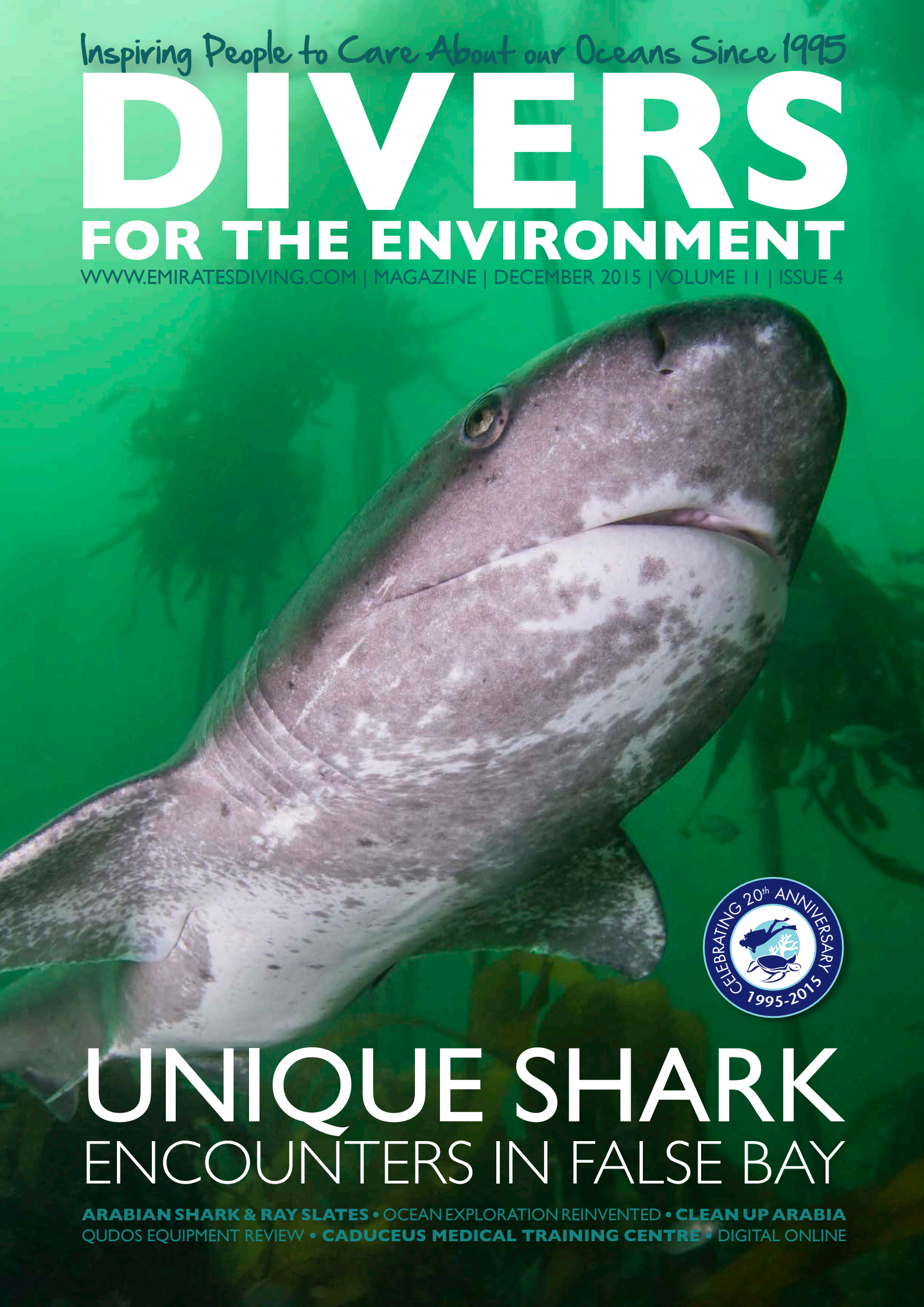
Inspiring People to Care About our Oceans Since 1995

DIVERS FOR THE ENVIRONMENT

WWW.EMIRATESDIVING.COM | MAGAZINE | DECEMBER 2015 | VOLUME 11 | ISSUE 4



CELEBRATING 20th ANNIVERSARY 1995-2015

UNIQUE SHARK ENCOUNTERS IN FALSE BAY

ARABIAN SHARK & RAY SLATES • OCEAN EXPLORATION REINVENTED • **CLEAN UP ARABIA**
QUDOS EQUIPMENT REVIEW • **CADUCEUS MEDICAL TRAINING CENTRE** • DIGITAL ONLINE

Photos by Erik Rådström

EDA
جمعية الإمارات للغوص
Emirates Diving Association

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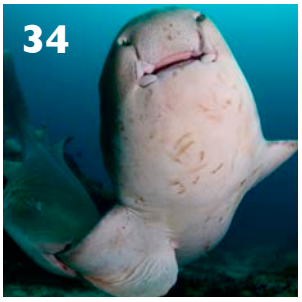

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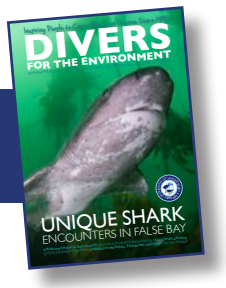
DIVERS FOR THE ENVIRONMENT

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 March 2016. Send all articles, feedback or comments to: **magazine@emiratesdiving.com**

EDA COVER

PHOTO BY SIMONE CAPRODOSSI



REDUCE REUSE RECYCLE

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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.

RESEARCH

Representative research among many dyslectics has now shown that the font actually helps them with reading texts faster and with fewer errors.

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**

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

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.scaprodossiphoto.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**

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 his 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**, contact me on social networks or via email at 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

DR. BARBARA KARIN VELA
Dr. Barbara Karin Vela is a Diving Medicine Physician EDTC/ECHM IIa, working in the Dubai London Specialty Hospital and a referral doctor in the United Arab Emirates for the Divers Alert Network Europe.
www.dubailondonclinic.com

SPIRIT OF THE UNION

IBRAHIM N. AL-ZU'BI
EDA Executive Director

As we celebrate the 44th UAE National Day, we reflect on the spirit that ties us all together, the Spirit of the Union that enables millions of people to co-exist and build lives together. The Spirit of the Union is derived from the vision and leadership of the Late Sheikh Zayed Bin Sultan Al Nahyan, EDA's founder, and now lives on through His Highness Sheikh Khalifa Bin Zayed Al Nahyan, President of the UAE and his fellow leaders of the nation's Emirates who are shaping the UAE's future.

It is the spirit that binds the cosmopolitan community of the UAE, connecting us under one banner, one flag. It is the spirit of the union that celebrates our culture and heritage and yet also shapes our future. The Spirit needs to be celebrated and shared by all citizens and residents of the UAE.

For hundreds of years, Pearl diving was a main part of the UAE's economy. Life in the Gulf was dominated by 'jewels of the sea'. For some, pearls brought fabulous wealth. For the men who harvested the pearl, it was more than an object of beauty; it was a way of life. For people with few resources on land, this jewel of the sea offered opportunity. Divers, rope haulers and captains would head to the oyster beds for three to four months every summer with the most basic necessities. Divers worked from sunrise to sunset, wearing only a nose clip, leather finger protectors, a stone weight and sometimes, a cotton suit to protect them from jellyfish. In one or two minutes, the diver would descend at least seven metres and put oysters in a basket before being hauled back to the surface. Pearls from the region were exported to India, Persia and Turkey and sold on to European and Chinese markets. The Gulf industry boomed with integration into global markets, particularly after the mid 18th century. As the demand for pearls increased, so did their value. By the mid 18th century, the high value led to trading centres being established in other places, even those with limited natural resources, such as Kuwait, Abu Dhabi, Dubai and Sharjah.

For those pearl divers who risked their lives to build the UAE economy, we celebrate the spirit of the Union. We are proud to be part of this nation and we will always be.

In this last big issue of 'Divers for the Environment' of 2015, we have some very interesting articles for you. You can read about the Reef Check updates from all over the world where divers make use of their underwater adventures and help protect the underwater world. You will also read about lots of initiatives from our dive centres and clubs promoting diving and organizing clean ups and fun dive activities.

Clean up Arabia 2015 was another great success this year – we had over a thousand participants helping to clean our beaches and dive sites all over the UAE. I would like to thank our Clean Up Arabia Patron HH Sheikh Hazza Bin Hamdan Bin Zayed Al Nahyan for his support and participation, our clean up sponsors Majid Al Futtaim, Coca Cola, Dubai Duty Free, Chalhoub and Le Meridien Al Aqah Beach Resort for their generous support, our partners in UNEP, Environment Agency - Abu Dhabi and Dibba Municipality for their support and most importantly, our EDA members for their dedication and passion to conserve our environment.

As we are coming close to ending the year 2015, I look back at all our events this year and the years before, at EDA's increasing active members and to all the discussions I've had with divers I've met whilst diving in and outside the UAE. One thing is clear, all divers genuinely want to make a difference and protect the marine life! To put it in a simpler and probably more selfish way, we want to enjoy our dives! And without a healthy marine life, dives are boring, aren't they?

I would like to wish everyone a happy 44th UAE National Day. EDA will be celebrating the National Day by publishing another valuable pearl diving cultural book. I also want to wish you all a Merry Christmas and a Happy New Year. I am looking forward to 2016, which I am sure will be as exciting, fun and rewarding as this year.

"On land and in the sea, our fore-fathers lived and survived in this environment. They were able to do so because they recognised the need to conserve it, to take from it only what they needed to live, and to preserve it for succeeding gerenations." THE LATE SHEIKH ZAYED BIN SULTAN AL NAHYAN

Dive Safe!

Ibrahim Al-Zu'bi

AN EDA MOVIE NIGHT WITH VOX CINEMAS AND A GULF ELASMO PROJECT PRESENTATION

On the 13th of October, EDA and VOX Cinemas in Mercato Mall hosted the documentary screening of Mexico Pelagico for EDA members.

Guest Speaker, Dr. Rima Jabado, Founder and Lead Scientist at Gulf Elasmo Project began the evening giving a presentation about her work on elasmobranchs (sharks, rays, guiterfish and sawfish) in the Arabian Seas with a Q&A for EDA members and how to get involved with her work.

MEXICO PELAGICO

While the Pelagic Life team is chasing the elusive sardine baitball in the open ocean near Baja California, they stumble upon a crude shark fishing operation that sparks a seismic shift in the group's thinking.

Departing from their original concept of documenting awesome sea-life phenomenon, they transform their mission to creating awareness of Mexico's sea-life while creating sustainable livelihoods for the shark fishermen in order to preserve a delicate and critical ecosystem.

Mexico Pelagico is the story of an unlikely pairing of interests. It is clear that once you swim alongside sharks, sailfish, dolphin, turtles and even crocodiles, your perspective will never be the same. Mexico Pelagico invites the audience to engage with Mexico's rich and majestic oceanic treasures, to be inspired and awed to take up the mantle of respect and conservation through ecotourism.

JERÓNIMO PRIETO – DIRECTOR

Mexico has a forgotten ecosystem: the mega fauna in the open ocean. This collection of marine life includes sharks, rays, billfish, dolphins, whales, turtles, among others, and in Mexican waters they encounter a variety of threats and opportunities. There is an over-exploitation of some species and yet massive sanctuaries and success stories exist out there. But the real problem is the complete oblivion of the general public to this particular topic.

Mexico is privileged because it has the largest congregation of whale sharks and great white sharks in the world.

Unique events occur in the seas of Mexico, such as the unusual congregation of sailfish and striped marlin that devour huge sardine bait balls. However, Mexico is also one of the countries with the highest export of shark fins in the world.

Mexico Pelagico is a documentary that tries to show a small layer of the open ocean in Mexico, illustrating the positive and negative events that occur. It is a product that condenses three years of exploration, learning and collaborative efforts in pro of the Mexican open ocean.

We believe we can and must protect the Mexican pelagic ecosystem by replacing uncontrolled fishing with sustainable ecotourism in partnership with the local community.

The purpose of this film is to show the splendor of Mexican marine life and incite the public to join the fight to protect the most forgotten and beautiful ecosystem in Mexico.

PELAGIC LIFE

We are a nonprofit organization dedicated to raising awareness and sustainable protection of the marine biodiversity of Mexico, one of the most diverse countries on the planet.

MORE INFORMATION GO TO:

www.pelagiclife.org
www.caypsomedia.com


VOX
EDA
DIVERS


VOX
فوكس سينما
vox cinemas
EDA

CADUCEUS MEDICAL TRAINING CENTRE

FEATURE AND PHOTOGRAPHY **ALLY LANDES**

On the 8th of November, we did a Sports First Aid & Injury Prevention Course and were certified with a CPR & AED certificate. Are you prepared in the likelihood of an emergency? William Sudell and Robert Jagoda are the driving force behind Caduceus Medical and they're catering their courses for divers and offering special rates for EDA members.

During my PADI education over the years, I have done my Rescue course and First Response and have been exposed to emergencies on several occasions. To refresh those skills not often used or if you are a complete beginner within the field, Caduceus is the perfect training educator to prepare you for what an emergency could entail and what to do about it.

OUR COURSE BREAKDOWN:

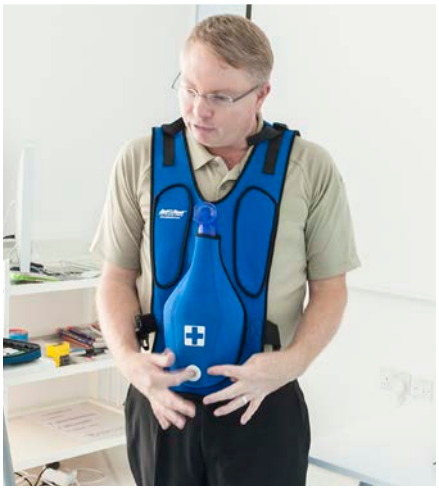
- Injury Prevention
- Recognition of injuries and medical problems
- General principles of sports first aid
- Components of Sport First Aid Kits

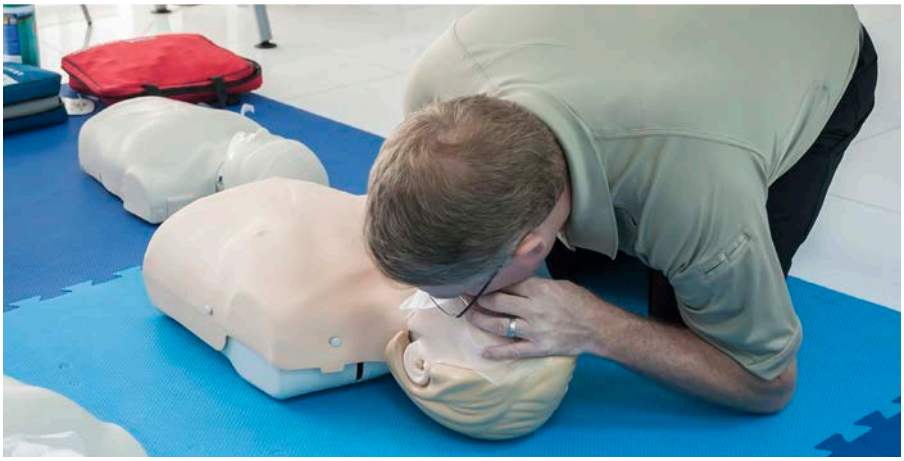
Our 4 hour course used practical assesments as well as theory for resuscitation (adult, child and infant), how to use an AED and how to deal with choking on a certain type of individual. We have a complete list of things to have in our first aid kits and we can draw up an emergency action plan knowing proximities of hospitals and clinics in conjunction with our location. Most importantly, we know when and how we can be involved within the law.

CADUCEUS MEDICAL PROGRAMME:

- First Aid & Remote Training Courses
- First Aid & Emergency Kits
- Automatic External Defibrillators (AEDs)
- Bespoke Medical & Response Kits
- Medical Consultancy Services
- Training Solutions & Remote Site Training
- Emergency Response & Evacuation Plans

www.dubaifirstaid.com






CPR and AED
TRAINER
FOR PRACTICE ONLY
NO MEDICINE NO NEEDLE

ARABIAN SHARK & RAY SLATES

SHARK AND RAY ILLUSTRATIONS © **MARC DANDO**

FOR EDA MEMBERS ONLY

EDA and Gulf Elasmo Project have teamed up to give EDA members a nifty tool to bring along on their dive trips to help identify Arabian sharks and rays. Marc Dando has illustrated 25 species of sharks and rays based on photographs taken in our region for the sole purpose of these informative slates. These slates are being distributed for free to EDA members in support of shark conservation in the region.

GULF ELASMO PROJECT

The Gulf Elasmo Project is a non-profit initiative working on elasmobranchs (sharks, rays, guitarfish and sawfish) in the Arabian Seas region. They aim to advance the research, education and conservation of elasmobranchs in the region by promoting, developing, supporting and undertaking research and educational initiatives.

WHY REPORT YOUR SIGHTINGS?

There is currently little information on sharks and rays in the Arabian Seas region. With increasing threats from fisheries, coastal development, habitat degradation and pollution, continued monitoring of sharks and rays is essential to ensure their long-term survival.

The Gulf Elasmo Project is collecting information about these species from Arabian Seas waters to increase understanding of the species diversity, abundance and distribution. Citizen science is a powerful tool to collect data from across the region. All sightings of sharks, rays, guitarfish and sawfish, whether historical or recent, can help. Populations of most of these species are in decline so your information is invaluable to science, to raise awareness about Arabian elasmobranchs, and to support management decisions.

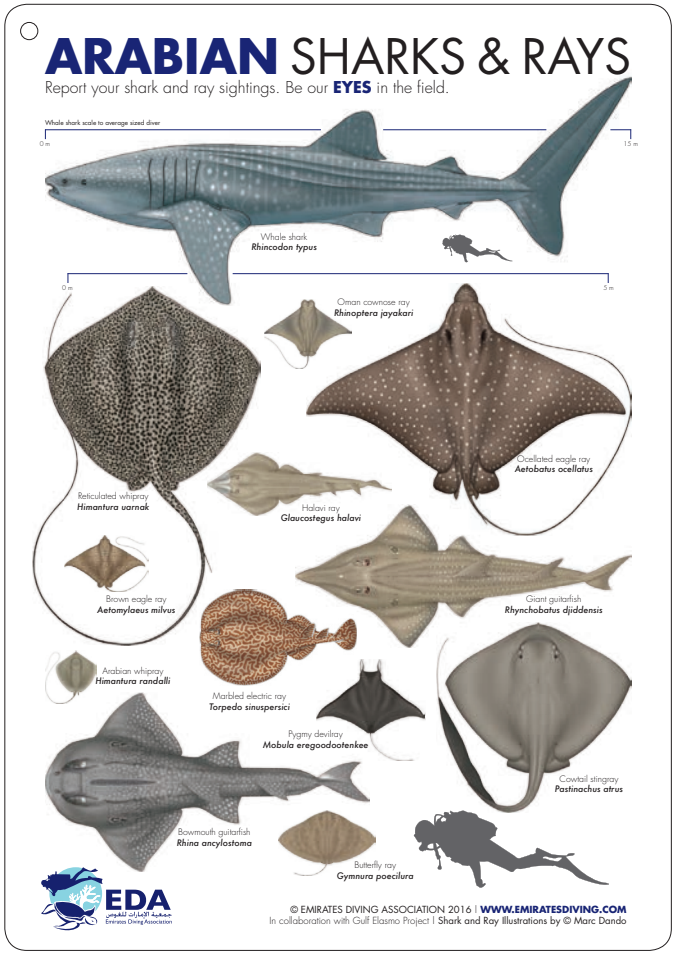
WHAT PHOTOGRAPHS TO TAKE

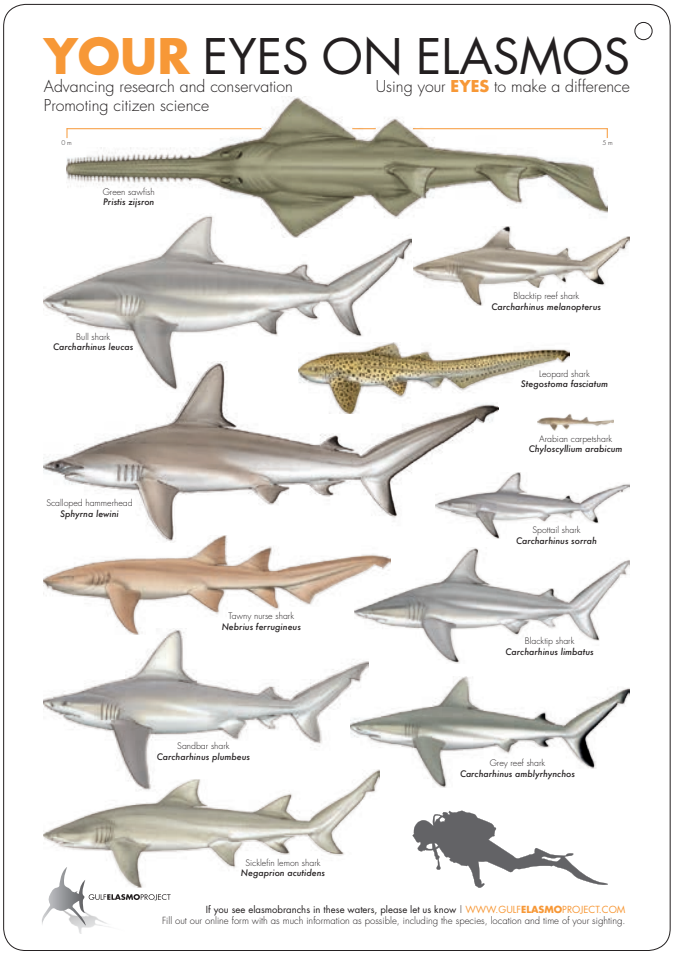
You do not have to be a professional photographer to submit your photographs. Any image can help us with this project. However, to help us make an accurate identification, side images of sharks showing the whole body, and top views of rays and guitarfish, are preferred. As male and female individuals can easily be distinguished, please try and take a photo of the pelvic area.

REPORT YOUR SIGHTINGS

If you see elasmobranchs in these waters, please let us know by visiting our website. **www.gulfelasmoproject.com**

Email us or fill out our online form with as much information as possible, including the number of animals you saw, the location, the time of your sighting and your activity at the time.





Email: info@gulfelasmoproject.com
www.gulfelasmoproject.com

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Facebook.com/GulfElasmoProject

GULF**ELASMO**PROJECT

YOUR EYES ON ELASMOS
Advancing research and conservation
Promoting citizen science
Using your **EYES** to make a difference

HSBC'S UMM AL QUWAIN BEACH CLEAN UP

On the 7th of November, EDA organised a beach clean up as part of Clean Up Arabia's campaign for HSBC as part of their support towards EDA, marine conservation and wanting to get involved in a hands-on, team building activity.

The location chosen by Umm Al Quwain municipality was a promenade close to the UAQ Beach Hotel. The EDA team got there early to set up and look around the beach to find there was much to clean up. Plastic waste of all kinds was found strewn all over the area! The HSBC volunteers had their work cut out for them!

The 70 HSBC volunteers started arriving from 9.30am for registration and after a short brief, they were handed their bags, gloves, t-shirts, caps and water and set off on their mission to clean the public beach.

It took a little more than an hour for everyone to come back with their bags full and they were all quite astounded at how much litter there was. The bags were placed together on the beach and after filling out the International Cleanup Cards (to record what was collected) a group photo was taken.

The group then headed to The Umm Al Quwain Marine Club for a well-deserved lunch.

NOMAD OCEAN ADVENTURES
WE ARE NOW OPEN IN DIBBA FUJAIRAH

We are open! Nomad Ocean Adventures are very proud to announce that an additional Nomad Diving Centre is now open in Dibba Fujairah.

After more than 10 years of servicing the Musandam, Owner Christophe Chellapermal decided that it was time to make a move into the UAE. The new centre is strategically located just over the border and 20 minutes down the road in The Royal Beach Hotel.

The team in the centre is led by PADI Course Director and Technical Trainer Phil O'Shea and PADI MSDT's Kyle and Jessica.

Nomad is doing things a little differently with the new centre. Although a PADI centre, it also carries the badges of IANTD and TDI. For those of you that know your agencies, they are predominantly Technical Diving agencies. So, in addition to PADI recreational and experience courses, the centre also has a strong technical theme with all technical configurations on offer including CCR.

The centre has Nitrox blending onsite and with the assistance of the primary centre in Musandam, Nomad can offer custom Nitrox gas blends and Trimix for technical divers and Nitrox is still FREE to certified divers at both centres. Shoppers will find retail products and accessories that cater for both recreational and technical divers.

The entire area between Dibba Rock and the hotel beach is a protected environment so marine life is thriving here with minimal human impact. The beach environment also has something unique to offer as it is home to approximately 20 Green Turtles which can be spotted all day long by simply strolling along the waterline, or you can get up-close and personal if you decide to snorkel off the beach.

Dibba Rock, one of the East Coast's most popular dive sites is about as close as you can get at just 800m from the beach. Although it still requires a boat ride to dive or snorkel the island, you can almost count the seconds it takes to reach it.

Nomad is diving other popular dive sites along the East Coast such as the Inchcape Wrecks, Martini Rock, Hole in the Wall, 3 Rocks and will also be heading to the Deeper Wrecks of Ines, Anita and U-533 for Technical Divers.

It is also worth mentioning that over recent

years, the Musandam has seen a dip in diving tourism due to the border crossing procedures, but this has relaxed somewhat over the past 12 months and the procedure is pretty straightforward. Residents must apply for their permit at least two days prior to their intended visit and while visitors should plan ahead too, they can in some cases get same day entry.

Nomad is diving the Musandam daily and the guesthouse facilitates overnight stays for multiple days of diving or to simply cut down that turnaround journey.

So with a PADI Instructor Development facility in the Musandam and a TEC REC centre in Dibba Fujairah, Nomad Ocean Adventures can just about satisfy all your scuba desires.

NOMAD
OCEAN ADVENTURES
www.discovernomad.com

NOMAD OFFER
25% off Open Water and Advanced courses until the 31st of December.

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NOMAD MUSANDAM
Tel: +968 2 683 6069
Email: Info@discovernomad.com

www.discovernomad.com

KIDS SCUBA

WE MAKE THE DIFFERENCE AND IMAGINE THE POSSIBILITIES

FEATURE **HJ. SYED ABD RAHMAN – FOUNDER & SCUBA EDUCATOR, KIDS SCUBA**

After successfully conducting scuba diving courses with kids and teens since 2004, Kids scuba now share their training for PADI scuba courses with orphanages youth and disabled divers. It all started after Syed Abd Rahman – Scuba Educator and PADI Master Scuba Diver Trainer for Kids Scuba, a PADI 5 star Dive centre near Kuala Lumpur saw an organization from the US extending the opportunities to disabled divers. This followed on to a meeting with Associate Professor – Dr.Lydia from the Department of the Spinal Corrective Rehabilitation Unit in the University of Malaya Medical Centre (UMMC) in Kuala Lumpur in early 2015. The day came when doctors and professors came to visit our Kids Scuba training establishment to view our pool setup at the Maybank Training Academy swimming pool in Bangi, which is about 30 minutes from Kuala Lumpur.

The selected candidate, Ms Jan Chia and Mr Tee Wei Ming were once victims of a major road accident involving spinal fractures resulting in them being paralysed for a year after the incident. After many years of corrective surgery, followed by physiotherapy treatments at UMMC, they were given the opportunity by the doctors to have a go at scuba diving. Jan and Tee took the challenge.

We welcomed the two new students with the doctors, Dr Neoh and Dr Jen at the pool for their first discover scuba class. The forms were completed, a briefing was conducted with a video session on scuba diving, scuba equipment, underwater breathing and the importance of buoyancy control. Jan and Tee completed their first discover scuba pool session with ease which then followed on to regular pool classes before being extended to their PADI Open Water course supported by PADI Asia Pacific in April 2015.

During the following months, the two students developed their underwater scuba skills by attending our weekly Saturday confined water training. To keep it interesting, we coupled the dives with games and underwater pool photography for them. Seeing them both mastering skills such as buoyancy control while moving underwater with their hands assisted by our volunteer divers makes me humbled as an Instructor, by their energy, determination and their efforts to reach their goals as Open Water Divers.

After detailed planning for the Open Water island trip, Tioman Island in Pahang state was selected due to the convenience of the water entry, accessibility and the support extended to Kids Scuba by our associate, B & J Dive Centre, a PADI 5 star IDC dive centre at Salang Pusaka Resort.

The first day dives were conducted by the shallow water next to the Salang Jetty. I could see both students were nervous at first, but with some jokes and great assistance from Dr Jen and Dr Neoh, Mr Tommy Yap – an experienced PADI Instructor, our Divemaster and four Rescue divers, it made the two feel more comfortable for their first open water dive.

The second day was the boat dives. Our first dive was to Renggis Island in Tioman where Jan and Tee did their first backroll entry, after much

training and repeated exercise in the pool, I was very happy that they had performed the backroll entry with ease.

We did a slow dive with them assisted by the team and the doctors from a shallow depth of 5 meters and we observed them to a maximum depth of 12 meters. During the dives, we stopped at the Treadmill Gym equipment wreck and posed with Jan and Tee for a photo shoot which was familiar to them with their regular physio training. We observed that they were both more comfortable and gaining confidence in observing the lovely marine environment. Our second boat dive was from Soyak Island in Tioman where we completed a 35 minute dive to a depth of 10 meters.

On the the third day we did two dives from the Salang Jetty to a maximum depth of 10 meters. During these dives, Jan and Tee requested to be more independent underwater. During the dives we saw schools of Yellowtail fish, a huge Moray eel and the two were in awe of seeing and experiencing this huge aquarium of marine life right in front of them.

During the last two dives, I personally saw so much achievement in Jan and Tee within their buoyancy control, confidence and comfort whilst moving underwater with their hands. They were independently in control of hovering above the beautiful coral reefs in close proximity and monitored by our Kids Scuba professional dive team and volunteers.

Within my 15 years of experience as a professional Scuba Instructor teaching young kids and teens, this has indeed been the most rewarding moment of my diving career to see our two "special" students be able to achieve scuba diving at this level. The effort, determination, patience and confidence between them was just amazing, beyond words can express.

That evening after dinner, we gathered at the B & J Dive Centre assisted by the dive manager, Mr Faizal to have a special graduation for Jan Chia and Tee Wei Ming to be officially certified as PADI Open Water Divers with the PADI certificate and temporary card. After a short note from Mr Tommy and Mr Faizal for their achievements, I was truly humbled seeing the smiles and gleam in their eyes holding their PADI Open Water Diver certificates for such an achievement.

We would like to take this opportunity to thank friends of Kids Scuba for their exceptional support, especially to Associate Professor Dr Lydia Abdul Latif, Dr Aina, Dr Jen Ping, and Dr Neoh Yuen from the University of the Malaya Medical Centre as doctors in attendance. Mr Tommy Yap and Mr Lianto for the wonderful videos and underwater photos. Universal Fitness & Leisure UFL for the Scuba equipment. B & J PADI 5 star IDC Dive Centre and Salang Pusaka Resort in Tioman. Mr Danny Dwyer and Mr Johnny Chew from the PADI Asia Pacific office for all the support and assistance.

The short videos for the dives with Jan and Tee can be viewed online:
http://is.gd/M2VSzN
http://is.gd/yiVcfK

www.kidsscuba.com

RENOWNED EXPLORER, ENVIRONMENTALIST AND FILMMAKER CÉLINE COUSTEAU LAUNCHED THE LEADERSHIP PROGRAMME FOR ROOTS & SHOOTS IN ABU DHABI

FEATURE **ENVIRONMENT AGENCY – ABU DHABI**

ABU DHABI, OCTOBER 25, 2015 | During the past week, the Environment Agency – Abu Dhabi (EAD) hosted Céline Cousteau – granddaughter of the famous French underwater explorer Jacques Cousteau – in order to launch the leadership programme for Roots & Shoots. The leadership programme involves inviting inspirational role models to talk about their work in the environmental field.

Cousteau is the director of CauseCentric Productions, a non-profit organisation that produces and distributes multimedia projects focused on grass-root organisations who specialise in environmental issues. She has produced and presented television documentaries which involve regular stints out at sea, such as when she spent five months diving off the coast of Antarctica and Easter Island for a 12-part series.

In 2014, EAD partnered with the Jane Goodall Institute founded by the world-renowned conservationist, anthropologist and UN messenger of peace, Dr. Jane Goodall, to bring the global environmental and humanitarian initiative, 'Roots & Shoots' to Abu Dhabi with an aim to help equip a generation of inspired youth with the knowledge and skills to create meaningful change and live sustainably.

Through the Roots & Shoots programme, young people assess their local community and identify specific challenges in their neighbourhood. They prioritise issues, develop solutions and take positive action in activities and projects to benefit animals, the environment, and society as a whole.

During her visit, Céline who is an ambassador of the Roots & Shoots programme in Abu Dhabi, spoke at NYUAD's "Social Impact Leaders" series. She also visited local schools in Abu Dhabi who are Roots & Shoots members.

Céline also visited the 'Mangroves from the Water' art exhibition, which is sponsored by EAD and hosted by a group of artists who found their inspiration and refuge within the mangroves of the UAE.

Reflecting on her visit to Abu Dhabi, Céline Cousteau said, "It is a pleasure to be here in Abu Dhabi to launch the leadership programme on behalf of Jane Goodall's Roots & Shoots, encouraging young people to explore the opportunities and challenges within environmental causes, using media as a vehicle for the communication of important stories."

ABOUT CÉLINE COUSTEAU:

- As Director of CauseCentric Productions Céline Cousteau produces cause focused multi-media content about humanitarian and environmental stories. Céline is also Founder and President of the nonprofit organization The Céline Cousteau Film Fellowship, extending her family legacy to the next generation of storytellers. The Cousteau Fellowship's mission is to empower young aspiring filmmakers, creatives, and activists to inspire change through filmmaking. Daughter of ocean explorer and filmmaker Jean-Michel Cousteau and granddaughter of the legendary Jacques Yves Cousteau, Céline has worked on over 18 documentaries as presenter and field producer. Her current major work, "Tribes on the Edge" is a result of a request the tribes of the Vale do Javari, Brazilian Amazon made to have her tell the world they exist. Based on the plight of the indigenous tribes and her own personal journey, this project includes a documentary film, engagement and education campaign, coffee table book, and sculpture installation – with a targeted launch for fall 2016.

- Member of the World Economic Forum Council on Oceans, Céline holds a masters in International and Intercultural Management and is fluent in three languages. Currently Guest Designer for Swarovski and Ambassador for The TreadRight Foundation as well as brand ambassador for Serengeti Sunglasses, Céline sits on the advisory boards of The Himalayan Consensus and Marine Construction Technologies. She was previously international spokeswoman for the La Prairie skincare company from 2007 through 2014, Sustainability Partner with Contiki Holidays from 2010-2014, and has served on the board of advisors for Adventurers and Scientists for Conservation as well as Plant a Fish. Often traveling as a public speaker, Céline is also mother to a young boy.

ABOUT ROOTS & SHOOTS

- Dr. Jane Goodall initiated the programme with 16 Tanzanian students in 1991. Since then it has spread rapidly, engaging young people throughout the world. Today, the Roots & Shoots network has blossomed into more than 150,000 members in over 130 countries, all working on local and global service projects.

- The creation of a local chapter of the initiative follows the successful completion of a 2014 pilot that included New York University Abu Dhabi, American Community School, British International School of Abu Dhabi, Emirates Private School, Al Muna School, Al Mushrif School, Indian School and Bangladeshi School.

- Roots & Shoots Abu Dhabi won the international Green Apple award at the House of Commons, UK in November 2014 for the pilot programme. The website of the local office is **www.rootsnshoots.ae**, which provides teachers and students with free resources and a platform to share success stories with the world.

Oceans' mission is to co-create a world class community and check-in tool for divers and explorers worldwide – using Oceans' data and imagery to make the oceans universally accessible for anyone, everywhere. GREAT ADVENTURES AHEAD - JOIN US

OCEAN EXPLORATION REINVENTED

In a world covered in water, Oceans mission is to create the best-in-class independent tool and community for ocean explorers and scuba divers. Oceans will be the go-to place for everyone with interest in discovering the teeming world underwater, and a public voice for the oceanic environment and the protection of marine life in the world's oceans.

Oceans is an award winning * digital tool for ocean exploration, allowing the worlds scuba divers to log, share and plan diving experiences with friends and divers around the world, making it possible for anyone to explore and discover the oceanic life under the surface. Oceans is available for iOS and Android. As a Google Glass explorer company, Oceans is also working to make the product available for Glass and other wearable devices.

EXPLORE A WORLD OF OCEANS...

Oceans is all about co-creation. Together with the world's ocean community, we are set to map the ocean's teeming life, vivid landscapes and fragile environment for everyone to explore.

...AND FIND YOUR NEXT ADVENTURE

Get inspired from your friends' adventures, or browse through an endless global stream of divers' logs, photos and highlights.

SHARE YOUR DIVING EXPERIENCES...

Oceans intelligently knows where you are and makes logging your sites and observations fast and intuitive. Offline mode allows for check-in even where mobile networks are off limit. Sharing oceanic endeavors has never been easier.

...AND KEEP YOUR LOGBOOK SAFE AND ACCESSIBLE

Your log book will always be with you – safely stored in the cloud – and ready to be shared with friends and family wondering what life underwater is like.

DISCOVER UNCHARTED WATER. OR NEARBY HIDDEN GEMS...

Oceans discovery features lets you roam the world's oceans in search of your next adventure. Find out the best spots for whale sharks, manta ray cleaning stations, or colonies of playful sea-lions.

Oceans maps lets you see who is diving nearby, and what's hidden underneath. Who knows, maybe you have an ancient wreck hidden in your backyard.

THE FUTURE OF OCEANS

Oceans goal is to make the underwater world universally accessible to everyone, everywhere. We believe new technology is a great way to reach this goal – creating awareness of a world otherwise hidden to most of us.

Stay tuned as Oceans reinvents ocean exploration through technology and visualization.

THE FOUNDING TEAM

Oceans was founded in 2013 by diving brothers Jimmy and Daniel, both having studied computer science at the Royal Institute of Tech – Stockholm, Sweden. With over 20 years of experience in product design, engineering and marketing, they combine building great products with a passion for the world and underwater wildlife.

JIMMY REUTERWALL
CO-FOUNDER, CEO

Jimmy has a background in product design, engineering and marketing on consumer products since 1999 working for startups, creative agencies and corporations in media, internet and telecom industries.

DANIEL REUTERWALL
CO-FOUNDER, CTO

Daniel has worked in engineering, content management and web technologies since 2002 within internet, security and energy sectors.

REDESIGNED TIMELINES
Oceans 1.2 "Mantaray" introduces all new timelines that highlight the amazing underwater images captured by divers around the world. Let's go explore...

EXTENDED CHECK-IN TOOL
Oceans tools for logging dives have been extended with features for time of day, visibility, temperature, gear and gas. All with intuitive touch controls for easy and fast check-ins.

YOU'RE IN THE LIGHT...
The highlights stream will feature the best dives and images from all our Oceans, and one of them will be featured in dive-of-the-week! Will it be you next time?

*** Oceans was named the winner of the first ever Google Glass Showdown in Europe at SIME'13 and the app is available for free on the App Store and Google Play with download links on www.oceans.io.**

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The Damaniyat Islands are a group of nine islands about 18km offshore to the North of Muscat. They are Oman's only fully protected marine reserve and the stunning marine and island environments are still in near-pristine condition. The biodiversity is plentiful with some of Oman's best-developed coral reefs, nesting sea turtles and a plethora of inquisitive inhabitants such as schooling fish, moray eels and tropical reef fish; eagle and mobula rays can be expected between May and October, with the leopard shark also visiting Oman's waters. Blink and you will miss something!

There are a total of 17 dive sites in three island groups at the Damaniyat Islands, varying from around 5m to 30m, making it perfect diving for less experienced divers seeking to increase their log book entries and confidence.

The Dive & Stay package, priced at OMR 190 per room for two occupancy, two nights, includes:

- Two nights stay at deluxe garden view room based on double occupancy
- Free upgrade to sea view room, subject to availability
- Daily Breakfast for 2 people
- One day dive trip for two persons (8am-4pm)
- Excluding Damaniyat park permits and equipment hire
- Including all taxes and service charges
- Above offer is valid from 1st December to 30th April 2016 and not applicable during public holidays

If you prefer snorkeling to diving, the above package is available at OMR 160.

Millennium Resort Mussanah is approximately 3½-4 hours driving time from Dubai or Abu Dhabi, or just 45 minutes from Muscat International Airport. For bookings, email reservations.mrmo@millenniumhotels.com or call +968 26871518.

MARINE ECOLOGY RESEARCH CENTRE
A HEART FOR CONSERVING, PRESERVING AND EDUCATING

Attached to Gayana Eco Resort on Pulau Gaya, the largest of five islands in the Tunku Abdul Rahman Marine Park, the Marine Ecology Research Centre (MERC) is a 10-minute ferry ride from Kota Kinabalu. MERC took off in 2007 as a learning and educational centre within marine research and conservation efforts in programmes such as giant clam propagation, coral reef restoration, protection and the treatment of marine species. Driven by passion from its owner, MERC pledged to address the increasing threats on marine life, combating its effects by returning to nature what was previously destroyed. Headed by Project Director, Alvin Wong and a team of six enthusiastic scientists and support staff, MERC has since then evolved into a research and rehabilitation facility.

Global concern for climate change and increasing threat of extinction to the world's last remaining giant clams is the driving force behind the daily research and conservation initiatives conducted here. MERC has taken a step beyond just co-existing with the environment and trying to be eco-friendly, by emphasizing the need for sustainable development, eco-friendly development, co-existence with nature, going green, and protection and conservation. MERC's mission is to produce life of threatened and endangered species that are destined for extinction unless something is done fast.

This mission has translated into a range of functions conducted at MERC:

1. Propagation of giant clams – MERC was certified by the Malaysia Book of Records as the first centre in Malaysia to successfully produce all seven species of the world's giant clams found in Malaysian waters. Under this programme, over 10,000 spats above one centimetre in length have been produced and transferred from the hatchery to the nursery area.
2. Coral reef restoration – efforts are targeted to restore the coral reefs in Teluk Malohom that have been destroyed by explosives and chemicals by irresponsible fishermen.

MERC
MARINE ECOLOGY RESEARCH CENTRE

- Replanting of broken coral fragments – since June 2009, nearly 5,000 fragments with a high survival rate of 90% have been successfully transplanted in the sea bed. Its creative Coral Adoption programme has also seen over 440 coral plants being embedded in the sea.
- Introducing artificial reefs to rejuvenate marine habitat through the installation of two electric Biorock structures to accelerate coral growth. MERC is the first in Malaysia to utilize this technology.

3. Education of visitors and awareness building on marine conservation issues – Various programmes are being imparted to visitors, school groups and villagers on the island to help them understand their role in protecting the marine environment. Display tanks at MERC provide a touch and feel experience while the 30-seater auditorium on-site allows groups a more comprehensive audio-visual tour led by the MERC team. There are packages such as 'Be A Marine Biologist For A Day' and 'Mariner' for those under 12 and for birthdays.

Celebrations are offered to visitors to learn more about the marine issues in a fun, educational and interactive manner.

In March/April 2012, MERC held the first Marine Conservation Awareness month which highlighted the plight of the endangered Giant Clams that are being threatened by over-harvesting and irresponsible fishing methods. The giant clam acts as as the "liver" of the ocean in separating harmful waste from clean water. Irish singer Ronan Keating was the guest of honour for the event who gave a celebrity endorsement to MERC's efforts.

4. Protection, and treatment, of marine species – over time MERC has evolved into an unintended marine sanctuary when local villagers bring injured creatures such as hawksbill turtles, green turtle and nurse sharks for treatment and rehabilitation.

MERC is also committed to supporting the practice of sustainable aquaculture in an effort to reduce the pressure on wild fish sources, by creating a close collaboration with Borneo Eco Fish, an aquaculture farm which adheres to a strict policy of non-chemical and non-drug farming. Borneo Eco Fish supplies fresh, live fish to Gayana Eco Resort and Bunga Raya Island & Spa Resort on the same island as well as several seafood restaurants around Kota Kinabalu.

For its significant efforts in marine conservation, protection and education, MERC received, the Most Innovative Tourist Attraction Eco-Tourism Conservation Award 2008-2009 by Ministry of Tourism Malaysia. The Centre has also earned the respect of VIP visitors such as Taleb Rifai, Secretary General of the UN-World Tourism Organization, and writer and talk show host, Martha Stewart.

"Since the opening of our Marine Ecology Research Centre in 2007, we have successfully cultivated 2,000 giant clams of 7 different species and 8,000 coral fragments in our ocean nursery through our in-house guest participation programme. All the giant clams as well as 1,000 corals have been reinstated into their natural habitat, half of which have been sponsored by foster parents through our adoption programme" says Tomas Anderson, General Manager of Gayana Eco Resort.

For more information, about MERC visit: **www.merc-gayana.com**

TO SINK OR TO SWIM

FEATURE PATRICK VAN HOESERLANDE ILLUSTRATION PETER BOSTEELS

It seemed a simple plan. Skubba dove with the hose in the bucket. With one hand he held onto his homemade diving helmet and in the other hand, he held the hose. Before he went underwater, he saw Fred start to pump.

The ffft-sound told him fresh air was coming into the bucket. The water level dropped slowly and after a while, he saw air bubbles escaping from under the brim. It was working. Now he could remain underwater.

He had to occasionally surface because he lost some air due to a sudden movement. But, when it all went well, he could fully enjoy the underwater world for as long as possible. He got to see little red dots, and long wires that resembled plants (or were they plants resembling long wires?). Every time he came up, he could share the discoveries with Fred. At last he was diving!

The attempts to refresh the air in the bucket by turning it from time to time, failed. Sometimes Skubba was lucky to catch some air, but it was never enough to breathe more than a few times. It was only when he dragged the heavy bucket up to solid ground that he could successfully refresh all the air in it. Although it was a tiring job, it meant that he could continue diving without getting a headache. After being in and out of the water a few times, he could no longer see Fred anymore. What was Fred up to?

After yet another trip back up from the water, he finally ran into Fred. His friend stood there with an air pump and a long hose in his hands.

"Do you want to refresh the air in the bucket with that?" asked Skubba.

"Yes. I will attach one end of the hose to the pump and put the other end into the bucket. If you take care to keep the end of the hose in the bucket, then I will do the pumping."

The dives went on for days. Fred pumped while Skubba dived. They were both happy and they would have stayed that way if Skubba had not tripped one day.

That dive day, Skubba wanted to observe a fish up close. He had already found out that he could dive deeper by extending the hose on the bucket, but he had not figured out how to yet move forward. In fact, he could, with difficulty, only move up and down. But at that very moment he wanted to follow the fish. The first step went well, but during the second one, his right foot got stuck on the hose, causing him to lose his balance. Trying to recover, his left foot hit a piece of a train rail. In an attempt to stay upright, he pulled on one side of the bucket causing it to turn upside-down. With a 'clock'-sound, the air escaped. Entangled in the hose Skubba surfaced.

"I want to be able to move!" he shouted at Fred who was still pumping.

ARCHIMEDES

FEATURE PATRICK VAN HOESERLANDE ILLUSTRATION PETER BOSTEELS

"Eureka!", exclaimed Fred.

"What has Erika got to do with this?"

"No, EUUUreka. That is what Archimedes cried out sitting in his bath."

Skubba had always found Fred a bit special, but now he was convinced that his friend had completely lost it. "Who is Archithing?"

"Archimedes was a Greek scientist who had to find a way to tell his king if a crown was made out of gold."

"Do you need to be a scientist for that? If you melt the crown you can see that immediately."

"No, not this one. It had been a gift, so the crown could not be melted down."

"Aaah." Skubba sighed, wondering what that had to do with diving.

"When Archimedes got into his bath, he observed that some of the water had spilled over."

"I know that too!" Skubba exclaimed, "and if you jump in, then the water splashes against the walls."

Fred continued calmly, "Archimedes found that the weight of water spilt would be the same weight as the lump of gold of the crown. If not, the crown was a fake. Eureka. Found it!"

"Yeah, yeah. Let's dive," Skubba still did not understand the connection.

"No, wait and listen! If we know how heavy your bucket filled with water is, then we just have to make sure your empty bucket's weight is just as heavy. Got it? Once we know that, you will be able to move underwater."

Although the whole thing made no sense to Skubba, the last words were like music to his ears. And he knew that when his strange friend promised something, it would happen.

Fred took the bucket from Skubba and quickly disappeared. Skubba was left there to wait.

A little later, Fred returned with the bucket which had now become very heavy.

"What have you been doing?"

"A full bucket weighs 5 kilograms. On the outside of the bucket I've attached 5 kilograms of lead I found in your father's garage. That is why the bucket is so heavy. Go back into the water and stick your head in the bucket like you normally do."

Skubba thought, 'put 5 kilograms on my head? Fred can barely carry it and I need to go diving with that?' Skubba had his doubts, but the urge to dive like a real diver was just too great to miss. He decided to do what his friend had asked him to do.

While Fred was pumping air, he stuck his head into the bucket. He noticed that once in the water the bucket was not that heavy after all. He even had to pull on it a bit to get underwater completely.

He held it firmly and took a step forward. He could now easily walk. Hey, that worked without tripping. Nice!

"I can move!" he yelled surprised. But the water around the bucket muffled the sound. Fred did not respond to his cry and carried on quietly pumping air in.

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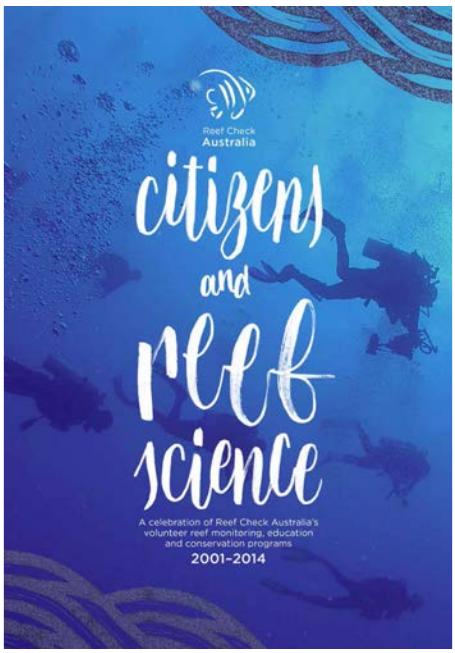
REEF CHECK AUSTRALIA CELEBRATES ACHIEVEMENTS WITH LATEST REPORT

BY **JOS HILL, FOUNDER OF REEF CHECK AUSTRALIA** PHOTOS REEF CHECK AUSTRALIA



My first adventure on a coral reef was on the Great Barrier Reef while I was on a gap year back in 1995. I was hooked after one dive. As a Biology undergrad student, I spent the next few years learning everything I could about coral reefs. I was surprised to learn how little we knew about the scale of the problem at that time. I wanted to do something, so I searched online for a way I could help. I was thrilled to discover Reef Check in 1999 and I jumped on an opportunity to coordinate surveys in Thailand. Solutions to complex environmental problems necessitate collaboration across communities, business and government. Reef Check provides tools for people to come together around reef conservation – and it was the opportunity to engage with people from all walks of life that attracted me to this work. To this day I am committed to a collaborative approach to conservation.

In 2001, I moved to Australia to pursue a masters degree at James Cook University. At that time, a small group of marine biologists and dive tourism professionals were developing a plan to engage the general public in monitoring key dive sites on the Great Barrier Reef and they asked me if I would coordinate this effort. Thrilled about this opportunity, I organized the first Reef Check surveys from a borrowed cell phone and internet cafés in Port Douglas, Queensland. Today, I am inspired to see Reef Check Australia emerge as an award-winning environmental charity that has engaged hundreds of volunteers in monitoring reefs all around Australia, as well as contributing to a range of ocean conservation initiatives.

Reef Check Australia recently published its first long-term report that summarizes a suite of achievements it has made between 2001-2014. Since 2001, the organization has trained >300 volunteers, conducted more than 600 reef surveys, and educated tens of thousands of residents about the importance of Australia's reefs. A recent paper submitted to Coral Reefs describes how Reef Check Australia's volunteers are able to report upon changes in hard coral cover with comparable precision as scientists from the Australian Institute of Marine Science (AIMS).

Despite unsettling news from AIMS that Australia's Great Barrier Reef (GBR) has lost half of its coral cover in the past 30 years, Reef Check volunteers have shown us that some reef areas have increased their coral cover over the past decade. RCA's GBR Monitoring Program focuses on dive tourism areas and highlights a sample of some of the best reefs in Queensland – those reefs that recreational divers would expect to see when they visit. RCA data show us that we should not give up hope and continue to urge the Australian Government to implement policies that protect coral reefs for future generations.

Subtropical rocky reefs in Southeast Queensland are far less known than the GBR. These reefs live in a transition zone where tropical and temperate species co-exist and support a surprising diversity of species. Yet water quality pollution and fishing pressure put this unique environment under threat. Through reef monitoring, education and local engagement, RCA has helped to put these reefs on the map and has been praised for inspiring community momentum for marine conservation in this region. Today, RCA data inform government management planning in the region.

I want to take the opportunity to thank the staff at Reef Check HQ for the support and advice over the years and commend RCA's volunteers, staff and board for carrying on this fabulous effort.

Jos Hill founded and led Reef Check Australia between 2001-2009. She is now Associate Program Director at the Coral Reef Alliance.

BULELENG BALI DIVE FESTIVAL PROMOTING CONSERVATION THROUGH RECREATIONAL DIVING

BY **REEF CHECK INDONESIA**

Buleleng of North Bali held its first Buleleng Bali Dive Festival (BBDF) event in Pemuteran Bay on the 23-26 of October focusing on promoting diving tourism and various conservation activities in North Bali. Buleleng reserved its marine areas as Marine Management Areas in 2011.

In recent decades, diving tourism has become a popular recreational activity. Through diving, everyone is able to see the beauty of underwater life such as colourful coral, fish and other marine life. More recently, with the advancement of photography equipment, underwater life has become an interesting subject for photographers. Buleleng, in particular, has such magnificent underwater beauty from abundant coral reefs, nudibranchs, the unique sea-dragon, garden eels, the schooling of bumphead parrotfish, and many more.

Besides recreational diving, Buleleng is famous for its rapid conservation movement. Previously known as a cyanide fishing area, Buleleng has transformed itself into a leading district in marine conservation. For instance, a number of conservation programs have been awarded with various international and national awards for their efforts.

Thus, through the festival, divers got to be involved and learn more about the ongoing conservation programs in Buleleng. Several monitoring and educational programs were conducted to support management of the Marine Management Area network, which is divided into three regions, including East Buleleng (Kec.Tejakula), Central Buleleng (Lovina and surrounding area) and West Buleleng (Pemuteran Bay). The Marine and Fisheries Agency of Buleleng facilitated the monitoring and opened activities to all divers who wanted to participate, providing extensive and valuable information for the further management of the marine areas.

Coral reef monitoring was conducted on the 23rd and 24th of October, accompanied by local guides from Reef Check Indonesia's network communities, providing training for divers on reef monitoring techniques. Over 40 Reef Checkers joined the event, hailing from various backgrounds such as students, dive guides, hobbyist divers and local residents.

For more information on how to get involved with Reef Check Indonesia, visit **www.reefcheck.or.id**

PHILIPPINES ECOEXPEDITION SHOWS PROGRESS MADE IN MARINE CONSERVATION

BY **GREGOR HODGSON, REEF CHECK FOUNDATION EXECUTIVE DIRECTOR**

The Philippines Siren was our base of operations for the 2015 Central Visayas survey expedition. A team of six guests hailing from Canada, the US, UK and one WWDS Dive Instructor from Spain took part in the Eco Diver training while in the crystal clear waters of Cebu and Negros. Stops included MoalBoal, Dauin, Apo Island, Cabilao, and Balicasag – areas where I had worked as a US Peace Corps Volunteer over 35 years ago.

It was inspiring to see that blast fishing has stopped in the area. We only heard one distant blast off Bohol the entire trip. This used to be dynamite fishing central. All the work by NGOs including Reef Check, the government Bureau of Fisheries officers, and local mayors has finally paid off. The reward is seen in the large numbers of small fish such as Anthias which are now too numerous to count. It was also encouraging to see so many local towns trying to set up and maintain their own Marine Protected Areas so that the fish have time to reproduce.

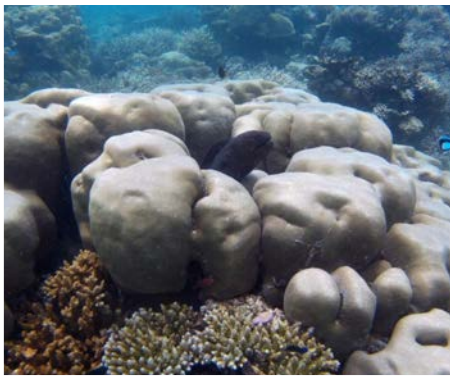
Our intrepid team was able pass all their tests and to complete our surveys which will soon be added to the Reef Check global database.

As usual, the entire crew and dive staff of WWDS went out of their way to support our training and in addition to covering the training costs, even made a significant donation to Reef Check. The WWDS dive guides are incredible at finding all the weird critters that photographers like to shoot. So readers, if you want to have a fun dive trip and also learn how to do a Reef Check survey, please check our list of expeditions and sign up for next year's amazing Visayas trip at **www.sirenfleet.com**.

Thanks to the great support provided by WWDS dive staff and the Siren crew!

NO BLEACHING AND LOTS OF TEACHING
ON BIOSPHERE EXPEDITIONS' MALDIVES EXPEDITION

BY **BIOSPHERE EXPEDITIONS**



If you have ever visited the Maldives, you will have seen fleets of luxury liveaboards motoring around the atolls taking their guests to well-known dive sites to experience the underwater beauty that the Maldives is famous for. This September, one of those liveaboards, the MV Carpe Diem, housed a rather different clientele – the honeymooners and adventure divers were replaced with studious environmentalists embarking on a training course to learn the monitoring techniques necessary to collect reef health data – Reef Check.

From five different countries, 10 participants, two of whom were Maldivian, came together to learn the Reef Check methodology on an annual research expedition organized by nonprofit conservation organization Biosphere Expeditions. Biosphere Expeditions recognizes the importance of training local Maldivians, alongside citizen scientists from around the world. Once the expedition is over, and most participants have returned to their temperate homes, the Maldivians have continued access to their reef and with their newly acquired knowledge, can support Biosphere Expeditions' work with additional Reef Checks, amongst them the first such all-Maldivian survey in 2014.

So, with the lounge of the Carpe Diem transformed into a classroom and its dhoni (dive boat) now a research vessel, the ten newly qualified Reef Check divers set out on a survey route previously visited in 2011 and 2013. "We revisit the same sites to get a clearer idea of what's going on," says Catherine Edsell, expedition leader and Reef Check trainer, "much can be gleaned from repetitive datasets – they help us to see what is changing, especially when it comes to the issue of bleaching."

With a global El Niño event and documented sea surface temperatures rising, the team was on high alert for signs of coral bleaching. Bleaching occurs when corals are stressed, resulting in expulsion of the symbiotic algae (zooxanthellae), which not only give them their color, but provide them with food via photosynthesis. Without their zooxanthellae, corals appear bright white or luminous yellow and it was this sign that the team was on the look-out for.

Initial training dives around Baros Resort's house reef revealed no such incidence, but Mariyam Shidha Afzal, this year's expedition scientist and a previous Maldivian recipient of Biosphere Expeditions' training programme said, "Bleaching can be quite localized, so we may find when we travel south that things are different." Fortunately this was not the case and there was minimal bleaching at all survey sites. Storm damage, on the other hand, was quite severe, especially at Bathalaa Maaga and Holiday Thilla, and it was easy to see why, as throughout the expedition, monsoon storms battered the more exposed atolls, causing one of the surveys to be aborted.

"Understanding the factors that are affecting the health of the Maldives' reefs is the ambition of the programme", says Dr Jean-Luc Solandt of the Marine Conservation Society and Reef Check co-coordinator for the Maldives. "It is never a simple story – when we put our heads underwater at each site, we have a basic understanding of what's likely to be affecting the reef, but Reef Check allows us to nail this down further with data on a wide variety of factors. At the same time we are able to train Maldivians and conservationists from other countries to do the same, so we are delighted with the long-term results of the trainings and collaborations we are forging in the Maldives."

Biosphere Expeditions' placements this year, kindly supported by the Rufford Foundation, were Mohammed Ryan Thoyyib, currently working for LaMer (Land and Marine Environmental Resource group – a local environmental consultancy), and Irthisham Hassan Zareer from the Maldives Whale Shark Research Programme. Both organizations have an ongoing relationship with Biosphere Expeditions and offer up their most promising candidates to become Reef Checkers. "I feel extremely lucky to be part of such an expedition that brings people together from different corners of the world for the same goals, to try and conserve the beautiful reefs that we are blessed with," says Irthrisham, "I am hoping to get in contact with some of the other Reef Check trainers from the Maldives and with the help of some more dedicated divers, carry out more surveys at the end of the year."

REEF CHECK CALIFORNIA COMPLETES EXPEDITION ALONG BIG SUR COAST

BY **ANNA NEUMANN, NORTH COAST REGIONAL MANAGER** PHOTOS **REEF CHECK CALIFORNIA**

For years people have warned me of the dangers of turning my hobby into my profession. 'You will start to hate diving' or they say 'you will get bored or jaded.' I have to admit swimming through the murky green water counting fish for two days straight can be a little uninspiring and tedious, however I've always told myself how lucky I am to have such complaints and at least I'm not sitting in a cubical crunching numbers. Then there are the days, and dives, that really make me realize how wrong those people are; case in point, the Reef Check California expedition along the gorgeous Big Sur coast of California.

In early May, Reef Check launched a Kickstarter campaign to run an expedition up the Big Sur coast to survey 9 new sites that would start filling in data gaps between San Luis Obispo and Monterey Bay. The campaign was a huge success. The trip created a buzz among our volunteers and recreational divers alike and we had no problem filling the boat with eager divers.

On the evening of June 21st when I arrived at the Vision, docked in Morro Bay, I was full of anticipation and almost giddy with excitement. Upon boarding I realized I wasn't the only one, smiling and equally happy faces greeted me. We set up gear and laid out sleeping bags and explored the boat which was going to be home for the next three days. We took off at roughly 2am heading to our first sites in the Big Creek reserve. After the morning briefing and a few cups of coffee we geared up and made the first splash. As we descended onto the reef, blue rockfish schooled among the giant kelp that reached to the surface making the light dance through the water column. Giant kelp and bull kelp reached to the surface with Pterygophora creating a shady understory hiding vertebrates and invertebrates of all sorts. Vermillion rockfish darted through the kelp forest while the more friendly kelp and gopher rockfish came out of the cracks to say hello. Bigger fish like lingcod and cabezon also made appearances among the smaller fish, always startling me with their large size and grumpy faces.

On the second day, we moved farther north to the Point Sur reserve and made an early morning jump into 30-45 feet of visibility and 50 degree water. Once again the early morning and cold water misery were quickly replaced by the breathtaking reef. Wolf eels relaxed in nests of red kelp while abalone hid in holes and purple hydrocoral grew along the side of a pinnacle. As a second dive that day, we hit Andrew Molera reef which has now taken the top seat of 'best dive of my life' from the walls in Cozumel, Mexico. With more stunning visibility, jeweled snails, eels, abalone, rockfish, and anemones galore, I did not want the dive to end.

Our third and final day was spent in the White Rocks reserve where we were brought back to the reality of diving in central California. The near 18ft of visibility felt like a slap in the face in comparison to the previous days' dives, however the vermillion rockfish nibbling on my transect tape still brought a smile to my face. I was also very excited to dive a newly re-named reef called Daddy Bob's Reef. The previous name, Paranoids, was unfitting and just a little creepy, so the team and I decided to re-name the reef after my father who helped us raise nearly $1500 in the Kickstarter campaign.

In total, we were able to complete surveys at all 9 of the planned sites and have a little extra time for a play dive. The new site list includes Point Sur, Andrew Molera, South Wreck, Esalen, Dolan, Lopez, Daddy Bob's, Harmony and White Rocks as well as another new site surveyed the weekend prior on the southern side of the White Rocks reserve called 12 Mile.

Thank you to everyone who helped make this trip possible!

AMAZING CONDITIONS AND UNIQUE SIGHTINGS HIGHLIGHT CHANNEL ISLANDS EXPEDITION

BY **CHARLEEN CONLOGUE, REEF CHECK SOUTHERN CALIFORNIA VOLUNTEER COORDINATOR**

In July, Reef Check launched a Kickstarter campaign to raise funds to survey the northern Channel Islands of California. After reaching full funding for our campaign, the survey expedition was held in September and visited Santa Rosa, Anacapa and Santa Cruz Islands. Our goal was to complete as many dive sites as we could and we definitely accomplished that. We had an excellent team of 25 citizen scientist divers on this expedition with a range of experience: a handful had volunteered with Reef Check California for ten years whereas others were finishing up their training on this trip. We were able to do an unprecedented eleven sites in three days! On behalf of the Reef Check Foundation, I would like to thank everyone who donated to our Kickstarter project, especially to the Lesser family, Michael Schechter and Channel Islands Scuba for their remarkable donations.

DETAILS OF THE EXPEDITION

I arrived at Ventura Harbor around 9:30pm on August 31st to board the Truth Aquatics liveaboard boat. Once I finished catching up with fellow Reef Checkers, I laid in bed trying to fall asleep. Around 3:30am, I woke up to the boat's engines starting and water splashing on the side. I thought to myself, "Here we go!" With a smile on my face and excited little butterflies in my stomach, I tried falling asleep again. Waking up with a cup of coffee, watching the sunrise, feeling a crisp breeze on my face and looking at the Channel Island chain is a wonderful experience. I would recommend it to anyone who has any bit of wanderlust.

The first day of the expedition was spent surveying four different dive sites on Santa Rosa Island – East Point, Elk Ridge, Johnson Lee and South Point. Of these, Elk Ridge was definitely one of my favorite sites of the whole expedition; it is a beautiful rocky reef. With gorgeous kelp forests, there were numerous surf perch and rockfish swimming over our transects, and an amazing number of invertebrates including colorful nudibranchs and a wrestling octopus that wanted to take my transect line. I was laughing so much I probably used a third of my air having that tug-of-war! South Point was an amazing dive as well, with clusters of Red Abalone, some measuring up to 27cm, and fish like Kelp Greenlings and Lingcod. Exhausted from a wonderful first day, everyone settled into their bunks and got some much needed rest.

Anacapa Island was gorgeous the next day! We had pristine conditions; the sun was out, the water was about 69°F and the visibility averaged 40 feet at our dive sites. We surveyed four locations again – Landing Cove, Cathedral Cove, Cathedral Wall and Goldfish Bowl. For our second dive day, Landing Cove was pretty stellar with iconic California kelp forests and sea lions swimming around us. Goldfish Bowl gave everyone something to celebrate; some of our scientific divers saw a Giant Black Sea Bass and others saw a green sea turtle, which are very unusual for this area. I am pretty sure everyone came up from the dive with smiles on their faces and pictures of the amazing sea creatures we saw.

That night we stayed in Scorpion Bay. A handful of divers did a fun night dive while others played dominos and watched sea lions feeding on squid and flying fish.

Our final day on Santa Cruz Island treated us well. We performed surveys at three dive sites: Scorpion Anchorage, Pelican Anchorage and Cueva Valdez. Scorpion Anchorage was an amazing dive. It was a very pleasant surprise. I counted every Southern California fish during this dive, which was incredible. Even though conditions were amazing, most of our team performed four dives a day which is definitely admirable. Doing that many dives a day consecutively is exhausting and they did it with smiles on their faces. On the trip home, the ocean rewarded us with 8-10 blue whales during the channel crossing.

Thank you again for your support of this project, there is no way we could have done it without you!

REEF CHECK LEADS RESPONSE TO 3RD GLOBAL CORAL BLEACHING EVENT

PHOTOS **DR GREGOR HODGSON** AND **HELEN BRIERLEY**

On September 9, 2015, Drs. Gregor Hodgson (Reef Check) and Mark Eakin of the National Oceanic and Atmospheric Organization (NOAA) organized a meeting in Washington, DC to bring together senior staff from international NGOs, government and funding agencies to present the evidence and to ask them to form a Coral Reef Coalition to oversee the emergency response to the third Global Coral Bleaching Event (GCBE3). The group agreed to work together on the following goals:

1. Seek additional funding for standard monitoring and checking accuracy of NOAA satellite model predictions quickly.
2. Use GCBE3 as a lever in climate change debate (COP21).
3. Track management success because resilience-based protections may be ineffectual.
4. Make data on bleaching and management immediately available via a rebranded/ multi-branded Coalition Global Reef Tracker database now at: data.reefcheck.org/
5. Track coral/algal adaptation trajectory so that we know where adaptation is helping protect corals.
6. Increase PR on coral reef loss via all media.
7. Support the creation of an X-prize approach to test solutions to bleaching.

On October 8th, the Reef Check Foundation teamed up with NOAA, Catlin and University of Queensland to formally announce that the ongoing coral bleaching event was indeed global, and that immediate action was required by environmental groups worldwide. This announcement was picked up by hundreds of media throughout the world such as the Guardian in the UK and CNN. Coral reefs endangered by bleaching in global event, researchers say.

Beginning in 2014 and predicted to continue into mid-2016, the El Niño along with global warming has caused ocean temperatures to rise and "bleach" large portions of the world's coral reefs. When the water heats up above the normal seasonal temperature range, coral bleaching occurs, which can eventually lead to coral death. If NOAA long-range predictions are correct, by the end of 2016, this bleaching event could result in the biggest loss of biodiversity in recorded history of reef ecosystems. It threatens icons such as the Great Barrier Reef of Australia.

Reef Check's Dr. Hodgson also requested and helped to co-author a Consensus Statement from the International Society for Reef Studies, the distinguished scientific group comprised of coral reef scientists.

During the emergency meetings of the new Coral Reef Coalition, members from NOAA, The Nature Conservancy, Conservation International and World Wildlife Fund have pledged to bring this emergency to the forefront of their respective organizations' climate change agendas. It is integral that the public be aware of this ongoing and impending crisis, and that steps are taken to increase monitoring of reef health in order to assess damage as well as to seek potential solutions.

Reef Check, with 19 years of standardized global reef data, has offered to co-brand its Google Earth based Global Reef Tracker database to include data from other organizations.

The 3rd Global Coral Bleaching event since 1997 has already bleached and killed large areas of coral reef in many parts of the world, including Hawaii, American Samoa and Florida. Based on satellite data and climate models, NOAA's Coral Watch Program predicts this to be the worst event in history. Parts of the Pacific and Caribbean are bleaching now and will experience peak bleaching in October/ November. During the early parts of 2016, Australia and the Western Indian Ocean will be threatened with the hottest water on record.

"This is a global biodiversity emergency," says Dr. Hodgson, "because coral reefs are the second most diverse ecosystem on earth after rainforests. They are found throughout the tropics and they are invaluable because they supply fish and shellfish, protect the coast from wave erosion, are a focus of coastal tourism, and have immense genetic diversity that has only just been tapped for drugs such as Ara-C, a potent drug used to fight childhood leukemia."

There is an urgent need to improve field tracking of the 3rd Global Coral Bleaching Event and quickly deploy more teams and more frequently to measure the actual damage to the reefs. NOAA models predict more severe damage to coral reefs in many parts of the world during the remainder of 2015 and into 2016. The 1998 event killed at least 11% of the world's coral reefs and in areas such as the Maldives, some 90% of the corals were killed. Many reefs in the Caribbean were damaged during a regional bleaching event in 2005 and over 70% of corals were killed on reefs in parts of Thailand during GCBE2 in 2010.

EDISON INTERNATIONAL JOINS FORCES WITH REEF CHECK TO MONITOR RECOVERY OF CATALINA ISLAND REEF

BY **DEBBIE FELLMAN** PHOTOS **DAN MCGANTY** AND **BRIAN WOOTEN**

As part of Edison International's "Adopt a Reef" partnership with Reef Check, volunteers from Edison recently joined a team of Reef Check California divers to monitor Casino Point Reef at Catalina Island. The reef was battered by storms last year and Reef Check has been tracking its recovery.

There are many ways to experience California's beauty: a hike in the mountains, a stroll along the beach. Or, if you're willing to squeeze into a wet suit, a dive underwater. There, you can explore the colorful ecosystems of rocky reefs and kelp forests.

Like coral reefs worldwide, California's rocky reefs have been diminished by human activity and oceanic events. Add the effects of last year's winter windstorms and Catalina Island's Casino Point Reef isn't in the best of health. Enter Reef Check, a nonprofit dedicated to saving reefs worldwide, and a longtime partner of Edison International.

"The storm's impact on the Casino Point Reef was massive," says Dr. Jan Freiwald, director of Reef Check California. Through the Adopt-a-Reef partnership, Edison International and Reef Check are together monitoring recovery of Casino Point Reef. "By regularly monitoring the reef and its marine life, along with our 10 years of historical data from before the storm, we are able to track and evaluate the reef's recovery."

Recently, volunteers from Edison International, parent company of Southern California Edison (SCE), suited up in scuba gear to participate in the last of four marine life surveys at Casino Point Reef this year.

Underwater, with their waterproof clipboards, they counted members of key species such as Garibaldi, the official state marine fish of California, kelp bass, black surfperch, California sheephead, sea cucumbers and marine snails.

Most of the 21 Edison International volunteers at the Casino Point event were experienced divers and participated in the event as members of EcoIQ, one of SCE's 14 employee resource groups, and the sponsor of the dive event.

"This dive helped me gain a deeper understanding of the situation affecting reefs, and how important it is to document their well-being with consistent data collection," said Catherine Leland, an SCE senior project manager and the volunteer leader of EcoIQ, who organized the event.

Other recent EcoIQ events included restoring hiking trails that were damaged by the deadly Station Fire in 2009 and tending to urban vegetable gardens at the urban Earthworks Farm & Community Garden.

Reef Check's work spans the globe, and its scientific methods produce data from reefs worldwide. This data is used to document reef health and preserve and sustain reef ecosystems.

Edison International has a long history of giving back to help marine life flourish along the Southern California coast. Near Del Mar, the San Dieguito Wetlands Restoration Project revitalized 150-plus acres of coastal wetlands, creating a fish nursery and a refuge for migratory waterfowl and endangered species.

FEATURE CREATURE
TIGER SHARK (*GALEOCERDO CUVIER*)

FEATURE **IUCN RED LIST 2009** PHOTOGRAPHY **SIMONE CAPRODOSSI**

RED LIST CATEGORY & CRITERIA: NEAR THREATENED
Scientific Name: *Galeocerdo cuvier*
Common Name: English: Tiger Shark

Justification: This assessment is based on the information published in the 2005 shark status survey (Fowler et al. 2005).

This large (>550 cm), omnivorous shark is common world wide in tropical and warm-temperate coastal waters. It is a relatively fast growing and fecund species. The Tiger Shark (*Galeocerdo cuvier*) is caught regularly in target and non-target fisheries. There is evidence of declines for several populations where they have been heavily fished, but in general they do not face a high risk of extinction.

However, continued demand, especially for fins, may result in further declines in the future.

Range Description: The Tiger Shark has a worldwide distribution in tropical and warm temperate seas. Randall (1992) described its distribution as follows: 'In the western Atlantic it ranges from Cape Cod to Uruguay, including the Gulf of Mexico, Bermuda and islands of the Caribbean; in the eastern Atlantic it is found on the West African coast from Morocco to Angola; it remains unknown from the Mediterranean Sea, but there are reports from Iceland and the United Kingdom (these were probably based on vagrants transported there during a warm year by the Gulf Stream) (Compagno 1984). It occurs throughout the Indo-Pacific region from the northern Red Sea to South Africa and east through the islands of Oceania and northern New Zealand (though not yet reported from Easter Island); in the eastern Pacific it ranges from southern California to Peru, including the Galapagos and Revillagigedo Islands.'

Little is known of the Tiger Shark's depth range. Clark and Kristof (1990) illustrate a female Tiger Shark of about 250cm total length (TL) from a photograph taken from a submersible in 350m of water off Grand Cayman. The species is also encountered in very shallow water.

Countries occurrence: Native: American Samoa (American Samoa); Angola (Angola); Anguilla; Antigua and Barbuda; Aruba; Australia; Barbados; Belize; Benin; Bermuda; Brazil; Cameroon; Cayman Islands; Colombia; Congo; Cook Islands; Costa Rica; Côte d'Ivoire; Cuba; Djibouti; Dominica; Dominican Republic; Ecuador; Egypt; Equatorial Guinea; Eritrea; Fiji; French Guiana; French Polynesia; Gabon; Gambia; Ghana; Grenada; Guadeloupe; Guam; Guatemala; Guinea; Guinea-Bissau; Guyana; Haiti; Honduras; Iceland; Indonesia; Jamaica; Kenya; Kiribati; Liberia; Marshall Islands; Martinique; Mauritania; Mexico; Micronesia, Federated States of; Montserrat; Morocco; Mozambique; Nauru; New Caledonia; New Zealand; Nicaragua; Nigeria; Niue; Norfolk Island; Northern Mariana Islands; Palau; Panama; Papua New Guinea; Peru; Pitcairn; Puerto Rico; Saint Kitts and Nevis; Saint Lucia; Saint Vincent and the Grenadines; Samoa; Saudi Arabia; Senegal; Sierra Leone; Solomon Islands; Somalia; South Africa; Sudan; Suriname; Tanzania, United Republic of Timor-Leste; Togo; Tokelau; Tonga; Trinidad and Tobago; Tuvalu; United Kingdom; United States (Alabama, California, Connecticut, Delaware, Florida, Georgia, Hawaiian Is., Louisiana, Maryland, Massachusetts, Mississippi, New Jersey, New York, North Carolina, Rhode Island, South Carolina, Texas, Virginia); United States Minor Outlying Islands; Uruguay; Vanuatu; Venezuela, Bolivarian Republic of; Virgin Islands, British; Virgin Islands, U.S.; Wallis and Futuna; Western Sahara; Yemen

FAO Marine Fishing Areas: Native: Atlantic – eastern central; Atlantic – northeast; Atlantic

– northwest; Atlantic – southeast; Atlantic – southwest; Atlantic – western central; Indian Ocean – eastern; Indian Ocean – western; Pacific – eastern central; Pacific – northwest

Lower depth limit (metres): 350

Current Population Trend: Unknown

Population severely fragmented: No

Habitat and Ecology: Randall (1992) reviewed a large number of studies on the feeding behaviour of Tiger Sharks, including Norman and Fraser (1937), Springer (1938), Whitley (1940), Bigelow and Schroeder (1948), Gudger (1948a,b, 1949), Kauffman (1950), Ikehara (1960), Springer in Gilbert (1963), Gohar and Mazhar (1964), Clark and von Schmidt (1965), Randall (1967, 1980), Tester (1969), Fujimoto and Sakuda (1972), Bass et al. (1975), De Crosta et al. (1984) and Stevens (1984). He concluded that this species has probably the most diverse diet of any shark species. Prey includes numerous bony fish, sharks, rays, turtles, sea birds, seals, dolphins, sea snakes, cephalopods, crabs, lobsters, gastropods and jellyfish. They consume carrion and readily take baited hooks. Tiger Sharks also have a propensity to consume "garbage" of human origin, including plastics, metal, sacks, kitchen scraps and almost any other item discarded in the sea.

The age and growth characteristics of Tiger Sharks have been investigated by a number of authors, most notably De Crosta et al. (1984) and Branstetter et al. (1987). Working in the north-west Hawaiian Islands De Crosta et al. (1984) estimated that a Tiger Shark with a precaudal length of 200cm is about five years old and that one of 300cm is about 15 years old. Branstetter et al. (1987) used similar techniques to De Crosta et al. (1984) to produce growth curves for Tiger Sharks from the coast of Virginia and the northern Gulf of Mexico. They estimated that initial growth was very fast, but that the rate of growth of very large animals is 5-10cm year-1; thus, individuals of 400-450cm TL would be 20-25 years of age. Branstetter et al. (1987) gave a maximum age of 45-50 years. Smith et al. (1998) estimated the intrinsic rate of increase of a tiger shark population at MSY to be 0.043 year-1. Randall (1992) summarised that the size at maturity of male Tiger Sharks is 226-290cm TL and in females 250-350cm TL.

The Tiger Shark is the only species of the family Carcharhinidae that is ovoviviparous. Litter sizes are large, with between 10-82 embryos reported from a single female. Mean litter sizes of 30-35 have been reported (Tester 1969, Bass et al. 1975, Simpfendorfer 1992). The size at birth is 51-90cm TL (Randall 1992, Simpfendorfer 1992). Clark and von Schmidt (1965) gave the gestation period as 13-16 months. There have been few other estimates of gestation period. Mating is reported to take place in the Northern Hemisphere in spring, with pupping the following spring to summer. Mating occurs before full-term females have given birth to young, indicating that litters are produced every two years or less. In the Southern Hemisphere Stevens and McLoughlin (1991) and Simpfendorfer (1992) have reported pupping during summer. The young are very slender with a flexible body and caudal fin; they swim with an inefficient anguilliform motion. Branstetter et al. (1987) concluded that they are probably very vulnerable to predation at this stage, especially by sharks, including their own kind.

Tagging studies, particularly in the western Atlantic, have provided the best information on the movements of Tiger Sharks. Randall (1992) provided data from a range of studies that indicated that two patterns of movement are observed in tagging studies. The first of these is where the release and recapture positions are close together, suggesting that the individual may have remained in a relatively small area. The other pattern observed is where the individual is recaptured a long distance from the release site, often after a short period at liberty. The maximum reported distance between release and recapture for a Tiger Shark was approximately 3,430km.

Systems: Marine

Use and Trade: Tiger sharks are caught as target species and as bycatch. Products utilized include flesh, fins, skin, liver oil and cartilage. Fins, skin and liver oil all considered to be of high quality and can fetch good prices. The species is also caught by recreational fishers.

Major Threat(s): Tiger sharks are caught in numerous fisheries world wide, both as target species and bycatch. Products utilised from Tiger Sharks include flesh, fins, skin, liver oil and cartilage. Although not considered of high quality, the mercury content of this shark's flesh is lower than other large carcharhinid species (Simpfendorfer pers. data). The fins, skin and

liver oil from Tiger Sharks are all considered to be of high quality and can fetch good prices. The high value of products has increased commercial fishing pressure on this and similar species worldwide, especially since demand for high quality shark fins has increased. Catches of Tiger Sharks in directed shark fisheries have been documented for a number of areas including the western Atlantic (e.g., Kleijn 1974, Hoey and Casey 1986, Berkeley and Campos 1988, Bonfil 1994, GSAFDF 1996), Australia (Stevens et al. 1982, Lyle et al. 1984), India (Burman 1994), Papua New Guinea (Chapau and Opnai 1986), Brazil and Taiwan (Province of China) (Bonfil 1994). Commercial catches are also taken in many other areas but few records of their capture exist. Tiger Sharks are not typically the target species in these fisheries but are bycatch in fisheries targeting other shark species. Catches of Tiger Sharks in these fisheries are often not reported directly, but observer data on the species composition can be used to make estimates.

In the US East Coast/Gulf of Mexico shark fishery tiger sharks are the third most common large, coastal species caught in the fishery, accounting for 12-20% of the catch (GSAFDF 1996). However, they account for only 5% of the landed weight as they are considered of limited value since finning is not allowed in this fishery. Most of the individuals caught in this fishery are juveniles less than 150cm FL, although large animals are also taken (S. Branstetter pers. comm.).

In northern Australia gillnet fisheries catch Tiger Sharks, although the mesh sizes used have precluded the capture of significant numbers (Lyle et al. 1984). In northern West Australia a number of fishers have used heavy drumlines to fish for large sharks. Tiger Sharks have been a major target of these fishers, with catches reaching 116t (live weight) in 1994/95 (Simpfendorfer and Lenanton 1995). All operators who have targeted Tiger Sharks in this area have now ceased fishing.

Tiger Sharks are taken as bycatch in a variety of fisheries including tuna and swordfish longline fisheries (e.g., Anderson 1985, Berkeley and Campos 1988), particularly those operating on, or close to, the continental and insular shelves. They are also taken in trawl fisheries (e.g., squid, fish and crustacean trawl fisheries), although normally in small numbers. There are few records of Tiger Shark catches for these fisheries. Tiger Sharks are undoubtedly caught in tropical and subtropical artisanal fisheries. However, gear limitations in these fisheries probably precludes the capture of large numbers, especially of larger individuals. There are few published data on artisanal fishery captures and it is not possible to quantify catches or the impact that these may have on Tiger Shark populations.

Tiger Sharks are caught by recreational fishers. The species is one that has International Game Fish Association (IGFA) status, the current record being 596kg. Catches have been documented off the east coast of the United States, Australia and South Africa (e.g., Stevens 1984, Anderson 1985, Casey and Hoey 1985, Pepperell 1992, Anon. 1994). Estimates of total catches of shark by recreational anglers off the east coast of the United States (including the Gulf of Mexico) in 1978 are 10,300t (Casey and Hoey 1985) and in 1980 over 15,000t (Anderson 1985). Estimates of the species composition of the recreational catch indicates that Tiger Sharks represent 0.8-2.1% of the catch. Based on these estimates of species composition, the recreational Tiger Shark catches in 1978 and 1980 would have been approximately 10-20t and 15-30t, respectively. More recently recreational catches have declined, and tagging and release has become more common. In Australian waters Pepperell (1992) estimated that Tiger Sharks represented approximately 10% of the sharks captured by IGFA associated clubs off the New South Wales coast during the 1970s. This increased to approximately 20% during the 1980s, due to increased targeting. Size composition data provided by Pepperell (1992) indicate that the bulk of the catch was 80-130kg. Stevens (1984) estimated that Tiger Sharks comprised 17% of the recreational catch by anglers off New South Wales between 1979 and 1982, based on catch sampling.

Tiger Sharks are undoubtedly caught by recreational fishers in many countries, and not only those documented above. Recreational fishing is likely to account for significant mortality in Tiger Shark populations in coastal waters of some countries.

The large size, and propensity to occasionally attack humans, makes Tiger Sharks a target of shark control programmes, particularly those operating in tropical areas (e.g., Queensland (Paterson 1990) and Hawaii (Wetherbee et al. 1994)). However, they are also taken in other programmes (e.g., South Africa (Dudley and Cliff 1993) and New SouthWales (Reid and Krough 1992)). These control programmes use either large mesh gillnets and/or heavy lines to capture large, dangerous sharks. The theory behind the programmes is that fishing reduces the abundance of the large, dangerous sharks and so reduces the probability of attacks in areas where there has previously been relatively high records of shark attacks. There is conflicting evidence as to whether these control programmes are effective in reducing the abundance of Tiger Sharks. Evidence from Paterson (1990), Simpfendorfer (1992) and Dudley and Cliff (1993) indicates that Tiger Shark abundance has either remained steady, or even increased in "meshed" areas. Catch rate data from Hawaii indicated that shark control programmes did reduce Tiger Shark abundance (Wetherbee et al. 1994). These data suggest that at best the use of shark control programmes to reduce population levels of Tiger Sharks may be of only limited value.

Tiger Shark populations face a variety of threats. These include not only a large range of directed and bycatch fisheries, but also problems such as the ingestion of human garbage. The high value of some products (especially fins) from Tiger Sharks has resulted in increased fishing pressures on this species in recent years. Musick et al. (1993) noted a precipitous decline in Tiger Sharks off Virginia, USA, due to both recreational and commercial harvesting between 1980 and 1992. There is anecdotal evidence that in areas where catches in commercial fisheries are high, abundance has been significantly reduced (e.g., Taiwan (POC) (Bonfil 1994)). There is some evidence from shark control programmes that localised catches of Tiger Sharks do not affect abundance.

The widespread distribution of this species increases the likelihood that it will survive increasing levels of exploitation in certain areas. Its growth and reproductive rates are also relatively high, making the levels of mortality that the Tiger Shark can survive higher than for many other species of shark. Additionally, juvenile survivorship increases where adult Tiger Shark populations have been depleted by fisheries and hence predation of young is lessened. However, the overall life history constraints to increased mortality applicable to all sharks must also be borne in mind when considering the conservation status of this species.

Conservation Actions: There are no specific conservation or management measures in place for the Tiger Shark. However, in the US Atlantic and Gulf of Mexico this species is managed under a Fisheries Management Program (FMP) introduced in 1993. It is included in the large coastal group which has an annual quota of 1,285t. This group is dominated by Sandbar Shark (*C. plumbeus*) and the Blacktip Shark (*C. limbatus*). A new FMP was introduced in early 1999, placing Tiger Sharks in the ridgeback large coastal group which have a quota of 622t and a minimum size of 137cm fork length. A court placed an injunction on these new regulations pending further court action by commercial fishers.

Citation: Simpfendorfer, C. 2009. *Galeocerdo cuvier.* The IUCN Red List of Threatened Species 2009. **www.iucnredlist.org**

THE ART OF PEARL DIVING

FEATURE AND PHOTOGRAPHY **SLAVA NOOR – WWW.THEPINKFINS.COM**

Rough ocean, wooden boats miles away from home and months of sleeping under the stars of the Gulf's sky were the reality of a pearl diver in the old days. Pearl diving played an important role in the economy of the United Arab Emirates in the 18th and 19th Centuries with many families depending on the income from it. People settled around the shores and divers polished their skills by spending numerous hours at sea.

The diving season would start as early as April or May when the water was still a bit cool and typically last until October. A pearl diver would receive an advance from a boat owner that would provide for the family that stayed at home.

They would then be given their uniform – a blue "wizar" and a white shirt – traditional Emarati garment at that time for sailors and a pink one for the captain or "nakutha". Once the divers were ready for the trip, the traditional wooden boat with white sail would take off into the Ocean in search of the best pearl diving spots that were marked on old maps and kept in secrecy.

Divers back then did not have the equipment that we enjoy today and had to face many dive related risks to make a living. The methods used to pearl dive did not change until the fourteenth century, with only a nose clip and a rope with a stone attached to it as the tools to assist in submersion. Divers would dive as deep as forty metres up to thirty times a day and collect as many oysters as they could on a single breath. The oysters were gathered in baskets made of dry palm trees and later opened under the careful supervision of the Captain. Every diver would get a share from the sales so everyone was interested in getting as many high quality pearls as they could.

An experienced pearl diver could predict whether the oyster was hiding a valuable pearl just by looking at it. Apparently, oyster shells have rings that tell their age just like the rings of trees do. The older the shell is, the higher the chance of finding a large beautiful pearl inside. Finding a rare and large pearl could be truly life changing and allow a diver to buy a house or start a small business. Failing to find good pearls would mean becoming indebted to the boat owner and having to pay back the following year.

Pearl diving lost its economical value for the UAE when the Japanese introduced the cultured pearl in the 1930's. Now this beautiful tradition can be experienced on the island of Sir Bani Yas where Major Ali from the Emirates Marine Environment Group with his Serdal team, together with Al Mahara Dive Centre organise pearl diving trips. I had a chance to learn a great deal on the trip and even find my own pearl. But that is another story that can be found on my blog. **www.thepinkfins.com**

Great White Shark | Photo by © Sijmon de Waal

SHARKS: MONSTERS, MYTH, MYSTERY OR MAGICAL

PART ONE

FEATURE **PAUL WARWICK**

Mention the word "shark" to any human being and it conjours up all kinds of primal emotions from fear to fascination, admiration to astonishment and dread to disillusionment.

INTRODUCTION

Sharks: Monsters, Myth, Mystery or Magical perhaps sums up the most enigmatic, most misunderstood of animals in vast expanse and diverse nature of our marine kingdom. Most of what we think we know is myth and folklore motivated and self-sustained by man's primal fears and emotions – it is this view which "sticks" in people's minds and colours and shapes their perception of this "perfect" of all marine predators. As a result it also defines the nature of our interaction with them and why we consider them to be a threat, rather than taking the view that we are a threat to them, so are they really the monsters of nightmares? Mystery they certainly are, we know so little about them, their interaction with the marine environment, their life cycle, breeding and their migration patterns, and why they do what they do. In my opinion, magical is perhaps the best description of this animal which has such a positive and profound impact upon all marine ecosystems and is a "yardstick" for the most effective assessment of the overall health of our oceans and seas. Sharks provide the "balance" which assures the productivity and vibrancy of our oceans and seas and to the life cycles of plethora of unique ecosystems across our water planet. There is a shark for every environment, every depth, every degree of temperature or salinity and every range of marine species.

Mention the word "shark" to any human being and it conjours up all kinds of primal emotions from fear to fascination, admiration to astonishment and dread to disillusionment. Yet when most people think of these cartilaginous fish, a single image comes to mind: a large, sharp-toothed and scary animal that chases and eats people and "demonised" by film makers and the "bad ill-informed press and media". Yet despite the work of the many international marine conservation organisations and groups that educate and inform the general public, that generalisation does sharks a huge disservice as they have far more variety than that and as we are finding out, they are more beneficial to the health of our oceans than anyone can imagine. They are indeed the most enigmatic of animals and perhaps some of the most fascinating. They are certainly the most successful of all species that have ever lived on this planet, having been around for over 400 million years and survived major climate change, cataclysm and geological upheaval as our planet has evolved. They have even seen the dinosaurs "come and go" and I have no doubt, will out survive many other species.

The general scientific name for all fish characterized with a "cartilaginous skeleton" is *Selachimorpha*, but their higher classification within the animal kingdom is *Elasmobranchi*. Did you know there are more than 500 species of sharks swimming in the world's oceans and seas today? They range in size from the length of a human hand to more than 39 feet (12 meters) long – of those, over half are less than one meter (or about 3 feet) in length. They come in a variety of colours (including bubble gum pink), shapes and unique features; some feed on tiny plankton while others prefer larger fish and squid or molluscs and crustaceans. The largest shark (and also incidentally the largest fish) is the gentle Whale shark, the smallest is the Dwarf Lanternshark which is only 8 inches long. This tiny shark is found in deep waters off the coasts of Columbia and Venezuela. Inbetween, there are hundreds of large and small sharks with various shapes and with a multitude of important ecological roles in the ocean. Widely dispersed across our water world, they are found in just about every kind of ocean habitat, including the deep sea, open ocean, coral reefs, and under the Arctic ice.

Wherever they live, sharks play an important role in ocean ecosystems – especially the larger species that are more "scary" to people. Sharks and their relatives were the first vertebrate predators and their prowess, honed over millions of years of evolution, allows them to hunt as top predators in our oceans and seas and keep the marine ecosystems in balance. The health of the shark population is generally a good indication of the overall health of the marine habitats in which they live and is used as a "litmus test" by marine biologists conducting "health checks".

DIVERSITY

Today, living sharks are grouped into nine basic orders:

GROUND SHARKS

Ground sharks (*Carcharhiniformes*) are some of the most familiar sharks, including Tiger

Lemon Shark | Photo by © Philippe Lecomte

sharks, Bull sharks, Reef sharks, Hammerhead sharks and Catsharks. They are defined by an elongated snout and nictitating membrane (from Latin nictare, "to blink" – is a transparent or translucent third eyelid present in some animals that can be drawn across the eye for protection and to moisten it while maintaining visibility). There are over 270 species of sharks worldwide in this order.

THORNY SHARKS

The order (*Echinorhiniformes*) includes two species of shark: the Prickly shark and the Bramble shark. They get their names from the thorn-like dermal denticles (small scales) covering their skin and are slow-swimming, bottom-dwelling sharks.

BULLHEAD SHARKS

Bullhead sharks (*Heterodontiformes*) are smaller sharks, reaching lengths of 5 feet or so, with pig-like snouts and small spines on their fins. They live on the shallow seafloor in warm and tropical areas of the Pacific and Indian Oceans.

PRIMATIVE SHARKS

The order (*Hexanchiformes*) includes Cow sharks and Six Gillsharks, the most primitive sharks alive today with skeletons resembling those of ancient extinct sharks, and the Frilled sharks, which can only survive in very deep water. What makes these sharks unique is their gill slits: they have six or seven gill slits (depending on the species) unlike all other sharks, which have five.

MACKEREL SHARKS

The 15 species of Mackerel sharks (*Lamniformes*) includes the Great white shark, Basking shark, Megamouth shark, Goblin shark and Thresher shark, among others. They are found all over the world in shallow water to the deep oceans. The embryos of mackerel sharks feed on their younger siblings and fertilized eggs while still in the womb.

CARPET SHARKS

The Carpet sharks (*Orectolobiformes*) are so-called because many of these species have ornate carpet-like skin patterns. They include the Whale shark, Wobbegongs, (yes you heard it right!) Bamboo sharks and Nurse sharks.

SAWSHARKS

Sawsharks (*Pristiophoriformes*) are no more than 5-foot-long, bottom dwelling sharks with toothy saw-like snouts. After detecting a prey's vibrations in the water, they slash at them with their saws to disable or kill them. They look very similar to the critically endangered sawfish, but sawfish are classified as rays, not sharks.

APLACENTAL VIVIPARITY

The order (*Squaliformes*) includes a wide variety of sharks – from the very smallest (the Dwarf Lantern Shark at 8 inches long) to the 21-foot Greenland shark. What do they all have in common? They are born live from eggs that hatch inside the mother's body.

ANGEL SHARKS

Angel sharks (*Squatiniformes*) look rather like skates, with flat bodies that they bury beneath the sand on the seafloor. But they have incredibly sharp teeth. They lie in wait for their prey of small fish and squid, and then surprise them with a sharp and deadly bite.

For those "fear mongers" in the marine community, archeological evidence has shown that today's sharks whilst both fascinating and fearsome had some pretty impressive ancestors roaming our seas and oceans millions of years ago, which grew to enormous sizes and were clearly "top of the marine food chain". The Megladon (*Carcharodon megladon*) was a similar animal to the Great white shark of today, but this "hunter of the seas" was twice as big as any known Great white at over 20 metres long – can you imagine swimming with a creature that big? The remains of another shark (*Ptychodus mortoni*) was over 10 metres long and given its physiology was clearly a slow moving bottom dwelling shark feeding on crustaceans and molluscs. Our ancient oceans and seas must have been wondrous to behold and filled with a rich variety and diversity of life in order to support large populations of such large animals. That shark species are much smaller and less in number today is perhaps indicative of the failing health and diversity of our current oceans and seas which we are doing very little to support and manage.

ANATOMY

SKELETON

No matter what their size, all sharks have a similar anatomy. Like other Elasmobranchs (a

subclass of animals that also includes Skates and Rays), sharks have skeletons made of cartilage – the hard but flexible material that makes up the framework of human noses and ears. This is a defining feature of Elasmobranchs, as most fish have skeletons made of bone. Cartilage is much lighter than bone, which allows sharks to stay afloat and swim long distances while using less energy.

TEETH

Every shark has several rows of teeth lining its jaws. Unlike people, which have a limited number of teeth in their lifetime, sharks are constantly shedding their teeth and replacing them with new ones. A shark can lose and replace thousands of teeth in its lifetime! Not all shark teeth are the same, however:

- Some have pointed teeth for grabbing fish out of the water.
- Others have razor-sharp teeth for biting off chunks of prey, allowing them to attack and eat larger animals other than bony fish of the same size.
- Sharks that eat shellfish have flatter teeth for breaking shells.
- Filter-feeding sharks that sift tiny plankton from the water still have teeth, but they are very small and aren't used for feeding.

GILLS

Another defining feature of sharks is their array of gill slits. Unlike bony fish, which have one gill slit on each side of their bodies, most sharks have five slits on both sides that open individually (and some shark species have six or seven). After water flows into a shark's mouth as it swims, it closes its mouth, forcing the water over its internal gills. The gills extract oxygen from the seawater, after which the water is expelled through the gill slits behind its head. When they're resting, many shark species pump water over their gills to make sure the oxygen never stops flowing. This is called "buccal pumping" and is used by many sharks that spend their time sitting still on the seafloor like Nurse sharks, Angel sharks and Wobbegongs (there you go, I have said it again). But some sharks are unable to pump water this way and if they stop pushing water into their mouths by swimming, they suffocate. These sharks include most of the large oceanic sharks such as the Great white shark, Mako shark and the Whale shark.

SKIN

Over many millions of years of evolution, sharks have become some of the speediest swimmers in the ocean thanks to several adaptations:

- Their unique skin, which is made up of millions of small v-shaped "placoid scales", also called dermal "denticles". The rows of "denticles" are smooth in one direction from head to tail, which is why if to "pet" a shark in the opposite direction, they feel like sandpaper. The "denticles" look more like teeth than typical fish scales and allow water to flow smoothly past the skin, reducing friction and increasing their swimming efficiency.
- Many shark species known for speed also have slim, torpedo-shaped heads, like the Great white shark and others. The Shortfin mako shark is the fastest known shark, it can swim 25 miles per hour at a regular pace and reach 46 miles per hour in quick bursts that allow it to fly into the air.
- Sharks gain additional speed by stiffening their tail while swinging it back and forth.
- Bony fish maintain their position in the water column with the help of a swim bladder – a gas-filled organ in their body that allows them to stay neutrally buoyant. Sharks don't have swim bladders, and instead get help from their very large livers full of oil and the fact that their cartilage is about half as dense as bone. A shark's lightweight skeleton allows it to put more energy into swimming and use dynamic lift to maintain its place in the water.

Blue Shark | Photo by © Philippe Lecomte

A SHARKS SENSES

Sharks have six highly refined senses for both hunting and communication: vision, taste, smell, hearing, touch and electro-reception. These finely honed senses coupled with sleek, torpedo-shaped bodies make most sharks highly skilled hunters.

VISION

Shark species have variable sight and colour perception depending upon the conditions in their habitat, the way in which they have evolved, their primary food sources and their method of foraging and feeding:

- **Structure:** The structure of shark eyes is remarkably similarly to our own. Like ours, the pupils of many shark species change size in response to varying levels of light. Like a human eye, a shark eye has a cornea, lens, pupil and iris. Unlike us and more like cats, sharks have a layer of mirrored crystals behind their retinas called the "tapetum lucidum". This layer allows them to see better in dark and cloudy waters, in the deep sea or at night.
- **Size:** But within that basic plan, there is a wide range of seeing ability among shark species. Some have large eyes as big as six centimeters in diameter whilst others have very small ones less than one centimeter in diameter. It is now understood that shark's eye size varies depending on the shark's habitat. Many sharks that stay near the surface have evolved to hunt in the sunlight and rely on their vision more than other senses, so have large eyes. Some deep-sea sharks also have big eyes to pick up faint traces of light down in the darkness. Sharks that live in shallow water on the seafloor often have the smallest eyes because floating sediment kicked up from the bottom blocks their vision. These animals instead rely on senses like smell and electroreception over vision. Lastly, sharks that hunt fast-moving prey like fish and squids have bigger eyes (and presumably better eyesight) than those that eat non-moving prey.
- **Eyelids:** Sharks have eyelids, but they don't blink; they close their eyelids to protect their eyes from damage when fighting or feeding. But their eyelids don't close all the way. In addition, some species have a clear membrane (the nictitating membrane), which slides down to protect the eye in dicey situations. Shark species that don't have the membrane, like the Great white shark, will roll their eyes back in the socket when they are attacking prey for protection.

TASTE

Sharks don't have a very strong sense of taste. Taste buds that line the mouth and throat allow them to taste their food before they make the commitment to swallow. This helps them avoid dangerous prey items, which might have a bad taste. This could also be why many shark bite victims survive: the shark takes a bite, gets a bad taste in its mouth, and decides it doesn't want to eat, releasing the person.

Sharks don't have what we think of as a typical tongue. Instead they have a small piece of cartilage on the floor of their mouth called a "basihyal" that lacks taste buds. In most sharks, it doesn't appear to serve any real function.

SMELL

Sharks have truly remarkable noses. As they swim, water passes into their nostrils and across sensory cells lining the skin inside. These sensory cells are able to detect relatively small amounts of a chemical signal in the water. A shark's two nostrils can also detect smells separately to determine from which direction they originated, allowing them to smell in stereo. Just like we can tell where a sound is coming from depending on which ear the sound waves hit first, sharks can tell where a smell is coming from depending on which nostril the smell hits first. Now those are some impressive nostrils!

HEARING

Sharks have two small openings on their head (behind and above their eyes) that lead to internal ears. There, sensitive cells allow sharks to hear low frequency sounds and to pick up on possible prey swimming and splashing in their range.

TOUCH

Sharks don't have fingers that they can use to feel and touch. Instead, like other fish, a shark has a lateral line running along the middle of its body from head to tail. The lateral line system is a series of pores that lets water flow through the shark's skin, where special cells called "neuromasts" can detect vibrations in the water. A fish swimming nearby displaces water as it goes along, creating ripples; when those ripples hit the lateral line system, the shark can detect both the direction and amount of movement made by prey, even from as far as 820 feet (250 meters) away. Because of this ability, they can sense prey in total darkness.

ELECTRO-RECEPTION

Not only can sharks detect vibrations through their lateral line system, but they also have a "sixth sense" of sorts that allows them to detect the small electric fields that all animals create when their muscles contract. Sharks detect the electrical fields through small pores on their head that are full of special cells called "Ampullae of Lorenzini". These cells are filled with a jelly-substance that conduct electric charges received from ions, like sodium and chlorine, which are found in salt water.

When a fish moves its muscle to swim, the shark can feel it; when one is wounded and flopping around, it sends out a large electrical signal that will attract the shark. Sharks also use electroreception to navigate. They can sense the Earth's electromagnetic field, which likely allows them to migrate across large distances without getting lost. They can also sense objects in the water, allowing them to create a map of their immediate environment.

Silky Shark | Photo by © Michel Salsmans

Great White Shark | Photo by © Philippe Lecomte

Blacktip Reef Shark | Photo by © Philippe Lecomte

LIFE CYCLE AND REPRODUCTION

GROWTH

The lifespan of most shark species is still largely a mystery and would appear to vary considerably. Sharks grow and mature slowly and reproduce only a small number of young in their lifetimes. Unlike most bony fish, they put a lot of effort into producing a small number of highly developed young at birth rather than releasing a large number of eggs that have a high probability of not surviving. Because of these traits, sharks numbers are particularly susceptible a wide variety of external threats such as overfishing, disease and changes to their environment or feeding grounds. Scientists determine the age of most species of fish by counting the "rings" on their "otoliths" (tiny calcium carbonate structures in their ears) like the rings on a tree. But this isn't so easy for sharks because their otoliths are the size of a grain of sand and are thus very difficult to see. Another method measures the growth of shark vertebrae using similar "rings," but how frequently the rings are laid down varies from species to species, making that method also unreliable. Recently, scientists have been using a new method of determining shark age: by using a radiocarbon timestamp. Using this method, they've found that sharks likely live much longer than previously thought. For example, the oldest male Great white shark was 70 years old, and the oldest female was 40 years old, much longer than previous estimates of about 20 years. Similarly, Sand tiger sharks were found to live up to 40 years, which is 11 years longer than originally thought.

MATING

All sharks produce young through internal fertilisation. A male shark does not have a penis. He has two claspers on the rear of his underside, attached to his pelvic fins, which he inserts into a female shark to deliver sperm to her eggs. We don't know a lot about the specifics of how sharks mate since not many sharks have been "caught in the act". Typically the male will only use one of his claspers at a time, depending on the pair's position (although some shark species may use both claspers). Sometimes they mate side by side, while other times the female will lay upside down. Female sharks can store male sperm in order to fertilize an egg later on if the time isn't right for reproduction. There are also several cases of "internal asexual reproduction" in sharks, a phenomenon called "parthenogenesis". This occurs when a female shark is isolated from males and so mating cannot take place to fertilise the eggs, yet she still produces a shark pup. Scientists think this may be a last-ditch attempt at reproduction when a male isn't present, and that it likely does not happen very often in the wild.

REPRODUCTION

There are three different ways a baby shark can be born once a female shark has a fertilized egg, depending on the species:

- **Viviparity:** Is when a shark nourishes her growing shark embryo internally and gives birth to a fully-functional live pup. These shark species, like the hammerheads maintain a placental link to the embryo, similar to humans.
- **Aplacental Viviparity:** Also called "ovoviviparity", there is no placental link. The most common type of reproduction in sharks, "ovoviviparity" occurs when the egg hatches while still inside the mother. Once hatched, the embryo gains nutrition from what remains of the egg yolk, nutritious fluids from the mother's womb, and sometimes from consuming other eggs in the uterus. Sand tiger sharks will actually eat their siblings in the womb. Female Sand tiger sharks often mate with several different males, producing a litter of shark pups from a number of fathers. Researchers think that the larger sharks will consume their smaller siblings that are not as closely related to prevent competition.
- **Oviparity:** Other shark species release an egg case, where the developing embryo gains nutrients from a yolk. Typically sharks that live on the seafloor, like the Swellshark and Dogfish (are oviparous. They attach their egg case to a rock or other hard surface, or wedge it into a safe spot on a sandy bottom or rocky area. The egg case of most sharks is a leathery transparent brown pouch, with slits on either side that allow water to flow through to replenish oxygen in the sac. The tiny shark moves around to help facilitate the water movement and once the nutrients from the yolk sac are used up, the small shark makes its way out of the case to fend for itself. The empty egg cases often wash up on beaches and are referred to as "mermaid purses."

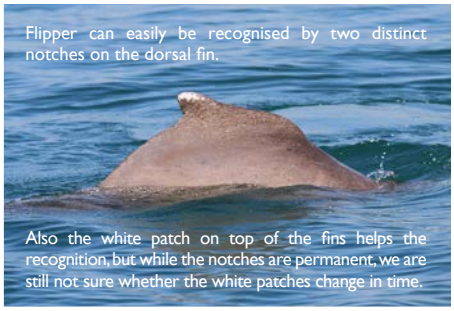
Grey Reef Shark | Photo by © David Robinson

Leopard Shark | Photo by © Sijmon de Waal

FIRST INSIGHT ON DUBAI'S HUMPBACK DOLPHINS: WHAT WE KNOW SO FAR

FEATURE **AYŞE DEMIRER**


This photo was submitted by a member of the public along with the sighting's details and helped us to identify Flipper. Photo by Y. Aubourg


Flipper can easily be recognised by two distinct notches on the dorsal fin.

Also the white patch on top of the fins helps the recognition, but while the notches are permanent, we are still not sure whether the white patches change in time.


Flipper and SP008 together


SP008 has a very deep scar on the back. This is very likely from an incident with a fishing net or line.

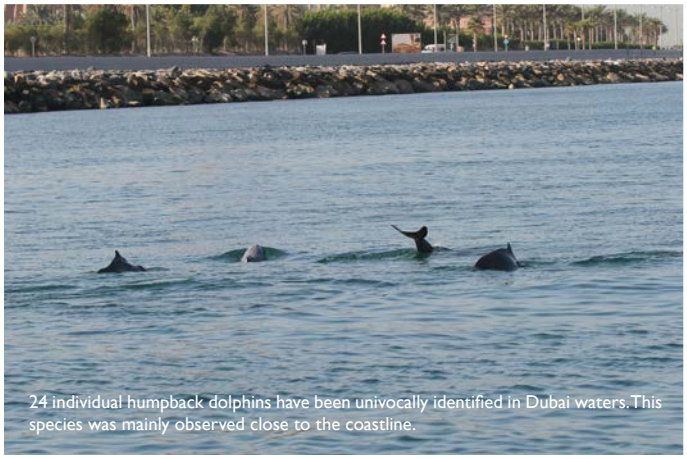
Compared to the excitement of the fieldwork, sitting infront of a computer screen doing data analysis sounds boring and tedious, but eventually the results are always rewarding! In the previous issue, we reported our results about the Indo-Pacific bottlenose dolphins along the Dubai coastline and illustrated how taking simple photographs can become a powerful method to understand the status of a dolphin's population. Photo-identification is a non invasive research method, which allows researchers to understand the population structure and estimate the population size of dolphins and whales. During our year long survey conducted in 2013-2014 along the Dubai coastline by the UAE Dolphin Project team, the humpback dolphin was one of the most frequent dolphin species sighted close to the shore. Recently, we completed the photo-identification data analysis for this species with some interesting results!

Out of 7 sightings recorded with a total of 50 dolphins spotted, based on the photo-Identifications we now know that we actually only encountered 31 individuals of which 8 are juveniles and calves.

Our photographic records allowed us to univocally identify 24 individuals. Nearly 40% of those were sighted more than once during the survey, and 5 individuals were spotted 3 to 4 times. In addition, we were able to match a sighting reported by the public to one of the individuals, Flipper. This really proves how valuable public reports can be! Flipper has been spotted four times between November 2013 and November 2014 within a small range of only a few kilometres close to Jumeirah Beach. Another individual also sighted 4 times, SP008, was seen together with Flipper in 2013, but then on two occasions in 2014, who was reported with another group and in another area, very close to the Palm Jumeirah. As in the bottlenose dolphins, sadly also for this species, we witnessed the disappearance of a newborn. The mother, SP013 was sighted with her newborn calf in November 2013, but when sighted again almost a year later, she was without calf. The mother and calf bond is one of the strongest in all dolphins and the couple is generally united for about 3 year.

Re-sighting individual dolphins is extremely valuable information as it allows researchers to draw conclusions regarding the overall population size, but also survival rates, movements and social bonds of the animals in an area. In the case of the Dubai humpback dolphins, the high number of re-encounters of the same individuals compared with a relatively small number of sightings let us infer that the

This map depicts Flipper and SP008's sightings and their movements in the surveyed area. They have been spotted together twice in November 2013.



24 individual humpback dolphins have been univocally identified in Dubai waters. This species was mainly observed close to the coastline.

A very deep cut in the calf's tail shows the dangers caused by the likely impact of fishing gear.

local population that utilise these waters is not very big, and small populations never cope well with anthropogenic and environmental stress, like habitat degradation.

The very distinct fin is the main identification feature in humpback dolphins, however we observed a number of individuals, including SP008, with large scars which, on one hand help us to recognise the animal more easily, but on the other hand it also shows that this species suffers from dangerous entanglements in fishing gear or plastic waste which cuts deep wounds, leaving permanent marks if they survive.

Clearer proof of entanglement was observed on a calf. It was first sighted alongside its mother in October 2013 in front of DOSC, but when re-sighted in November 2014 with its mother and four other individuals in the waters between the Burj Al Arab and the Palm Jumeirah, the excitement of re-encountering him was shadowed by a closer look at its photos later on. We sadly noticed that a fishing line was entangled around its upper body and around a flipper. It also had an injury just above its tail and a suckerfish attached to its belly (never a sign of good health in dolphins). In many cases, dolphins sadly cannot free themselves from nets, lines or plastic parts and either die from serious injuries from the deep cuts or they drown because the entanglement keeps them from swimming to the surface to breathe. Unable to help, we only hope that the young dolphin somehow freed itself from the fishing line and survived its injuries. Hopefully we will see it again next season!

www.uaedolphinproject.org

HUMPBACK DOLPHIN
(Sousa plumbea)

The humpback dolphin is grey in colour with a long slender beak, but clearly recognizable by the characteristic hump in front of the dorsal fin. The top of the fin may show white pigmentation in some individuals.

The maximum length is approximately 2.7m. It is found in shallow, coastal waters less than 100m deep. Recently, the Arabian humpback dolphins have been recognised genetically closer to the African form and its scientific name has changed from *Sousa chinensis* (present in the eastern Indian Ocean species) to *Sousa plumbea*.

GALAPAGOS WHALE SHARKS

FEATURE **CHRIS ROHNER** PHOTOGRAPHY **SIMON PIERCE**

If you have dived with whale sharks in the Galapagos and took photos, you can contribute by uploading your photos to the global whale shark database. If you have not, make it your mission to dive this most amazing place.

After more than a day and a half at sea, we finally see a rocky island in the middle of a vast ocean. An epic stone arch above the crashing waves marks our dive site for the next two weeks. We have come to Darwin Island in the Galapagos together with a team of international scientists to see the biggest fish in the world.

Whale sharks are amazing animals to swim or dive with and impress most people with their huge size and gentle nature. Jacques Cousteau famously only ever saw two whale sharks in his life, but these days we know better where and when to find them. This is great for marine tourists who want to observe whale sharks in the wild, as well as for scientists who are trying to learn more about this threatened species. The EDA magazine has regularly reported on whale shark science conducted by local groups, such as SharkWatch Arabia, and international groups, such as the Marine Megafauna Foundation. And we have learnt a lot about whale sharks in the past decade. One of the major challenges remains that we almost always see and study juvenile sharks. Where the big mature individuals, and especially the pregnant females, spend their time has been a mystery. And it is exactly these large sharks with big bellies that brought us to the Galapagos Islands.

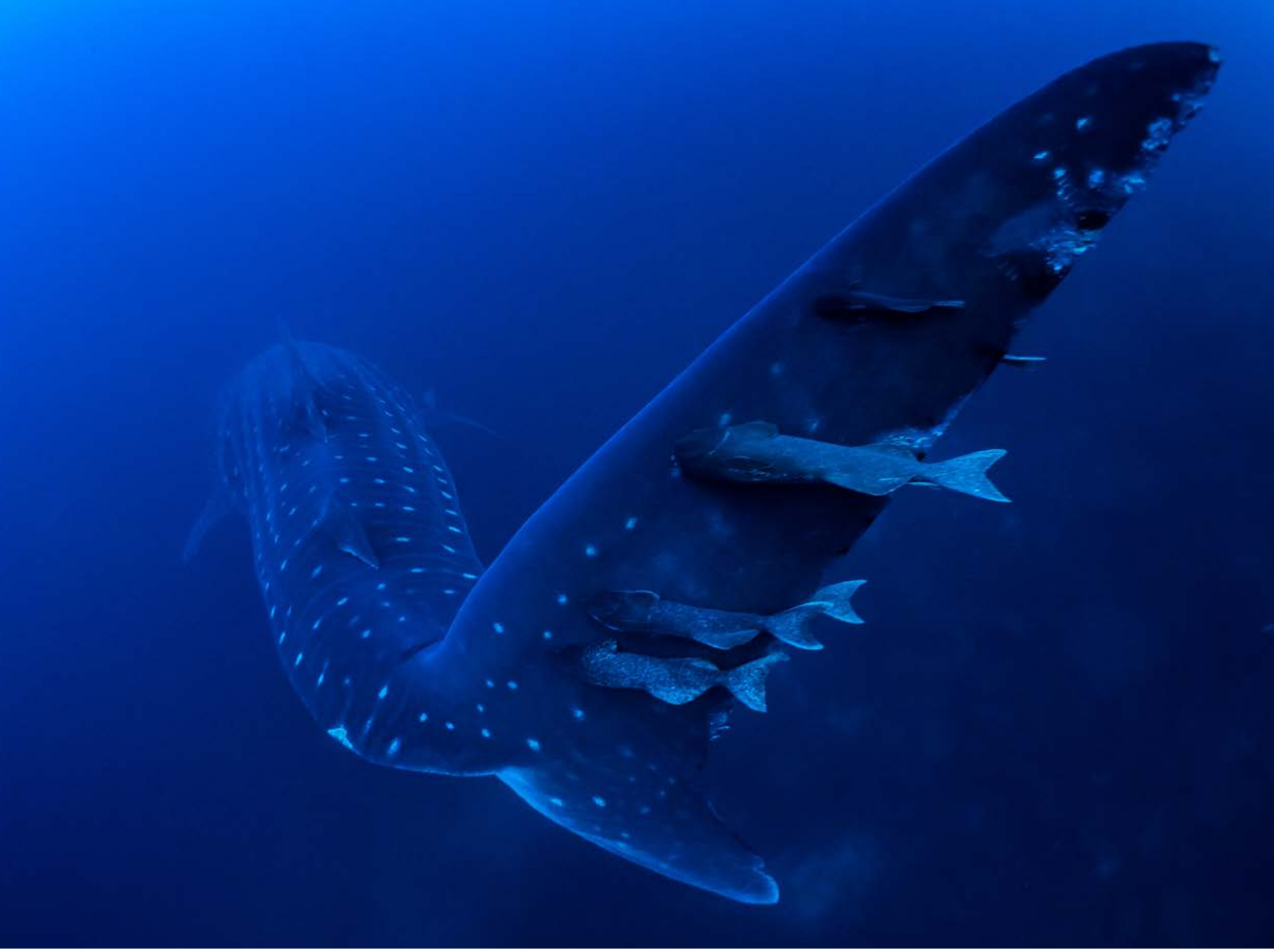
Diving at Darwin's Arch brings out the superlatives in every visitors' descriptions of their time here. Schools of hammerhead sharks cruise along the wall, Galapagos sharks patrol their territory, turtles feed among the reef, morays hide in the holes, yellow-fin tunas swim by, dolphins surf the waves above and silky sharks accompany you on the safety stop. From the moment you stick your head in the water, until you come back out, there is something exciting to see.

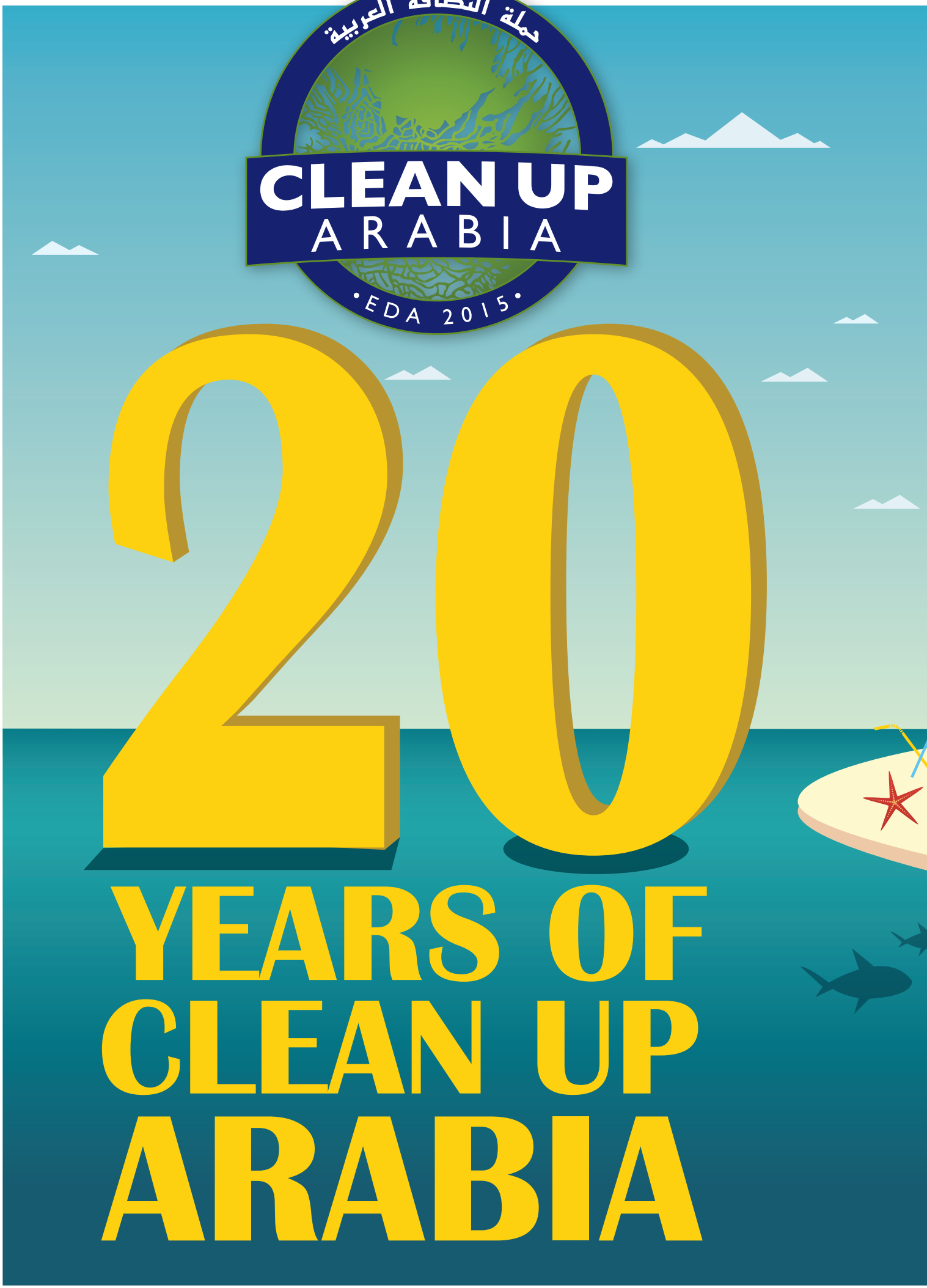
With all the other marine megafauna around us, it was almost difficult to concentrate on our major goal. But then the shaker sounds, we look down-current and there she comes, swimming slowly just off the reef wall towards us. The sight of this 13m long whale shark is a truly awesome experience, and that's not even their maximum length yet. We swim out towards her, take identification photos and small skin samples and attach a satellite sender that allows us to track her movements in the coming months. Darwin Island is a pit-stop for her, and after a day or two she continues her journey through the open ocean. Over the two weeks here, we saw 16 different whale sharks, one bigger than the next and almost all were pregnant females.

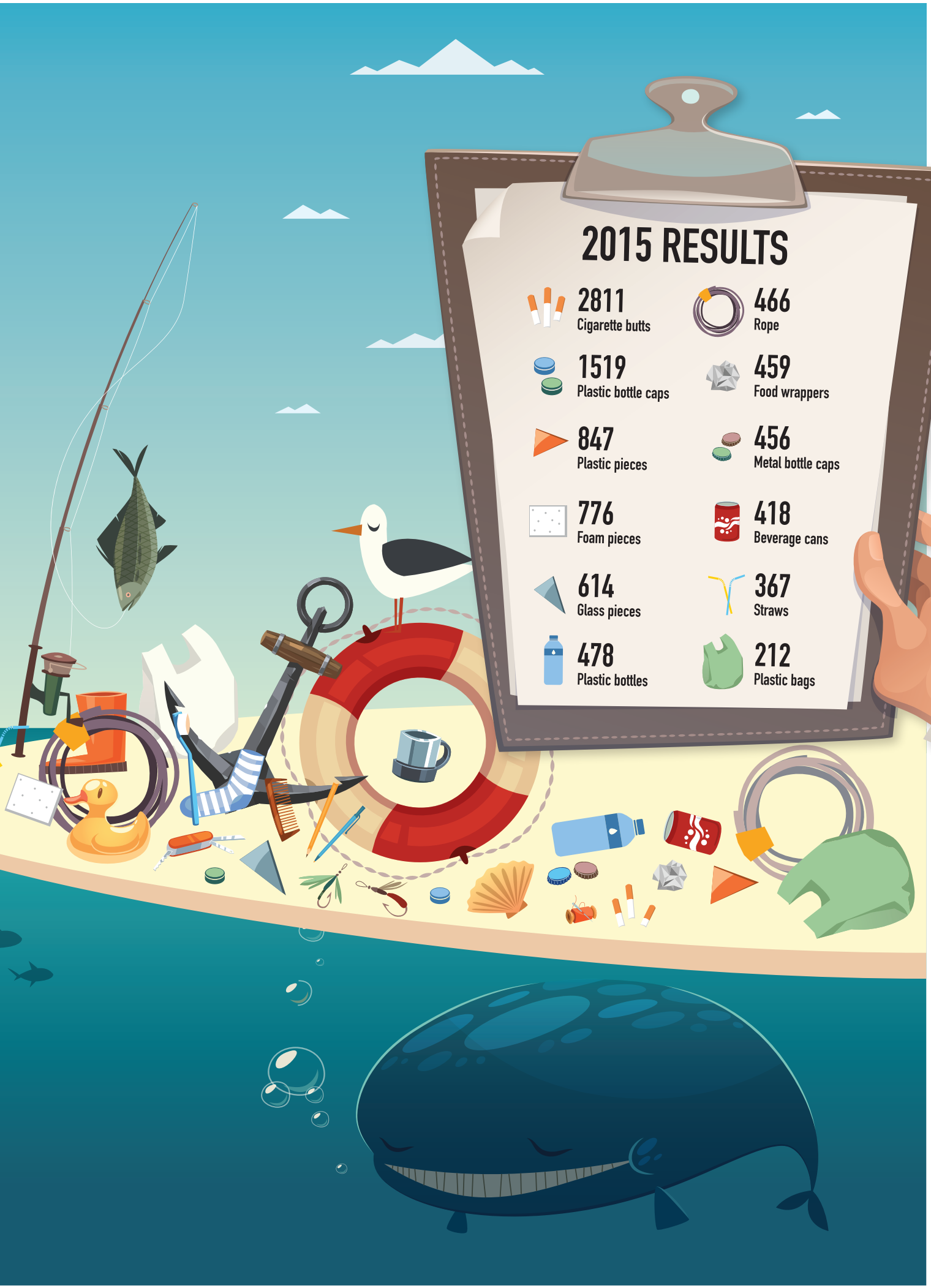
Now that we have seen large, pregnant whale sharks, we have more questions to answer: What is their reproductive cycle? How often do they come to Darwin Island? How many individuals use this place along their large-scale movement paths? Thankfully, whale sharks are individually identifiable from their spot pattern, and we can answer all of these questions from photographs alone. Since us scientists cannot continuously be diving at Darwin's Arch, we need the help of divers. So if you have dived with whale sharks in the Galapagos and took photos, you can contribute by uploading your photos to the global whale shark database (see box). And if you have not, make it your mission to dive this most amazing place.

Upload all your whale shark photos from the Galapagos and elsewhere to the global database (**www.whaleshark.org**) and you will be kept up to date with sightings from the individuals you have seen.

The Galapagos Whale Shark Project brings scientists and the Galapagos National Park team together to study whale sharks at Darwin Island. The Marine Megafauna Foundation (**www.marinemegafauna.org**) conducts research around the globe on whale sharks, manta rays and other large species. You can join MMF researchers on research holidays with Aqua-Firma (**www.aqua-firma.co.uk**), including Mexico and Tanzania in 2016.




حملة النظافة العربية
CLEAN UP
ARABIA
EDA 2015
20
YEARS OF
CLEAN UP
ARABIA


2015 RESULTS
2811
Cigarette butts
466
Rope
1519
Plastic bottle caps
459
Food wrappers
847
Plastic pieces
456
Metal bottle caps
776
Foam pieces
418
Beverage cans
614
Glass pieces
367
Straws
478
Plastic bottles
212
Plastic bags

CLEAN UP ARABIA
(REGIONAL BEACH AND DIVE SITE CLEAN UP CAMPAIGN)

PHOTOGRAPHY **ALLY LANDES** INFOGRAPHIC **MARIA GASAN**

"During Clean Up Arabia, we ask residents across the region to take action and keep beaches and dive sites clear of marine debris for the sake of our future generations. Involving volunteers from the local community allows them to make a positive environmental impact in their marine environment and to preserve the region's diverse marine life."
ESSA AL GHURAIR, EMIRATES DIVING ASSOCIATION'S CHAIRMAN

EVENT ORGANISERS: EDA
MAIN SPONSOR: Coca-Cola
PLATINUM SPONSOR: MAJID AL FUTTAIM
GOLD SPONSORS: Dubai Duty Free
SILVER SPONSOR: Chalhoub Group
SUPPORTING PARTNERS: Le MERIDIEN AL AQAH BEACH RESORT FUJAIRAH; Environment Agency - Abu Dhabi
PARTNERS: UNEP; Clean Up the World; Ocean Conservancy

Under the Patronage of His Highness Sheikh Hazza bin Hamdan bin Zayed Al Nahyan, the Emirates Diving Association (EDA) organized the 20th annual Clean Up Arabia on Friday the 13th of November 2015, supported by the Environment Agency – Abu Dhabi (EAD), The Centre of Waste Management – Abu Dhabi, The Critical Infrastructure and Coastal Protection Authority – Abu Dhabi, Abu Dhabi Fishermen's Cooperative, Le Meridien Al Aqah Beach Resort Fujairah and Dibba Municipality, and was sponsored by Coca Cola, Majid Al Futtaim, Dubai Duty Free, and Chalhoub Group. 350+ community volunteers participated in the beach clean up.

The campaign clears beaches and key dive sites from harmful marine debris and raises public awareness about the negative impacts that marine debris has on our health and that of our wildlife. Unfortunately due to high winds and rough seas the day before, the UAE Coast Guard would not allow dive boats out and the only dive clean up that took place was from Dadhna Port by the 20 divers from the UAE Divers Group.

"During Clean Up Arabia, we ask residents across the region to take action and keep beaches and dive sites clear of marine debris for the sake of our future generations. Involving volunteers from the local community allows them to make a positive environmental impact in their marine environment and to preserve the region's diverse marine life. The annual Clean Up Arabia is an ideal opportunity to spread awareness concerning our marine environment, we also want to highlight the UAE's efforts to conserve the marine environment. It provides people with a sense of purpose and achievement that they can make a difference," said Essa Al Ghurair, Emirates Diving Association's Chairman.

The East Coast Clean Up took place from Le Meridien Al Aqah Beach Resort Fujairah. Registration began from 8am and volunteers kick started their day with a breakfast selection of croissants, danish pastries and fruits, juices, teas and coffee. A buffet lunch was served after the clean up, followed by group photos and then the annual volleyball tournament took place.

The EDA team came in 3rd place, Le Meridien followed in 2nd, with Dubai Duty Free winning 1st place.

Rubbish collection results from the East Coast Beach Clean Ups on Friday 13th of November and the dive Clean Up done near Dadhna Port by UAE Divers Group.

BEACH	
TRASH ITEM	TOTAL
Cigarette Butts	2811
Food Wrappers	459
Plastic Take Out Containers	221
Foam Take Out Containers	168
Plactic Bottle Caps	1519
Metal bottle Caps	456
Plastic Lids	270
Straws/Stirrers	367
Forks/Knives/Spoons	190
Plastic Beverage Bottles	478
Glass Beverage Bottles	284
Beverage Cans	418
Plastic Grocery Bags	212
Other Plastic Bags	285
Paper Bags	154
Paper Cups & Plates	179
Plastic Cups & Plates	236
Foam Cups & Plates	154
FISHING GEAR	
Buoys/Pots/Traps	43
Net & Pieces	77
Line	46
Rope	466
OTHER TRASH	
Balloons	27
Cigar Tips	272
Cigarette Lighters	70
Construction Materials	143
Fireworks	33
Tires	6
PACKAGING MATERIALS	
6-Pack Holders	14
Other Plastic/Foam Packaging	144
Other Plastic Bottles	128
Strapping Bands	83
Tobacco Packaging/Wrap	148
PERSONAL HYGIENE	
Condoms	22
Diapers	24
Syringes	2
Tampons/Tampon Applicators	5
TINY TRASH (< 2.5cm)	
Foam Pieces	776
Glass Pieces	614
Plastic Pieces	847
EXTRA	
Hangers	8
Chairs/Tables	1
Shoes	4
Tissues	14
Wood Pieces	58
Dead Animal	11
Batteries	3
Rubber Pieces	11
Car Mat	1
Cartons	2
Fabric/Clothing Items	7
Metal Pieces	4
Band Aids	2
Cotton Buds	3
Electrical Wires	1
Barbecue Sticks	4
Toothbrush	1
Foil Pieces	1
Kite	1
Plants	2
GRAND TOTAL:	**12,990**

UNDERWATER	
TRASH ITEM	TOTAL
Cigarette Butts	2
Plactic Bottle Caps	100
Metal Bottle Caps	72
Plastic Lids	10
Plastic Beverage Bottles	27
Glass Beverage Bottles	20
Beverage Cans	35
Plastic Grocery Bags	3
Paper Cups & Plates	7
Plastic Cups & Plates	11
FISHING GEAR	
Buoys/Pots/Traps	1
Net & Pieces	1
Line	4
Rope	1
OTHER TRASH	
Construction Materials	7
PACKAGING MATERIALS	
6-Pack Holders	1
Other Plastic Bottles	10
Strapping Bands	6
TINY TRASH (< 2.5cm)	
Foam Pieces	2
Glass Pieces	4
Plastic Pieces	6
GRAND TOTAL:	**330**





SUN

GOLF COURSE






ELECTRO BEAT ACADEMY

EDA





CLEAN UP
ARABIA

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ARABIA























CLEAN UP
ARABIA


HARRIS

SPORTS AND WELL-BEING
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DUBAI DIVE FREE








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Photo by UAE Divers Group

Photo by UAE Divers Group

Photo by UAE Divers Group

HELPING SUPPORT THE FIGHT AGAINST MARINE DEBRIS!

FEATURE **JESSICA MCMILLAN** (DIVEMASTER IN TRAINING) PHOTOGRAPHY **ROY ACUNA** (YAS WATER WORLD)

The start of this year's annual Clean Up Arabia event in Abu Dhabi under the patronage of HH Sheikh Hazza Bin Hamdan bin Zayed Al Nahyan, saw divers of all levels and experience come together in high numbers to help the fight against marine debris polluting our waterways.

With the tremendous support of EAD, Tadweer (Abu Dhabi Center of Waste Managament), CICPA (Critical Infrastructure and Coastal Protection Authority) and the Abu Dhabi Fishermen's Port, Clean Up Arabia saw the removal of large quantities of rubbish. Most notably was the vast amount of beverage cans that were brought up.

Divers faced difficult conditions with only a short time frame and very limited visibility (less than thirty centimetres), yet still managed to persevere through the obstacles.

The biggest find on the day was some old construction material consisting of a cement block and a metal ladder which was brought up by divers.

These events would not be possible without the support and passion for diving and the environment from the local diving teams, including SeaHawk, UAE Divers, the Falcon Diving Club, Filippino Diving Club and Borouge. Whilst Al Mahara Diving Center provided support for the divers including the equipment rental, boat and kayaks, CICPA generously donated their time and the use of their boats to help transport the volunteer divers throughout the mina to effectively collect the copious amounts of rubbish inside the Abu Dhabi Fishermen's Port.

This year's inspirational mascot Dana the Dugong was a welcome addition to Abu Dhabi's Clean Up Arabia. Everyone had great fun posing for photos with Dana to help spread awareness of the environmental issues marine mammals face.

To kick off the event, HH Sheikh Hazza bin Hamdan Bin Zayed Al Nahyan welcomed all the divers and thanked them for their time during the clean up. After registration and a wonderful buffet breakfast put on by His Highness, the diver's donned on their equipment and with high spirits and enthusiasm, climbed aboard their vessels to begin their morning's mission. All the volunteer divers did an absolutely fantastic job to help clean up the port.

Once all the rubbish was brought up by the divers, the process of counting the items collected began. Two hundred and sixty beverage cans were brought up, one hundred and nineteen beverage bottles (plastic and glass), and almost 70 pieces of assorted bags were collected. Along with other items such as cups, plates, rope and construction material.

A guest appearance made by Dana the Dugong was well received by the divers who loved posing with the mascot to help spread awareness of the environmental issues marine mammals face, by the destruction and pollution of their homes.

A special thank you goes out to our photographer of the day, Roy (representing Yas Water World), who managed to capture some of the wonderful moments and achievements from the day's events.

A big thank you to everyone who helped and supported the cause to such a fantastic event and we look forward to seeing you all at next year's annual Clean Up Arabia 2016.

UNDERWATER	
TRASH ITEM	TOTAL
Beverage Bottles (Plastic)	88
Beverage Bottles (Glass)	31
Beverage Cans	260
Grocery Bags	17
Other Plastic Bags	51
Cups and Plates (Paper)	23
Cups and Plates (Plastic)	2
Straws/Stirrers	3
Boat Ladder	1
Serving Tray	1
Ropes	15
GRAND TOTAL:	**330**


DIVERS FOR THE ENVIRONMENT
EDA
CLEAN UP ARABIA



CLEAN UP ARABIA




UAE DIVERS

CLEAN UP ARABIA












UAE DIVERS
UAE DIVERS










CLEAN UP
CLEAN UP















EDA



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UAE
falcons
Diving
Team

DIVERS FOR THE ENVIRONMENT
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CLEAN UP
ARABIA
AWARE


EDA

[QUDOS] TO THE LIGHT
EQUIPMENT REVIEW

FEATURE AND PHOTOGRAPHY **ALLY LANDES**


No external light used


With the **[qudos]** action video light

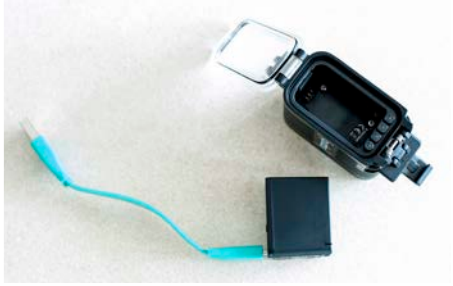
When Grand Stores asked me to review the **[qudos]** action video light, I hadn't expected such a tiny thing to be so relevant! The setup is so compact, it integrates with your GoPro system seamlessly and the light only weighs in at 150 grams.

Not only does it pair with your GoPro, but it also mounts onto your DSLR or tripod with a cold shoe for your shots out of water. It's pocket size and handy!

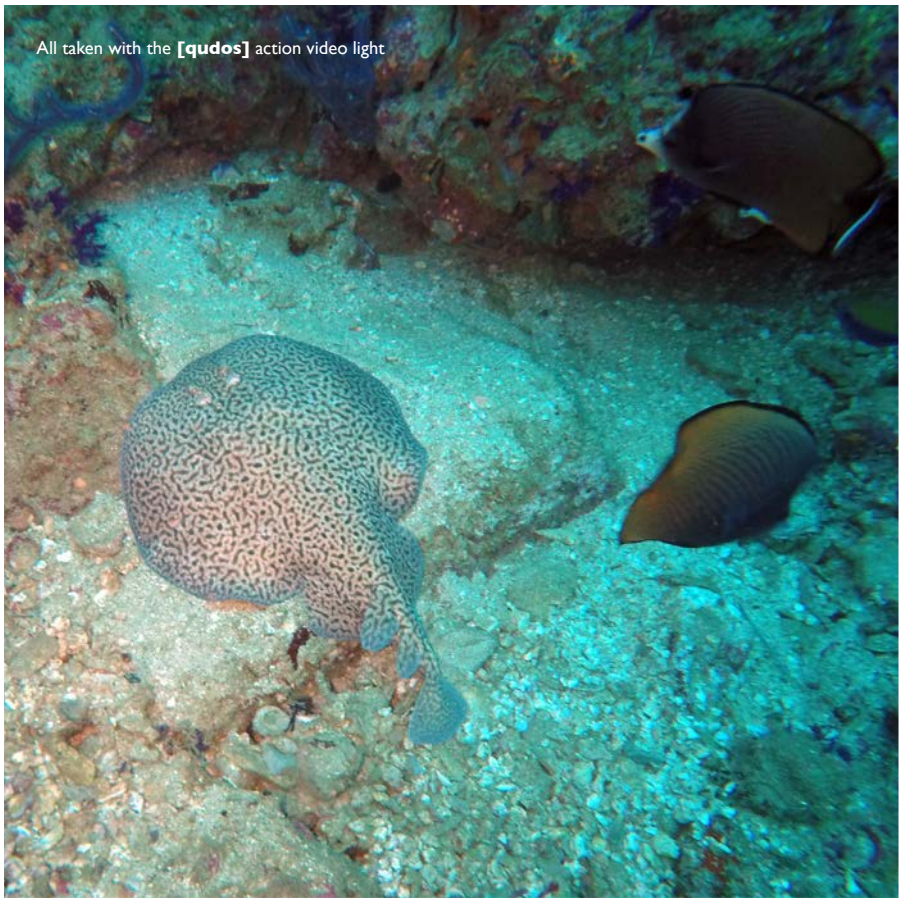
All underwater photographers and videographers know how important light is to their equipment setup. They also know how expensive good lights are to come by. The **[qudos]** light won't break the bank, it's affordable and effective.

Colour is lost with depth and a GoPro on a dive loses all meaning when not paired with a light. The **[qudos]** action video light by knog really does make a difference for close up action underwater and is waterproof up to 40m.

There are 3 light modes to choose from (wide angle, narrow angle and ultra wide angle), with both a high (impressive) lumens and low lumens (70-400) option. I like to shoot photography in RAW so only use my GoPro for video even though there is a photo option, so I have pulled stills from the video clips for this instance.



All taken with the **[qudos]** action video light

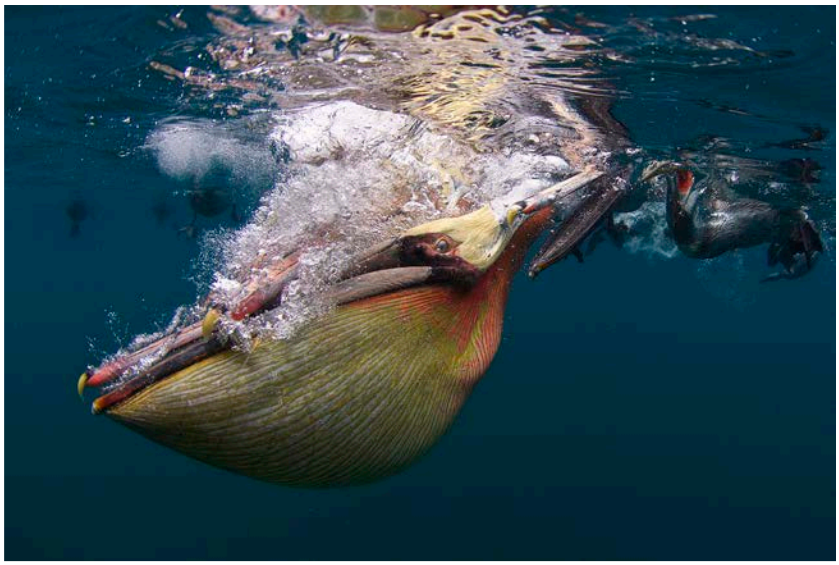


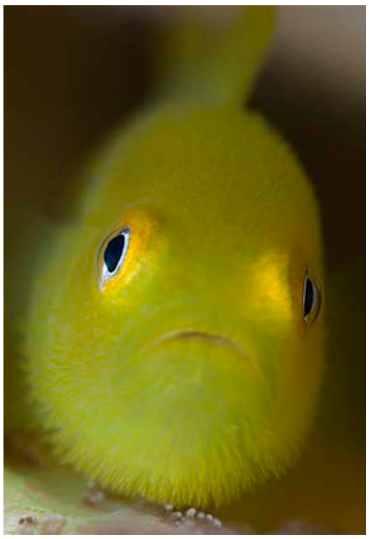
DIGITAL ONLINE

جمعية الإمارات للغوص

EMIRATES DIVING ASSOCIATION

PHOTOGRAPHY AND FILM COMPETITION





ENTER DIGITAL ONLINE 2016

EDA'S 8th ANNUAL UNDERWATER PHOTOGRAPHY AND FILM COMPETITION

COMPETITION OPENS:
Sunday, 3rd January 2016

SUBMISSION DEADLINE:
Thursday, 28th April 2016 @ 11:59 PM (GST)

AWARDS & EXHIBITION NIGHT:
Wednesday, 25th May 2016 | 19:00-22:00 | AUD

EVENT BY EDA

EDA
جمعية الإمارات للغوص
Emirates Diving Association

EXHIBITION VENUE

AUD | AMERICAN UNIVERSITY IN DUBAI
School of Architecture, Art and Design

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SEAOMAN Discover, Explore, Experience
OMAN SAIL
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MTM Marine LLC
Al Boom Diving

WWW.EMIRATESDIVING.COM

EDA is a non-profit voluntary federal organization and is accredited by UNEP as an International Environmental Organization.

PHOTOGRAPHY & FILM COMPETITION
DIGITAL ONLINE 2016 RULES AND GUIDELINES

GENERAL RULES

- 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 share respect for 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 winning images in the 'Divers for the Environment' magazine, EDA's social media pages and on the EDA website. Winning 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 Thursday, 28th April 2016, at 11:59pm (GST – Gulf Standard Time).
- The finalists will be announced and their work displayed at the exhibition and award ceremony on Wednesday, 25th May 2016 at the American University in Dubai (AUD). Participants who do not make it to the evening of the event will be asked to collect their prizes from the EDA offices.
- Prizes will be announced in March.
- 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 & UPLOADING ENTRIES

- Registration and submission entry is open from Sunday, 3rd January 2016 and the final deadline is on Thursday, 28th April 2016, at 11:59pm.
- The participant must be a valid EDA member. Submit entries via email to photo@emiratesdiving.com with the requested category detail information.
- File names should include photographer's name and the category. (eg. TSmith-Macro.jpg, TSmith-WideAngle.jpg, TSmith-BestofUAE.jpg, TSmith-Black&White.jpg, 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. Yousendit or Dropbox with file name of the Videographer.
- The preferred method of entry is electronically, however, if this method is not possible due to lack of proper 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.

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 AND COMPACT)
   Definition: Any underwater subject taken in the UAE and the Musandam.

4. **BLACK & WHITE** (DSLR/MILC/COMPACT)
   Definition: Black and 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

BLUE OCEAN

Definition: Looking for films of all genres – documentaries, narratives, shorts and animation films. Film subject must focus on all aspects of our Blue Ocean 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.

Good luck to everyone taking part in Digital Online 2016! 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. 1st place winners by highest score will choose a prize before all other winners, 2nd place winners before 3rd place winners, etc. Please note, each individual can only win one prize or prize package.

DIGITAL ONLINE JUDGES

IMRAN AHMAD | PROFESSIONAL PHOTOGRAPHER
Imran Ahmad Photography and ESCAPEINC Dive & Photography

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
FACEBOOK: Imran Ahmad Photography

NUNO SÁ | WILDLIFE PHOTOGRAPHER
Professional Photographer Specializing in Marine Life

Nuno has been a professional photographer since 2004, specialized in marine life photography. He is the author of three books and several dozens of articles published in National and International magazines. He is the co-author of the "Azores Diving Guide" – Portugal's first published diving guide, and a regular collaborator of several magazines, such as National Geographic Portugal.

He is the first Portuguese wildlife photographer nominated in some of Europe's major nature photography competitions, such as: Wildlife Photographer of the Year and Asferico International Nature Photography Competition, amongst others.

Nuno is also on the Wild Wonders of Europe's team of top European nature photographers. This is the world's biggest ever nature photography project with an expected public of over 100 million people, a project supported by the National Geographic Society.

WEBSITE: www.photonunosa.com

JONATHAN ALI KHAN | WILD PLANET PRODUCTIONS
Managing Director – Natural History TV Production, Underwater filming specialists, video production and photography.

JAK is a topside wildlife and underwater camerman, 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
FACEBOOK: Wild Planet Productions

CHRISTOPHE CHELLAPERMAL | PADI & TEK TDI REBREATHER INSTRUCTOR
Founder and Owner of Nomad Ocean Adventures

Christophe Chellapermal arrived in the UAE 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
FACEBOOK: Nomad Ocean Adventures Musandam

ALLY LANDES | EMIRATES DIVING ASSOCIATION
Events Coordinator, Editor, Graphic Designer, Photographer and 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.

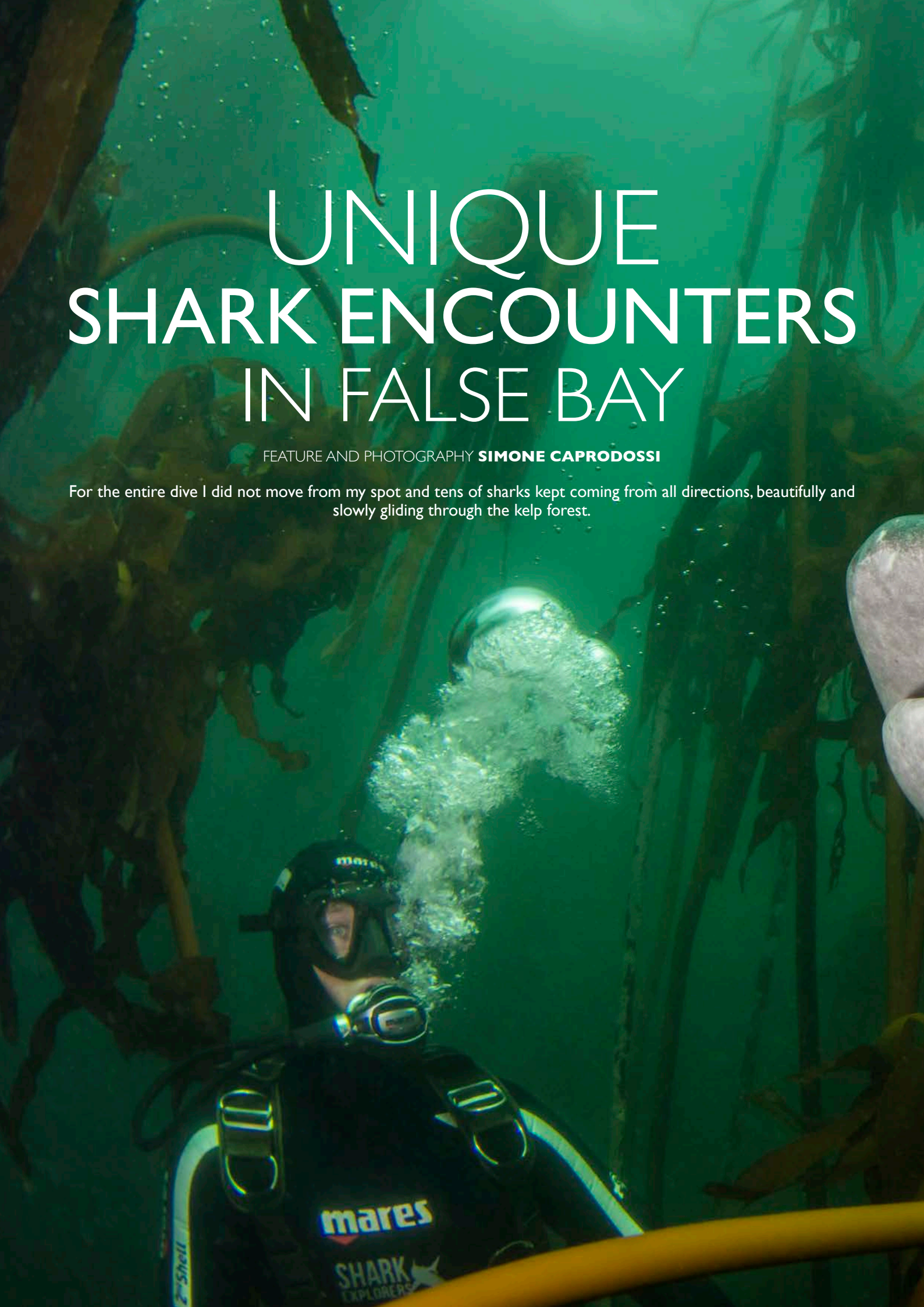
Ally keeps busy within her fields of passion, always looking to fill gaps with improvements, developing EDA's brand, designs and managing all the EDA social media and FAM trips.

As a qualified PADI Instructor, she utilizes the experience within everyday life at EDA.

UNIQUE SHARK ENCOUNTERS IN FALSE BAY

FEATURE AND PHOTOGRAPHY **SIMONE CAPRODOSSI**

For the entire dive I did not move from my spot and tens of sharks kept coming from all directions, beautifully and slowly gliding through the kelp forest.



As I got confirmation of a conference I would attend for work in Cape Town in November, I immediately wrote to the team at Shark Explorers to organize a diving weekend at the end of my business trip. I had just spent 10 days with Brocq Maxey and Morne Hardenberg from Shark Explorers on the amazing Sardine Run in June and I was looking forward to seeing them again and trying the unique diving of False Bay.

Brocq organized everything for me from pick up in Cape Town to the stay in the lovely Quayside Hotel in Simon's Town that is the base for the diving trip.

The area is actually most famous for cage diving with great white sharks which is Shark Explorers main activity in season I had come to do a couple of years ago. That was another amazing experience, particularly the shark breaching at the surface during the hunt for seals that is a behavior uniquely observed in this area.

November is off season for great whites in False Bay, but it is a great time to dive the inshore kelp forests of the Cape Peninsula.

The inshore dive here is very special as it is one of the only places in the world where you can consistently dive with the very prehistoric looking Broadnose seven gills shark (*Notorynchus cepedianus*, also known as the cow shark) a large shark that can reach lengths of 3m and weigh up to 700 pounds. They are quite unique – as per the name – for having seven gills as opposed to 5, as most shark species. They are found in large numbers in the shallow kelp forest and I was told you could encounter tens of them in one dive. Besides these big shark attractions, additional fun comes from the possibility to encounter different species of small, but very cute cat sharks at the bottom of the kelp forest and I was looking forward to adding to my shark species list. And last but not least, after the sharks, you typically spend the second dive playing with fur seals. So there is plenty to fill a pretty exciting diving weekend.

As my conference ended on the Thursday afternoon, Morne's dad Warren was already waiting outside my hotel to take me to Simon's Town. Warren had also been with us on the sardine run, so it was great to see him again and catch up during the lovely roadtrip along the beautiful cape coastline.

About an hour and a half later, we were in Simon's Town, a lovely quaint fishing village and I checked into the Quayside Hotel. As I was given one of the nicest rooms with full port and bay view, I was able to catch the sunset on the port while starting to put together my underwater camera gear.

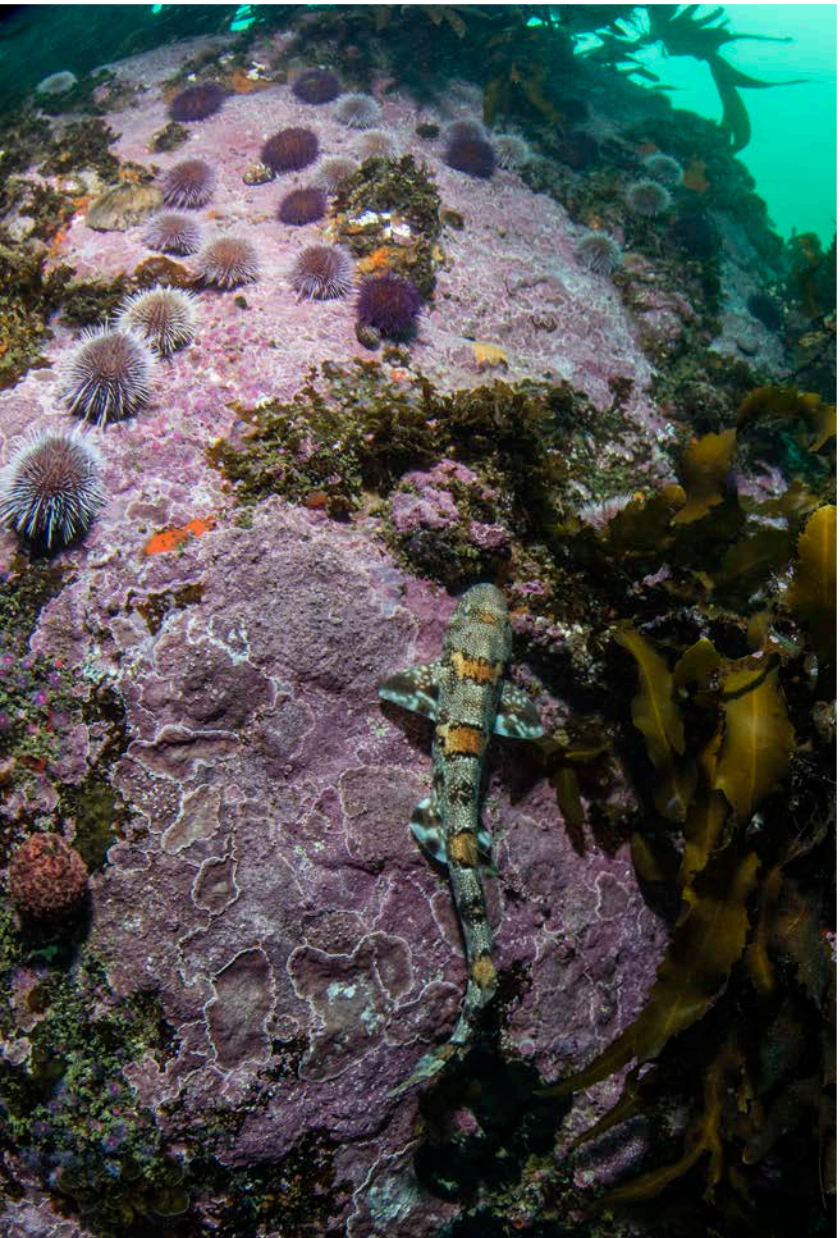
Brocq called me to confirm the next morning's diving with the awesome surprise that it would just be myself and him, as the rest of the team was fully booked filming a documentary.

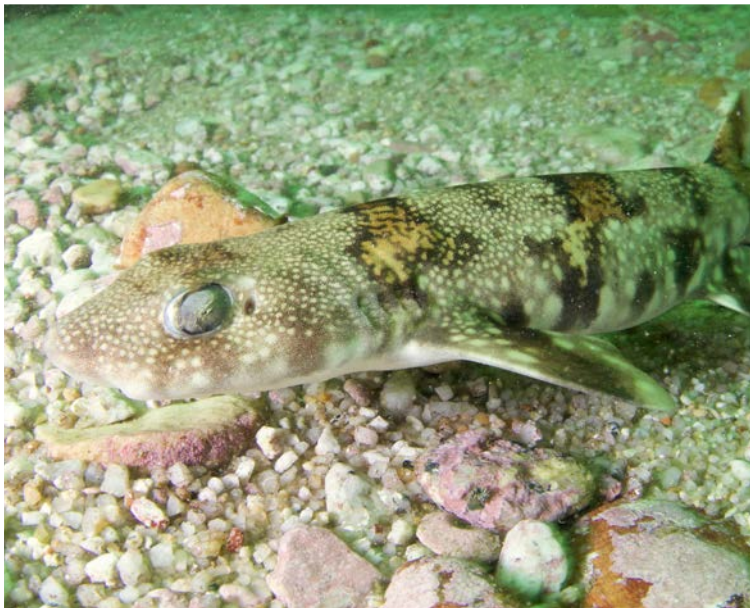
The next morning at 8am, I was promptly in the Shark Explorers shop to meet Brocq and pick up the gear and get ready to go. I had not taken my own diving gear with me for just 2 days, so I was happy to find totally new gear and particularly, a very warm two piece 5mm wetsuit providing a nice 10mm on the body to survive the 13 degree water temperature. This was my first dive in really cold water and freezing was my main fear being used to Middle East and Indian Ocean water temperatures.

After sorting out my gear, I went back to my room to wait for the dive boat to reach the pier which I could see from my window, with time for a coffee. The boat showed up and it was time to start our diving adventure. This time I got to meet the third partner of the Shark Explorers team, Stephen Swanson who was taking us out on the boat. It is a short boat ride from the Simon's Town pier to the small protected bay where the dive site is.

This was also my first time diving in a kelp forest, so as we jumped in, after a small temperature shock, I quickly forgot about my body and immersed in this fascinating new environment. Only a few minutes into the dive and the first seven gill shark appeared and two or three of them passed by, but they were not very curious and it was just a quick encounter. Brocq decided to try looking for them in another area of the bay, so I followed him through the magical kelp forest. As we reached a small sandy patch I started spotting the really cool little catsharks and lost track of time just hanging at the bottom with puffadder catsharks, dark shysharks and pajama sharks, such unique and fascinating creatures.

Back on the boat we quickly decided to go back for a second dive in the same spot to





try to find more seven gills and get a longer encounter with them and leave the fur seals for the next day.

That had been a great decision as we went back in for one of the most epic dives of my life. We got straight down to a large sandy patch surrounded by high kelp at around 12 meters. It took two minutes to setup my strobes and figure my exposure out and as I raised my head from the camera, the first shark appeared above me. For the entire dive I did not move from my spot and tens of sharks kept coming from all directions, beautifully and slowly gliding through the kelp forest. Not only was there a constant supply of these amazing sharks, but many were very curious and bumped into my camera dome several times as well as appearing as shadows directly above my head. The only additional distractions were the small cat sharks that were trying to compete for attention, swimming by my legs on the sandy bottom. I only wished I had more eyes to take it all in. I was so lost in the incredible experience that I only realized it when seeing Brocq literally shaking from the cold, that we had been in for about 50 minutes. As we ascended between the last passing sharks, I suddenly felt all the accumulated cold and they had to pull me up into the boat with my big smile frozen on my face.

Still in amazement I could not wait to get back and check the hundreds of photos I had taken as well as to sit in the sun with a warm drink. After defrosting and having a nice warm meal in the sunshine, I took advantage of the sunny afternoon to have some fun with the cape penguins. There is a colony of these endemic species just 20 minutes walk from the port. A large colony is on a beach where most tourists go and it is quite busy and organized with defined paths and marked off limit areas. Brocq directed me to another beach where a small colony hangs freely and you can walk up to them, obviously respecting a safe distance not to disturb them. The beauty of this spot is that hardly any tourists go there, so I got good private penguin time.

It was now time to look forward to the next day of diving and I could not wait to be in the same waters again.

The next morning I went straight down to the boat as the gear was already all set on it. Brocq had to leave for a few days right after our diving day, so Stephen took care of me for the day. We were still a small group with a dive master and two other divers. As we jumped into the kelp, I realized how lucky I had been the previous day with visibility, as this time it was much more limited and more sediment was visible in the water. It also took the first half hour of the dive to find the right spot for the sharks and once we found them, we only had about 10 minutes of fun with them. Still, we got to swim through the kelp and encountered 6-7 seven gill sharks and many catsharks that still made for a very fun dive, but obviously did not match my previous day.

This time we stuck with the program and moved on to dive with fur seals. The seal colony is on some rocks further down towards the cape and you can immediately tell you are approaching them by the charming smell. The dive is rather a snorkel with tanks as the seals play close to the surface, so there is no point in going any deeper than 3 or 5 metres.

The visibility was quite poor and the sky a bit overcast for photos, so for once I neglected the camera to mostly have fun playing with these smart and curious animals. It is just a joy to be so close to a wild animal and have them come to truly play with you as well as watching them play and interact with each other.

Staying shallow and not moving much, the cold forced us out again and this was the end of a really great little diving weekend.

Thanks again to Warren, Brocq and Stephen for taking care of me, it is such a pleasure to spend time and dive with friends that share such a passion for sharks and the sea. I can 't wait to come back!

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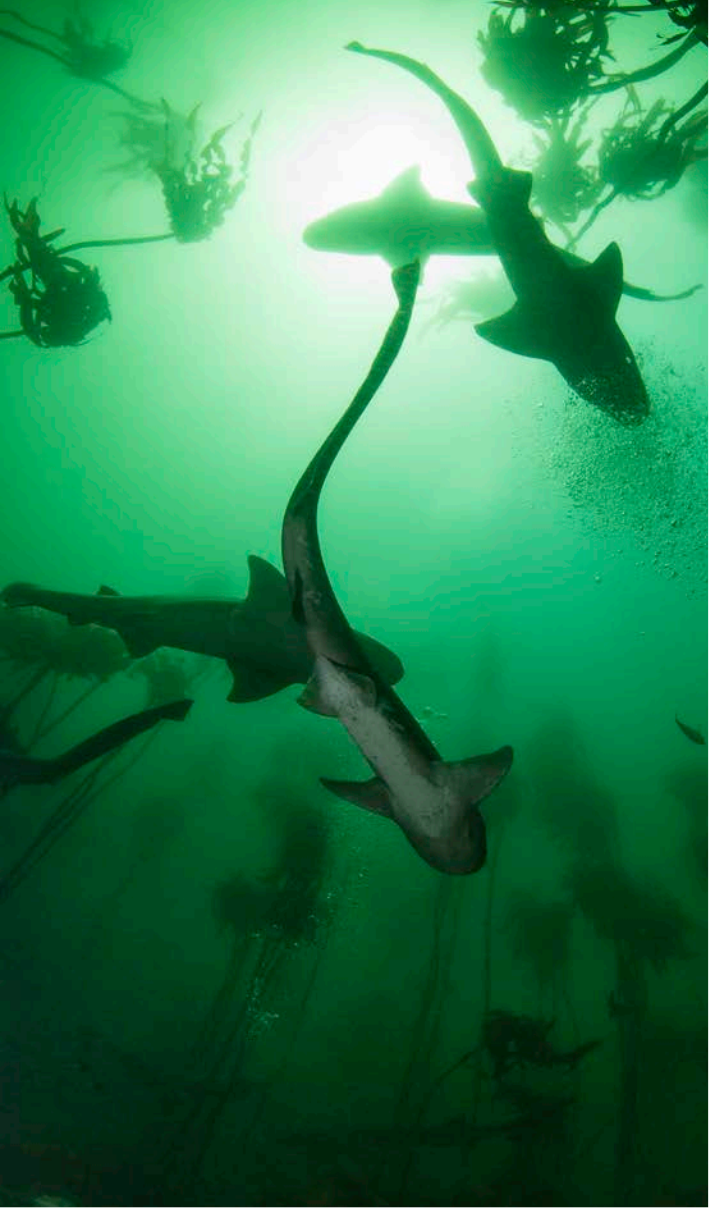

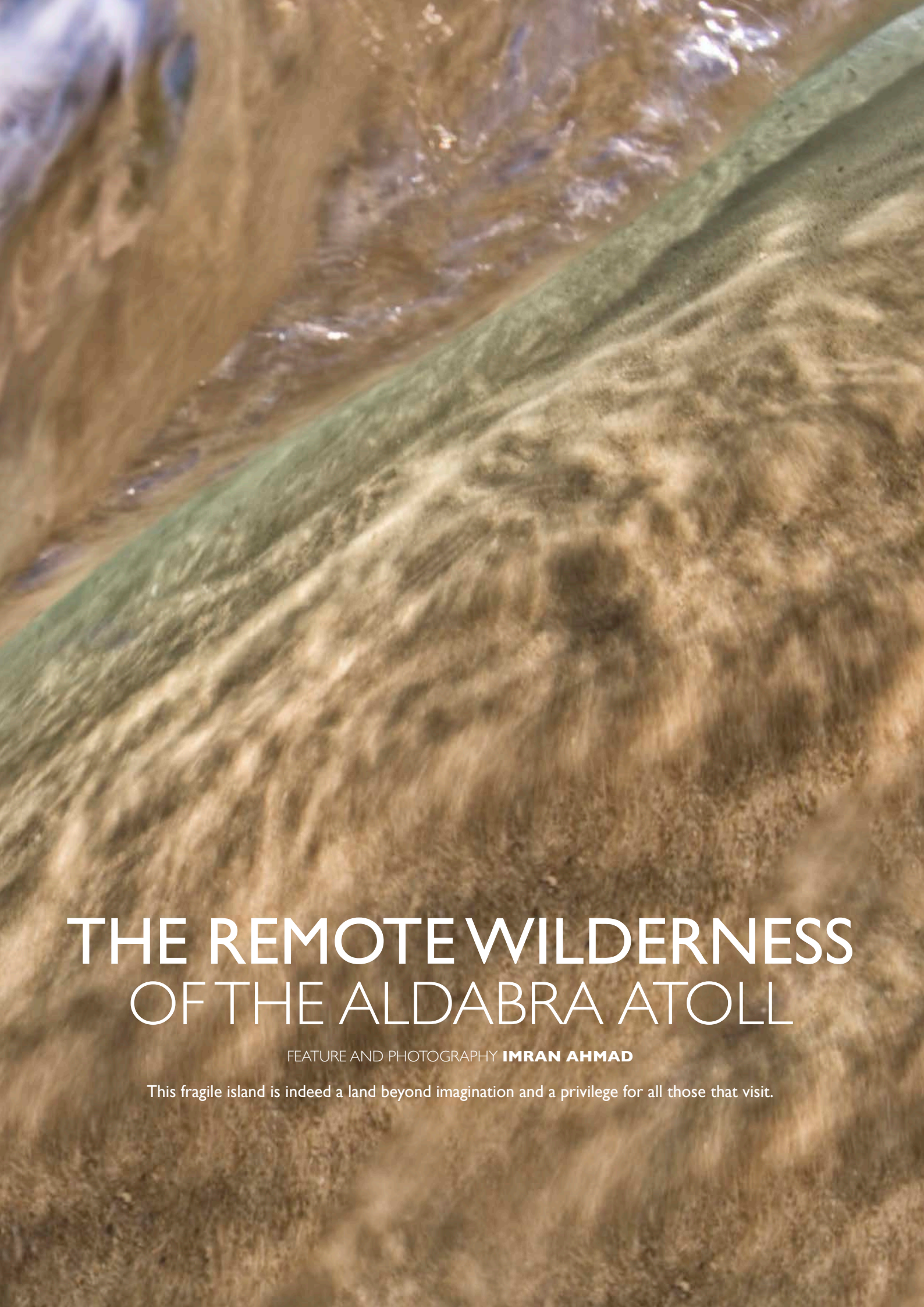

THE REMOTE WILDERNESS OF THE ALDABRA ATOLL

FEATURE AND PHOTOGRAPHY **IMRAN AHMAD**

This fragile island is indeed a land beyond imagination and a privilege for all those that visit.

The remote wilderness of Aldabra atoll, one of the Seychelles southernmost islands, is approximately 1066km southwest of the main island of Mahé. The Aldabra group is comprised of a distinct and isolated group of coral islands. Aldabra itself is the world's largest raised coral atoll some 35km long by 14km wide, and a total land area of around 140km^2. Its geographical isolation, rough terrain and scarcity of fresh water have deterred large human populations from settling. As a result, Aldabra is significantly less disturbed than other atolls worldwide. It remains as an outstanding example of a coral atoll and in 1982, gained World Heritage Status from UNESCO. The atoll is a refuge for many endangered and unique species and is considered to be a biodiversity hotspot and one of the world's remaining natural wonders. Few people have ever been there and even fewer have spent more than a couple of hours at this wild and beautiful atoll.

Aldabra's extraordinary terrain is rugged and extremely harsh. It consists mainly of fossilised coral reefs and mushroom shaped rocks called 'champignon', eroded to form a brittle and dangerously sharp rock. Pavé, a rough limestone and platin, a flatter limestone, are also found on Aldabra and together they form a rough ring around the central lagoon. The average height above sea level is only 8 metres, which is very low considering Aldabra's vast size. This ring is formed of four main islands (Picard, Grande Terre, Polymnie, Malabar) and many smaller islets. The only permanent human settlement is on Picard Island.

Aldabra's enormous lagoon is fed and drained by four narrow channels to the ocean, which together provide the tidal heartbeat of the atoll, dominating all activity. The lagoon and coral reefs are largely unspoiled and teeming with colourful, diverse and abundant sea life. They are home to hundreds of tropical fish species and, in recent years, the only population in Seychelles of the rare Dugong. The coral reef at Aldabra is also an important global example of a stunning intact marine ecosystem with amongst the highest abundance of marine predators in the world. Aldabra's waters also act as a corridor for large migratory marine species including many species of whale and dolphin, marine turtles, whale sharks and several other large shark species.

Being on Aldabra is such a surreal experience that it is often likened to going back in time. Giant tortoises of many species used to occur all over the world, roaming islands large and small. Of these, there are now only two species left; Aldabra's 100,000 endemic giant tortoises make up the world's largest remaining population of this ancient and iconic group of species and it is three times larger than the better known Galapagos population. Similarly, flightless land birds, such as rails, used to be common on islands across the world but have been wiped out by colonising humans and invasive species. Aldabra now hosts a growing population of the last remaining flightless rail population in the Indian Ocean.

Aldabra's list of other natural attributes is lengthy and impressive. The atoll has been colonised by breeding seabirds in their tens of thousands: Greater and Lesser Frigatebirds, Boobies, five species of tern including the large Caspian Tern, tropicbirds, and even an oceanic

breeding colony of Greater Flamingos. Aldabra is also a turtle mecca, with an increasing number of turtles laying eggs on the beaches annually. And the atoll hosts one of the largest populations of the world's biggest terrestrial arthropod, the Coconut Crab. Other animals and birds found on Aldabra include colourful geckos, fruitbats, landbirds, shorebirds, and insects, many of which are endemic to the atoll.

The only human inhabitants on Aldabra are the small group of SIF staff and researchers based at the research station on Picard Island. The energy requirements of this station were supplied by noisy diesel generators. But in 2012, a landmark project was completed on Aldabra which saw energy-efficient equipment replace inefficient appliances and a photovoltaic-diesel hybrid system replaced the diesel generators. The resulting 57% decrease in energy demand of the Aldabra research station, has enabled the solar system to generate 94% of the new demand, reduced the station's dependency on diesel fuel by 97%, and has significantly lowered the carbon footprint of the station.

The management of this site has an interesting history. Aldabra is now under the management and protection of the Seychelles Islands Foundation (SIF), a public trust established in 1979. SIF's initial mandate was to conserve and continue ecological research at Aldabra. This came about following a narrowly averted ecological disaster in the 1960s when plans were revealed, amidst great controversy, for Aldabra to be developed as a British/American military base. An international outcry ensued, led by British scientist Professor David Stoddart, and finally, after five years of efforts, the military base plans were aborted and the stewardship of the atoll was passed onto the Royal Society of London, who initiated a long-term research programme. It was Diego Garcia that ultimately took Aldabra's place in the Western Indian Ocean military base plans.

In 1976 Aldabra was returned to Seychelles and immediately granted the highest level of protection by the Seychelles government, who also soon established SIF as the responsible management authority. In 1982 Aldabra was inscribed on the UNESCO World Heritage list. Inscription of the Vallée de Mai on Praslin island, onto the UNESCO list quickly followed in 1983. It wasn't until 1989 that a new and unique twinning arrangement began, when SIF was also granted management of the Vallée de Mai. Aldabra, at over 1,000km away from Mahé with no infrastructure or permanent human population, had always been a challenge to run and finance. The Vallée de Mai, which soon became the most popular visitor attraction in Seychelles, was in a position to supply the finances to keep both sites operating. This management and financial arrangement has worked for nearly 25 years and continues to provide the foundation for all of SIF's operational work at the two sites.

Aldabra is a refuge for many and its extraordinary ecosystem is a place unlike any other, thankfully it has received the protection it deserves. This fragile island is indeed a land beyond imagination and a privilege for all those that visit.

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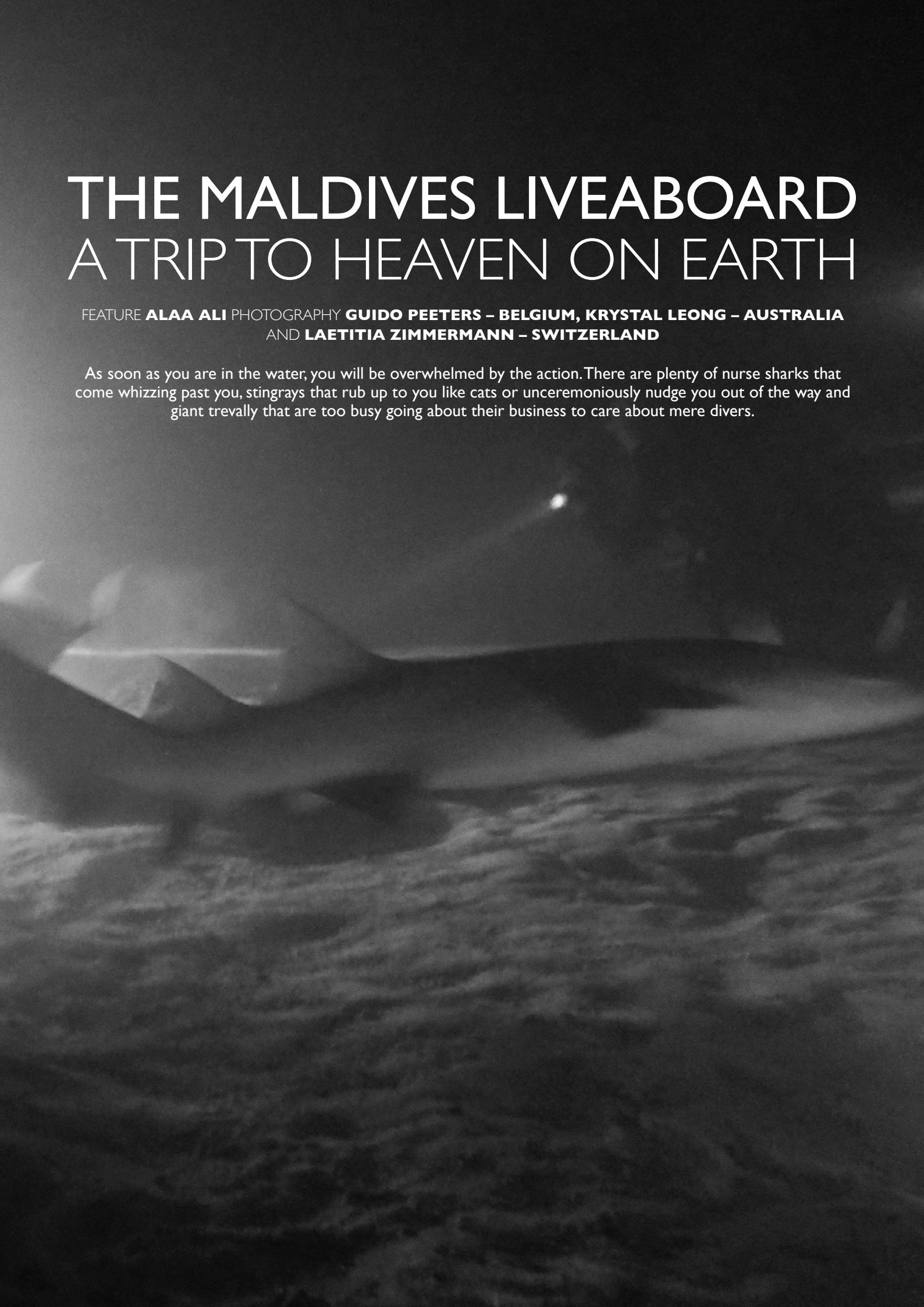
THE MALDIVES LIVEABOARD
A TRIP TO HEAVEN ON EARTH

FEATURE **ALAA ALI** PHOTOGRAPHY **GUIDO PEETERS – BELGIUM, KRYSTAL LEONG – AUSTRALIA** AND **LAETITIA ZIMMERMANN – SWITZERLAND**

As soon as you are in the water, you will be overwhelmed by the action. There are plenty of nurse sharks that come whizzing past you, stingrays that rub up to you like cats or unceremoniously nudge you out of the way and giant trevally that are too busy going about their business to care about mere divers.



After experiencing my first liveaboard trip in Egypt's Red Sea back in 2011, memories, keep flashing back in my head! Every time I browse the photos and the videos taken during that trip, I get inspired to repeat the whole experience all over again! That's when I started searching the internet for other liveaboard options around the world. I have shortlisted several according to locations, such as Mexico, Cayman Islands, Maldives, Egypt (again), Bali and Raja Amput. I finally decided on Maldives for the following reasons:

DISTANCE

A movie and a nap would entertain a 4 hour flight from Dubai. It's pretty close!

WEATHER

April boasts the warmest sea temperatures of the year. During this month, average temperatures hover around 29°C, which is perfect for water sports and seaside activities. Maldives also enjoys 9 hours of daily sunshine and relatively little cloud during this month, thanks to the northeastern monsoon winds.

DIVING QUALITY

Scuba diving around the Maldives has recently become hugely popular among the diving community. The abundant isolated islands offer an enormous playground for divers to explore. Dive sites are divided by several types: pinnacles, channels, reefs and wrecks.

With 26 atolls spread over 90,000 square kilometers, there's plenty of pristine coral to explore. The protected lagoons allow divers to hover along with the tide to discover colourful sponges and soft corals.

DIVING PACKAGE AFFORDABILITY

USD1,300 or AED5,000 for 7 nights and 8 days sounded like a bargain to me. It was especially attractive since it included en-suite accommodation onboard, meals inclusive, most drinks (water, tea, coffee, etc.), professional divemaster services, tank and weights, air refills, up to 3 dives per day, one night dive and a BBQ on a deserted island.

BIG FISH

If you love big marine life, the Maldives will make your heart skip a beat! Talk about whale sharks, mantas and the abundance of various reefs. You may see more of the larger marine life species in one dive than you have in your entire dive career!

LIVEABOARD TRIPS

Liveaboard cruises are plentiful in the Maldives and there are more affordable ones than you may think. Forget long transfers and bumpy speedboat rides, whatever direction you head for, you'll find amazing dive locations and a friendly atmosphere.

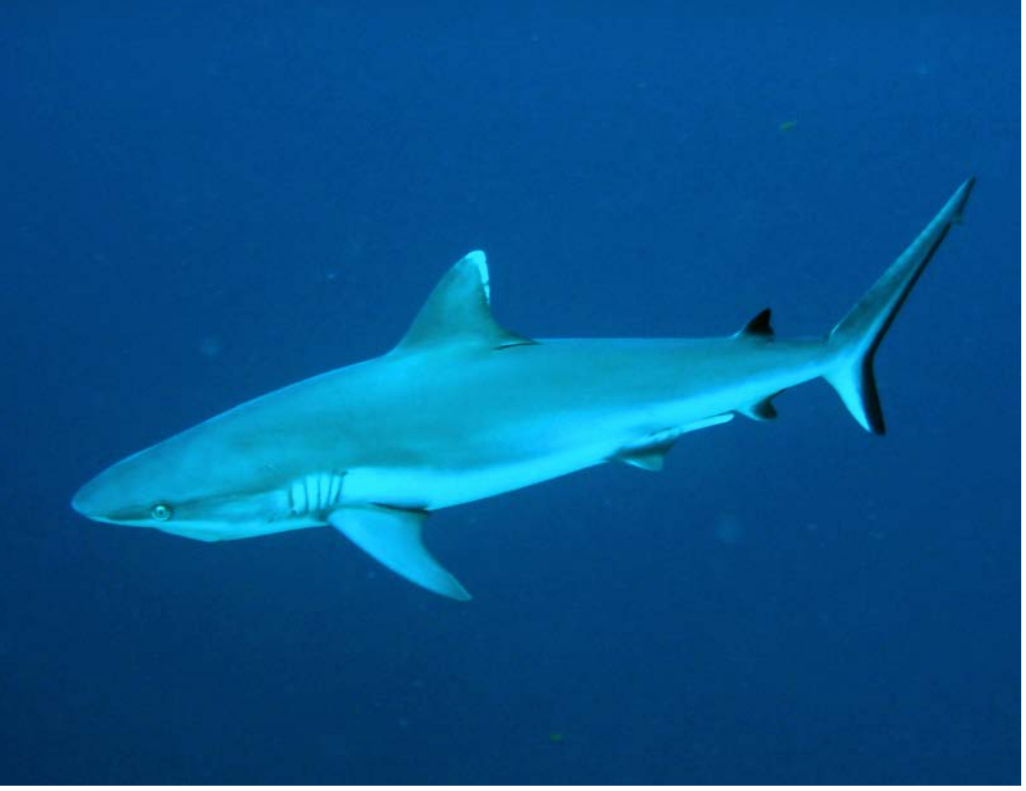
DAY 1

As soon as I landed at the airport, I was greeted and transferred to the main boat. The MV Sting Ray is an exceptionally comfortable and spacious liveaboard boat operated by one of the most experienced and outstanding teams in the Maldives. After the arrival of all the divers, we spent the first night at the Hulhule harbor near the capital city of Male. The next morning, we started our journey headed towards the South Male Atolls. (Atoll is a group of islands surrounded by common reef formation).

DAY 2

Kuda Giri – South Male (Wreck Dive)

This site is considered a wreck dive as it is dominated by the small wreck that lies upright on the South Male seabed between a depth of 15 and 35 meters. However the name of the site describes the giri, or pinnacle that is found nearby and this too could be considered a dive of its own. You will probably drop to the deepest part of this wreck to begin your dive. The currents are often absent or negligible so this is one site the less experienced diver can enjoy. They may wish to stay toward the shallower bow section. The wreck was sunk on purpose to form an artificial reef and has been well and truly colonized by orange, red and






yellow sponges, as well as Orange cup coral (*Tubastraea coccinea*). When you are scuba diving on the wreck you should look out for the big schools of glassfish that hover together in the interior and a large school of batfish that seems to stay around the wreck. The wreck is penetrable via a couple of different methods, but it is small and any group penetration needs to be handled in an orderly fashion.

Miyaru Kandu – Felidhoo Atoll (Channel Dive)
This is not an easy dive for beginners, especially in the presence of strong currents when you need to make a quick descent to the reef since currents in the center of the channel may be strong enough to wash you away. The upper part and the outer reef has some very nice corals, while the channel slope is poor. While swimming, we kept the reef to our right shoulder. Once we reached the bottom at 30 meters, we rested on a sandy portion of the reef and started observing grey reef sharks with the oncoming current, whitetip reef sharks, jacks, turtles, napoleons, groupers and sometimes also eagle rays on the edge and in the channel.

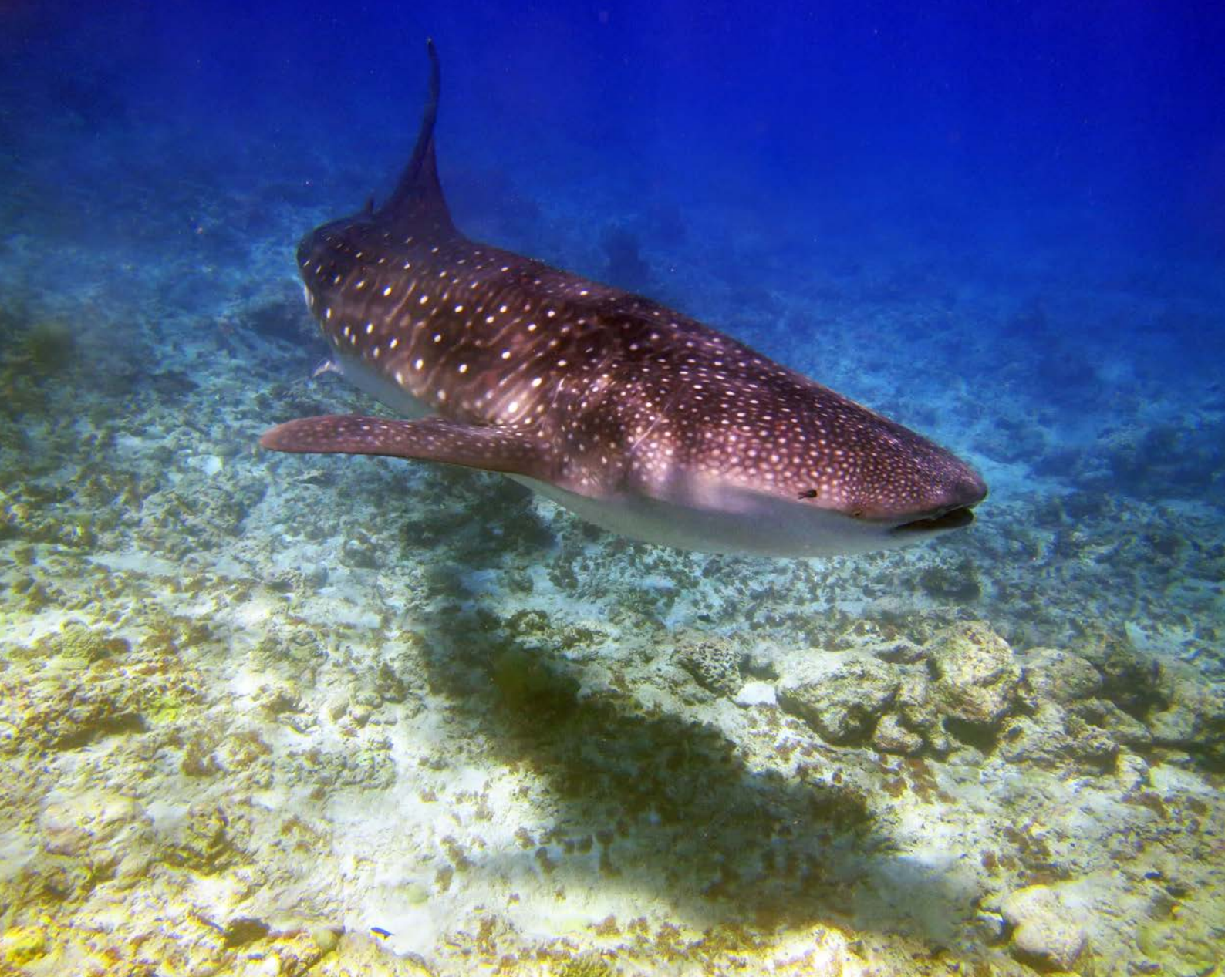
Fotteyo Kandu – Felidhoo Atoll (Channel Dive)
The mouth of the channel is exposed to the ocean and when the currents are incoming, a good variety of fish species gather at the entrance to the channel. This site is considered one of the top dive sites in the Maldives! Animals commonly spotted include grey reef sharks patrolling the channel mouth, jacks and tuna in the deeper water, schools of midnight snappers and red snappers swarm in huge groups. The wall features caves, overhangs and swim throughs at different depths. These caves and overhangs are filled with colourful yellow soft coral, deeper caves and overhangs are filled with huge bushes of black corals. The thila (coral reef just below the surface) in the middle of the channel entrance is the best place to do the safety stop. A surface marker is a must at Fotteyo Kandu.

DAY 3
Early Morning Hammerhead Dive – Felidhoo Atoll (Blue Ocean Dive)
The Fotteyo Kandu dive site is not only famous for the day dives, but also for an early 6am hammerhead dive. This dive is performed very differently from the day dives as divers spend most of the time in the blue water. During the early morning hours, scallop hammerheads rise to shallower depths and divers get to take a glimpse at them. Unfortunately we were unlucky!

Golden Wall – Felidhoo Atoll (Channel Dive)
Named for the beautiful blanket of yellow soft coral that covers it, Golden Wall is located adjacent to a channel that acts as a busy expressway for sharks and stingrays, eagle rays, schooling tuna, trevally, and barracuda. With overhangs where turtles and sharks sometimes nap, and where glassfish and colourful schools of anthias and other reef fish can normally be found, the site is also home to moray eels, lobsters and crabs to name a few. Beginning at ten meters and featuring a maximum depth at 35 meters, the site is suitable for all divers.

Devana Kandu – Felidhoo Atoll (Channel Dive)
This dive site was declared a Marine Protected Area. With an inland current which divers will experience, this is one of the most exciting drift dives of Felidhoo Atoll. In the outer reef there are caves that fall vertically from 30 meters into the depths below. In the middle of the northern passage is a long, narrow reef which rises slightly up to 15 meters from the sandy floor at 18 meters. The divers can go along the channel length of 1km from the north where south passages are merged to a wide range of healthy corals. A magnificent display of corals stretch every 500 meters of the channel width to a depth of about 15 meters, which is unlike any other diving channel.

Alimatha – Felidhoo Atoll (Reef Night Dive)
Alimatha is 5 star experience! One of the Maldives most famous dive sites of all time and it has earned its reputation. Here is the best advice. Jump into the water 20-30 minutes



before the sun sets, NOT when it's dark.

As soon as you are in the water, you will be overwhelmed by the action. There are plenty of nurse sharks that come whizzing past you, stingrays that rub up to you like cats or unceremoniously nudge you out of the way and giant trevally that are too busy going about their business to care about mere divers.

My advice would be to stick with your group, and there is pretty much no point in moving around too much – pick a spot, and get comfortable. Obviously you will need a torch and if you are shooting underwater it gets really tricky. If you are shooting stills – you will need a focus light, without it, it will be extremely frustrating. If you are shooting video, you will need at least one powerful strobe. The best thing to do is just sit down and stuff will come to you – so just get comfy, get your settings set and shoot away!

DAY 4

KUDARA THILA – SOUTH ARI ATOLL (REEF DIVE)

This is a really beautiful dive. We started by going through a beautiful arch covered in coral. There were coral and reef fish of all colours on top and lots of snappers, fusilier and anthias. On the top of the thila was a large turtle, moray eels, angelfish, coral groupers, soldierfish, nudibranchs, triggerfish and various puffers. There are also large overhangs with beautiful corals in the roof. The reef top is at 14 meters with sharp drop-offs to 20 and 25 meters on the sides. There is a small canyon on the north side and a big long cave at 20 meters on the eastern side. When the current is not too strong, divers can swim around this 80 meter long thila without too much difficulty. On the deeper, more gentle slopes on the northern side, there are large sea fans. Swimming around the fan slopes there are a number of grey and white-tip reef sharks.

Kudhi Maa – South Ari Atoll (Wreck Dive)

Kudhi Maa Wreck is a medium sized steel wreck lying very close to the Machafushi House Reef. The wreck is a Japanese cargo ship which was purposely sunk in 1998 to provide divers visiting the South Ari Atoll with a wreck. It's 52 meters wide! On and around the shipwreck you can find a school of bat fish, some puffer fish, box fish, large lion fish and 2 basking nurse sharks are always positioned under the wreck! One interesting feature of the wreck, is the competition for space that has sprung up on the surface itself. Algae, sponges, sea squirts and corals are all fighting for that valuable piece of metal to start their growth from. The depth starts at 12 metres and descends to 30 metres.

DAY 5

Five Rocks – South Ari Atoll (Pinnacle Dive)

This site contains 5 huge pinnacles at 25 meters deep. There was a strong current and the visibility wasn't great! Full of channels, overhangs, saw so many fish, about 6 sharks including a grey reef shark, 2 napoleons, leaf fish, oriental sweet lips and moray eel. I noticed that the coral reef was healthy and very colourful here! This remote site is made up of 5 underwater rocks forming a pinnacle with a flat top at about 15 meters. A GPS was used to locate the site. This site is washed by currents and the marine life and corals are spectacular.

Sun Island Beyru – South Ari Atoll (Reef Dive)

Whale shark searching began at 9am We spotted the first whale shark near Sun Island Beyru and snorkeled for almost 20 minutes till the whale shark faded into the blue. The second encounter was at the outer reef of Sun Island Beyru while diving. The whale shark swam with us for a few minutes then faded






again into the blue. I noticed the swinging current effect for the first time! It was nice, yet you do have to keep a constant check as you can hit or damage the coral reef while swinging!

Dhigga Thila – South Ari Atoll (Reef Dive)

One of the few thilas in ari atoll displaying magnificent coral growth. Great site for reef sharks, large gorgonian fan corals and large overhangs worth exploring. The table corals on top of the thila are also worth checking out. For me this was one of the best dives in the Maldives! After finishing 3 dives on this day, the crew had prepared a treat for all the divers! They took us to a deserted island and we had an amazing BBQ dinner and amazing pirates of the Caribbean experience!

DAY 6

Panettone – South Ari Atoll (Reef Dive)

The minute we jumped into the water there was a 3.5 meter manta ray waiting for us! It was hovering over a rock allowing cleaning fish to do their job! The encounter was pretty close. Behind us, a whitetip reef shark and eagle ray were swimming. The water current got stronger and it was swinging so we then had to hold onto the rocks.

Dhega Thila – South Ari Atoll (Reef Dive)

This site has a very interesting formation, with a wall of sea fans on the outside of the main peak and pinnacles on the western side. There is a tunnel to swim through cutting the reef where yellow sweepers stay. On the north side there are another two pinnacles, with a narrow canyon between them. The dive can be very deep and currents treacherous. This was the worst dive on the trip due to very strong currents which I couldn't fight! I ended this dive in 15 minutes.

Moofushi Kanu – South Ari Atoll (Reef Dive)

This reef is around 2km long with caves and overhangs teeming with life. Here you can admire the sea fans, whip corals and its marine life of sting rays, manta rays, napoleon wrasse and sharks.

CONCLUSION

A liveaboard is by far the greatest way to cover a large area and see the best of the best dive sites which the atolls have to offer.

All the sites were good, but some were better than others. Strong water currents were an obstacle for me in some dive sites. I would certainly go back for more!

USEFUL LOCAL TERMS

ATOLL: A group of islands surrounded by a common reef formation.

CONA: Clear area among corals.

FALHU: Lagoon encircled by a reef sometimes with one or more islands inside.

FARU: Large reef partially exposed at low tide.

FINOLHU: Island with few or no coconut trees.

FUSHI: Big island usually on the outside reef of the atolls.

FUTTARU: Reef where waves break.

GIRI: Small patch of coral a couple of meters below the surface.

HALU: Clearing in lagoon.

KANDU: Sea inside an atoll.

KANDU OLHI: Channel.

MAA KANDU: Sea outside an atoll.

THILA: Coral reef a few meters below the surface.

VILU: Deep area inside lagoon.

DIVING DHOANI: A smaller open boat that accompanies the mother boat during the cruise with all the diving equipment, compressor and tanks.

EFFECTS OF DIVING ON THE BRAIN (PART II)
CAN DIVING HAVE LONG-TERM HEALTH EFFECTS?

FEATURE **JENNA WILEY**

We keep examining the possible relationship between acute dive injuries and neurological complications. The question is still unresolved, and we submit to the experts a second series of questions to better understand some of the effects of diving on the brain.

What is the relationship between reduced neuropsychological performance and the presence of brain lesions?

MOON: So far, no one has demonstrated any such relationship in divers.

UZUN: The presence of brain lesions does not always reflect a reduction in neuropsychological performance. However, some studies have established a correlation between white-matter lesions and cognitive impairment in older adults, and some others suggested that periventricular white-matter lesions were predictive of future development of dementia. On the other hand, studies assessing the relationship between brain lesions and neuropsychological performance in divers failed to demonstrate any correlation.

TETZLAFF: Impaired executive functioning and memory have been found to be significantly associated with white-matter brain lesions.

How do voluntary apnea and hypoxia relate to potential brain damage in breath-hold divers?

MOON: When breath-hold divers reach the surface, their blood oxygen levels are often low (hypoxemia), which causes some breath-hold divers to lose consciousness for a few seconds. It is conceivable that repetitive hypoxic episodes like this could cause cumulative brain damage.

UZUN: A few studies have investigated brain damage in breath-hold divers. One recent study (Andersson et al., 2009) reported an increase in serum levels of the S100B protein, a marker of neural damage, immediately after voluntary apnea. The authors postulated that hypoxia-induced neuronal damage or temporary impairment in the blood-brain barrier could account for this finding. Whether voluntary apnea causes cerebral damage in the long term is yet to be determined.

TETZLAFF: Prolonged breath holding will reduce oxygenation of the brain. There is evidence from the field of obstructive sleep apnea that intermittent hypoxia is associated with cognitive decline and silent brain infarcts, which predominantly involve small-vessel cerebrovascular disease. However, unlike patients with obstructive sleep apnea, breath-hold divers do not appear to develop permanent sympathetic or any significant reflex cardiovascular activation. The increase in serum levels of a protein called S100B, a brain-damage marker, after extreme apneas performed by elite breath-hold divers may point to the likely disruption of the blood-brain barrier. S100B, however, is a nonspecific marker and may be increased by extracranial injury. Extreme apneas as performed by elite breath-hold divers cause significant stress on the cardiovascular and respiratory systems. It should be noted that extreme breath-hold diving is a dangerous activity that can cause serious health hazards, among which long-term brain damage is the least worrisome.

What risks to the central nervous system does diving impose on a person?

MOON: The main risk, although low, is cerebral decompression illness (DCI). This could be due to DCS (in-situ bubble formation in tissues) producing bubbles in blood vessels that could then reach the brain. This may also be caused by arterial gas embolism (AGE), where bubbles result from rupture of alveoli in the lung during decompression caused by breath holding or lung disease.

UZUN: Scuba diving is associated with a number of neurological risks including DCS, AGE, anoxia and high-pressure nervous syndrome.

TETZLAFF: The major mechanism leading to central nervous system damage from diving is through gas embolism of arterial cerebral vessels. This can be caused acutely by AGE following pulmonary barotrauma or spillover of venous gas emboli to the arterial circulation (as may occur in the presence of a PFO). Also, silent embolism of cerebral microvessels by inert gas bubbles may cause chronic injury. Thus, uneventful diving and diving within no-decompression limits should minimize risk to the central nervous system from diving.

Should scuba divers with no history of DCS worry about long-term cumulative injuries from diving?

MOON: No.

UZUN: No. There is currently no convincing evidence that scuba diving causes long-term cerebral damage in asymptomatic divers.

TETZLAFF: There is no need to worry. As outlined above, ischemic cerebral vessel disease may occur as a consequence of gas bubbles arising from diving, but diving within recommended limits and following recommended procedures should prevent such injuries.

MEET THE EXPERTS

RICHARD MOON, M.D., obtained his medical degree from McGill University in Montreal, Canada. He is professor of anesthesiology and medicine and medical director of the Center for Hyperbaric Medicine and Environmental Physiology at Duke University Medical Center in Durham, N.C.

GÜNALP UZUN, M.D., is an associate professor of underwater and hyperbaric medicine at the GMMA Haydarpasa Teaching Hospital in Istanbul, Turkey.

KAY TETZLAFF, M.D., is associate professor of medicine in the department of sports medicine at the university of Tuebingen, Germany and consultant in diving and hyperbaric medicine.

CURRENT RESEARCH

To better understand some of the effects of diving on the brain, researchers at DAN are beginning a study that will screen divers for acute effects of scuba diving on executive brain functions. The objective of the study is to assess possible neurological dysfunction after extreme breath-hold diving and deep scuba diving in asymptomatic divers.

COMING TO GRIPS WITH SYMPTOMS

A REAL CASE SHOWS HOW TO PERFORM A PROPER DIAGNOSIS THAT EXCLUDES DCS

FEATURE **MARTY MCCAFFERTY, EMT-P, DMT**

THE DIVER

The diver was an experienced 43-year-old female with more than 150 lifetime dives. She was reportedly healthy and reasonably fit, and she denied taking any medications regularly.

THE DIVES

The dives were made in the ocean from a private vessel; the diver breathed air and performed a three-minute safety stop on each dive. The water temperature was 14°C, and the diver wore a drysuit with attached gloves. The first dive was to 26m for 22 minutes. After a one-hour surface interval, she made a second dive to 17m for 40 minutes. Despite her use of dry gloves, the diver's hands became cold, especially during the second dive. At the surface she reported reduced sensation in both hands with associated loss of grip strength. She and her companions attributed the symptoms to being cold, and they headed home.

CONTACT WITH DAN

The diver experienced some difficulty driving due to the reduced sensation and strength in her hands. Thinking her symptoms resulted from being cold, she spent more than an hour immersing her hands in warm water, but she noted no change in her symptoms. Concerned that she might have decompression sickness (DCS), she called DAN. The diver and the DAN medic discussed her dive profiles, breathing gas and any potential issues that might have occurred on either dive. The discussion then turned to the symptoms: their time of onset, character and evolution. During the conversation two important pieces of information surfaced. First, her wrist seals were well used, meaning the chances were very low that constriction had impeded normal circulation. Second, the diver had a history of similar symptoms.

THE COMPLICATION

The diver reported a history of carpal-tunnel syndrome. Upon reflection she noted her present symptoms were essentially identical to those she had before. Once carpal-tunnel symptoms became a likely explanation, the medic sought to determine whether some activity during the dive could have aggravated the condition. The diver explained that she made the dives to familiarize herself with the use of a new camera housing in the marine environment. She confirmed she had an appropriate amount of weight for ballast, but she realized she did not have the weight positioned for proper trim. The housing tended to float with the lens side up, which required her to flex her wrists to bring the camera into a usable position. The DAN medic encouraged her to be evaluated at the local hospital's emergency department that day.

DISCUSSION

There are no tests or imaging methods such as X-ray, CT scan or MRI that can diagnose DCS. The diagnosis of DCS is typically reached by a process of elimination. This can be more difficult when a pre-existing condition mimics the symptoms of DCS. Three primary factors are associated with the diagnosis: provocative dive profiles, proximity of symptom onset to diving and symptoms consistent with DCS. Let's review this case with these criteria in mind.

The diver's profiles (26m for 22 minutes on air; 60-minute surface interval; 17m for 40 minutes on air) were not particularly aggressive, but DCS cannot be ruled out based on this exposure alone. The actual onset time of the symptoms is somewhat unclear due to the fact that the diver's hands were so cold. However, the symptom onset was well within 24 hours, the timeframe within which DCS symptoms are expected to occur. Eighty percent of all DCS symptoms present within the first 12 hours following a dive.

Regarding the specific location of her symptoms, there are no documented cases of DCS in which symptoms occurred in both hands and nowhere else. Some might argue that a pre-existing musculoskeletal condition could predispose the individual to an increased risk of DCS in the affected area. There is some evidence that this is a possibility, but no such predisposition is statistically apparent; the case data about DCS do not support the idea that previously injured areas of the body are prone to DCS. DAN's recommendation that the diver seek medical evaluation was to ensure review of all other possible signs and symptoms.

THE CONCLUSION

The diver chose to wait until the next morning so a physician familiar with her condition could evaluate her. Her symptoms had improved slightly overnight and remained localized in her hands. The diver did not report any new symptoms. A physical evaluation determined that the reduced sensation originated at the heels of the hands and extended into the index, middle and ring fingers of both hands. The fifth (little) fingers were unaffected.

Based on this verified presentation and the manner in which the diver repeatedly flexed her wrists during the dives, the doctor suggested that the symptoms were consistent with an aggravation of the diver's existing carpal-tunnel syndrome. The doctor spoke with one of DAN's consulting dive physicians. After reviewing the profiles, the time of symptom onset, the character and progression of the symptoms and, ultimately, the objective physical findings, both doctors agreed that DCS was unlikely, and hyperbaric treatment was not recommended.

There is no substitute for a physical examination in person. A diagnosis cannot be made over the phone or based solely on signs and symptoms that appear in a particular list. None of the signs or symptoms listed for DCS is exclusive or unique to DCS; all factors need to be considered in their proper context. While one of the essential goals in the management of DCS is prompt initiation of treatment in a hyperbaric chamber, this should not supersede a thorough medical evaluation. Medical examinations that occur prior to treatment have not been associated with negative clinical outcomes, and they may uncover other important causes of symptoms that were erroneously associated with diving.

If a diver develops symptoms following a dive, encourage prompt evaluation by a medical professional, and do not hesitate to contact us via the DAN Emergency Hotline (+39 06 4211 5685).

DAN®
DIVERS ALERT NETWORK EUROPE

MORE WATER, LESS BUBBLES – AVOIDING DEHYDRATION

FEATURE **GUY THOMAS, EMT, DMT, DAN EUROPE VICE PRESIDENT MISSION AND OPERATIONS**

What is dehydration and how does it influence diving safety?
Dehydration occurs when the body loses more fluid than is taken in and this can lead to medical problems that should be avoided. Generally, these problems (especially in the case of chronic or severe dehydration) can result in headaches, decreased performance, irritability, confusion, fatigue, muscle cramps, reduction of thermoregulation, decreased level of consciousness, the production of kidney stones (long term) and can even lead to shock which is a life threatening condition. It is clear that these problems will negatively influence the medical condition of both divers and non divers and dehydration should therefore be avoided at all times.

For us divers there is another concern: dehydration is a contributing risk factor for Decompression Sickness (DCS).

Why? Dehydration reduces the volume of blood plasma and perfusion of tissues, so it thickens the blood and reduces blood flow. Since blood is partially responsible for the transportation of nutrients and for gas exchange, thickened blood will affect the off-gassing of Nitrogen and increasethe risk of developing DCS.

How big is the risk on DCS?
In principle, diving increases the risk of becoming dehydrated. We have seen during some of our DSL projects that many divers are not well hydrated before the dive (and even less after the dive). In normal conditions however proper hydration should not become the main concern of divers, neither should it be ignored. However, when going on a diving holiday the risk factor rises due to increased frequency of diving and (usually) increased climate. Therefore, appropriate hydration should be a key concern.

Why does the risk factor change during my diving holiday?
Obviously the risk does not increase just because you are on a holiday, but there are behavioural and environmental factors that contribute to the diver becoming dehydrated much faster and without realising it.

In reality dehydration begins to develop when you enter the airplane that takes you to your preferred dive destination. The air in the cabin is much dryer than the air on earth and our lungs have to work harder to humidify the air, meaning your body is constantly losing fluids whilst on board.

It is recommended to drink 240ml of water each hour of the flight. So, if you would be travelling from the UK to Egypt, you would need to drink 1.2litres of water to maintain a good balance of fluid, while you would need approximately 750ml when flying from Italy to Egypt. These are volumes not many will drink during a flight.

Many travellers also like to drink coffee, coke or a beer during their flight, but these liquids just don't have the same hydrating effect as water. Alcohol and drinks containing caffeine are diuretics, consuming these will result in dehydration as they absorb water from the cells in your body and increase urine production. Consequently, the diver arrives at their destination with mild dehydration.

But this is only the beginning of the holiday. What do divers want to do during their holiday?

Enjoy the sun, enjoy the sea, dive as much as possible and why not have some fun and drinks in the evening. Let's take a look at why this dehydrates you faster than normal.

Enjoying the sun: The most attractive dive destinations for the regular diver are those "warm water" locations where there are nice, big coral reefs and nicely coloured fish. In these destinations there is a warm, sunny and sometimes humid climate. It is clear that in these conditions you sweat and if you sweat you lose fluid, which if not replaced makes you dehydrated. If you then also get sunburnt you will lose fluids even faster. When you have sunburn, your skin gets red and hot (and sometimes becomes painful) and our body reacts to this by sending fluid to the skin. The sun and wind will evaporate this moisture and even more fluid gets lost in this way. Actually with these increased outdoor temperatures you also enjoy the wind and since most dives during the holidays are boat dives, you like to feel the wind on your skin which gives you that refreshing feeling. But in reality, the wind (wind itself or the wind created by the velocity of the boat) evaporates sweat and moisture, increasing dehydration again.

Sea water – Salt: When coming out of the sea, the (salt) water will dry and leave salt crystals behind on your skin. These can often visually be seen, and have the ability to absorb and hold water molecules. This means it will take the moisture out of your skin, which then will evaporate due to the sun and wind, increasing dehydration further.

Diving: There are 3 things particular to diving itself that increase dehydration: Sweating, Immersion Diuresis (increased urine production) and breathing compressed air. While the dive suit keeps you warm during the dive, it also does not allow you to cool down. So if you already are in a warm climate and are sweating when only wearing a t-shirt, imagine

how much you will sweat in a dive suit. During the dive, the increased ambient pressure and cooler water temperature will cause the blood vessels in the extremities to narrow and blood will be shunted from the extremities to the core of our body (heart, lungs and large internal blood vessels) in an effort to keep you warm. This increased blood volume in our core is seen by our body as a fluid overload. As a reaction the kidneys will produce more urine (which means losing water and salt again). This is also why divers feel the need to urinate during or immediately after the dive and this is referred to as Immersion Diuresis. Although one might think that when urinating a lot you are well hydrated, it actually means you are losing excessive fluids. Another cause for loss of fluids while diving is the air you breathe. Just as in the airplane, the air in the scuba cylinders is dry and you already know you lose more fluid to humidify this dry air. If you then also take into account that due to the colder water temperature, your lungs need to work even more to warm up the air, then you are increasing this moisture loss even more.

Alcohol: You are on holiday and it is not uncommon to have some fun and a few alcoholic drinks when enjoying your free time. While drinking and diving is never recommended, alcohol also makes you dehydrate faster. As you know already, alcohol (as well as coffee and other drinks containing caffeine) has a diuretic effect, increasing the urine output. This will make you urinate more frequently making you dehydrate.

Sickness: Vomiting, because you have been drinking too much or because you suffer from seasickness or for any other reason will heighten the rate of dehydration because you lose large amounts of fluid and electrolytes in a short period of time. The same negative effect can be seen when you have traveller's diarrhoea, which is an intestinal infection that occurs as a result of unsanitary food handling.

Medication: Some medication, especially blood pressure medication has a diuretic effect and as you know this diuretic effect will lead to dehydration.

If you now consider that on a diving holiday, you like to dive daily and even twice a day, then you can understand the increased dehydration and DCS risk. Obviously the risk does not increase just because you are on a holiday, but there are nine behavioural and environmental factors that contribute to the diver becoming dehydrated much faster and without realising it.

How do you know you are dehydrated and what can you do?
In general, a good indicator is the colour of urine. It should be transparent or light yellow. Darker coloured urine normally means you are dehydrated, although the colour can also be influenced by certain medication. Also little or no urine might mean you are dehydrated, although a lot of urine is not an indicator that you are well hydrated.

SYMPTOMS OF DEHYDRATION

Mild-Moderate

- Thirst (this means you should not only drink when you are thirsty as thirst already means you are dehydrated a bit)
- Dizziness
- Headache
- Muscle cramps
- Tiredness
- Dry or sticky mouth
- Dark coloured urine
- Decreased urine output

Severe

- Extreme fatigue – Weakness
- Extreme thirst and very dry mouth
- Sunken eyes and/or eyes that do not produce tears
- Not passing urine for eight hours
- Dry skin that sags slowly into position when pinched up
- Rapid heartbeat, weak pulse
- Rapid breathing
- Low blood pressure
- Irritability and confusion
- Seizures
- Low level of consciousness

Most dehydration is mild and can easily be resolved by drinking more water. The use of Oral Rehydration Salts or Isotonic sport drinks in addition to water can also be considered as these will replace salts and electrolytes. However, where more severe symptoms are apparent, immediate medical care is required.

How to avoid dehydration?
It is much better to avoid dehydration instead of resolving it. Only by avoiding it, divers will reduce the risk of DCS.

After discussing dehydration and its effects on the body, we can conclude you should rinse yourselves down with fresh water after every dive, keep your dive suit off until right before the dive itself, avoid or moderate alcohol consumption or drinks with caffeine and protect yourselves from too much sun/sunburn.

But the easiest thing to do is to drink plenty of water. However, you do not want to increase plasma volume too rapidly as this will only increase urine production again and not hydrate the body tissues. Therefore the advice is to drink a glass of water every 15-20 minutes instead of drinking a litre of water just before or after the dive. This will allow the tissues to be hydrated and consequently avoid the decreased gas exchange which can lead to bubble formation and DCS. How much you actually need to drink depends on many factors, but drinking at least 2 litres extra (in addition to what you normally drink a day) will help you to keep hydrated. You can also consider eating foods with a high water content, such as fruits and vegetables. Some companies also sell drinking bags that can be used to drink underwater, during the dive.

THE DAN EUROPE "MORE WATER, LESS BUBBLES" SAFETY CAMPAIGN

DAN Europe started the "More Water, Less Bubbles" campaign at the end of 2012.

Articles such as this one have been published in the Alert Diver magazine and on the website. In addition, an email campaign was started amongst DAN members, informing them on how to avoid dehydration and thus reducing the risk of DCS. At the 2013-2014 dive shows 3,000 aluminium drinking bottles with the campaign's slogan were distributed amongst new and renewing DAN members. Posters and banners, reminding divers to drink enough water have been made and placed in different locations in Egypt, where due to the climate, the amount of diving and the high amount of tourists, dehydration is one of the major risk factors in getting DCS.

DCS is caused by bubble formation and growth in the blood and body tissues which can result in hypoxia. In normal circumstances Nitrogen is washed out by the lungs after a dive, but this washout will be less effective when the diver is dehydrated, increasing this bubble formation and growth, which can lead to DCS.

The slogan "More Water, Less Bubbles" refers to the fact that when a diver is well hydrated, the risk on this bubble formation and growth will be less.

ADDITIONAL INFO

Research was also done on pre-dive hydration (Report published on 4 march 2008; Preventive effect of pre-dive hydration on bubble formation in divers by E Gempp, J E Blatteau, J-M Pontier, C Balestra, P Louge).

Although this report is not particularly concentrating on dehydration it shows that pre-dive hydration significantly decreases circulatory bubbles, thus offering a relatively easy means of reducing DCS.

Additional Research was done by DAN Europe on Surface Tension. Surface tension (ST) is a potent natural force, typical of many substances, including body fluids and tissues. When dealing with bubbles, it is inversely proportional to the cubic root of the radius of the bubble. That is very small bubbles are subject to very high Surface Tension (pressure), larger bubbles are subject to lower Surface Tension. With high ST a bubble is subject to a force which contrasts its growth and may even lead to its disappearance. Low ST, on the contrary, will allow a bubble to grow faster and with less external impediments.

UNEXPECTED AIR POCKETS

THE IMPORTANCE OF GOOD ORAL HEALTH FOR DIVERS

FEATURE **BRITTANY TROUT**

THE DIVER

The diver, a 40-year-old male with more than 1,500 lifetime dives, had no known medical conditions and reported a healthy lifestyle. In the months before this incident, he had multiple root canals and other major dental work done. He made several decompression dives on a rebreather using a scooter without any problems in the week preceding the incident.

THE INCIDENT

On his last dive of a weeklong series, the diver felt a momentary dull pressure and pain in his lower teeth during his descent; he dismissed it since the pain seemed to vanish as he continued with the dive to a maximum depth of 47m. When he started to ascend after spending 30 minutes at 41m, he experienced sharp and severe pain in the same teeth. After ascending an additional 1.8 or 2m, the diver became aware that several dental fillings had come loose. As he continued his ascent, two fillings fell apart and came out of his teeth. He halted the ascent for a few minutes to compose himself and assess how to reach the surface safely before proceeding.

To avoid further complications and prevent the dental-filling debris from damaging the bailout valve of his rebreather, he switched to his backup open-circuit unit and spit out the filling fragments. He then returned to the closed-circuit loop to conserve breathing gas. His dive buddy was attentive and assisted him with his scooter and reel throughout the ascent. The diver stayed at 29m for 10 minutes to deal with the excruciating pain he felt throughout his lower teeth before proceeding with a safe ascent to the surface.

THE DIAGNOSIS

Several days after the incident the diver went to his dentist, who suggested that biting too hard on the regulator mouthpiece had generated pain similar to that caused by bruxing, the grinding or clenching of the teeth. Diagnostic X-rays showed the amalgam (metal) fillings in five of the diver's teeth were either damaged or missing entirely. Defective fillings may have allowed air to enter between the filling and the tooth and become trapped. During ascent the trapped air expanded and created pressure against the internal structures of the tooth, which triggered the tooth pain and caused two of the fillings to fall out.

The dentist replaced the damaged fillings, but the diver continued to experience tooth pain when diving. He sought a second opinion from another dentist, who identified through further X-rays that there were problems with the fillings of four teeth and recommended replacement. The diver had the fillings replaced and returned to diving without experiencing tooth pain. This was a case of barodontalgia (tooth pain caused by change in ambient pressure), also known as dental barotrauma.

DISCUSSION

As a diver descends into the water, the ambient pressure increases by one atmosphere every 10m. This pressure change affects body cavities such as the ears and sinuses by creating unequal pressures between the body cavity and the ambient environment. This is relieved by equalizing the pressure. When a tooth is damaged, restored defectively or has a loose crown, an opening may allow air to enter into the space and become trapped during a dive with no means of being equalized. The diver may experience tooth pain during descent, when pockets of air that exist under defective fillings are compressed, or during ascent as the trapped air expands and may crack teeth or loosen or expel fillings.

In this case, the diver had tooth pain on ascent due to defective fillings, which subsequent dental diagnostics confirmed. The unusual aspect of this case was that a total of five teeth appeared to have been affected on the same dive, two of which were confirmed to have lost fillings during the dive. Barodontalgia generally originates with poor oral health, neglected dental maintenance and/or ineffective dental treatments. Of the 347 total cases of barotrauma reported in the 2008 edition of the DAN Annual Diving Report, two cases were categorized as barodontalgia. Although a rare occurrence, barodontalgia should not be dismissed; it can lead to potential safety risks such as rapid ascents and impaired judgment during a dive due to severe pain.

This case, in which as many as five teeth were affected by barodontalgia during the same dive, is extreme. However, it serves as a reminder that being fit to dive is holistic and includes dental health. It is not necessary to seek a dentist specifically trained in dive medicine for dental checkups; rather it is important to routinely visit a dentist that provides quality care so you can be confident your dental health is maintained. The FDI World Dental Federation advises that divers have regular dental checkups, refrain from diving (or flying in nonpressurized cabins) within 24 hours of any dental treatment that requires anesthetic and wait seven days after an oral surgical procedure before returning to diving.

Fillings are prone to deterioration over time. Semiannual dental exams allow the dentist to inspect existing fillings for damage and to detect and treat tooth decay in a timely manner. By maintaining good oral health, divers can avoid barodontalgia and smile easily after diving.

OXYGEN – AN ESSENTIAL PIECE OF YOUR DIVE GEAR

FEATURE **PATTY SEERY**

Oxygen has long been recognized as the primary first aid for scuba diving injuries, specifically decompression sickness (DCS) and arterial gas embolism (AGE). Inhalation of 100 percent oxygen works by accelerating the diffusion and elimination of the excess nitrogen absorbed during diving, improving circulation (thereby promoting reoxygenation of tissues) and reducing swelling and associated inflammatory responses. For oxygen first aid to be most effective, the patient needs to breathe 100 percent oxygen delivered by a certified oxygen provider at an appropriate flow rate and with a good mask fit.

A BRIEF HISTORY OF OXYGEN USE IN DIVING FIRST AID

In 1878 French physiologist Paul Bert, while treating compressed-air divers and caisson workers, began using oxygen to relieve symptoms of what is now recognized as DCS. His experimental research on animals corroborated his clinical findings, which led him to be the first to propose using pressurized oxygen to treat "caisson disease." Despite the fact that surface-pressure oxygen long remained the only available treatment for decompression, it was nearly a century before its use became widespread.

In the early 1960s, the expansion of recreational scuba diving led to the use of hyperbaric oxygen to treat dive injuries. It was still another decade before oxygen was recommended while transporting an injured diver to medical care. The use of oxygen first aid for diving injuries increased over the years, but implementation was slow. A review of the DAN dive accident data in 1987 revealed that only 37 percent of injured divers received oxygen first aid and that oxygen use in first aid actually dropped between 1987 and 1990. To promote oxygen use, DAN introduced the DAN Oxygen First Aid Program in 1991, which has evolved over the years as understanding of treatment and equipment has grown.

DAN'S MISSION

In light of compelling evidence in favor of oxygen first aid, one of DAN's stated missions is to ensure that oxygen first aid equipment and people trained in its use are at every dive site, which means dive instructors and even divers may need to own their own oxygen units, which they care for and maintain.

STORAGE AND MAINTENANCE OF OXYGEN EQUIPMENT

Oxygen units should be stored assembled but depressurized in protective cases. This ensures the equipment is ready to use and protects it not only from damage but also from exposure to oils and grease, which increases the risk of fire. To further reduce the fire hazard, the equipment should also be kept away from open flames or people smoking.

Oxygen units should not be exposed to temperatures higher than 51°C, so they should not be stored in motorized vehicles on hot days. When transporting units to and from dive sites, the equipment should be secured such that it will not fall or roll.

Note that oxygen cylinders are regulated by the same laws as scuba cylinders and thus should periodically undergo hydrostatic testing.

The standard procedure for oxygen-regulator maintenance involves service every two years or as the manufacturer recommends.

Along with the regulator service, check the oxygen washer to ensure it is free of cracks, dirt, grease and oil. If any of these are present, change the washer. When reseating the regulator, confirm that the pins are aligned with the oxygen tank valve, and test for leaks by turning on the system. As always, remember to depressurize the system before storing it.

Service the oxygen-delivery mechanism (demand valve or manually triggered ventilator [MTV]) every two years or as recommended by the manufacturer. In addition, test MTVs and verify their function before each use. Test

the demand valve by inhaling through the mask and exhaling away from it. Check the MTV by depressing the activation button then covering the ventilation outlet with the palm of your hand. It should automatically shut off. If it doesn't, don't use it, and send it in for servicing.

Visually check hoses and tubes for cracks or stress marks before each outing and when the system is serviced. Replace these as necessary.

Finally, inspect masks for cleanliness and signs of age.

After each use, clean the system using the following procedure:

1. Wipe down the cylinder and hoses to remove sand or dirt.
2. Disassemble the demand valve or MTV.
3. Soak plastic parts in a mild bleach solution for 10 minutes, rinse with fresh water, and allow to air dry.
4. Do the same with the oronasal mask (Pocket Mask), but discard the chimney.
5. When all parts are dry, place a new chimney on the oronasal mask, reassemble the system, and store it in its protective case.

Non-rebreather masks and bag-valve masks are single-use items and should be discarded after use.

For detailed information and hands-on practice, sign up for a DAN Oxygen First Aid for Scuba Diving Injuries course.

FILLING OXYGEN CYLINDERS

There are two primary methods of getting oxygen fills:

1. with a prescription
2. with documentation of training (must be current)

In the past, a prescription was not required in European countries and a proof of training represented all that was needed to obtain Oxygen fills. The DAN Oxygen First Aid for Scuba Diving Injuries course helps divers meet those training requirements. Unfortunately, the EU and, as a result, some European countries, now require a prescription in order to purchase Medical Oxygen fills. In a few countries, it is even required to rent oxygen cylinders from authorised gas companies instead of owning an oxygen cylinder.

Many divers obtain prescriptions from dive physicians or personal physicians who understand the need for emergency oxygen at dive sites; however, the prescription technically limits the administration of the prescribed drug (oxygen in this case) to the person for whom the prescription is written. Some doctors may be willing to write a prospective prescription authorizing dispensing emergency oxygen, although they are not obligated to comply with such a request.

Although in most European countries it still is relatively easy to obtain oxygen fills, there are countries where it becomes challenging to get your oxygen cylinder filled without the help of a doctor who agrees to issue a prescription.

DAN TRAINING – OXYGEN FIRST AID FOR SCUBA DIVING INJURIES COURSE

DAN Oxygen First Aid for Scuba Diving Injuries course represents entry-level training designed to educate divers and interested non-divers (such as a charter boat captain) to recognise scuba diving injuries and to provide emergency oxygen first aid.

JET LAG, MELATONIN AND DIVING

FEATURE **BARBARA KARIN VELA, MD** PHOTOGRAPHY **SIMONE CAPRODOSSI**

Even though we live near nice diving destinations, many of us still travel to explore underwater world's elsewhere. Quite often this involves air travel, several time zones away. Crossing several time zones in a short time causes jet lag syndrome, Desynchronosis, or Rapid Time Zone Change Syndrome. Jet lag may affect one's ability to dive safely. Jet lag is the bodies inability of immediately adjusting to the time

in a different zone. Symptoms include feeling tired, hungry and alert at wrong times. This is a temporary disorder as the body is able to reset itself at a rate of about one day for every time zone travelled. The more time zones we cross, the greater the expression of the syndrome and the longer it takes to overcome. Most people have fewer problems with westward travel (lengthening day) than eastward travel (shortening day). Jet lag can be worsened by insufficient sleep before the journey.

In the preparation of a trip, try to move your bedtime to as close as possible to the bed time of your destination. If travelling eastwards, start going to bed one hour earlier per day for each time zone you will travel and get up earlier, to catch some sunshine and start adjusting your body clock differently. Avoid coffee, tea, chocolate, and alcohol as well as exercise 3-4 hours before the new bedtime. If travelling westwards, try to go to bed later and stay in bed longer.

Effects of jet lag are much worse if we lose sleep during flight. During sleep, the body temperature falls and activity of some hormones change. This usually occurs at the same time every day, but these activities are triggered by changes in surrounding light and noise. With the onset of dark, our brain starts to excrete melatonin, or "hormone of dark", which regulates circadian rhythm and sleeping patterns. Melatonin is not strong enough to do things on its own, so avoiding things, which makes one alert (caffeine, alcohol) and using earplugs and an eye mask which fully blocks out the light, helps a lot. If this is not enough, one can use 0.3mg to 1mg of melatonin 30 minutes before bedtime (and keep eyes covered with mask or stay in a dark room).

Once you arrive at your destination, do what locals do: stay active during the day time and go to bed in the evening. If jet lag is still bothering you, another option is synthetic melatonin, which is classified in the US as a dietary supplement. A study in the British Medical Journal in 1989 reported that taking synthetic melatonin tablets could help travelers restore normal sleeping patterns. In that study, 20 volunteers traveling back and forth between New Zealand and England took daily doses of either 5mg of melatonin or a placebo before, during, and after their flights. Those taking melatonin returned to their normal sleep patterns in 2.85 days on average, compared with 4.15 days for those taking a placebo.
However, scientists in the US and many other countries are not yet convinced that enough evidence exists to prove the efficacy of over-the-counter melatonin tablets. There is not enough information abut long-term effects of taking melatonin. As melatonin is classified as a food supplement, there are no measures in place to assure that all melatonin products meet minimum standards. In 2005, MIT released the results of a meta-analysis of 17 peer-reviewed studies using melatonin. It showed that melatonin was effective in helping people fall asleep at doses of 0.3mg. Higher doses of melatonin seem to be less effective after only a few days' use.

For the purpose of treating jet lag, it is suggested that a dose between 0.3mg-5mg of melatonin should be taken on the first day you travel at the time you will want to go to sleep at your destination (doses may vary as melatonin is not regulated enough). This may be continued at bedtime for a few days once you are at your destination. Melatonin seems to be most effective when crossing five or more time zones, or traveling east. Only adults should take melatonin. Do not drink alcohol when taking melatonin.

Be aware that higher doses of melatonin can cause sleepiness, lethargy, confusion, and decreased mental sharpness. Operating motor vehicles or heavy machinery should be avoided after taking your daily dose of melatonin. Melatonin is considered non addictive and safe for a short-time use. However, it can interact with various medications, including anticoagulants, immunosuppressant, diabetes medications and birth control pills. If you have any health conditions, you should check with your doctor before using melatonin for any purpose.

Diving on the first day of your destination is probably not a good idea after a long trip. Take some time to rest, have a light meal and drink plenty of fluids. To be well rested for your diving the next day, you may take a lower dose of melatonin (0.3mg to 1mg) at bedtime. Generally, it is advised not to engage in activities that require alertness, such as diving or driving for four to five hours after taking melatonin. This means, if you arrive at your destination late at night and take melatonin after midnight, you should probably abstain from the first morning dive.

Dr. Karin Vela is Diving Medicine physician EDTC/ECHM IIa and is working in Dubai London Specialty Hospital.

PLANNING A DIVE TRIP? DO YOU KNOW WHAT TO DO IN AN EMERGENCY?

FEATURE **WILLIAM SUDELL – CADUCEUS MEDICAL**

SCENARIO 1

The calypso had 14 divers on board, that day one of the divers became unconscious after ascending back to the vessel. No one knew CPR or trained in first aid… Are you? Does the boat you hired have an emergency plan and designated medical kit and first aider?

SCENARIO 2

While snorkeling, your son stands on a poisonous barb from a marine animal. Do you know the correct first aid steps and do you have an appropriately equipped first aid kit?

There are many other examples that occur everyday around the world. In most cases, we usually do not know what to do if an emergency arises or who to call. What if there is no one to call? Do you have the equipment and the basic training to take action?

PLANNING & PREPARING FOR A TRIP

Being able to anticipate for an emergency will ensure you can act quickly when something unexpected occurs. Using an Emergency Action Plan as a guide for diving is a good way to start.

Emergency action plans provide guidelines for individuals about what information you need to gather for a trip. See the example plan on the right. Remember, not all of the information is available but at least you know that before you need it and can plan appropriately. Don't assume your operator has one, or your divemaster or any other individual – take action and make sure you are ready! And guess what? You might very well save someone's life or your own in the process.

FIRST AID KITS & FIRST AID TRAINING

Knowing first aid is vital during an emergency, make sure you are current in first aid skills and if there is a group, check with others to see who else is currently trained in first aid.

Make sure you have a personal first aid kit with you irrespective of what is available. This allows you to personalize items that may be more suitable for you e.g. latex-free gloves (if allergic), blister plasters (not always available), lip balm (personal) & a CPR airway (personal). If there is a first aid kit on the boat or in the location, make sure it is fully stocked, available and current. Contents vary from country to country, so make sure you are aware of the contents. If there is oxygen available, is it full and is there someone trained to use it. Don't be afraid to ask the divemaster about this, you are not questioning anything but your own personal safety after all!

REMEMBER…

Emergency planning is not being paranoid and expecting everything to go wrong, but planning to make an emergency when it happens however chaotic, will enable you to better manage the situation.

Remember the 7 P's: Proper Planning, Preparation and Practice, Prevents Poor Performance!

EAP: this is a simple step. Copy the template and fill it out at home. Add the info required and place it in your "visible or easy accessed" first aid kit. If you are planning to go camping, then, print a new one and add the information (e.g. ambulance regional number, nearest hospital, hyperbaric chamber, phone numbers, etc.)

Today, with so many apps, I am pretty sure there is one that meets your criteria and is easy to use.

CADUCEUS MEDICAL
OWNER – WILLIAM SUDELL
Tel: +9714 554 7056
Email: training@dubaifirstaid.com

Contact **www.dubaifirstaid.com** for all your first aid training & first aid kit requirements.

CADUCEUS medical

GEOGRAPHICAL INFORMATION		
Dive Location Name		
GPS Location		

CONTACT INFORMATION		
Dive Operator Name		
Boat Name		
Contact of Divemaster		
Dive Operator Base Contacts	Office	Mobile
Divemaster	Mobile	

EMERGENCY CONTACT INFORMATION		
Emergency Services Contact Number	Mobile	Other
Marine Radio Frequency Information		
Other		
Other		

MEDICAL INFORMATION		
First Aid Kit Onboard & Current		
Oxygen Capability		
AED Location or Nearest AED		
Emergency Transport from Port		
Nearest Medical Facility	Name	Contact
Nearest Hospital	Name	Contact
How to get to Facility from Port		
Dive Doctor Contact Details	Name	Contact
Hyperbaric Chamber Contacts (if available)	Name	Contact

Emergency Planning can ensure your dive is pleasurable and enjoyable as it should be!

UPCOMING EVENTS

DIGITAL ONLINE 2016 OPENING FOR SUBMISSIONS

3 January 2016 - 28 April 2016 | Email: photo@emiratesdiving.com

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DIVE MIDDLE EAST EXHIBITON (DMEX)

1-5 March 2016 | Dubai International Marine Club Mina Seyahi

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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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DMEX
DIVE MIDDLE EAST EXHIBITION

IN ASSOCIATION WITH
EDA
جمعية الإمارات للغوص
Emirates Diving Association

1,318KM
of diving coastline in the UAE

154,000
certified divers in the GCC

$5M+
annual retail value of diving equipment and accessories in the GCC

1~5 March 2016
Dubai International Marine Club
Mina Seyahi

Contact us today
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Call +971 4308 6275 or email:
sharon.kelly@dwtc.com

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