FEATURE **DR. DIEGO OLIVARI, DIVING AND HYPERBARIC MEDICINE**

Carbon dioxide (CO<sub>2</sub>) is a by product of a normal metabolism, a modulator of the physiological chemical environment and a substance involved in the regulation of the respiratory and circulatory systems. The effects of CO<sub>2</sub> are based on changes in the acidity of the interstitial, vascular and cellular fluids. More advanced studies on the effects of CO<sub>2</sub> started in the 1960s as a result from increased uses of submarines and space capsules. In these contained environments, increased levels of CO<sub>2</sub> would result in dramatic consequences. The purpose of this article is to review previous CO<sub>2</sub> studies and explain how this gas interferes with human physiology during underwater activities.

**The following overview summarizes the relevance of CO<sub>2</sub> in human physiology:**

- CO<sub>2</sub> is a normal constituent of bodily tissues;
- CO<sub>2</sub> is produced in the process of normal metabolism;
- CO<sub>2</sub> stimulates the neuro-sensory mechanism of respiratory control;
- CO<sub>2</sub> relaxes vascular smooth muscles and regulates the circulation in vital organs such as the brain;
- CO<sub>2</sub> diffusion in body fluids alters their acidity providing the right environment required for enzymatic reactions.

## I | PHYSIOLOGICAL ASPECTS OF CO<sub>2</sub>

The elimination of CO<sub>2</sub> produced through metabolism is happening through the respiratory system and is regulated by the CO<sub>2</sub> itself. The breathing cycle is stimulated by

a declining pH due to the increased level of CO<sub>2</sub>. The oxygen uptake, according to several authors (Lambertsen), could be considered as an "incidental consequence of the respiratory elimination of carbon dioxide". The main role of this CO<sub>2</sub> controlling system is not a complete elimination of produced CO<sub>2</sub> but maintenance of the right pH level (7.35-7.45) by retaining the right amount of CO<sub>2</sub> in the bodily fluids (45-50mmHg). These levels support the correct function of metabolic processes and ensure appropriate exchange through the cell membrane. Numerous processes are linked to the pH and its effect on the tissues – from the neuronal transmission, inflammation process, complement activation, blood cells recruitment during specific situations, etc.).

**The level of required CO<sub>2</sub> pressure in the tissues is maintained in two main ways:**

- By a control process initiated at chemosensitive, respiratory neurons. These cells can recognize elevated levels of CO<sub>2</sub> (above 50mmHg) by the pH reduction resulting from an increase in PCO<sub>2</sub>;
- The anatomic design of the lungs allows for only partial flushing of the alveolar spaces during each respiration. Our lung "design", in addition to the dead spaces in our respiratory system, facilitates CO<sub>2</sub> retention.

Understanding this processes is crucial to fully comprehend the important changes while diving underwater.

## II | ABNORMAL INCREASE OF CO<sub>2</sub>

Here we consider situations where CO<sub>2</sub>

**levels may rise above normal:**

- An acute increase of CO<sub>2</sub> resulting from sudden exposure to high ambient concentration can happen if the scrubber of the rebreather is not functioning as intended;
- Chronic progressive increase of CO<sub>2</sub> levels in confined living spaces with insufficient ventilation or scrubber system (open-closed diving bells, submarines, saturation systems, hyperbaric chambers);
- Intermittent occurrence (i.e. prolonged exposure to changing increased levels of CO<sub>2</sub> while using a rebreather);
- Autogenous increase due to a progressive deficiency of a pulmonary system leading to retention of metabolically produced CO<sub>2</sub> (apparently active during underwater activities). It seems being submerged decreases the response of our brain to an increased level of CO<sub>2</sub> so the respiratory system is not prompted to increase the breathing rate as it would on the surface.

In all events of increased CO<sub>2</sub> levels, our body will try to reduce its level by an adaptive process that involves the respiratory system through renal function (by increasing the retention of bicarbonate, the kidneys counteract the increase of acidity). If the exposure is severe or in some cases, due to metabolic or physiological changes, such alternations in our physiology can avoid severe consequences.

## III | THE CHEMICAL REACTIONS RELATED TO CO<sub>2</sub>

The chemical changes initiated by elevated CO<sub>2</sub> in bodily fluids, are associated with acidity





modification and acid-based modulations.

Several alkaline substances (bicarbonate and blood proteins such as haemoglobin) play an important role in the reduction of increased levels of  $\text{CO}_2$ , leading to a reduction of blood pH towards the acidity.

In the circulation system, carbon dioxide exists in three forms: physically dissolved (the smallest part), as carbamino compounds and as bicarbonate ions (the largest part). When  $\text{CO}_2$  reaches the lungs, the evolution to gaseous form happens almost instantaneously, determining the exhalation of  $\text{CO}_2$  and the intake of  $\text{O}_2$ .

#### IV | THE BIOLOGICAL REACTIONS RELATED TO INCREASED $\text{CO}_2$

Considering the above, we see that  $\text{CO}_2$  is a dominant factor linking respiratory actions with metabolism: a change of  $\text{PCO}_2$  prompts a change in concentration of hydrogen ions ( $\text{H}^+$ ) in blood, brain and other tissues.

Another important effect of  $\text{CO}_2$  is the depression of the central nervous system. The effects of  $\text{CO}_2$  are five times greater than the effects of nitrous-oxide – an anaesthetic gas that is 40 times more narcotic than Nitrogen. Acute exposure to inhaled  $\text{CO}_2$  concentration of approximately 15%, inevitably results in unconsciousness.

Analysing Lt Thomas Lanphier's experiment (to follow) shows that certain subjects have a high sensitivity to elevated  $\text{PCO}_2$  and show respiratory stimulation at a low level, whereas

other groups have a lower sensitivity with higher levels of alveolar  $\text{CO}_2$ .

In all subjects, effects on the circulatory system, autonomic nervous system and central nervous system have been demonstrated. These effects include: relaxation of smooth muscles of the vessels with a consequent vasodilatation that counteracts the stimulant effect on the heart rate; a double activation of sympathetic and parasympathetic nervous system (both being part of an autonomic nervous system); and the depressant action on the central nervous system. This reaction is related to the narcotic effect of  $\text{CO}_2$  and to changes in acidity of the intra and extra-neuronal fluids that influences the function of our nervous cells.

#### $\text{CO}_2$ has different effects related to its concentration in the inhaled gas:

- Up to 3% of  $\text{CO}_2$  at sea level does not produce recognisable respiratory discomfort;
- Levels between 4% and 6% produces detectable respiratory stimulation;
- Reaching 7-10% of  $\text{CO}_2$  can create dyspnea and deterioration of mental performance;
- 15-20% of  $\text{CO}_2$  causes notable respiratory distress with a rapid loss of consciousness and spasmodic neuromuscular twitching;
- Concentrations between 20% and 30% can cause convulsions within 1 to 3 minutes.

#### V | LANPHIER & OTHER STUDIES

The most comprehensive study on the retention of  $\text{CO}_2$  in divers has been conducted by Lt Thomas George Lanphier (a

medical officer of NEDU – Navy Experimental Diving Unit) in collaboration with Dr. Christian J Lambertsen of the University of Pennsylvania between 1955 and 1956. The purpose was to find a method to evaluate the personnel of the US Navy before deploying them in underwater activities.

During the study, the end-tidal Carbon Dioxide ( $\text{ETCO}_2$  – the amount in mmHg of  $\text{CO}_2$  measured in the exhalation of volunteers) and the rate of breathing activity (as the indirect result of increased retained  $\text{CO}_2$ ) were measured during rest and during work, while breathing different mixed gases at the surface, at 7.9 metres (26 feet) and at 30 metres (99 feet) depths. During one of the study phases, the work was performed in a wet, simulated dive (with a pool in a hyperbaric chamber); another phase was during a dry, simulated dive in a hyperbaric chamber (without pool).

The following mixed gases were used at given depths: air at the surface and at 30 metres, 45/55 oxygen/nitrogen mix at the surface and at 30 metres, 45/55 oxygen/helium mix at the surface and at 30 metres, 7/93 oxygen/nitrogen at 30 metres and 100% oxygen at 7.9 metres. The study was based on approximately 100 dives. The 35 volunteers were both divers and non-divers. The results of Lanphier's study was very interesting.

The analysis of all values and tables is fascinating, but in this article we will summarize the results: Comparing the values at the surface and during





work at a depth of 30 metres there was an increase of  $\text{ETCO}_2$  (measuring the diver's exhalation). This increase was not seen while breathing air or in the 45/55 oxygen-nitrogen mix. A very low (not significant) increase was registered while breathing oxygen at 7.9 metres, 7/93 oxygen-nitrogen mix at 30 metres and 45/55 oxygen-helium mix at 30 metres.

The increased  $\text{ETCO}_2$  created an increase in the breathing rate of non-divers though this was insignificant in divers. No significant increase of  $\text{ETCO}_2$  has been registered during work at a depth of 30 metres in dry

simulated dives. Moreover, Lanphier tried to analyse the nature and onset of symptoms of  $\text{CO}_2$  retention, but the results appeared quite confusing and the only undisputed symptom was the impairment of mental performance.

If we try to draw conclusions from the results summarized above, it appears the retention of  $\text{CO}_2$  is related to the depth (it is present during work at 30 metres), to the density of the mixed gases (it is higher while breathing oxygen-nitrogen mixtures rather than breathing oxygen-helium mixes) and to the higher percentage of oxygen in

a breathing mixture containing nitrogen. A higher percentage of oxygen seems to reduce the pulmonary ventilation.

The altered breathing rate in divers is not the only cause of  $\text{CO}_2$  retention – we can register increase of  $\text{ETCO}_2$  both in divers that don't react with an increased breathing rate, and in non-divers that have an increased breathing rate but where this breathing rate does not appear to reduce  $\text{ETCO}_2$ . The situations above appear to result from immersion in the water as they are not present in dry, simulated dives.





seems to correlate an increased amount of microparticles (products that form in the blood after decompression stress and after inflammation processes) with high levels of retained  $\text{CO}_2$ .

#### VI | HYPOTHETICAL REASONS FOR INCREASED $\text{CO}_2$ DURING UNDERWATER ACTIVITIES

$\text{CO}_2$  retention has been related to different mechanisms but primarily to the increased density of breathing gases. This is due to increased efforts in breathing activities with reduced gas exchange as a consequence.

A second cause seems to be a seemingly common habit among experienced divers to reduce the breathing rate in order to save gas. It is unclear if this is a conscious adaptation or due to a missing response from the respiratory system. The increased work of breathing from the effect of different pressure between the mouth and the centre of the lungs in different positions and with different SCUBA devices, surely has an impact on  $\text{CO}_2$  retention as well. Exhaling against resistance, such as during a dive using a rebreather with the counterlungs located in a lower position (below the mouth), can provoke a reduced elimination of  $\text{CO}_2$ . Increased dead spaces in the breathing apparatus also lead to rebreathing of  $\text{CO}_2$ .

Following a review of these studies, we can conclude that Carbon Dioxide retention during diving activities is very relevant to a diver's safety and requires a much deeper understanding. It seems important to develop a decompression algorithm allowing for management of increased levels of  $\text{CO}_2$  as well the necessary protocols to control excessive levels.

These factors encouraged the development of a new algorithm called CDDM (Carbon Dioxide Decompression Model) that I am developing which could be especially important for rebreather applications. The research activities planned as part of this study will hopefully lead to improvements in our understanding of the mechanisms relating to  $\text{CO}_2$  retention in divers.

**Dr. Diego Olivari** studied Medicine in Florence during his Military Academy course. After 17 years in service, in operative regiments, he retired and started working as an Emergency and Critical Care Doctor.

He completed a postgraduate Masters in Diving and Hyperbaric Medicine in Pisa (the course is recognised by IMCA and DMAC/ETDCHmed lev I and II), and starting to follow several Commercial Diving Companies and projecting almost 15 different research projects (included two new decompression algorithms for open and closed circuits). He is now employed in Dubai as a Diving and Hyperbaric Specialist.

#### Variations in human physiology related to the higher level of $\text{CO}_2$ have been demonstrated in various studies, including:

- A study by the National Aeronautics and Space Administration (NASA) in the 1970's showed a reduced maximal work capacity when the inhaled  $\text{CO}_2$  was greater than 2% (15 mmHg).
- Henning et al., evaluated the effect on cognitive performance with a higher level of inhaled  $\text{CO}_2$  and concluded degradation starts when the percentage of  $\text{CO}_2$  goes above 5-6% where a sudden loss of consciousness may also occur.
- According to the study of Kety & Schmidt (University of Pennsylvania) an increase of inhaled  $\text{CO}_2$  may reduce the time of the onset of CNS oxygen toxicity symptoms. This mechanism seems to be related to a cerebral vasodilatation resulting in an increased brain oxygenation.
- An article about caisson workers in Japan reported an elevated rate of decompression sickness (more than 300%) due to ventilation problems in the caisson that resulted in an increase of inhaled  $\text{CO}_2$ .
- New research performed by Professor Steven Thom (University of Pennsylvania)





## 6 TIPS FOR SAFE LIVABOARD DIVE TRAVELS

FEATURE **CAREN LIEBSCHER**

Liveaboard dive safaris are particularly popular among divers planning their holidays. You get to live on the ocean and you can devote the entire day to your favourite activity: pure relaxation and adventure!

What sounds like total freedom to you though, may represent annoyance or discomfort to others. To avoid turning your dream vacation into a bad memory, we have compiled a few tips and tricks specially addressed to those who have never undertaken a dive safari or liveaboard cruise before.

### MEDICAL CONSIDERATIONS

As in any dive holiday, it is important to be in good health. Remember that a doctor may not be on board, so you had better prevent problems in the first place. Make sure you have no dental problems and have

all required vaccinations, personal prescription drugs, remedies for seasickness, diarrhoea, constipation, colds and ear problems. Also consider your specific limitations (disabilities, diseases, allergies, etc.) which could get worse once on board.

It is always good to have a current medical examination for diving fitness according to requirements by diving organizations or respecting the requirements of the diving and hyperbaric medicine societies.

In case a medical emergency should arise, there are some other elements implied. The boat could be far away from shore: location of the emergency and time (night) might influence any possible evacuation. So be aware that there might be delays in getting you to a proper medical facility. Also keep in mind these

kinds of evacuations are normally costly and it is recommended to carry a good dive (and health or travel) insurance with you, together with emergency telephone numbers.

### DIVE TRAINING & EXPERIENCE

Complete dive training is important, and having extensive diving experience is of great advantage too. In most cases, beginner training on board is not possible. Also, you can only focus on any new issues onboard, once the fundamental diving problems are mastered. This includes proper buoyancy control, drift diving, diving next to steep walls as well as wreck diving and night diving.

### DIVE MATERIALS AND SPARES

Your dive equipment should be in perfect working condition, have the correct fit, and you should be familiar with it. But it is



always possible something breaks, so you better be prepared for some minor hiccups. Bringing along replacement parts is highly recommended, since in the case of malfunction or failure, nothing can be purchased on site – you are in the middle of the ocean!

#### Just consider bringing with you:

- Mask or fin straps
- Spare mouth piece
- Small spare lamp
- O-rings
- DIN/INT adapter
- Blind plugs HD, MD
- Tool kit
- Carabiner
- Cable ties

#### CHOOSING THE RIGHT WETSUIT

Generally this depends on the destination. Just remember that, especially during long dives, water can deprive your body of a high amount of thermal energy, even if it's relatively warm.

This is all the more important as on liveboard cruises there are several dives per day. At the beginning of the day, as the first dive starts, the water temperature might feel warm and comfortable, but this will change after more dives throughout the day. Stepping into your wet and cold neoprene suit when getting ready for the night dive will feel anything but comfortable. A good idea may be taking along your thicker suit in winter or spring, especially when diving at sites such as in the Red Sea.

Also remember that even a slight scratch from a coral heals very poorly in sea water and that nettle threads on the skin are painful. A thin

wetsuit that also covers arms and legs can help prevent this. While snorkelling, it will also protect you against sunburn.

#### WHAT ABOUT THE BOAT/DIVE CENTRE?

You want to make sure the centre and boat chosen can guarantee you a nice and safe holiday. Liveboard dive boats should have:

- Optimised space;
- Fixation points for dive equipment, especially for tanks;
- A large dive platform at the stern (entry and exit point).

#### Before booking, get detailed information about:

- Boat's name and size;
- Cabin outfitting (e.g. double story bunks or single beds, air conditioning, shared toilets/showers or individual toilet/shower in each cabin, in-cabin space);
- Fresh water tank, additional desalination system;
- 24-hour power supply/generators, charging options for flashlights, torches, lamps, etc;
- Tank size and material (aluminium tanks are lighter and require more lead), secured/lashed valve connections (DIN, INT);
- Max number of dives per day, possibility to do night dives, limitations regarding dives (duration, depth, residual pressure etc);
- Space available in the salon, on the deck and on the platform;
- Possibility to do accompanied dives on request;
- Is the compressor on the deck (noise nuisance) or under the deck? Can it aspirate "bad air" such as exhaust gases from the boat's engine or the kitchen? Is Nitrox filling possible?
- Is the deck skid-proof, also in wet conditions?

- Are there any hand-railings to hold on to on the boat?
- Are there spare parts or extra diving equipment available on board?
- Are first aid and oxygen materials available and stored in a weather, water and shake proof mode?
- Does the boat carry safety equipment such as inflatable life rafts or boats, fire detectors, fire extinguishers, radio, radar and GPS?

When you get an answer to all of the above questions, and you've made sure your liveboard dive trip is well prepared, don't forget to bring along your photo or video camera, and capture unforgettable moments.

We hope we provided you with some helpful pieces of advice, and wish you beautiful adventures, wherever you go!

#### Advantages of a liveboard dive safari:

- Pure and simple diving without the need of hauling around heavy equipment;
- Unspoiled, exclusive dive spots;
- Sharing your favourite leisure activity with a group of like-minded people.

#### Challenges:

- Living in a confined space with a number of strangers of different nationalities, having the most diverse habits and interests. Not everybody is made for it;
- Possibility to encounter long-lasting storms;
- Water scarcity (check out our More Water, Less Bubbles campaign).

Some information was taken from Werner Scheyer's book *Sicherheit (Safety)*.

## HYDROCEPHALUS, SHUNTS, AND SCUBA DIVING – CAN THIS BE SAFE?

FEATURE **CAREN LIEBSCHER**

#### Can someone with a shunt go scuba diving?

The answer to this question is not an easy one and a bit complex. In general, a shunt is a system that shifts fluids. In this specific case, a shunt is an artificial pathway made of fine tubes, a catheter, and a valve. The fluid to be shifted is from the brain to the body's periphery because the person has been diagnosed with a hydrocephalus (from Greek "hydro" for "water" and "cephalus" for "head").

Our brain and spinal cord swim in a so-called cerebrospinal fluid (CSF) that buffers it against concussions and also protects it otherwise. Scientifically it's called *Liquor cerebrospinalis*. The CSF fills cavities, so-called ventricles in the brain. Usually the CSF is produced and then absorbed by the brain and its adjacent layers in a balanced way. A hydrocephalus is caused by a deficiency regarding the absorption of the brain's fluid which can evolve from a bleeding in the brain caused by a previous stroke or ruptured aneurysm, or can just be a birth defect. It is a very

serious, life-threatening neurological condition and jeopardizes all vital functions since it puts the brain under increasing pressure. The pressure cannot go anywhere because the skull is a bony and solid structure which cannot expand.

The symptoms of a hydrocephalus may be low blood pressure, bradycardia, slurred speech, inability to walk, speak, think, eat, drink or act in any way, extremely slow movements, comatose tiredness and, finally unconsciousness. A person with these symptoms needs immediate help and medical attention. In an emergency situation like this, a neurosurgeon will drill a hole in the skull and release the fluid and the pressure. If the hydrocephalus is a permanent condition, the insertion of a shunt system is indicated as a permanent solution to continuously release the superfluous fluid from the brain. People can live a normal – terrestrial – life with a shunt.

The shunt's catheter is positioned centrally in the brain's ventricular system and connects

to the tube via an adjustable unidirectional overpressure valve. The tube runs subcutaneously, i.e. under the skin, along one side of the body and leads either into the abdominal cavity or to the atrium of the heart. Fluid will be shifted from the brain to the periphery of the body when the pressure in the head overcomes the pressure setting of the valve.

Those shunts are called either VP shunt or VA shunt. VP stands for ventricular-peritoneal and VA for ventricular-atrial. "Peritoneal" means the abdominal cavity (peritoneal cavity), "home" to our inner organs and intestines, while "atrial" refers to the atrium of the heart. Both peritoneal cavity and atrium have the capacity of taking up additional fluid which can be absorbed and be excreted via the kidneys. Which shunt system is inserted lies mainly upon the discretion of the operating neurosurgeon.

Shunts shift fluids and under normal circumstances there would be no air involved.





Therefore, pressure differentials are not necessarily expected from the changes in pressures of diving. Ventriculo-peritoneal (VP) shunts are considered less likely to cause problems when diving whereas ventriculo-atrial shunts (VA) bear an increased risk of bubble formation at the point of shunt insertion, shunt malfunction due to high pressure or extreme pressure changes, and an increased risk of epilepsy following the insertion. In case of such epileptic seizures, a seizure-free and anticonvulsant-free period of at least 5 years would be required before considering diving or going back to diving again.

Studies have shown that a person with a VP shunt is assumed to be able to dive safely up to four atmospheres of pressure. This means that it is most likely safe to dive down to 100 feet (33m), as was demonstrated in hyperbaric chambers where normal functioning of the shunts up to this pressure was shown. Specialists believe a VP shunt will drain normally because the ventricles in the brain, as well as the abdomen, will be equally affected by the increased ambient pressure of the deeper water. VA shunts however, are affected by the blood stream in which nitrogen bubbles may form while surfacing from a dive. These bubbles have the potential to interfere with a well-functioning shunt. VA shunts are therefore not allowed by most diving certification agencies.

Clearly, diving should be suspended if there are any problems with breathing, headaches or neurological disorders (like spasticity). People with shunts should be warned about the risk that there is poor functional reserve in case of either any problem with the shunt or any

problem with DCI. Regarding DCI, as long as the hydrocephalus is managed well and the ventricles are not enlarged, it is not assumed that there is an increased risk of DCI in VP shunt carriers.

Another real threat can be infections. Surgery sutures after shunt insertion should be healed completely before any water – fresh – or sea water – comes in contact with them. The catheter reaches into the brain's ventricular system but its other end is just below the skin of the skull. If there is a wound on the scalp close to the top end of the catheter and the area gets infected, it could quickly reach the brain – and a brain infection is a life-threatening scenario.

Generally, a person with a shunt should think twice before travelling abroad and diving in remote locations. In order to make an informed decision about it, it is advisable to consult a neurosurgeon specialized in shunt systems and a dive physician knowledgeable in the same field. Both neurosurgeon and diving physician need to know the entire medical history, the pre-existing condition that led to the insertion of the shunt, and the person's current health status before they can give a complete answer.

In most cases, a person with a hydrocephalus has experienced serious, life-threatening temporary brain deficiency. A shunt system is an artificial and technically complicated system. Material damage or defects can occur – as in any artificial systems. Such dysfunctions or malfunctions require immediate intervention. Only a clinic with a neurosurgical department can help in this

situation. Determining a shunt dysfunction or malfunction usually requires brain imaging with a CT (computer tomography). After locating the defect and determining its severity, it will require immediate brain surgery and probably a replacement or part revision of the shunt system. In some cases, only the valve may need adjustment. Not every clinic has the special technical equipment. Some valves can be adjusted by magnets from the outside and surgery will not be necessary, but you need to find a hospital with this specific magnetic system. Since there are several valve and shunt systems on the market, you are lucky to find one exactly like yours, and really unlucky if you don't. In many dive spots, such state-of-the-art medicine and higher standard health care might not be easily available.



**AlertDiver**

#### TAKE HOME MESSAGE:

Divers with a shunt should watch out for neurological disabilities, numbness of extremities and "autonomic" instabilities (e.g., postural hypotension, blood pressure changes and disability reacting to cold water immersion). Neurological deficits should be documented for any diving physician in case of an accident. A copy (or the original) of the valve pass should be carried. The shunt should be fully functional and have no dysfunction.

You should get information on what kind of restrictions you have to follow while diving with a shunt. Neurosurgeons and dive physicians should well explain the involved risks. It is advised to arrange dives with specially trained dive instructors and to inform dive buddies about the implanted shunt system.

Be a responsible diver! Good luck and good health to you!



# EPILEPSY

FEATURE **DR LOUIS VAN HEERDEN**

Divers who have epilepsy should consider all the factors of their condition before going underwater, as a seizure while diving can have serious implications for the diver.

The terms "epilepsy" and "seizures" (or convulsions) are generally used interchangeably. Seizures are paroxysmal (unpredictable and uncontrollable) manifestations of the electrical properties of the cerebral cortex. To put it differently, it is the uncontrolled, involuntary electrical discharge of neuronal activity of a part or whole of the brain. To bring this into perspective, epilepsy is a medical condition with recurrent, unprovoked seizures. The classification and manifestations will depend on the area of the brain that is involved.

## WHAT MAY CONTRIBUTE TO EPILEPSY?

One may find it quite surprising that seizures are a very common, nonspecific manifestation of neurological injury and disease. As we understand it, the main function of the brain is to transmit electrical impulses. It is said in recent literature that one's lifetime likelihood of experiencing at least one epileptic seizure is around 9% and that the likelihood to receive the diagnoses of epilepsy in one's lifetime is about 3%. The prevalence of active epilepsy, though, is only about 0.8%. Epileptic seizures may have many causes, including a genetic predisposition, head trauma, a stroke, brain tumours and withdrawal from alcohol and/or drugs. It would appear that certain conditions may lower the threshold for epileptic seizures and in-water exposure certainly counts as the single most important one when we bring diving into the equation. Sensory deprivation, hyperventilation, nitrogen narcosis, acidosis (from carbon dioxide retention), anxiety and hypoxia (for whatever reason) may all contribute to lowering the threshold of convulsions under normal circumstances. These can all occur more easily at depth. Other factors include fatigue, psychological stress, substance abuse, flickering lights, illness and certain nutrient deficiencies. Combining even a single one of the aforementioned factors and in-water exposure puts an epileptic person at greater risk when diving; firstly, it increases the risk of having a seizure underwater and secondly, it increases the near-inevitability of a fatal outcome, i.e. drowning.

## HOW DOES EPILEPSY WORK?

Let's take a closer look at the anatomy (structure) and physiology (functioning) of epilepsy. It can broadly be classified as focal seizures, where the electrical discharge of neurons (brain cells) involves only a specific part or area of the brain, or as generalised seizures, where the whole brain is involved. The structural area of the brain that is



involved, in part or as a whole, is called the cerebral cortex and anatomically constitutes the surface area of the cerebrum (the "large" brain). The focal interictal epileptiform spike or sharp wave is the clinical neurophysiological hallmark of focal-onset seizures and the cellular neurophysiological correlate to this is called the paroxysmal depolarization shift (PDS). In short, this process involves depolarization (a change of the resting potential or "current") of the neurons through calcium-dependent potassium channels followed by a prominent after hyperpolarisation. If the number of discharging neurons are more than a several million, scalp electrographic electrodes are able to record the electrical activity with an electroencephalogram (EEG).

The mechanisms that may co-exist in different combinations to cause focal-onset seizures are decreased inhibition or increased excitation of the neurons. These will be summarised, because an in-depth discussion falls outside the scope of this article. Mechanisms leading to decreased inhibition of neurons are defective gamma-aminobutyric acid (GABA)-A and B (which is a neurotransmitter) inhibition, defective activation of GABA neurons and the defective intracellular buffering of calcium. Mechanisms leading to increased excitation of neurons are increased activation of N-methyl-D-aspartic acid (NMDA) receptors, increased synchrony between neurons due to ephaptic (passage of an electrical impulse from one neuron to the next) interactions and increased synchrony and/or activation due to recurrent excitatory collaterals. Focal-onset seizures may advance to generalised seizures. The influence of the diving environment on epilepsy has already been discussed. When considering these variables individually, each and every one already constitutes a contraindication to diving. One should appreciate the gravity of the situation when these are combined.

## WHAT CAN DIVERS DO ABOUT EPILEPSY?

While it is true that the risk cannot be quantified, most medical professionals will

remain reluctant to declare recreational divers with undiagnosed seizures or the diagnoses of epilepsy fit to dive in view of the possibility of a fatal outcome should the risk occur. It is the opinion of this author that an individual with epilepsy should channel his/her adventurous energy into land-based activities that can offer just as much exhilaration and fulfilment. Seizures that were caused by vagus stimulation (fainting due to a nerve outflow pathway), positional hypotension (low blood pressure), low blood sugar, recreational drugs and fever convulsions before the age of five (without any subsequent seizures), may be the exceptions. The data available to us tell us the following: 30% of individuals suffering from epilepsy will have seizures or convulsions despite their medication, about 50% of children suffering from juvenile epilepsy will have no recurrence in adulthood with no increased risk when compared to the general population (some authorities maintain there is an increased risk of less than 1%), chances of experiencing another seizure decreases exponentially with time and reaches an almost normal risk after five years (which does not take the added stresses of diving into consideration), and 30% of children and 65% of adults will experience epileptic seizures or convulsions in the first two years that they discontinue their anti-epileptic medication. Some diving authorities now allow individuals with epilepsy to dive after five years with no seizures after discontinuing their medication. Other medical professionals are of the opinion that two years without seizures after discontinuing medication may be an acceptable risk for these individuals to dive, with the provisos of a depth restriction to 15 metres of seawater (MSW), clear warm water and no nitrox breathing mixtures. Although the incidence of sudden unexpected death in epilepsy (SUDEP) is low (about 2.3 times higher than in the general population), most of these deaths are due to impaired consciousness. A diver with epilepsy should ultimately decide. Should they wish to continue with diving after considering all the information provided, they should accept the increased risk, as should their dive buddies.

## WANT A SECOND OPINION?

Safety when diving should always remain your first and foremost priority. This also applies when considering a condition like epilepsy and its medication. Remember, you are also responsible for the safety of the divers diving with you. The DAN Europe hotline is always available with specialised help.

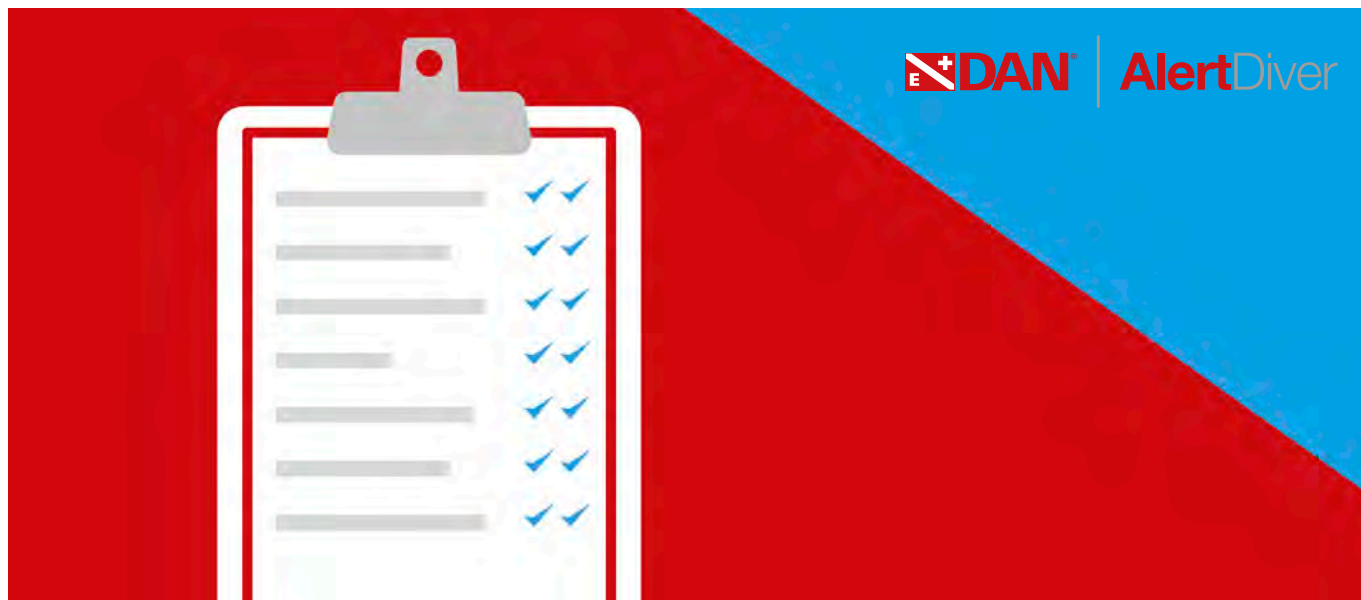




# BETTER PLAN AHEAD

## THE EMERGENCY ASSISTANCE PLAN (EAP) OR CONTINGENCY PLAN

FEATURE **CAREN LIEBSCHER**



An Emergency Assistance Plan (EAP) or Contingency plan is a prerequisite for the successful rescue of an injured diver. This includes immediate on-site first aid and emergency treatment as well as the fastest possible transport to the closest and most adequate medical facility. Redaction of an EAP falls under the responsibility of the local dive operator.

As a diver, you can do a lot for your own safety, however some things are out of your hands and you have to rely on the dive operator. Therefore, it is important to pay attention to the safety awareness of a live-aboard operator, dive centre or dive boat owner, dive instructor, divemaster or other staff member. The choice of the holiday destination can also be decisive. In a country where general safety standards are poor, dive operations may also lack safety regulations and requirements.

Safety gaps are lurking everywhere and their consequences are more serious in diving than they would be on land. A divemaster guiding a group of novices without computers to their limits; a dive boat owner without emergency equipment such as an oxygen unit able to deliver 100% medical oxygen to at least two divers and for sufficient time; a liveaboard safari whose staff is not trained in first aid and emergency treatment; dive shops that rent poorly maintained equipment with defect valves or missing o-rings, or who "forget" to change compressor filters: they all belong to the grossly negligent category.

As beautiful as an out-in-the-ocean, away-from-civilisation liveaboard safari may seem, as ugly it could turn when there is no radio

connection, cell phones aren't working and the crew forgot satellite phones (or even first aid equipment on board). No chance to get any prompt help in case of an emergency in that unfortunate case.

Be it a dive business on land or a liveaboard, everybody – also dive guests – should get access to info such as current telephone numbers of the closest hyperbaric chamber. This includes contact numbers of dive medical specialists of the nearest facility, emergency doctors and emergency services. Keeping that information current is something of the utmost importance, as addresses, phone numbers, contact persons or access routes are often subject to variations. If there is a missing link, the chain will break.

The crew needs to know what to do in an emergency. The fastest transportation and the logistics need to be clear. In case an operator has several boats, each boat may have its own EAP and a different one for the base on land.

To raise awareness about safety and make diving even safer, DAN has developed the DSP (Diving Safety Partner) programme. The DSP is made of 3 levels, with an associated Hazard Identification and Risk Assessment (HIRA) component. This initiative is specifically addressed to dive operations, helping businesses to identify and improve the areas where they lack safety. Dive operations fulfilling all requirements gain visibility and recognition within the recreational diving community and, ultimately, more clients. For a professional assessment conducted by one of our experts, requests can be sent to [dsp@daneurope.org](mailto:dsp@daneurope.org).

### INSTRUCTIONS AND WARNINGS FOR CONDUCTING DIVES

Briefings and debriefings, information on getting in and out of the water, safety stops, meeting points and procedures in case of separation, as well as instructions and warnings for post-dive activities: these are all elements that should be considered.

Briefing before the dive is of enormous importance for the divers to assume their own capability to take up the dive and to know what to expect during immersion. A good briefing includes details about navigation, currents, depth and duration of the dive, and surely not only the marine life that you will probably see.

The crew should inform divers, especially the inexperienced ones, that no freediving activities should be carried out after SCUBA diving. Deeper successive dives on the same day are not recommended either, due to nitrogen bubble formation and increased DCS risk. Advise to wait for at least 24 hours before engaging with such activities.

Both professional and recreational divers taking care of safety aspects prior to a dive may soon benefit from their farsighted approach, as they will know what to do in case of an emergency or may even prevent it. Let's keep diving a marvellous adventure, as it should always be!

### ONLINE DAN RESOURCES

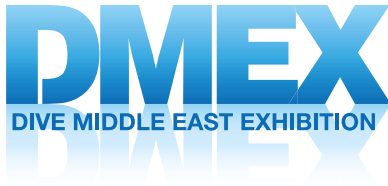
- Download the EAP template.
- How to make an EAP.
- Apply for the DAN Diving Safety Partner programme.



# UPCOMING EVENTS

## DIVE MIDDLE EAST EXHIBITION (DMEX)

28<sup>th</sup> February - 4<sup>th</sup> March 2017 | At the Dubai International Marine Club, Mina Seyahi



Anchored firmly at the centre of the UAE's diving community with 154,000 certified divers, DMEX celebrates its 11<sup>th</sup> anniversary being co-located with the Dubai International Boat Show.

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

## DIGITAL ONLINE 2017

8<sup>th</sup> January - 23<sup>rd</sup> April 2017 | EDA's Underwater Photography and Film Competition



**DIGITAL ONLINE**  
جمعية الإمارات للغوص  
EMIRATES DIVING ASSOCIATION  
PHOTOGRAPHY AND FILM COMPETITION

Digital Online 2017 opened for submissions on the 8<sup>th</sup> of January and closes @11:59pm (GST) on the 23<sup>rd</sup> of April. Category submissions must be emailed with correct labels to [photo@emiratesdiving.com](mailto:photo@emiratesdiving.com). The rules and guidelines can be found on page 69.

31<sup>st</sup> May 2017 | Awards Night in Rotunda Gallery, AUD | 19:00-21:00

1-7 June 2017 | Exhibition Open to the Public  
9:00-17:00 on week days and 14:00-17:00 on Fridays at the American University in Dubai, Rotunda Gallery.



**EDA**  
جمعية الإمارات للغوص  
Emirates Diving Association

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### MISSION STATEMENT

To conserve, protect and restore the UAE marine resources by understanding and promoting the marine environment and promote environmental diving.

### LEGISLATION

Emirates Diving Association (EDA) was established by a Federal Decree, No. (23) for the year 1995 article No. (21) on 23/02/1995 and chose Dubai as its base. The Decree stipulates the following responsibilities for EDA.

- To legislate and regulate all diving activities in the UAE.
- Ensure environmentally respectful diving practices in all EDA members.
- Promote and support the diving industry within the UAE by coordinating the efforts of the diving community.
- Promote diving safety in the commercial and recreational diving fields through standardization of practices.
- Promote and preserve historical aspects of diving within the gulf region and enhance environmental education to diving and non diving communities through EDA activities.

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**MINI HOW-TO:**

- Bottlenose dolphin
- Humpback dolphin
- Indus dolphin
- Striped dolphin

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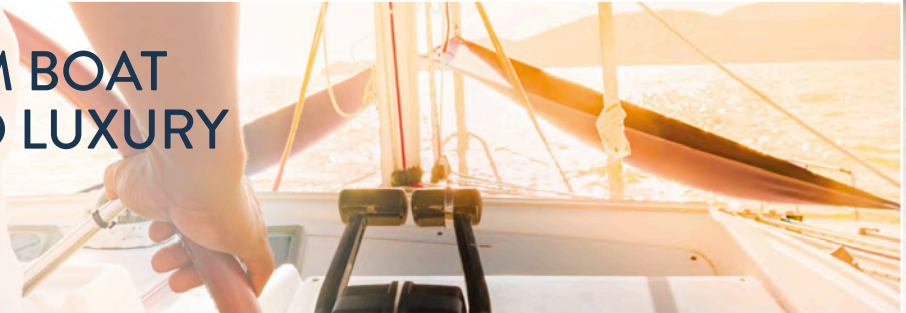
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