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DIVERS FOR THE ENVIRONMENT

WWW.EMIRATESDIVING.COM | MAGAZINE | DECEMBER 2018 | VOLUME 14 | ISSUE 4

IMMERSIONE ITALIANA

SPECTACULAR DIVES IN ITALY

SEA OF LIFE WITH VOX CINEMAS • **WASTESHARK** • 2018 IS THE INTERNATIONAL YEAR OF THE REEF
REEF CHECK NEWS • CLEANUP ARABIA 2018 • **UNDERWATER ULTRASOUND** • DAN EUROPE

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EMIRATES DIVING ASSOCIATION
PHOTOGRAPHY AND FILM COMPETITION

DIGITAL ONLINE

EDA'S UNDERWATER PHOTOGRAPHY AND FILM COMPETITION

COMPETITION OPENS:
Sunday, 6th January 2019

SUBMISSION ENTRIES CLOSE:
Sunday, 28th April 2019 @ 11:59 PM (GST)

AWARDS & EXHIBITION NIGHT:
22nd May 2019 @ American University in Dubai

* Digital Online's 2019 Rules & Guidelines can be found on page 87.

WHAT CAPTURES YOUR IMAGINATION?

EDA
جمعية الإمارات للغوص
Emirates Diving Association

REGULARS

NEWS

KIDS CORNER

REEF CHECK

FEATURES

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's. The magazine is 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 released in March 2019. Send all articles, feedback or comments to: magazine@emiratesdiving.com

COVER

PHOTO BY SIMONE CAPRODOSSI
An Italian Tourist in Italian Waters

REDUCE REUSE RECYCLE

UW PHOTOGRAPHY

DIVING DESTINATIONS

HEALTH

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

EDITOR & DESIGNER

ALLY LANDES
Ally is EDA's Project Manager, Graphic Designer, Writer, Editor, Photographer & Videographer. She created and introduced 'Divers for the Environment' back in December 2004 as an educational tool to share information by professionals, conservationists, scientists and enthusiasts from all over the world, to better care for and protect our underwater world.

COVER STORY AUTHOR & PHOTOGRAPHER

SIMONE CAPRODOSSI
Simone is an award winning Italian underwater and travel photographer. He lived in Dubai for 12 years and has been a main feature contributor to the EDA Magazine and is one of EDA's Digital Online competition judges. Simone now resides in Australia where he owns and manages the Sundive dive centre in Byron Bay.
www.sundive.com.au

THE QUARTERLY CONTRIBUTORS

Meet the regular quarterly magazine contributors who share their passions, interests and the expertise of their fields for our readers. Want to contribute?
Email: **magazine@emiratesdiving.com**

JESPER KJØLLER
Professionally involved in the diving industry since he started diving in the early nineties, Jesper ran a successful Scandinavian divers magazine for many years. His articles and photos have appeared in books, magazines and websites all over the world. Today he lives in Dubai, involved in marketing but finds time to teach diving to Global Underwater Explorers.

LEVENTE ROZSAHEGYI
Levente started his photography in 2001, which led to experimenting with underwater disposable cameras and eventually introduced him to DSLRs and housings. Levente has travelled various parts of the world since 2005 and takes photos both under and above water, sharing his experiences and highlighting environmental issues. His underwater photography has won him several international competitions.
Instagram: levente.photography

FERNANDO REIS
Conservationist, environmentalist, shark expert, specialised in shark diver training and in shark advocation. Fernando Reis is the Founder and Executive Director of the Sharks Educational Institute which he set up in 2016.
www.sharksinstitute.org

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

عام زايد

YEAR OF ZAYED

SPIRIT OF THE UNION 2018

IBRAHIM AL-ZU'BI
EDA Executive Director

As we celebrate the 47th UAE National Day, we reflect on the spirit that ties us all together, the Spirit of the Union that enables millions of people to coexist 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.

I look back at all our events this year, from the rise in EDA's volunteers to all my discussions with the members and divers that I sometimes randomly meet while diving in the UAE and outside of the UAE, and reading the articles in this issue, the first thing comes to my mind is that divers are making a difference all over the world. In this last issue of, 'Divers for the Environment' for 2018, we have very interesting articles for you. You can read the Reef Check updates where divers make use of their underwater adventures and help protect the underwater world. You will also read about lots of initiatives from the diving community and see the results of this year's Cleanup Arabia campaign.

Cleanup Arabia 2018 was another great success this year; we had a fantastic turnout of participants helping to clean our beaches and our dive sites. I would like to thank our Cleanup Arabia sponsors for their generous support, our partners in UNEP, the UAE Ministry of Climate Change & Environment and Dibba Municipality for their support, and most importantly, our EDA members for their dedication and passion to conserve our environment. I have no doubt that all divers want to protect and conserve the marine life, in simple words, we want to enjoy our dives and be responsible at the same time; without healthy corals or fish, dives would be boring!

Making a difference goes beyond protecting the environment, although as you will read in this issue, divers have been busy everywhere organising cleanups and awareness campaigns. I am very happy to see more activities for different stakeholders of the community.

We are officially announcing the DMEX – Dive Middle East Exhibition's new name; which is the DIVE MENA EXPO. The show will be on from the 26th of February, until the 2nd of March 2019 at the Dubai Canal, Jumeirah, co-located with the Dubai International Boat Show. I am very excited to meet all of you there to be a part of our new and improved annual Dive Show.

We are also launching the Digital Online Underwater Photography and Film Competition's 2019 rules and guidelines in this issue. Enjoy this time to capture your new images and film footage and we'll announce the sponsors and prizes in the March magazine issue next year.

I would like to wish everyone a happy 47th UAE National Day. I also want to wish you all a Merry Christmas and a Happy New Year. I am looking forward to 2019, 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 if for succeeding generations."
The late Sheikh Zayed Bin Sultan Al Nahyan

Happy reading and safe Diving!

Ibrahim Al-Zu'bi

Ibrahim N. Al-Zu'bi

AN EDA MOVIE NIGHT WITH VOX CINEMAS

SEA OF LIFE

SYNOPSIS

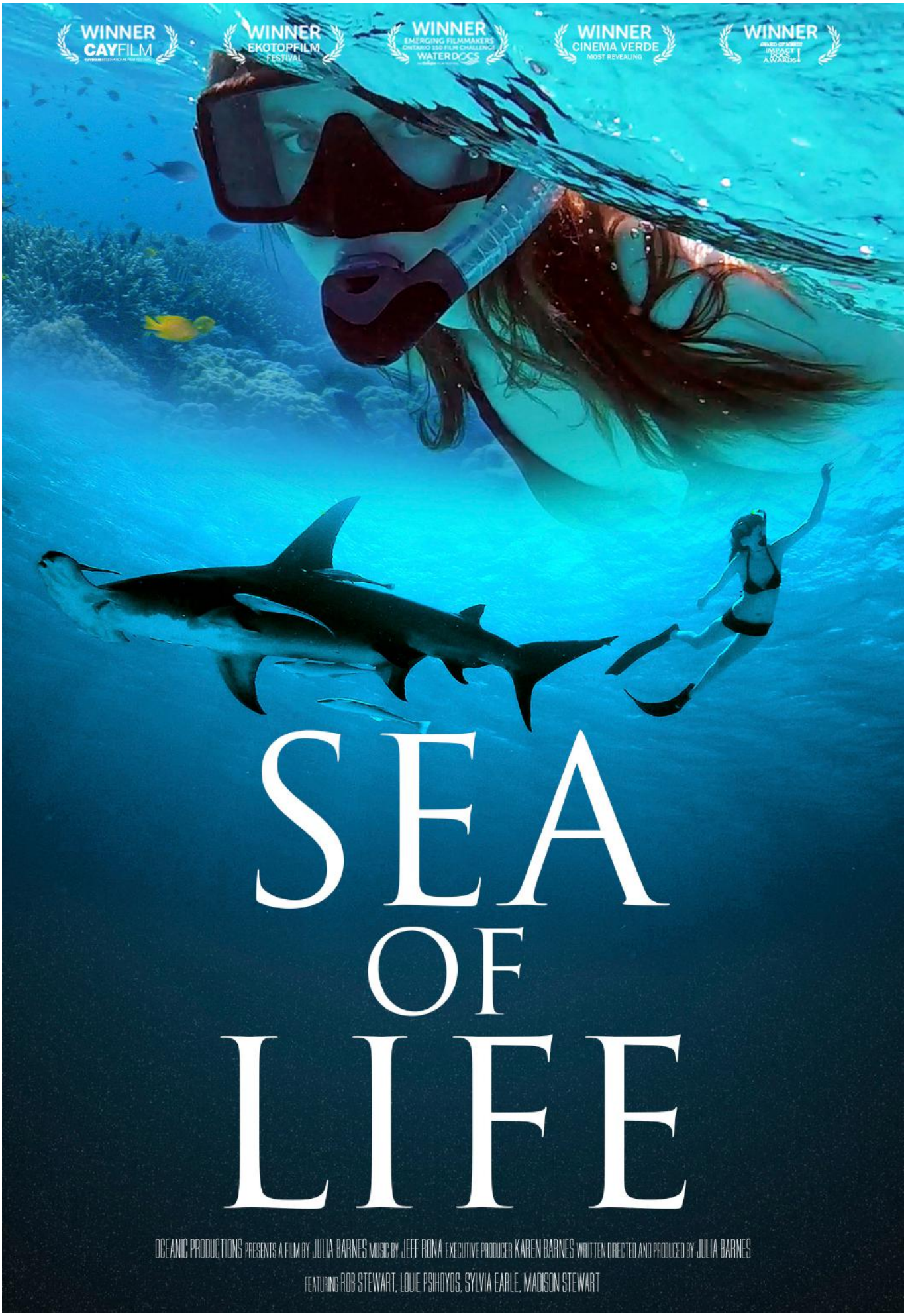
With access to renowned environmental experts and breathtaking underwater cinematography, award-winning filmmaker Julia Barnes takes audiences on a provocative journey, through the most stunning and threatened ecosystems on the planet and the rallying movement to save them, leaving audiences around the world inspired to fight for our oceans and our future.

Believing that people will change the world once they know what's happening, Julia picks up a camera and sets out on a mission to expose the reality of the world's oceans in this full length feature documentary. Through compelling footage she sheds light on crucial environmental issues, revealing not only how the oceans are in jeopardy but how each of us has the power to turn things around.

Sea of Life is a film about changing the world. It's about rising up in the face of catastrophe and having the courage to fight for what you love.

JULIA BARNES

Julia Barnes is the award-winning filmmaker behind Sea of Life. For as long as she can remember Julia has been passionate about the natural world, but it wasn't until she was 16 that she realised the world she loved was in jeopardy. After watching Rob Stewart's documentary Revolution and learning that the world's coral reefs, rain forests and fisheries are expected to be gone by the middle of the century she was compelled to take action to protect the world she loved from human destruction. Film was the most powerful weapon she could imagine so at the age of 16, with no film experience, she picked up a video camera and set out to make a documentary to raise awareness about the biggest threats facing the planet and inspire audiences to turn things around. Sea of Life is a call to action for today's youth, presenting the challenges we face as an opportunity for young people to rise up and become the heroes the world needs.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EMERGING FILMMAKERS
ONTARIO 150 FILM CHALLENGE
WATERDOCS
WINNER
CINEMA VERDE
MOST REVEALING
WINNER
SEA
OF
LIFE
OCEANIC PRODUCTIONS PRESENTS A FILM BY JULIA BARNES MUSIC BY JEFF RONA EXECUTIVE PRODUCER KAREN BARNES WRITTEN DIRECTED AND PRODUCED BY JULIA BARNES
FEATURING ROB STEWART, LOUIE PSIHOYOS, SYLVIA EARLE, MADISON STEWART

BCG CELEBRATES SPIRIT OF TOGETHERNESS AT ITS SECOND ANNUAL COMMUNITY SERVICE DAY

The Boston Consulting Group Middle East collaborated with associations, businesses and NGOs to drive impact in the local community, in-line with BCG's Social Impact Mission and core corporate values.

In line with its commitment to drive corporate social responsibility, The Boston Consulting Group (BCG) held its second Community Service Day on October 4, 2018. The event organised by the Emirates Diving Association, in collaboration with the Umm Al Quwain Municipality was a successful drive to clean-up one of Umm Al Quwain's public beaches and compare results from last year's same clean-up.

Joerg Hildebrandt, Senior Partner & Managing Director at BCG Middle East said, "Dedication to social impact is one of the core values. Our team has collaborated with local organisations to contribute to some of the leading philanthropic initiatives. The Community Service Day reflects our responsibility towards the communities in which we operate. Our 2018 Community Service Day was a great success and we are grateful to our staff, as well as our valued partners."

Each of the partner NGO projects supported during the Community Service Day delivered unique impact. For example, Uber EATS & Uber Drivers worked with BCG to offer personal and social development through group and one-on-one sessions. The Emirates Diving Association pledged to collect rubbish from the beach to help protect and restore the UAE's marine environment, while BCG prepared gift packs for ship crews together with The Mission to Seafarers and visited them at designated ports.

BCG also partnered with the Manzil Center for People with Disabilities, Abdulla Al Ghurair Foundation for Education, Stray Dogs Centre and SNIFF, Al Jalila Hospital, Thukher Social Club and Various Local Startups.

CORPORATE BEACH CLEAN-UP: The Boston Consulting Group	October 4th 2018 Umm Al Quwain Camping Beach	
TRASH TYPE	**ITEMS COLLECTED**	**TOTAL**
MOST LIKELY TO FIND ITEMS	Cigarette Butts	376
	Food Wrappers	51
	Plastic Takeout Containers	14
	Foam Takeout Containers	111
	Plastic Bottle Caps	165
	Metal bottle Caps	67
	Plastic Lids	56
	Straws/Stirrers	118
	Forks/Knives/Spoons	12
	Plastic Beverage Bottles	63
	Glass Beverage Bottles	266
	Beverage Cans	11
	Plastic Grocery Bags	8
	Other Plastic Bags	43
	Paper Bags	9
	Paper Cups and Plates	8
	Plastic Cups and Plates	15
	Foam Cups and Plates	8
FISHING GEAR	Buoys/Pots/Traps	1
	Nets	22
	Line	8
	Rope	12
OTHER TRASH	Cigar Tips	19
	Cigarette Lighters	11
	Construction Materials	16
	Fireworks	2
	Tyres	3
PACKAGING MATERIALS	6-Pack Holders	10
	Other Plastic/Foam Packaging	8
	Strapping Bands	4
	Tobacco Packaging/Wrapper	10
PERSONAL HYGIENE	Diapers	6
TINY TRASH (< 2.5 cm)	Foam Pieces	10
	Glass Pieces	5
	Plastic Pieces	2
DEAD/INJURED ANIMAL	Crab (dead)	2
	Bird (dead)	1
	Fish (dead)	4
EXTRA	Shoe	1
	Knife	1
	Animal Bones	2
	Clothing Items	4
	Pillow	2
	Carpet	4
	Barbeque Grill	1
TOTAL ITEMS COLLECTED		1572
TOTAL BAGS COLLECTED		14
TOTAL WEIGHT COLLECTED (KGS)		349

WASTESHARK

TO COLLECT PLASTIC AND OTHER DEBRIS AROUND DUBAI MARINA

Dubai Marina Yacht Club is the first marina in the United Arab Emirates to partner with Ecocoast to operate WasteShark.

UAE-based marine and coastal protection specialist, Ecocoast, announced that they have partnered with Dubai Marine Yacht Club, a leisure attraction of Emaar Hospitality Group, to collect plastic and other debris to minimise marine pollution in the marina.

WasteShark is one of the world's most technologically advanced waste management solutions. It collects plastic, oil, algae and other debris in various marine environments. It can be deployed 24/7 and can collect up to 350 kilogramme (or 180 litres) of waste, leaving a zero carbon footprint. WasteShark is designed to operate inside the Internet of Things. A number of sensors can be added to continuously gather data and monitor changes in the marine environment, to measure water quality, air quality and turbidity just to name a few.

Dubai Marine Yacht Club, the largest marina in the Middle East, has an impressive history of environmental initiatives. It is a member of the Marina Industries Association (MIA) and accredited as a Level 3 'Clean Marina' by the International Clean Marina Programme.

"This pioneering collaboration is an important step in further demonstrating our commitment to environmental best practice," says Ahmed Mohamed Abdelhalim, General Manager of Dubai Marina Yacht Club. "As the first marina in the UAE to install the innovative WasteShark technology, we are raising the bar in undertaking initiatives that will promote environmental sustainability and encourage the people to be more judicious about the use of plastic in marine environments."

Ecocoast partnered with Ran Marine Technology to bring this patented waste management solution to the Middle East. "Ecocoast's mission is to provide pioneering solutions that protect and support our marine environment," says Lachlan Jackson, Managing Director at Ecocoast. "Our work the The Ocean Cleanup tackles the issue of ridding the world's oceans of plastic. With our latest pollution management solution, the WasteShark, we tackle the problem at the source. We are excited to work with Dubai Marina Yacht Club and support their commitment to a clean marine environment," adds Jackson.

ENVIRONMENT AGENCY - ABU DHABI AND TOTAL

TO STUDY IMPACT OF CLIMATE CHANGE ON ABU DHABI'S SEAGRASS AND DUGONG POPULATIONS

EAD and Total to Study Impact of Climate Change on Abu Dhabi's Seagrass and Dugong Populations.

ABU DHABI, NOVEMBER 14, 2018: The Environment Agency – Abu Dhabi (EAD), the authority mandated to protect and conserve biodiversity in the Emirate of Abu Dhabi, has finalised a research agreement with Total, the French energy producer and provider, to collaborate on a study that explores the impact of climate change on Abu Dhabi's seagrass communities and dugong populations. The announcement was made on the sidelines of the Abu Dhabi International Petroleum Exhibition and Conference (ADIPEC) which took place between 12-15 November 2018.

The programme aims to explore the relationship between dugongs and their marine environment, before evaluating the impacts of climate change on the seagrass communities of Abu Dhabi. The study will place a special emphasis on the dugongs in order to develop appropriate adaptive management strategies for species conservation.

Commenting on the agreement, Dr. Shaikha Salem Al Dhaheri, Executive Director of the Environment Agency – Abu Dhabi's Terrestrial and Marine Biodiversity Sector said, "We are proud to partner with Total on this important initiative.This study is crucial towards enhancing our understanding of Abu Dhabi's extensive seagrass meadows, which support the world's second largest dugong population, as well as over four thousand green sea turtles."

She added, "The International Union for Conservation of Nature (IUCN) has listed Abu Dhabi's dugong population as 'vulnerable' for the last sixteen years. This programme would help the Agency take focused action on mitigating the impacts of climate change on our local dugong and other seagrass communities and protect this vital marine ecosystem."

Mr. Hatem Nuseibeh, President Total E&P United Arab Emirates & Total Country Chair in the UAE said, "Total in the UAE's long-term partnership with the Environment Agency - Abu Dhabi (EAD) is part of our ongoing strategy with the Total Foundation to act in a sustainable and responsible manner. We are proud to be in partnership with organisations that support actions committed to finding solutions to the challenges of climate change in the UAE".

The seagrass meadows of the Arabian Gulf provide critical support to regionally and internationally significant populations of dugongs, as well as many other marine species. They also play an important role in climate change mitigation through their ability to sequester carbon.

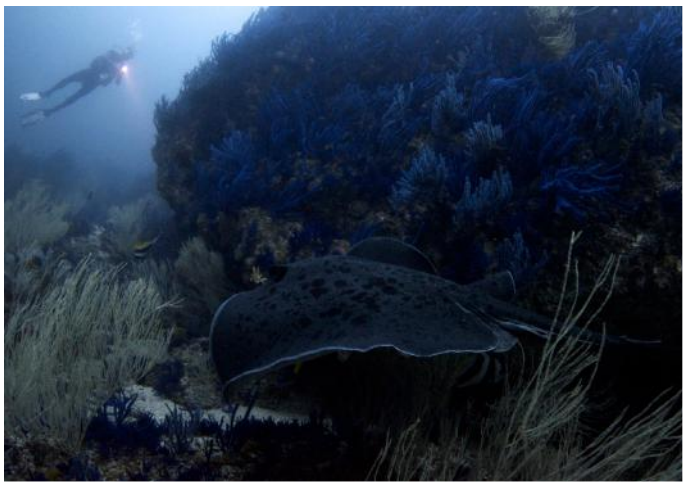
In the Gulf region, seagrasses are exposed to large seasonal variations in water temperatures and salinity – meaning that they are probably already living at the edge of their tolerance. The impacts of climate change are expected to put the seagrasses of Abu Dhabi under even more stress, which will, in turn, have a real impact on the dugongs that rely on seagrass for food.

EAD and Total share a long-standing commitment to environmental conservation and protection. Total was the key sponsor of EAD's Dugong Conservation programme from 1999 to 2018.

Dr. Shaikha Al Dhaheri and Mr. Hatem Nuseibeh during the signing ceremony.

AL MARSA TRAVEL MUSANDAM

BY **AL MARSA TRAVEL & TOURISM – MUSANDAM**





Al Marsa Travel Musandam is a 5 star diving and cruising specialist which offers all sorts of retreats in Dibba Musandam Oman. From short half-day excursions to six-day liveaboard dive trips, they explore Oman's dramatic northern Hajjar mountain range, Ru'us al Jibal, and its rocky coastline divided by fjords.

From breathtaking scenery to discovering spectacular underwater sea life: from night-time fishing to exploring remote villages; sail along Oman's dramatic coastline in a dhow with Al Marsa Travel Musandam.

Just 120 km away from Dubai, this majestic retreat is ideal for short half-day excursions, longer full day trips and can extend to liveaboard stays on vessels fully equipped (including satellite communication) for cruising with its air conditioned cabins, large open sun decks and freshly prepared meals by the onboard cooks. Enjoy the ride with activities that range from the more leisurely to extraneous – including all the facilities for diving, snorkelling, fishing, kayaking, and swimming. Explore the exotic marine species and dive into the wonders of the sea guided by a professionally trained and EFR/PADI Certified crew member who will mentor you through beginner classes to open water diving courses and grant you a certification upon completion.

Perhaps more than this, is the almost indescribable beauty of nature itself, with its clear starlit nights, panoramic ocean seascapes, hidden coastal villages with their interesting history and traditions in dhow building and fishing. Our dhows are top of the range and will cruise you up into these hidden bays, which are for the most part, inaccessible by land.

At Al Marsa, we have a dedicated, permanent team who are all passionate about diving! Our Instructors, Divemasters and maintenance crew are all highly skilled and qualified and have an excellent command of English. The team have worked with Al Marsa for many years and bring a wealth of diving knowledge and experience that covers all the Musandam area.

THE AL MARSA LIVEABOARD TRIPS

Let us take your experience to the next level with our exquisite traditional dhow to Khor Qabel and Ras Musandam, where you will be captivated by the majestic beauty of the sea and the picturesque mountain backdrop. Prepare yourself to experience the thrill of swimming with multitudes of colourful fish, Mola Mola, and Whale Sharks. To then be served a delightful buffet feast, snacks and refreshing beverages after a day of fun-filled activities.

Al Marsa Travel offers 2 night liveaboard trips every Thursday evening to Saturday late afternoon with 6 dives up to Red Island. A 6 and 7 night safari every Sunday from midnight to Saturday or Sunday morning with 18 to 21 dives up to Ras Musandam Oman.

FOR MORE INFORMATION CONTACT:
UAE: (M) +971 50 212 4100
OMAN: (M) +968 9936 3732, (T) +968 2683 6550
www.almarsamusandam.com

YEAR OF ZAYED

ENDANGERED TURTLES MIGRATE TO OMAN

Abu Dhabi, October 8, 2018: The recent tagging and release of endangered green turtles in Abu Dhabi has revealed previously unknown information about their nesting habitats, marking yet another conservation success in the Year of Zayed.

In April 2018, as part of The Year of Zayed, HE Razan Khalifa Al Mubarak, Secretary General of the Environment Agency – Abu Dhabi (EAD), led the capturing, satellite tagging and releasing of endangered Green turtles off Bu Tinah Island, an internationally recognised sanctuary for turtles in the Indian Ocean. Two of the turtles were aptly named Wisdom and Respect, representing the values celebrated during this Year of Zayed.

The ongoing research initiative, spearheaded by Emirates Nature-WWF in collaboration with EAD, aims to advance knowledge on the turtles' behaviour at sea and identify areas in need of protection in the UAE and the wider region to conserve these endangered migratory species of global importance. The high quality data received to date from the tags on this particular occasion, confirms that the turtles departed Bu Tinah Island roughly four to six weeks after their release. Wisdom and Respect followed the coastline towards the Straits of Hormuz and reached Oman a few weeks later, despite Respect starting her journey 30 days after Wisdom. Both turtles now rest in Ras Al Hadd in Oman with a large number of other green turtles, potentially getting ready to depose between 4 to 5 clutches of eggs as part of the nesting season. Interestingly, both migrations took about 30 days and the journey covered a distance of around 1,100 km at a sustained speed of around 36 km per day, or around 1.5 km/h.

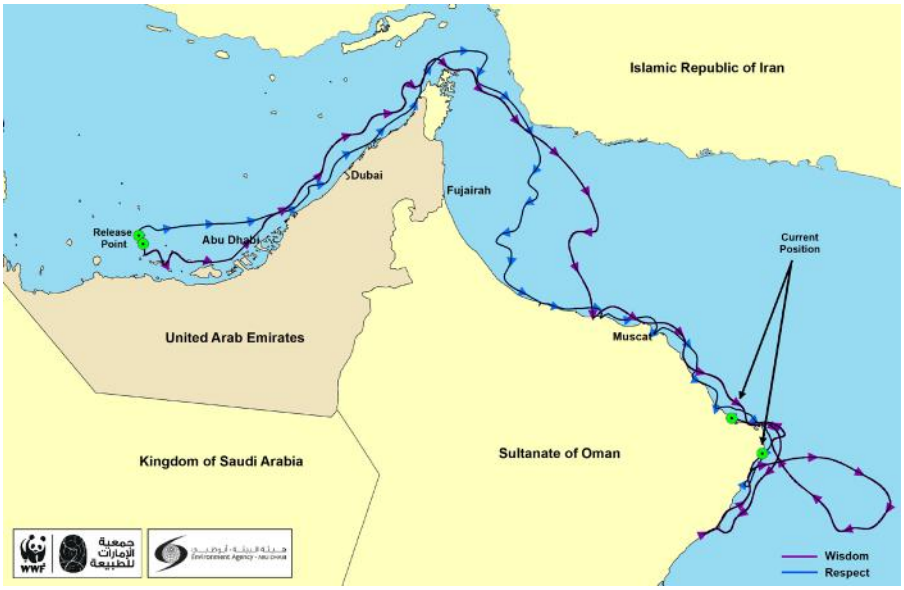
HE Razan Khalifa Al Mubarak, Secretary General of EAD said, "This finding is yet another conservation success that we can celebrate in the Year of Zayed. It is also a first to science in the region for Green turtles and tells us that in order to protect turtles, we need to work at the regional level to protect their foraging habitats, nesting sites and migratory routes. We will share these findings with neighbouring countries and continue to protect these key elements of sea turtle survival across their range."

"It is also symbolic that this finding occurred during The Year of Zayed. The late Sheikh Zayed bin Sultan Al Nahyan, Founding Father of the UAE, was considered one of the world's greatest conservationists. The marine environment, in particular, held an emotional value to him. He considered it a treasured part of our heritage, our present and our future. Under his leadership, some of the most impactful wildlife release programmes in the world became a reality. Since its establishment, EAD has worked to preserve Sheikh Zayed's environmental legacy and we will continue to do so," she added.

Of the seven species of marine turtles in the world, two occur in Abu Dhabi's waters: the critically endangered Hawksbill turtle and the endangered Green turtle. These two species extensively use Abu Dhabi's waters for foraging i.e. food and one species, the hawksbill, nests on the sandy beaches of several offshore islands. Turtles and their habitats are key indicators of the health of the environment, but at the regional level, the number of foraging habitats and nesting grounds are continually declining due to an increase in urbanisation and industrialisation.

The tagging and release took place on Bu Tinah Island, which is also home to coral reefs, dugongs, natural mangroves, dolphins, ospreys and Socotra cormorants. Located in Abu Dhabi's Al Dhafra region, the island lies within the Marawah Marine Biosphere Reserve, the region's largest and first UNESCO-designated marine biosphere reserve and one of the 19 protected areas under the Sheikh Zayed Protected Areas Network. The Island received international fame in 2011, thanks to the diversity of wildlife that exists on it and the ability of these different organisms to survive under extreme temperatures and salinity, but also after it managed to be a finalist in a global competition entitled, 'New 7 Wonders of Nature.'

For more information, please visit **www.ead.ae**.



ILLEGAL FISHING PRACTICES RESPONSIBLE FOR 20 DEAD DUGONGS IN ABU DHABI

NUMBER OF DUGONG DEATHS IN THE EMIRATE SEE YEAR-ON-YEAR INCREASE

Abu Dhabi, UAE – 26 November, 2018: Six dugongs have recently been found washed ashore on Abu Dhabi's coastline from Al Silaa to Ghantoot, in what is now considered to be a significant die-off of one of Abu Dhabi's most vulnerable species. The dugong carcasses were discovered by the Environment Agency - Abu Dhabi (EAD) rangers who regularly patrol Abu Dhabi waters. This incident brings the total number of dead dugongs found to 20 since the beginning of the year, in comparison to 15 during the same period in 2017.

The results of the investigation and necropsy indicate that the most probable cause of death was drowning via entanglement in un-manned and abandoned drift nets – an illegal fishing practice. This irresponsible act causes dugongs to be caught and ensnared in the lengthy netting.

Abu Dhabi is home to the world's second largest population of dugongs, with around 3,000 found in the Marawah Marine Biosphere Reserve. Dugongs, along with their foraging habitats and their migratory routes in the UAE, have been protected under Federal Law No. 23 and No. 24 since 1999. As a signatory to the United Nations Convention on the Conservation of Migratory Species, the UAE has an international commitment to protect local dugong species. This represents an important pillar of the legacy of the nation's founding father, the late Sheikh Zayed Bin Sultan Al Nahyan, to preserve the environment and support regional and global efforts towards the conservation of dugongs.

Dr. Shaikha Salem Al Dhaheri, Executive Director of Terrestrial and Marine Biodiversity at EAD, said, "The Agency will continue to prioritise the protection of dugong habitats and ensure that enforcement of the laws continues to be applied strictly, in partnership with the Critical Infrastructure & Coastal Protection Authority (CICPA). We strongly urge all fishermen to cast their nets mindfully, prudently and responsibly and fish in a sustainable manner – in line with our local and federal laws."

The Agency has regularly reiterated the issue of illegal fishing practices with the local fishing community, applying pressure on them to discontinue them and to report the locations of any abandoned fishing nets. EAD, with the support of CICPA, has also ramped up its random inspections to mitigate the detrimental impacts of illegal fishing practices. All violators found applying illegal fishing practices will be stiffly penalised. First-time offenders may receive fines of up to AED 50,000 and/or an imprisonment term of not less than three months, while second-time offenders may receive fines of up to AED 100,000 and/or an imprisonment term of not less than one year. In 2018, EAD has imposed over 40 fines for illegal fishing practices following violations found during inspections.

In collaboration with TOTAL and TOTAL ABK, EAD has been studying and monitoring the local dugong population since 1999. These studies, which include satellite-tagging the dugongs to analyse their migration patterns, have given EAD a better understanding of dugong behaviour and the threats to their population. Since the beginning of the programme, EAD has investigated 165 dugong mortalities. The most common cause of death by far, has been suffocation from entanglement in abandoned fishing nets. Other causes of death have included habitat loss, marine pollution and collisions with speeding boats. Most of the deaths were reported during the winter season, which coincides with an increase in the level of fishing activity.

INTERESTING FACTS ABOUT DUGONGS

- Dugongs are the only marine mammals which are herbivore.
- The Arabian Gulf and Red Sea host around 7,000 dugongs.
- Dugongs have been traditionally persecuted by humans for their meat and oil.
- Dugongs are often referred to as "sea cows" because they feed almost exclusively on seagrass. They can eat up to 30 kgs of seagrass daily and can weigh anywhere from 230 - 500 kgs.




TOP ROW: 1. Warren Baverstock, Director of Aquarium Operations greeting with special guests. **2.** Special guests inaugurating the first release.
BOTTOM ROW: 1. Guests are able to see the turtles up close before the release and discuss their rehabilitation ailments with the DTRP team. **2.** Hope, the Green turtle who weighs in at 120 kg and has spent the past 2 years recovering from serious injuries to her carapace, is finally back in her environment and ready to make her journey back to sea.

DUBAI TOURISM EXTENDS ITS SUPPORT TO LOCAL TURTLE REHABILITATION PROJECT

FEATURE **DUBAI'S DEPARTMENT OF TOURISM & COMMERCE MARKETING (DUBAI TOURISM)**
PHOTOGRAPHY **ALLY LANDES**

Dubai Sustainable Tourism commends the 0 Jumeirah Group's conservation efforts with the release of 50 rehabilitated sea turtles into the Arabian Gulf at Jumeirah Al Naseem.

Dubai's Department of Tourism & Commerce Marketing (Dubai Tourism) has joined hands with the Jumeirah Group in support of their conservation efforts across the emirate. In an event that took place on the beach in front of Jumeirah Al Naseem on Thursday, the 15th of November, Jumeirah conservationists, with the support of Dubai Tourism, released 50 rehabilitated turtles back into the sea. Dubai Sustainable Tourism (DST), an ongoing initiative by Dubai Tourism to promote a more environmentally-friendly, greener future, supported the event as part of the ongoing Dubai Turtle Rehabilitation Programme.

Under the programme, more than 50 critically endangered loggerhead, green and hawksbill turtles found injured on beaches around the UAE were nurtured back to health in Dubai. This included VIP turtle, 'Hope', who weighed over 120 kg. 'Hope' is a young green turtle that arrived with serious injuries to her carapace (shell) and over the last two years the team of dedicated marine biologists at the Burj Al Arab Aquarium have worked to return her to her natural habitat. Rehabilitating more than 1,600 turtles to date, the Dubai Turtle Rehabilitation Project (DTRP) looks after turtles handed in by animal enthusiasts after they are found washed up on the beach, often injured with some facing minimal chances of survival.

Speaking at the turtle release day on Thursday, Ahmad AlFalasi, Chief Executive Officer, Corporate Services and Investment, Dubai Tourism said, "Working in line with the vision of His Highness Sheikh Mohammed bin Rashid Al Maktoum, Vice President and Prime Minister of the UAE and Ruler of Dubai, to transform Dubai into a sustainable environmental destination, the Dubai Sustainable Tourism initiative is a key driver for ensuring the continual development of the sector, enabling hotels and hospitality establishments to take stock and evaluate their processes. An essential aspect of ensuring the realisation of our sustainable tourism strategy is the strength of Dubai's public-private sector partnerships which have paved the way for successful initiatives, the Dubai Turtle Rehabilitation Project is an example of how Jumeirah Group's ongoing efforts are feeding into this vision."

Introduced to improve the sustainability of the tourism sector, DST contributes to the broader clean energy and sustainable development targets that Dubai has set out to achieve – also extending its support to conserving the emirate's wildlife. This includes the ongoing partnership with Emirates Nature-WWF, the leading non-profit organisation established to

TOP ROW: 1. The DTRP team proudly helping their amputee patients closer to the water's edge. **2.** Hope's unveil with Safa Community School students gasping at her size. **BOTTOM ROW: 1.** The paparazzi hotel guests are out cheering all the turtles on as they make their way to the water before they swim away home. **2.** Students and guests helping the DTRP team to release some of the smaller turtles out of their boxes.

conserve the nation's natural heritage.

Working closely with Dubai Tourism to ensure the environmental conservation of wildlife destinations across Dubai, Emirates Nature-WWF strives to help safeguard habitats, providing different species with environments they can rely on and thrive in. The organisation collects data about the lives, threats and needs of vulnerable species from the coast to mountains, and creates a central database to assist Dubai Tourism in creating Protected Area Networks. Yousuf Lootah, Executive Director – Tourism Development & Investments, Dubai Tourism said, "Dubai Tourism is playing an instrumental role in shaping the way forward for sustainable tourism. We are pleased to support Jumeirah Group's 'Dubai Turtle Rehabilitation Project' to foster more environmentally friendly practices within Dubai's tourism sector, reflecting Dubai's role in protecting its wildlife and their homes. DST's success depends on its strong partnership with the sector's stakeholders, as we come together to address the cause and effects that compromise the health of ecosystems and focus our energies on conservation efforts aimed at saving and restoring imperilled wildlife populations."

The Dubai Turtle Rehabilitation Project (DTRP) is based at Burj Al Arab Jumeirah and Madinat Jumeirah and is run in collaboration with Dubai's Wildlife Protection Office, with essential veterinary support provided by the Dubai Falcon Clinic and the Central Veterinary Research Laboratory. The project has been running in its current form since 2004 and in 2011 alone, over 350 sick or injured sea turtles were treated by the DTRP after being washed up on the region's beaches.

Peter Stubbs, Jumeirah Group Director of Health, Safety & Environment said, "As we continue with our commitment to the turtle project, we would like to thank members of the Dubai and UAE community for their continued support and also thank our hotel guests, who show such heartfelt interest in the great collaborative work that is done to support the project and the turtles of the gulf region."

The DTRP is currently the only project of its kind in the Middle East and Red Sea region. Founded by Warren Baverstock, Director of Aquarium Operations at the Burj Al Arab, in collaboration with Dubai's Wildlife Protection Office, the DTRP's aim is to help boost the number of turtles in the wild and research their movements by tagging them with satellite tracking devices.

Warren Baverstock, said, "Since starting this project back in 2004 I have watched how these events have provided such memorable experiences to our guests and the community of Dubai. As a committed group of marine conservationists, my team and I never tire of saving these incredible animals and feel honoured to be able to make a real difference in this region. Today's release consists of turtles both young and old, with some surviving against very extreme odds which could not have been possible without the dedication and support from all that work on the Dubai Turtle Rehabilitation Project. We are a truly unique conservation project within the Middle East and considered as one of the largest sea turtle projects in the world. Today is an incredibly special event and I hope that all of the turtles we have released go on to lead long lives."

Extending its support to leading industry stakeholders as they help safeguard wildlife and habitats, Dubai Tourism continues to carry out its sustainability initiative in collaboration with the following partners: Etihad ESCO, Dubai Carbon, Emirates Environmental Group, Emirates Wildlife Society – WWF and Emirates Green Building Council, as well as the Dubai Supreme Council of Energy, DEWA and Dubai Municipality as strategic partners.

2018 IS THE INTERNATIONAL YEAR OF THE REEF

BY **KIRSTY RICHARDS** AND **CLAIRE RUMSEY**





TOP ROW: Beautiful pieces of artwork by middle school students. **BOTTOM ROW: 1.** Coral Guardians have planted 26,000 healthy corals and seen fish numbers increase five fold. **2.** IYOR 2018 on the road, presenting the work done this year. **3.** Guam have produced their own range of IYOR 'swag' including t-shirts, hats, and reusable shopping bags.

To date, over 100 events have taken place around the world in support of IYOR and many countries including the Commonwealth of the Northern Mariana Islands, Guam, Japan, Germany, Seychelles, Philippines, the UK and Trinidad & Tobago have declared their support with official launches and awareness raising events. Individuals, schools, charities and businesses are also getting involved by organising beach cleans, reef photography exhibits and educational community outreach days. School children have put their passion for reefs on paper and designed stamps and beautiful pieces of artwork inspired by the International Year of the Reef.

This year ICRI teamed up with the Khaled bin Sultan Living Oceans Foundation for their annual Science Without Borders® Challenge. Their theme for IYOR was 'Why Coral Reefs Matter', which saw over 600 entries from 38 different countries!

The British Government challenged children aged 4-17 to design official stamps for the British Indian Ocean Territory (BIOT). Once again, hundreds of entries were received from around the world on the theme, 'Why are Coral Reefs and Oceans Important?'. Four winners were selected, one from each of the four age categories.

Speaking of stamps, Australia Post decided to celebrate IYOR by releasing five new 'Reef Safari' themed stamps for August's Stamp Collecting month in an aim to remind Australians about the amazing marine environment biodiversity of the Great Barrier Reef.

The Reef World Foundation celebrates IYOR 2018 by implementing the Green Fins IYOR 2018 Campaign. The campaign aims to make sustainable diving practices the social norm by promoting pragmatic solutions to key local threats identified through years of work with the dive industry; and encouraging other stakeholders, such as equipment manufacturers, to take action to reduce the pressures on coral reefs. Their latest infographic, #DoNotFeedTheFish, explains how human interaction with wild animals can be detrimental to their survival by creating unnatural behaviours. This follows on from #AlternativestoAnchoring which encourages and educates dive companies (and all boat owners) on ways to be more environmentally aware and have zero-impact boat trips, and #RedefineTheDive campaign focusing on underwater behaviour and how to be the most environmentally aware diver, and

School children between the ages of 4-17 were challenged by the British Government to put their passion for reefs on paper and design these beautiful stamps inspired by the International Year of the Reef. Hundreds of entries were received from around the world on the theme, 'Why are Coral Reefs and Oceans Important?'. These official stamps for the British Indian Ocean Territory (BIOT) are by the four winners selected from each age category.

enjoy zero impact dives. They have reached thousands across social media and through their Green Fins-certified dive centres.

Guam, a US territory in the Western Pacific, officially launched IYOR back in February and formed 'Guam Year of the Reef'. They have since been busy involving the local community in outreach events, educating the tourism sector in coral conservation and have also produced their own range of IYOR 'swag' including t-shirts, hats, and reusable shopping bags. The Commonwealth of the Northern Mariana Islands (CNMI) also signed a proclamation declaring 2018 the International Year of the Reef, aiming to bring about greater awareness of the value of coral reefs.

Our partners at The Ocean Agency recently supported Coral Guardian in their mission to educate former dynamite fishermen on coral reef restoration. It was such a success that these former fishermen have established a locally managed 1,550-acre MPA, in which they have planted 26,000 healthy corals and seen fish numbers increase five fold! This is the second in a series of #OceanOptimism stories coming from The Ocean Agency, following an IYOR expedition in the Coral Triangle, discovering how marine scientists are using underwater scooters, 360˚ cameras and artificial intelligence to survey miles of coral reefs and identify corals on thousands of images.

We have been lucky to have a number of incredibly talented and creative people come out in support of the Year. Some have combined science, art and music to create 'Tangerine Reef', a visual tone poem consisting of a time-lapse and slow pans across surreal aquascapes of naturally fluorescent coral, and cameos by alien-like reef creatures. Evanescent is a 2x4 metre multi-media sculpture, inspired by the plight of coral reefs by Paola Idrontino. Hundreds of people attended the opening of the immersive photojournalistic exhibition at UNESCO Headquarters in June.

We took IYOR 2018 on the road and travelled to the 14th Conference of the Parties (CoP) and the Convention on Biological Diversity (CBD) in Sharm El Sheikh where we had a space to engage people in IYOR, and a chance to present to a room full of people about what has been done in the name of IYOR this year.

Although the International Year of the Reef 2018 is coming to an end, the work being done will not end there. We are teaming up with 'Kids Care About Climate Change', where children aged 5-14 have been asked to draw a picture under the title of, 'What do Penguins and Coral Reefs have in Common?'. The end result will be all of the submissions and the IYOR logo printed on fabric and stitched into a giant flag which will be flown in Antarctica in 2019.

We will also be turning our attention to creating the end of year report. This report will be documenting all of the amazing work done by all of the IYOR participants and supporters. So, if you have done something to celebrate and haven't yet let us know, make sure you do so quickly.

WANT TO GET INVOLVED?

The IYOR website (**www.iyor2018.org**) is the central hub of all activities and events taking place around the world in support of IYOR. Here you'll find a wide variety of freely-available resources for use at your IYOR event including our logos, infographics and beautiful imagery from The Ocean Agency.

IYOR 2018
INTERNATIONAL YEAR OF THE REEF

IYOR'S SOCIAL MEDIA LINKS:
Twitter: @iyor2018 #iyor2018
Facebook: www.facebook.com/iyor18
Instagram: www.instagram.com/iyor2018

DEMA 2018
WHAT HAPPENS IN VEGAS…

FEATURE AND PHOTOGRAPHY **JESPER KJØLLER**

DEMA (Diving Equipment and Marketing Association) is the global organisation for the scuba diving industry. Each year, DEMA invites international dive professionals to attend the world's largest trade show in the scuba industry. We were in Las Vegas for DEMA 2018 to report on the four-day event.

The DEMA shows have for a long time been alternating between Las Vegas and Orlando every other year. The American dive industry is mainly concentrated in Florida and California, so the rotating pattern is an attempt to satisfy both the east and the west coast businesses.

I do not know who first got the idea to put a diving conference in a landlocked desert state like Nevada. Las Vegas is known for many things, but great diving opportunities are not one of them. However, Las Vegas is a very popular destination for business travellers, especially Americans, so the Vegas versions of the DEMA show are usually quite a bit larger than the Orlando editions. But most international DEMA patrons prefer DEMA in Orlando, as it is easy and convenient to sneak away for some ocean or cave diving before or after the conference.

The Las Vegas Convention Center is one of the largest convention centres in the world. With more than 180,000 m^2 of exhibition space, it hosts an estimated 200,000 participants every year.

With around 600 exhibitors and 9,000 visitors, DEMA can be a somewhat chaotic and overwhelming experience, but you soon notice that the layout of the show follows a predictable pattern from year to year. The different categories are grouped into villages. Education, destinations, imagery and tech each have their own sections and the large equipment manufacturers have their booths dotted around the hall. A DEMA veteran can easily navigate to key areas without looking at the map or consulting the DEMA app. Of course, there are minor adjustments from year to year as different businesses come and go, but coming back to DEMA is basically one big déjà vu. The DEMA show always involves a lot of walking – one of the days I clocked 10 km on the pace count on my iPhone.

WHAT'S NEW?

When walking around the show floor and running into friends and acquaintances in the business, the usual question is: have you seen anything new? What's the latest trend? It is always hard to answer, as DEMA is no longer the most important launching platform for new products or services in the diving industry. In the old days, before the Internet disrupted the marketing world, the equipment manufactures used the annual shows to unveil new collections and the new yearly catalogues, but today new ideas are continuously launched when they happen to be ready, not just once a year. But DEMA is still a very valuable venue for general networking, business-to-business meetings, signing up new customers and important FaceTiming with industry partners. The training organisations use the opportunity to conduct instructor updates and member forums. And no matter what your interests are, you will find plenty of interesting seminars, talks and presentations.

DIGITAL EVOLUTION

One of the most important developments are not a tangible physical product. It is an inevitable transition from printed manuals to digital teaching materials. Even if the evolution has been going on for some time, 2018 seems to be the golden year of the certifying organisation's digitalization of both their teaching materials and internal ecosystems.

It is a long, tedious and expensive process to move the entire training curriculum to online platforms, especially since the global organisations are operating in multiple languages, but the two major certifying organisations, PADI and SSI, seem to have made the full transition and implemented business models that covers the loss of sales of physical manuals and products. The newcomer, RAID recently merged with the American education enterprise Kalkomy. As a company that specialises in the development of digital teaching materials for various outdoors activities, they seem like a perfect partner for RAID and that will put even more pressure on the other organisations to propel digitalization even further.

HEROES AND CELEBS

At one end of the exhibition hall, the technical diving area has a presentation stage for talks about decompression, rebreathers and other advanced diving subjects. By far the most popular tech talk during the show was Canadian diver, Erik Brown's presentation on the events in Thailand that kept the entire world holding their breaths while the international team of cave divers rescued the 12 boys and their soccer coach from the flooded cave. Erik was part of the rescue team and gave a captivating speech on the rescue efforts.

During a separate event, PADI awarded medals of Valour to other representatives of the cave rescue team. PADI wanted to acknowledge the courage, strength, honour and dignity displayed during the rescue operation. Key members of the rescue team Rick Stanton and Jason Mallinson accepted the medals on behalf of the team.

Diving is not normally an endeavour that produces heroes, but the successful rescue operation definitely provided cave diving with a new glory in the public eye.

If you don't mind being a little star struck and you like to rub shoulders or shoot selfies with scuba celebrities such as Jean-Michel Cousteau, filmmaker Howard Hall or iconic underwater photography A-listers such as Stephen Frink, Michael Aw, Amos Nachoum or Eric Hanauer, DEMA is the place to be.

BLACKWATER

For underwater photographers and videographers DEMA is a cornucopia of knowledge. The photography stage was busy with presentations on different photo and video related subjects. One of the most popular presentations was macro specialist, Mike Barticks' lecture on a relatively new discipline – blackwater photography. Normally macro photographers are rummaging around on the slopes during night dives, documenting benthic lifeforms on the reef. But in recent years, new techniques have been developed that allows photographers to capture all the weird and wonderful creatures living suspended in the water column at night.

Blackwater photography involves going out in the open ocean and suspending a line under a large float on the surface. The line has lights deployed at every five metres. The whole arrangement is deployed over deep water, where the light attracts diminutive larvae, crustaceans, isopods and polyps that look like something from outer space. It is a challenging and sometimes very frustrating endeavour to get the critters in focus, but the results speak for themselves. Google 'blackwater photography', and you will see that it is the – "new black"!

MISSION 2020

The technical divewear specialist Fourth Element already launched their Ocean Positive initiative a while ago, but the British company realised that even if they successfully manage to outsource single use plastic from their entire product line, it would only be a drop in the ocean, no pun intended. That is why Fourth Element decided to engage the entire dive industry and make all the major players pledge to implement a similar strategy and outsource single use plastic, use recycled materials for packaging and to generally adopt green strategies wherever possible.

By inviting other organisations within the dive community to join Mission 2020 and encouraging them to make their own commitments, Fourth Element hopes to make this a commitment of the global dive community to protect the very thing which we all enjoy – the ocean.

Read more and see all the pledges at:
www.mission2020.org

DEMA 2019 will be in Orlando, Florida and in 2020 DEMA is back in New Orleans for the first time since 2001.

If you happen to be in the neighbourhood, DEMA is worth a visit – it is a trade show, but you can attend even if you are not professionally involved in the diving industry.

UNIVERSITY MALAYSIA TERENGGANU UMT AND DIVEHEART MALAYSIA TRAIN SIX DISABILITY PWD STUDENTS TO BECOME PADI SCUBA DIVERS

The University of Malaysia Terengganu (UMT), and non-profit organisation Diveheart Malaysia, collaborated on a new chapter by successfully training six Disability PWD students from the University Malaya Medical Center UMMC for their open water dives in Pulau Bidong with the Diveheart Programme 2018 held from October 18-20.

The event was officiated by UMT Deputy Vice Chancellor (Research & Innovation) Dr. Mazlan Abd Ghaffar, along with Diveheart's Founder and President, Jim Elliot, and Diveheart Malaysia Ambassador, Hj Syed Abd Rahman Syed Hassan.

It all started when the Vice Chancellor of UMT, Professor Dato Dr. Noraieni Mokthar met with Hj Syed Abd Rahman and Jim Elliot in 2016 to discuss the possibility of introducing PWD divers to scuba dive in the UMT Marine Research Center Facility on Bidong Island. 2017 saw 2 in-house Instructors and 6 Divemasters from UMT take the challenge in completing their Diveheart Adaptive Buddy Training with Hj Syed Abd Rahman.

In February 2018, the Deputy Director (Clinical) UMMC, Associate Professor Nazirah Hasnan selected new rehab patients for the Diveheart Scuba Programme and contacted Hj Syed Abd Rahman. After evaluating the PWD students in a water environment, the pool training began on weekends from May to October 2018 at the Kids Scuba PADI Dive Center located at the Recreation Hub, Tropicana Kajang Heights Swimming Pool, 30 minutes from Kuala Lumpur. Diveheart volunteers assisted on regular weekend pool trainings around Kuala Lumpur.

It was a dream come true for paraplegic Nurul Fathiah Jamaluddin, 30, to participate in the PADI open water scuba diving course in the beautiful tropical clear blue waters surrounding Pulau Bidong, UMT Marine Research Center, Terengganu.

"While my movements are somewhat restricted on the ground, I am able to overcome my fears and move freely in water which was an exhilarating experience." Water provides the perfect weightless environment for those who might otherwise struggle on land. Paralysed from the waist down after an accident 15

years ago, Nurul Fathiah was one of the six students chosen with special needs (PWD) to participate in the Diveheart 2018 programme.

The programme ended with more than 35 divers from UMT and volunteers from UMMC Rehabilitation Medicine Unit helping the PWD divers undergo the PADI course under the direct supervision of Hj Syed Abd Rahman, a PADI IDC Staff Instructor at Kids Scuba with 28 years experience in scuba diving.

We would like to mention that UMT is the first Marine Research University in the Asian region to have a Diveheart Adaptive Diver Buddy Team trained by Hj Syed Abd Rahman. "This is the first of its kind in Malaysia and the Asian region. The two-tier programme saw experienced adaptive trained divers volunteer in assisting PWD divers in and out of the water to acquire the speciality water training," said Mr. Baharim Mustafa, Manager at the UMT Marine Research Center.

The Diveheart and PADI Adaptive Scuba Programme involves volunteering tourism in Malaysia from China, India, Austria, Singapore and the US to enjoy the underwater beauty of Terengganu's Tropical coral reefs. This provides knowledge for those who have an interest in scuba diving activities and who want to enjoy the beauty of the marine environment with a mission in assisting others.

"With the Diveheart and PADI Adaptive dive procedure, each PWD diver is assisted by a minimum of two or three trained adaptive divers positioned on their left and right sides to ensure they are comfortable and safe while in the water," said Hj Syed Abdul Rahman.

PWD Divers interested in taking the Diveheart training programme in Malaysia can contact:
Hj Syed Abd Rahman
Kids Scuba PADI Dive Center
Tel: +60193176705
E-mail: syed.rahman@diveheart.org

DIVEHEART
Imagine the Possibilities
www.diveheart.org

DIVERS FOR THE ENVIRONMENT

STORY BY PATRICK VAN HOESERLANDE ILLUSTRATION PETER BOSTEELS

It will come, his mother had told him. He believed her. However, he looked for it every night in the mailbox and asked her if they had not forgotten him. On the third morning he asked her if she could call them. No she explained, he had to be patient a little while longer.

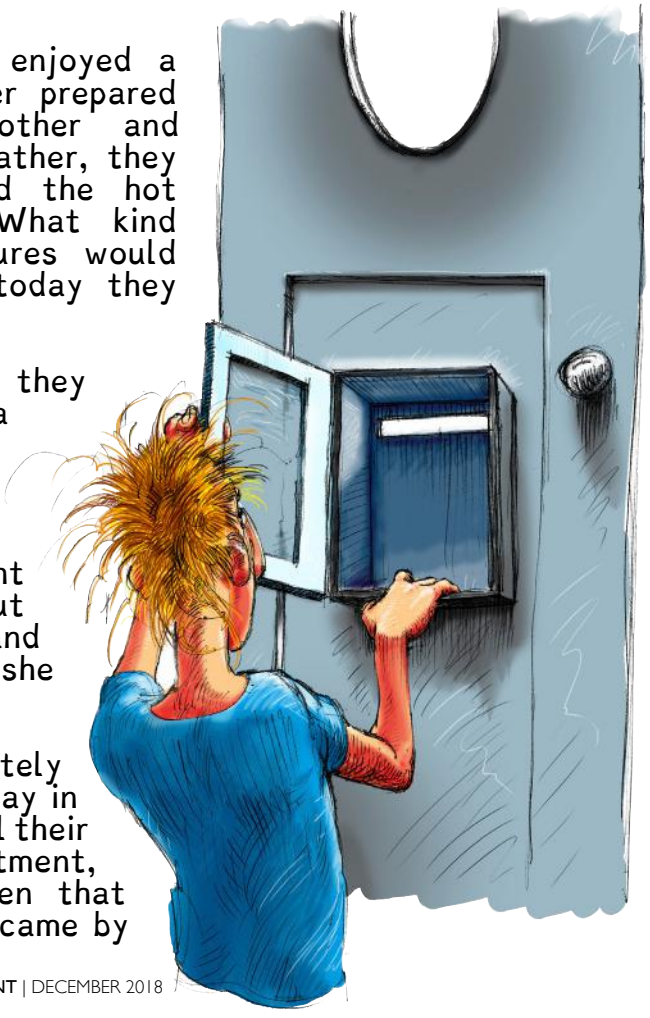
The next day he woke up a lot earlier than usual on his school day to catch the mailman to ask him if they had forgotten him. But the mailman had nothing for Skubba that morning either.

Could it be that he had to wait till after the weekend to receive it?

Skubba had planned that he and Fred would read it together. He had even promised Fred that he would not look inside it before they were together. He was allowed to look at the front and the back, but he could not browse through it.

If it was not in the mailbox, they would not be able to read it. When Fred called Skubba earlier that morning, it was still not there.

The two friends enjoyed a breakfast together prepared by Skubba's mother and with the cold weather, they really appreciated the hot chocolate too. What kind of diving adventures would they experience today they thought?



As soon as they started to make a plan for the day, Skubba's mother came back into the kitchen with a transparent package. She put it on the table and said nothing – she just smiled.

The boys immediately understood what lay in front of them. In all their previous disappointment, they had forgotten that the postman also came by on Saturdays. While they were talking at the breakfast table, Skubba's mother had gone outside to fetch the newspaper. And there it was. In front of them. On the table.

They both stared at it as if it were treasure. It was only when she asked if she had to remove the plastic, they dared to touch it.

Carefully they ripped off the cover that protected it. Letter by letter, they stripped its secrets... D.I.V.E.R.S... Nella had told them about it... F.O.R... They had already seen and browsed through one before... T.H.E... But this one was their first owned copy... E.N.V.I.R.O.N.M.E.N.T!

The magazine's front cover was a picture of a huge shark. "That's a whale shark," said Fred. Skubba thought it was a beautiful animal.

Fred found something new on every page and Skubba started to dream of incredible adventures.

They hardly dared to turn a page out of fear of losing the previous one. Sometimes they would go back to a specific page. It took up hours of their time. They were making new discoveries into a wonderful world. The texts were too difficult for Skubba to fully understand, but the pictures told him enough. Fred read all the articles and wrote down what he wanted to research more on.

And then they suddenly held their breaths. What was that? They could not believe it. The stories of... Skubba and Fred. They were in their favourite magazine.

Who was writing stories about them?

A BUDDY

STORY BY PATRICK VAN HOESERLANDE ILLUSTRATION PETER BOSTEELS

Every lesson was so much fun and interesting, but the week's wait between the two practices felt so long.

Skubba had now learned how to swim with real fins. Luckily they were able to convince Nella that it was better to put the fins on your feet rather than your hands. Big hands don't really help you to swim faster. Larger feet however do the job. Or did Nella pretend she didn't know? Fred was convinced she knew better, but Skubba was too enthusiastic about it to see through the game she played.

Skubba's snorkel clearing excercises went really well.

Nella had taught them how to clear a snorkel by telling them the story of the archerfish. This fish catches insects by shooting them with water from their mouths. They had to pretend to be archerfish and try to shoot plastic creatures at the pool's edge. First by filling the snorkel with water, and then blowing the water out. Once they passed that test they had to do it again, but this time by diving underwater with the snorkel, waiting a while to let it fill up with water and surface to shoot the creatures by blowing air through the tube. Little by little they learned to clear their snorkel as they surfaced. "Shoot the targets," Nella cried when they forgot to blow. If you do not blow it out, you could end up swallowing the water instead.

They learned to slowly snorkel with both their snorkels and fins, gracefully swimming along the water's surface with their heads facing down in the water and the snorkel position high above the surface. When snorkelling, you can spend time looking around underwater for hours. Unfortunately, the training did not last long enough to test that out.

Skubba could even dive through a hoop and pick a snorkel up from the bottom. Nella had shown them how to dive like a duck. Fred thought ducks did not dive, that they just tilted their body upside-down looking for food. Later, however, he had to admit that ducks do dive. Skubba looked more like a frog on his first attempt, but after a while he mastered the 'duck dive' pretty well.

He also kept an eye on his 'buddy'. A strange name for someone who dives with you. Apparently, you always dive in a pair. Both divers have to be in the water, together. Your buddy is a fellow diver, not somebody standing by on dry ground like Fred. Skubba liked that because that way you always had someone that knew what you had done and see the same things. You could try out and do new things together. Also, your buddy helps check your equipment before you get in the water. That makes it extra safe, because Skubba sometimes forgets things. A buddy can also help you put your equipment on. And of course, you are there to help him or her too.

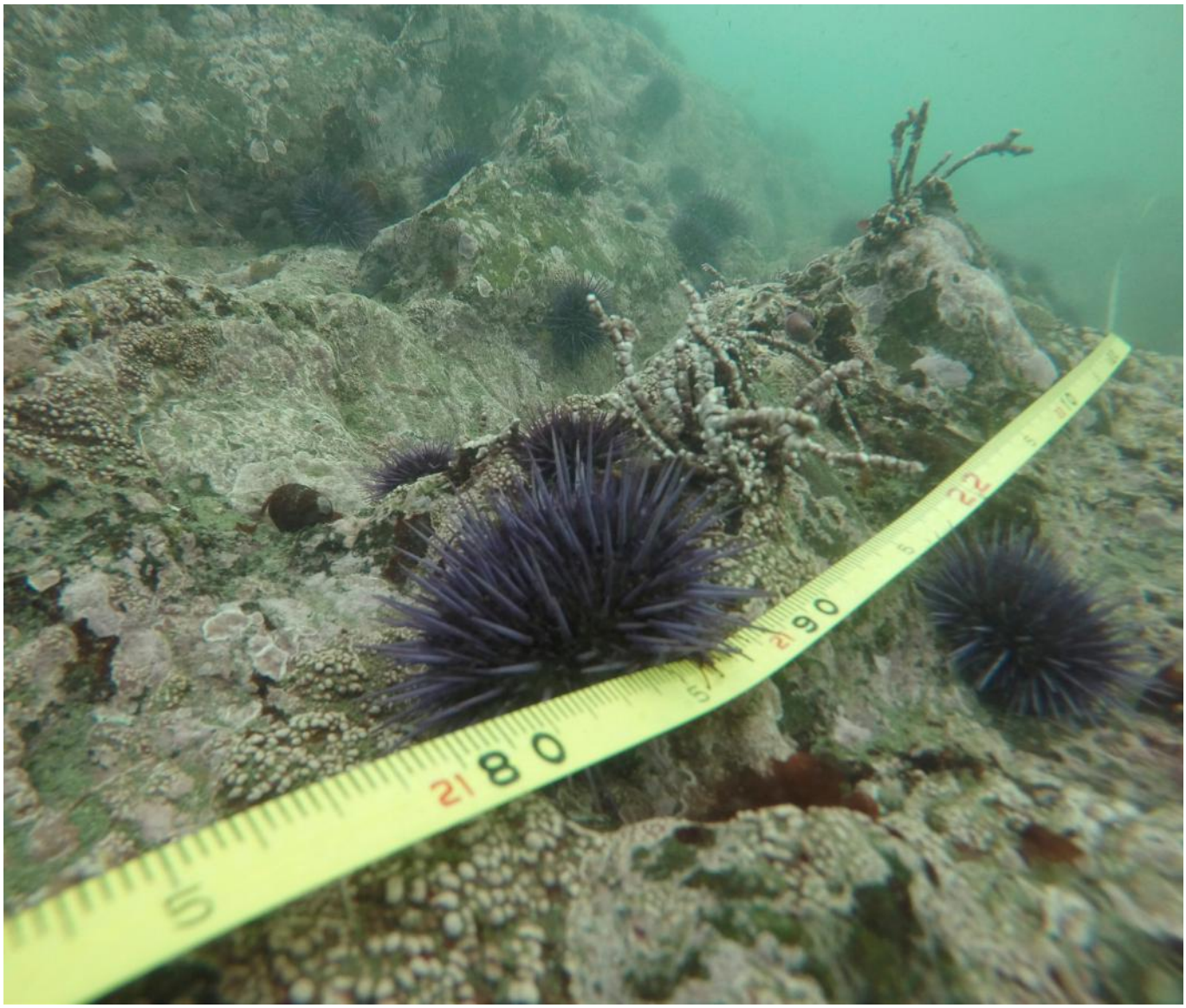
"Yes, Skubba, it is indeed more fun diving in two, and it is also safer. Your buddy can always help you if there are any problems underwater," Nella had explained.

He did not understand what Nella meant by problems underwater. Later, he got a hoop caught in his tank, so his buddy helped him get untangled. From then on he understood what Nella meant by a helping hand when encountering problems underwater. And yet, Skubba's best buddy was Fred who was always ready to help him and answer the many questions Skubba had. The only problem was, Fred did not dive.

COMMERCIAL AND RECREATIONAL URCHIN REMOVAL EFFORTS

TESTED ALONG CALIFORNIA'S NORTH COAST IN HOPES OF KELP FOREST RESTORATION

BY **REEF CHECK CALIFORNIA**



As previously reported, California's North Coast has been hit by massive changes to its rocky reef ecosystem over the last five years that consequently led to the closure of the recreational red abalone fishery last year.

Although oceanographic conditions have been more favourable along the North Coast this year and kelp is doing better in some places, we are still observing persistent urchin barrens.

Specifically, kelp densities at most of our sites are at or near zero, urchin densities continue to increase, and sunflower stars, an important urchin predator, continue to have low densities following the onset of the sea star wasting disease. Often these barrens persist for long time periods until some event such as a disease, large storm or a change in oceanic conditions leads to a die-off of the dense urchin populations.

Because of the rapid formation of urchin barrens, their pervasive presence in most North Coast sites, and the subsequent decline in abalone populations, scientists and stakeholders came together and formed the Kelp Ecosystem and Landscape Partnership for Research on Resilience (KELPRR) to take action in hopes that the kelp will have a chance to recover. KELPRR is currently enlisting the help of commercial urchin divers and recreational divers to remove purple urchins from reefs in the hope that kelp will return in the areas cleared of urchins. Commercial urchin divers have been consistently removing urchins from three targeted locations in the North Coast: Noyo Harbor, Caspar Cove, and Albion. Further, the California Department of Fish and Wildlife recently increased the limit for recreational take of purple sea urchins from 35 individuals to 20 gallons of urchins per diver per day. With this increased ability to harvest, recreational urchin removal efforts took place in Ocean Cove (early May) and Albion (mid-July).

Reef Check California's involvement in the KELPRR partnership is to monitor the sites where our partners – commercial and recreational divers – are removing urchins before and following the removals. Reef Check is not involved in the removal of urchins in the North Coast. The data we collect will assist in the evaluation of these restorative efforts and their effectiveness in changing these reefs from urchin barrens back into kelp forests. Reef Check's monitoring efforts will also identify any unintended consequences of these removals such as the appearance of invasive or unusual species should they occur in response to the urchin removals. This season, we have surveyed all five sites where commercial and recreational urchin removal efforts have been targeted, and plan to follow up with more surveys as these efforts continue.

EGYPT'S RED SEA DIVING SAFARI
COMPLETES BUSY SLATE OFTRAININGS AND SURVEYS

PHOTOS BY **STEPHAN MOLDZIO**

2018 marks the tenth year of the Reef Check monitoring programme started by Red Sea Diving Safari (RSDS) and Reef Check EcoDiver Course Director Stephan Moldzio to conduct regular surveys at the most important dive sites of RSDS. This year's two-week journey featured a full programme with two EcoDiver courses, two EcoDiver Trainer courses and five full surveys. Nine new Reef Check EcoDivers and three new EcoDiver Trainers were successfully certified.

As a pioneer of sustainable tourism in Egypt, RSDS has implemented an extensive environmental policy for many years, promoting eco-friendly practices, supporting various initiatives, educating their guests, and recently installing a photovoltaic plant to switch to renewable energies.

We started at Marsa Shagra, the northern-most and largest village of RSDS. The reef is well known for having around 300 fish species and a high abundance of large fish. There are also famous residents often found on night dives, including the big brown marbled grouper (*Epinepelus fuscoguttatus*), the Fatima red snapper (*Lutjanus bohar*) and the large north-reef giant moray (*Gymnothorax javanicus*). We also visited, "Shaab Shagra," a world famous dive spot known as "Elphinstone Reef" rising from more than 100m depth.

REEF CHECK ECODIVER COURSE AND FIRST SURVEY AT MARSA EGLA

The three-day course went through the theory combined with practical exercises and training dives. On the last day, we had a beach exercise to practice the Reef Check method on land, as a rehearsal before the real survey.

The next day, we went for our first survey at Marsa Egla. Similarly to dives in 2010 and 2012, we recorded no big fish, only two medium sized groupers within both depth contours. Instead, we found even more lost fishing lines.

NEXT STOP: MARSA NAKARI

After the first survey, we moved south to Marsa Nakari to conduct two more surveys at the house reef. Marsa Nakari is a peaceful and quiet village with fantastic offshore reefs at its doorstep. We surveyed both sides of the house reef for the fifth time. At Marsa Nakari North, we found 7.5 times more groupers and 9.5 times more snappers than in Marsa Egla and this "snapshot result" echoes the findings of previous surveys in past years.

FINAL STOP: WADI LAHAMI

For the last survey, we moved down to Wadi Lahami, the southernmost village of RSDS. Wadi Lahami is located south of Wadi El Gemal National Park, directly beneath a large mangrove area that is home for many seabirds, such as osprey, herons, terns, and sea gulls. We dived some of the most beautiful offshore reefs of southern Egypt.

Shaab Angel consists of impressive formations of massive, Porites black corals. The visibility is around 40m or even more, an indication for moderate biological productivity and accordingly we observed few fish.

The reefs Daisy and Shabrour, which are located in zone 1 of Wadi Lahami's dive sites, are true jewels! Here, the visibility is somewhat lower compared with those offshore sites, but high plankton availability also induces an incredible richness of fish and coral! Huge swarms of anthias, fusiliers, silversides, and on the other side, large hunting schools of jacks, barracudas, and snappers.

REEF CHECK ECO DIVER COURSE WITH THE RED SEA RANGERS

We met and worked with the Red Sea Rangers, whose daily work is to enforce marine protected areas in Egypt. Everyone had a different background, ranging from marine biologist, geologist, office workers to an engineer for mooring systems. The Rangers utilise various monitoring methods in the course of their regular work. Now, their goal was to become certified Reef Check EcoDivers.

An accelerated two-day course went quickly through the species ID and theory and put the focus on learning and correctly applying the method.

Finally, a fantastic two-week journey through all three villages of RSDS was ending. Thanks again to all the people involved. For anyone interested in joining the Reef Check activities next year, stay tuned for course dates and schedules – they will be published soon on **www.redsea-divingsafari.com** and **www.marinebiologyworkshops.com**, as well as their Facebook pages.

The EcoDiver course is suitable for all levels of diver with reasonable buoyancy, and the surveys are open to participants of the course or those who are already certified EcoDivers.

For more information contact Red Sea Diving Safari, Marine Biology Workshops, or one of the RSDS partner travel agencies in your country.

REEF CHECK PARTNERS WITH STREAM2SEA TO PROMOTE ECOCONSCIOUS SUNSCREEN PRODUCTS

Reef Check has partnered with Stream2Sea to raise awareness and education about the importance of personal care products that are safe for both people and the environment.

Stream2Sea offers the only mineral based sunscreen that has been tested and proven safe for freshwater fish, saltwater fish, coral larvae, and people. Their ecoconscious, biodegradable line includes suncreen, lip balm, shampoo, conditioner, body lotion and sun & sting gel that avoid any ingredient with known or suspected toxicity to our environment. They are members of 1% for the Planet, and they believe in Reef Check's mission!

Thanks to our new partnership, Reef Check will receive a portion of Stream2Sea sales that are tagged with the code 'reefcheck'.

Go to **www.stream2sea.com**, and use the code, **'reefcheck'** to get a 10% discount on your order – you will be raising money for Reef Check, too!

THE ROYAL MARINE CONSERVATION SOCIETY OF JORDAN CERTIFIES FIRST FEMALE ECODIVERS

BY **MOHAMMED KOTB**

The Royal Marine Conservation Society of Jordan (JREDS) hosted a Reef Check EcoDiver Training in Aqaba on 1-5 July. The training of local divers is part of JREDS' marine environmental programme to raise awareness about coral reefs and to build up a team of qualified divers for further reef monitoring activities off the Jordanian Red Sea coast. The fourteen trainees came from different professional backgrounds, including the Royal Jordan Naval Force, instructors and divemasters from local dive centres and the Aqaba Diving Association, and most notably, three women divers. Now Jordan has its first certified female EcoDivers.

The training was funded by the German government through the GIZ project, "The Sustainable Use of Ecosystem Services in Jordan". This training was designed and supervised by Prof. Mohammad M. Kotb, Reef Check Course Director and Coordinator for Egypt and Jordan, and operated by Mr. Mohammad Al-Tawaha, JREDS Marine Programme Manager.

Thanks to the great organisation and logistics provided by JREDS, the support provided by the Aqaba Marine Park – managed by the Aqaba Special Economic Zone Authority – and to all of the participants for their high motivation in learning and practicing in the classroom and underwater.

THE BLUEMOON ADVENTURE OFFERS NEW DIVING ADVENTURE

TAILORED FOR WOMEN

PHOTOS BY **CATHADVENTURE**

Catherine Edsell FRGS, expedition leader, Reef Check EcoDiver Trainer, PADI Divemaster and yoga teacher from Cathadventure has teamed up with Ida Vincent, fellow expedition leader, Marine Biologist and PADI Divemaster to bring women a new sub-aqua adventure on the reefs of Mangili, Southwest Madagascar, during 1-10 March, 2019.

Coral reef conservation has always been a huge passion for both women. While surveying the reefs of the Maldives last summer, they had an idea. Catherine already leads all-women adventures in the Namibian wilderness tracking desert elephants, so they thought, why not extend the model to the underwater realm?

The Bluemoon Adventure will be an all-female team, contributing to existing monitoring efforts around the globe, while enjoying the sisterhood of like-minded women. The name 'Bluemoon' refers to a species of parrotfish endemic to the region, but it also conjures up the idea of the cyclical connection with the moon and the tides. Catherine and Ida acknowledge the need for a balance between work and play, relaxation and conservation, activity and calm, so they will offer this balance on their expedition. Early morning yoga on the beach will be followed by classroom study of coral reef ecology and the Reef Check EcoDiver training course, and then followed by dives twice a day.

FOR MORE INFORMATION, GO TO:
www.cathadventure.com/the-bluemoon-adventure

FEATURE CREATURE
BULL SHARK (*CARCHARHINUS LEUCAS*)

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

RED LIST CATEGORY & CRITERIA:
NEAR THREATENED
SCIENTIFIC NAME: *Carcharhinus leucas* (Müller & Henle, 1839)
COMMON NAME: Bull Shark

SYNONYM(S)
Carcharhinus nicaraguensis (Gill, 1877)
Carcharhinus azureus (Gilbert and Starks, 1904)
Carcharhinus vanrooyeni (Smith, 1958)
Carcharhinus zambezensis (Peters, 1852)
Carcharias leucas (Müller & Henle, 1839)
Carcharias azureus (Gilbert and Starks, 1904)
Carcharias spenceri (Ogilby, 1910)
Carcharias zambezensis (Peters, 1852)
Eulamia nicaraguensis (Gill, 1877)
Galeolamna bogimba (Whitley, 1943)
Galeolamna greyi mckaili (Whitley, 1945)
Galeolamna leucas (Müller & Henle, 1839)
Galeolamna mckaili (Whitley, 1945)
Prionodon platyodon (Poey, 1860)
Squalus obtusus (Poey, 1861)
Squalus platyodon (Poey, 1860)

TAXONOMIC SOURCE(S): Müller, J. and Henle, F.G.J. 1839. Systematische Beschreibung der Plagiostomen. Plagiostomen, Berlin.

JUSTIFICATION
This assessment is based on the information published in the 2005 sharks status survey (Fowler et al. 2005).

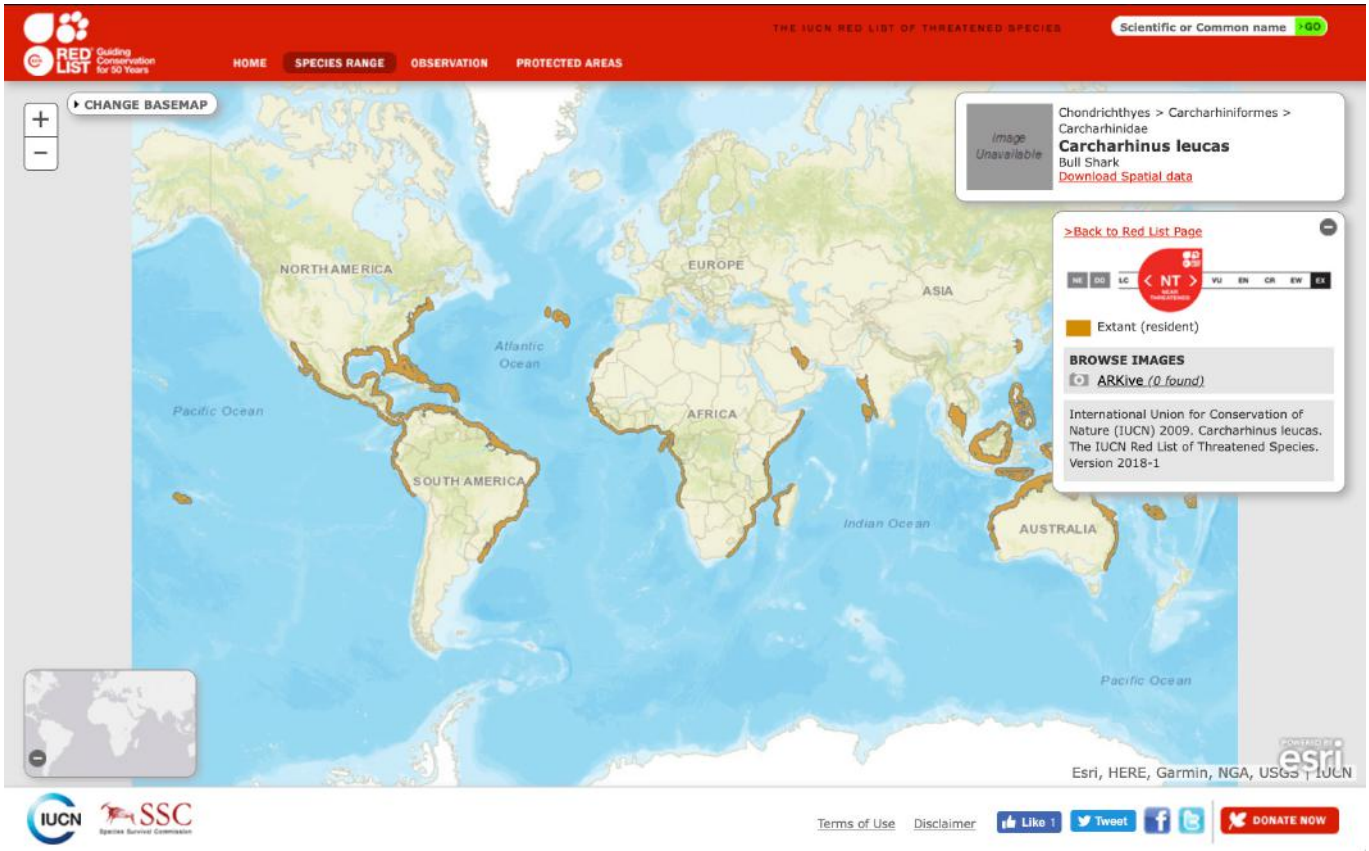
The Bull Shark (*Carcharhinus leucas*) is a common tropical and subtropical species that occurs in marine, estuarine and freshwater. It is the only species of shark that can exist for long periods in freshwater and penetrates long distances up large rivers. It is caught in fisheries throughout its range, but it is rarely a target species. Its occurrence in estuarine and freshwater areas makes it more vulnerable to human impacts and habitat modification.

Previously Published Red List Assessments:
2000 – Lower Risk/near threatened (LR/nt)

RANGE DESCRIPTION
The Bull Shark has a worldwide distribution in tropical and warm temperate areas, with seasonal appearances in cool, temperate waters (Garrick 1982, Compagno 1984, Last and Stevens 1994).This has resulted in multiple descriptions and numerous common names for the species (including Zambezi Shark, Swan River Shark and Lake Nicaragua Shark) from throughout its range (see Compagno (1984) for a full list of synonyms).

Primarily the Bull Shark is an inhabitant of continental shelf waters to a depth of about 150 m (but mostly less than 30 m), but it commonly moves into estuarine and fresh waters. It has been documented as travelling large distances up rivers (Thorson 1972), including the Amazon, Gambia, Ganges, Mississippi, San Juan (and Lake Nicaragua), Tigris and Zambezi. It also has been observed to tolerate hypersaline conditions up to 53 parts per thousand (ppt) (sea water is approximately 35 ppt). Although mostly a continental species, there are insular records from the Philippines and the South Pacific islands of New Caledonia, Fiji and Rangiroa (Compagno et al. 1989).

COUNTRIES OCCURRENCE: NATIVE:
Australia (Queensland); Bangladesh; Bolivia, Plurinational States of; Botswana; Brazil; Colombia; Costa Rica; Ecuador; Fiji; Gambia; Guinea; Guyana; India; Iran, Islamic Republic of; Iraq; Malawi; Mexico; Mozambique; Nepal; New Caledonia; Nicaragua; Peru; Philippines;



Senegal; South Africa; Tanzania, United Republic of; United States (Arkansas, Florida, Illinois, Iowa, Kentucky, Louisiana, Minnesota, Mississippi, Missouri, Tennessee, Wisconsin); Venezuela, Bolivarian Republic of; Zimbabwe.

FAO MARINE FISHING AREAS: NATIVE:
Atlantic – eastern central; Atlantic – western central; Atlantic – northwest; Atlantic – southwest; Indian Ocean – western; Indian Ocean – eastern; Pacific – western central; Pacific – eastern central; Pacific – southwest; Pacific – southeast.

Lower Depth Limit (metres): 150
Current Population Trend: Unknown
Population Severely Fragmented: No

HABITAT AND ECOLOGY

The Bull Shark is one of the few shark species that can tolerate long periods of time in freshwater, often penetrating long distances up freshwater rivers that connect to the ocean. For example, Thorson (1971) reported the movement of Bull Sharks from the ocean through the Rio San Juan system and into Lake Nicaragua, a large freshwater lake. *C. leucas* move into estuarine or fresh waters to give birth to their young (Springer 1963), while neonates and young juveniles appear to use these habitats as nursery areas (Snelson et al. 1984).

Bull Sharks grow up to about 340 cm in total length. The young are born at between 56-81 cm. Males mature at 157-226 cm and females at 180-230 cm (Compagno 1984b).

The diet of this species is relatively diverse, including turtles, birds, dolphins, terrestrial mammals, crustaceans, echinoderms, teleost fishes and elasmobranchs (Last and Stevens 1994). However, the most diverse diet is restricted to larger individuals that are capable of consuming larger prey. The most commonly eaten prey items are teleost fishes and elasmobranchs. In the coastal lagoons of Florida, Snelson and Williams (1981) recorded a wide array of species in the diet including jacks, snook, tarpon, mullets, catfish, croaker, stingrays and sandbar sharks, but noted that saltwater catfish and stingrays (*Dasyatis spp.*) were most commonly eaten.

Reproduction is by placental viviparity. Litter sizes range from 1-13 (Compagno 1984b), with most between 6-8 (Pattillo et al. 1997). The gestation period is 10-11 months, with birth normally occurring in late spring and summer (Clark and von Schmidt 1965, Bass et al. 1973, Branstetter 1981). In warmer areas (e.g., Nicaragua) breeding (and hence parturition) may occur year-round (Castro 1983). The length of the reproductive cycle has not been published, but is probably biennial (Compagno in prep. b).

Thorson and Lacy (1982) and Branstetter and Stiles (1987) have provided age and growth data for this species. Thorson and Lacy (1982) used tag recapture information to estimate the growth rates of Bull Sharks in Lake Nicaragua. They estimated that the growth rates in the first two years of life were 18 and 16 cm per year, respectively. Growth subsequently slowed to 11-12 cm per year and finally to 9-10 cm per year. They estimated that females would live up to 16 years and males to 12 years.

Branstetter and Stiles (1987) used vertebral ageing techniques to estimate growth parameters for animals from the northern Gulf of Mexico. They estimated the von Bertalanffy parameters to be L=285 cm, k=0.076 year-1 and t = -3.0 years. The oldest estimated male was 21.3 years and the oldest female 24.2 years. Their estimates of growth for early years were similar to those of Thorson and Lacy (1982), but growth in later years was thought to be much slower (4-5 cm per year), accounting for the larger maximum ages. Ages at maturity based on Branstetter and Stiles (1987) data are 14-15 years for males and 18+ years for females.

A number of migratory habits have been documented for this shark. Pregnant females migrate to estuarine areas to give birth. The juveniles remain in these areas until temperatures drop below optimum levels and then migrate to warmer offshore waters. A general migration along the United States east coast is also observed, with movement northwards during the summer as water temperatures rise and southwards again as temperatures cool in the north (Castro 1983).

Smith et al. (1998) have reported the results of demographic analysis for *C. leucas*. The technique that these authors used estimated the rebound potential (r2M, similar to the intrinsic rate of increase) from litter size, age at maturity, maximum age and natural mortality. They estimated natural mortality to be 0.166 year-1 based on a maximum age of 27 years. The estimated the rebound potential was 0.027-0.039 year-1.

Systems: Freshwater; Marine

USE AND TRADE

Commonly caught in both commercial and recreational fisheries. However, in most situations, Bull Sharks are not normally a fishery target species but are caught as bycatch or as part of a multi-species fishery. While the species has been exploited commercially for its skin, liver oil and flesh, currently its fins are the major product driving demand for this and many other species.

MAJOR THREATS

The frequent use of estuarine and freshwater areas by the Bull Shark makes it more susceptible to deleterious human impacts than species of sharks occurring in other coastal or offshore areas. Bull sharks more frequently encounter humans while in waters of low salinity, and are thereby subjected to increased fishing pressure and environmental changes associated with habitat modification.

Bull Sharks are commonly caught in both commercial and recreational fisheries. Thorson (1982a) reported that a commercial fishery existed for *C. leucas* in Lake Nicaragua and the Rio San Juan river system in Central America. However, in most situations, Bull Sharks are not normally a fishery target species but are caught as bycatch or as part of a multi-species fishery. For example, in the US Atlantic region they are an important component of inshore ecosystems, but only comprise 1-6% of the large coastal shark catch for this area (Branstetter and Burgess 1997).

While the Bull Shark has been exploited commercially for its skin, liver oil and flesh, currently its fins are the major product driving demand for this and many other species. There are limited data on recreational catches of this species. The best data come from the Gulf of Mexico where Casey and Hoey (1985) reported that in 1978 *C. leucas* made up about 11% (by weight) of the recreational shark catch of around three million pounds (Casey and Hoey 1985). Recreational catches of large sharks in the Gulf of Mexico have decreased substantially since the 1970s, but Casey and Hoey's results illustrate that recreational fishing may have a substantial impact on Bull Shark populations.

Beach protection programmes in KwaZulu-Natal, South Africa and Queensland, Australia also regularly catch Bull Sharks. Cliff and Dudley (1992) reported that between 1978 and 1990 the South African programme caught 59 Bull Sharks, 21% of which were released alive. Species identification problems occurred in the Queensland programme until the early 1990s, thus the importance of *C. leucas* can only be based on data from latter years. Gribble et al. (1998) reported that after identification was improved 16% of the sharks caught state-wide were Bull Sharks, with the majority caught in the central part of the state. The lack of historical data for the Queensland programme and the low abundance in the South African programme make it impossible to assess the impact of beach meshing on Bull Shark populations.

The location of nursery areas in estuarine and freshwater systems makes the species vulnerable to pollution and habitat modification, but there has been only limited study of these impacts on Bull Sharks. Canal developments have been prolific in some estuarine areas where the species is commonly found. It is not known whether these developments have negative impacts. In Florida, USA and the Gold Coast of Queensland, Australia, these developments have substantially altered the environment. Bull Sharks occur frequently in Gold Coast canals and the species has been responsible for a number of attacks on humans (Simpfendorfer unpubl.). The warm water effluent from power stations may also impact this shark. In Florida, USA, juveniles have been reported to be trapped in the warm water outfalls during winter when they would normally have migrated to warmer water areas (Snelson et al. 1984, C. Marine Center for Shark Research, Mote Marine Laboratory pers. Comm.). The potential impacts of pollution and habitat modification need to be further investigated for this species.

This shark is also exploited by large aquariums. The species is good for public display, adapting well to life in a tank and providing a good example of a larger, aggressive shark. With the number of public aquaria rising worldwide there is an increasing demand for this and other species of sharks for display. While populations are healthy the needs of aquaria can probably be met without affecting the wild population. However, if a wild subpopulation is depleted this may not be the case and aquaria need to have responsible collection policies that will not result in further pressure being placed on a species. At present there is no evidence that collecting for aquariums has any impact on the wild population of Bull Shark.

CONSERVATION ACTIONS

No specific management or conservation programmes are known for this species. It is managed in the U.S. east coast shark fisheries as part of the "large coastal" groups of species. The current quota for this group is 1,285 t/ year (1997), but Bull Sharks make up only a small percentage of this group (see above). Recent closures of coastal waters in several states in the southern US to gill netting have removed pressure on the juveniles in estuarine and coastal nursery areas.

CITATION

Simpfendorfer, C. & Burgess, G.H. 2009. *Carcharhinus leucas*. The IUCN Red List of Threatened Species 2009.
www.iucnredlist.org

UNITED ARAB EMIRATES
MINISTRY OF CLIMATE CHANGE
& ENVIRONMENT

الإمارات العربية المتحدة
وزارة التغير المناخي
والبيئة

CLEANUP ARABIA 2018

FEATURE AND PHOTOGRAPHY **ALLY LANDES**

On the 25th of November, the Ministry of Climate Change & Environment and the Emirates Diving Association, signed an MOU to enhance their collaboration in preserving and rehabilitating the marine environment and sustaining its resources.

PLATINUM SPONSOR:

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Clean Up the World

Ocean Conservancy

CLEANUP ARABIA
A MONSTER MONTH

"During Cleanup 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 local communities allows members to make positive impacts to their marine environment."
ESSA AL GHURAIR, EMIRATES DIVING ASSOCIATION'S CHAIRMAN

EAST COAST CLEANUP: Platinum Sponsor – Majid Al Futtaim with HE Dr. Thani Al Zeyoudi from the Ministry of Climate Change & Environment.

Emirates Diving Association (EDA) organised the 23rd annual Cleanup Arabia with a month of weekend clean-ups around the country. The first dive clean-up event was held on Friday, the 27th of October in Abu Dhabi in Meena Zayed with our Silver Sponsor – Chalhoub Group (15 volunteers). The East Coast dive clean-ups (138 volunteers) were done on Friday, the 2nd of November through the six dive centres that were hired for the dives at designated dive sites, and the lunch was setup at Le Meridien Al Aqah Beach Resort and Spa with our EDA Members, our Platinum Sponsor – Majid Al Futtaim, and our Silver Sponsor – Emirates NBD who both also did a beach clean-up in Dibba with their non-divers (65 volunteers). The third dive clean-ups (40 volunteers) were held in Abu Dhabi in the Corniche and Saadiyat Reef on Friday, the 9th of November, and also included a kayak clean-up of the Eastern Mangroves (45 volunteers) both with our Silver Sponsor – Emirates NBD and EDA Members. A big thank you to the Environment Agency - Abu Dhabi, Tadweer - Abu Dhabi and CICPA. The final beach clean-up was held in Ajman on the Al Zohra Beach (111 volunteers) in partnership with Ajman Tourism on Friday, the 23rd of November, with our Gold Sponsor – Dubai Duty Free and our Silver Sponsor – Emirates NBD, some of our EDA Members, as well as a team from the Bahi Ajman Palace Hotel.

A total of 414 Sponsors and EDA Members participated in Cleanup Arabia this year! A big thank you to everyone who was involved for making such a difference.

The campaign has been running since EDA's inception in 1995 and has, and continues to clear beaches and key dive sites from harmful debris. "The annual Cleanup Arabia is an ideal opportunity to spread awareness concerning our marine environment, we also want to highlight the UAE's efforts in doing so. It provides people with a sense of purpose and achievement that they can make a difference", said Essa Al Ghurair, EDA's Chairman.

On the 25th of November, the Ministry of Climate Change & Environment and the Emirates Diving Association, signed an MOU to enhance their collaboration in preserving and rehabilitating the marine environment and sustaining its resources. The MOU was signed by HE Dr. Thani Al Zeyoudi and EDA's Chairman – HE Essa Al Ghurair.

EAST COAST CLEANUP: Platinum Sponsor – Majid Al Futtaim with Eng. Hassan Al Yammahi – Head of Dibba Municipality.

EAST COAST CLEANUP: Silver Sponsor – Emirates NBD with Eng. Hassan Al Yammahi – Head of Dibba Municipality.

EAST COAST CLEANUP (L-R): The Dubai Voluntary Diving Team, the Panda Diving Club, Dive Mania, and the Filipino Scuba Divers Club.

WHAT ARE YOU DOING ABOUT IT?

FROM @ECO_MENA

The UAE has the world's highest per capita consumption of bottled water of as much as 285 litres per year, and a typical UAE resident uses around 450 plastic water bottles each year. Plastic takes around 700 years to degrade. 90% of the cost of bottled water is due to the bottle itself. 80% of plastic bottles produced are not recycled. Globally, the plastic recycling rate is very low and major quantities of plastics are being disposed in landfills where they stay for hundreds of years.

In addition to the millions of gallons of water used in the plastic-making process, two gallons of water are wasted in the purification process for every gallon that goes into plastic bottles.

THE WAY FORWARD

The solution to the plastic bottles usage lies in its minimum use and safe disposal. The first step is that once you open a water bottle, you need to completely consume it to fully utilise the resource. Do not throw away plastic bottles as litter. Alternatively, a flask, thermos or reusable water bottle can be used which can be refilled as required. It is advisable that religious places, hotels, malls, restaurants, conference rooms etc. should have efficient water purification plants and water dispensers to reduce the use of plastic water bottles.

FROM @YOUGOVMENA

8.3 billion tonnes of plastic was produced in the UAE alone last year. Despite the government's widespread efforts to solve this problem, there is low awareness among the masses.

CONCERN OVER PLASTIC USE

More than half (52%) of UAE respondents showed great concern with the use of plastic in their city, especially those residing in Dubai and Abu Dhabi. Interestingly, a significant proportion of Asians (60%) and those 40+ years (61%) have expressed higher concerns over the indiscriminate use of plastic in their city.

Close to two-thirds of respondents are concerned with excessive plastic waste leading to environmental degradation. Once again, the older generation is more alarmed about environmental degradation than their younger counterparts (18-29-year-olds), with three quarters of respondents aged over 40 years pointing out their concern.

The majority of the respondents (83%) believe reducing the use of plastics is the most ideal way to protect the environment. From these individuals, more than half stated carrying a bottle to refill water (59%) and avoided usage of plastic cutlery (56%) as a way to contribute in reducing the use of plastics in their daily life. Half of the respondents also mentioned switching to ceramics/glassware at home, with an equal number avoiding the use of plastic/paper cups in the office in a personal effort to go green.

Three quarters of the respondents claim to be re-using plastic as much as possible while 16% completely disagreed to the re-using concept. Interestingly, a higher number of people between the ages of 30-34 years claim to be re-using plastic more than any other age bracket. The majority of respondents mentioned re-using plastic bags, with a sizeable proportion (close to 60%) also re-using plastic bottles and take-away containers.

The concept of reduce and reuse seems to be popular among the masses to combat excessive plastic waste. Comparatively women are more effective in adapting to these changes than men. We see they are not only reducing the use of plastics in their daily life, but a higher number of females have also indicated reusing plastics across the board.

HOW ARE YOU MAKING A CHANGE?

The statistics are out there for us to dwell on and act upon to make a difference. Have you made a change in your homes, schools and businesses?

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GREAT MOMENTS FOR EVERYONE, EVERYDAY.

East Coast Dives. Photo by Al Boom Diving.

East Coast Dives. Photo by Al Boom Diving.


East Coast Dives. Photo by Freestyle Divers.

East Coast Dives. Photo by Alexandra Toma.


East Coast Dives. Photo by Freestyle Divers.

East Coast Dives. Photo by Divers Down.

East Coast Dives. Photo by Freestyle Divers.


East Coast Dives. Photo by Freestyle Divers.

East Coast Picnic Spot Dibba Beach clean-up by Platinum Sponsor – Majid Al Futtaim and Silver Sponsor –Emirates NBD. Photo by Paul Pater.

EAST COAST – 2 NOVEMBER 2018			
PICNIC SPOT DIBBA BEACH		**UNDERWATER**	
MOST LIKELY TO FIND ITEMS	TOTAL	MOST LIKELY TO FIND ITEMS	TOTAL
Cigarette Butts	63	Cigarette Butts	1
Food Wrappers	86	Food Wrappers	7
Plastic Takeout Containers	64	Plastic Takeout Containers	14
Foam Takeout Containers	28	Foam Takeout Containers	12
Plastic Bottle Caps	344	Plastic Bottle Caps	15
Metal bottle Caps	104	Metal Bottle Caps	0
Plastic Lids	45	Plastic Lids	0
Straws/Stirrers	69	Straws/Stirrers	0
Forks/Knives/Spoons	170	Forks/Knives/Spoons	18
Plastic Beverage Bottles	743	Plastic Beverage Bottles	10
Glass Beverage Bottles	166	Glass Beverage Bottles	12
Beverage Cans	156	Beverage Cans	23
Plastic Grocery Bags	59	Plastic grocery Bags	18
Other Plastic Bags	109	Other plastic Bags	1
Paper Bags	40	Paper Bags	0
Paper Cups & Plates	104	Paper Cups & Plates	15
Plastic Cups & Plates	115	Plastic Cups & Plates	16
Foam Cups & Plates	61	Foam Cups & Plates	0
FISHING GEAR		FISHING GEAR	
Buoys/Pots/Traps	14	Buoys/Pots/Traps	3
Nets & Pieces	28	Nets & Pieces	8
Line	11	Line	7
Rope	72	Rope	4
OTHER TRASH		OTHER TRASH	
Appliances	3	Appliances	0
Balloons	4	Balloons	0
Cigar Tips	34	Cigar Tips	0
Cigarette Lighters	20	Cigarette Lighters	0
Construction Materials	44	Construction Materials	9
Fireworks	1	Fireworks	0
Tyres	1	Tyres	1
PACKAGING MATERIALS		PACKAGING MATERIALS	
6-Pack Holders	2	6-Pack Holders	0
Other Plastic/Foam Packaging	84	Other Plastic/Foam Packaging	1
Other Plastic Bottles	28	Other Plastic Bottles	12
Strapping Bands	14	Strapping Bands	0
Tobacco Packaging/Wrap	34	Tobacco Packaging/Wrap	0
PERSONAL HYGIENE		PERSONAL HYGIENE	
Condoms	16	Condoms	0
Diapers	27	Diapers	0
Syringes	5	Syringes	0
TINY TRASH (< 2.5 cm)		TINY TRASH (< 2.5 cm)	
Foam Pieces	40	Foam Pieces	8
Glass Pieces	271	Glass Pieces	0
Plastic Pieces	69	Plastic Pieces	4
EXTRA		EXTRA	
Clothing Items	9	Arabic Coffee Cup	1
Goggles	2	Fins	1
Hanger	2	Metal Rods	1
Shoes	9	Scuba Mask	1
Tissue	32	Weight Belt	1
Yoga Mat	2	Pipe	1
TOTAL ITEMS	**3416**	**TOTAL ITEMS**	**225**
TOTAL BAGS	**37**	**TOTAL BAGS**	**46**
TOTAL WEIGHT (KGS)	363.8	**TOTAL WEIGHT (KGS)**	236.5

Abu Dhabi's Eastern Mangrove clean-up with kayaks with our Silver Sponsor – Emirates NBD and EDA Members.

Eastern Mangrove clean-up. Photo by Al Mahara Diving Center.

A big thank you to Environment Agency - Abu Dhabi, Tadweer - Abu Dhabi and CICPA. Photo by Al Mahara Diving Center.

Abu Dhabi Saadiyat Reef dive clean-up. Photo by Ocean Dive Center.

Abu Dhabi Corniche dive clean-up. Photo by Al Mahara Diving Center.

Photo by Al Mahara Diving Center.

Photo by Al Mahara Diving Center.

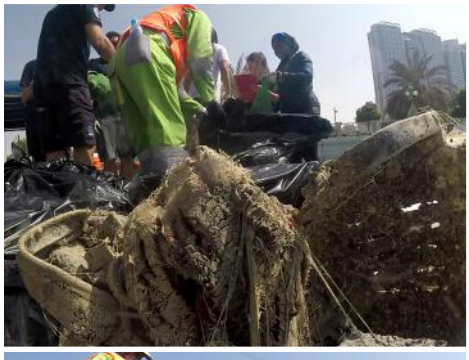
Photo by Al Mahara Diving Center.

ABU DHABI – 9 NOVEMBER 2018			
EASTERN MANGROVES		**UNDERWATER**	
MOST LIKELY TO FIND ITEMS	TOTAL	MOST LIKELY TO FIND ITEMS	TOTAL
Cigarette Butts	16	Cigarette Butts	0
Food Wrappers	97	Food Wrappers	18
Plastic Takeout Containers	16	Plastic Takeout Containers	12
Foam Takeout Containers	21	Foam Takeout Containers	0
Plastic Bottle Caps	149	Plastic Bottle Caps	97
Metal bottle Caps	3	Metal bottle Caps	0
Plastic Lids	42	Plastic Lids	13
Straws/Stirrers	7	Straws/Stirrers	0
Forks/Knives/Spoons	6	Forks/Knives/Spoons	7
Plastic Beverage Bottles	273	Plastic Beverage Bottles	196
Glass Beverage Bottles	108	Glass Beverage Bottles	68
Beverage Cans	99	Beverage Cans	422
Plastic Grocery Bags	179	Plastic Grocery Bags	9
Other Plastic Bags	129	Other Plastic Bags	14
Paper Bags	3	Paper Bags	0
Paper Cups & Plates	20	Paper Cups & Plates	0
Plastic Cups & Plates	59	Plastic Cups & Plates	23
Foam Cups & Plates	43	Foam Cups & Plates	16
FISHING GEAR		FISHING GEAR	
Buoys/pots/traps	15	Buoys/Pots/Traps	3
Nets & Pieces	12	Nets & Pieces	8
Line	15	Line	172
Rope	40	Rope	65
OTHER TRASH		OTHER TRASH	
Balloons	1	Balloons	0
Cigarette Lighters	6	Cigarette Lighters	0
Construction Materials	32	Construction Materials	4
Tyres	11	Tyres	0
PACKAGING MATERIALS		PACKAGING MATERIALS	
Other Plastic/Foam Packaging	32	Other Plastic/Foam Packaging	0
Other Plastic Bottles	11	Other Plastic Bottles	37
Strapping Bands	6	Strapping Bands	2
PERSONAL HYGIENE		PERSONAL HYGIENE	
Condoms	1	Condoms	0
Diapers	3	Diapers	0
TINY TRASH (< 2.5 cm)		TINY TRASH (< 2.5 cm)	
Foam pieces	73	Foam Pieces	0
Glass pieces	15	Glass Pieces	0
Plastic pieces	77	Plastic Pieces	0
EXTRA		EXTRA	
Broom	2	Football	1
Cable	4	Laptop	1
Carpets	2	Picture Frame	1
Ceramic Cup	1		
Chair	1		
Clothing Items	6		
Lamp	2		
Mattress	1		
Paint brush	1		
Shoes	15		
Sunglasses	1		
VHS Tape	1		
TOTAL ITEMS	**1,666**	**TOTAL ITEMS**	**1164**
TOTAL BAGS	**47**	**TOTAL BAGS**	**72**
TOTAL WEIGHT (KGS)	**277.5**	**TOTAL WEIGHT (KGS)**	**654**

AJMAN – 23 NOVEMBER 2018

AL ZOHRA BEACH

MOST LIKELY TO FIND ITEMS	TOTAL
Cigarette Butts	1317
Food Wrappers	301
Plastic Takeout Containers	79
Foam Takeout Containers	95
Plastic Bottle Caps	584
Metal Bottle Caps	147
Plastic Lids	98
Straws/Stirrers	203
Forks/Knives/Spoons	105
Plastic Beverage Bottles	246
Glass Beverage Bottles	226
Beverage Cans	294
Plastic Grocery Bags	160
Other Plastic Bags	171
Paper Bags	67
Paper Cups & Plates	123
Plastic Cups & Plates	125
Foam Cups & Plates	182
FISHING GEAR	
Buoys/Pots/Traps	41
Net & Pieces	36
Line	98
Rope	70
OTHER TRASH	
Balloons	22
Cigarette Lighters	44
Construction Materials	95
Tyres	4
PACKAGING MATERIALS	
6-Pack Holders	20
Other Plastic/Foam Packaging	90
Other Plastic Bottles	71
Strapping Bands	45
Tobacco Packaging/Wrap	76
PERSONAL HYGIENE	
Condoms	9
Diapers	54
Syringes	3
Tampons/tampon applicators	1
TINY TRASH (< 2.5 cm)	
Foam pieces	204
Glass pieces	136
Plastic pieces	353
EXTRA	
Barbeque Grill	1
Cable	6
Carpets	2
Clothing Items	35
Hangers	3
Shoes	7
Tea Bags	9
Toys	3
TOTAL ITEMS	**6110**
TOTAL BAGS	**54**
TOTAL WEIGHT (KGS)	**494.5**



CHALHOUB GROUP (AUH)
27 OCTOBER 2018

DIVE SITE: MEENA ZAYED

MOST LIKELY TO FIND ITEMS	TOTAL
Food Wrappers	4
Plastic Takeout Containers	4
Straws/Stirrers	1
Plastic Beverage Bottles	150
Glass Beverage Bottles	22
Beverage Cans	144
Plastic Grocery Bags	21
Other Plastic Bags	13
Paper Bags	1
FISHING GEAR	
Buoys/Pots/Traps	1
Net & Pieces	9
Line	13
Rope	16
OTHER TRASH	
Construction Materials	11
PACKAGING MATERIALS	
Other Plastic/Foam Packaging	6
EXTRA	
Anchor	1
Toothpaste Tube	1
Carpet	2
TOTAL ITEMS:	**420**
TOTAL BAGS:	**20**
TOTAL WEIGHT (KGS):	**285**

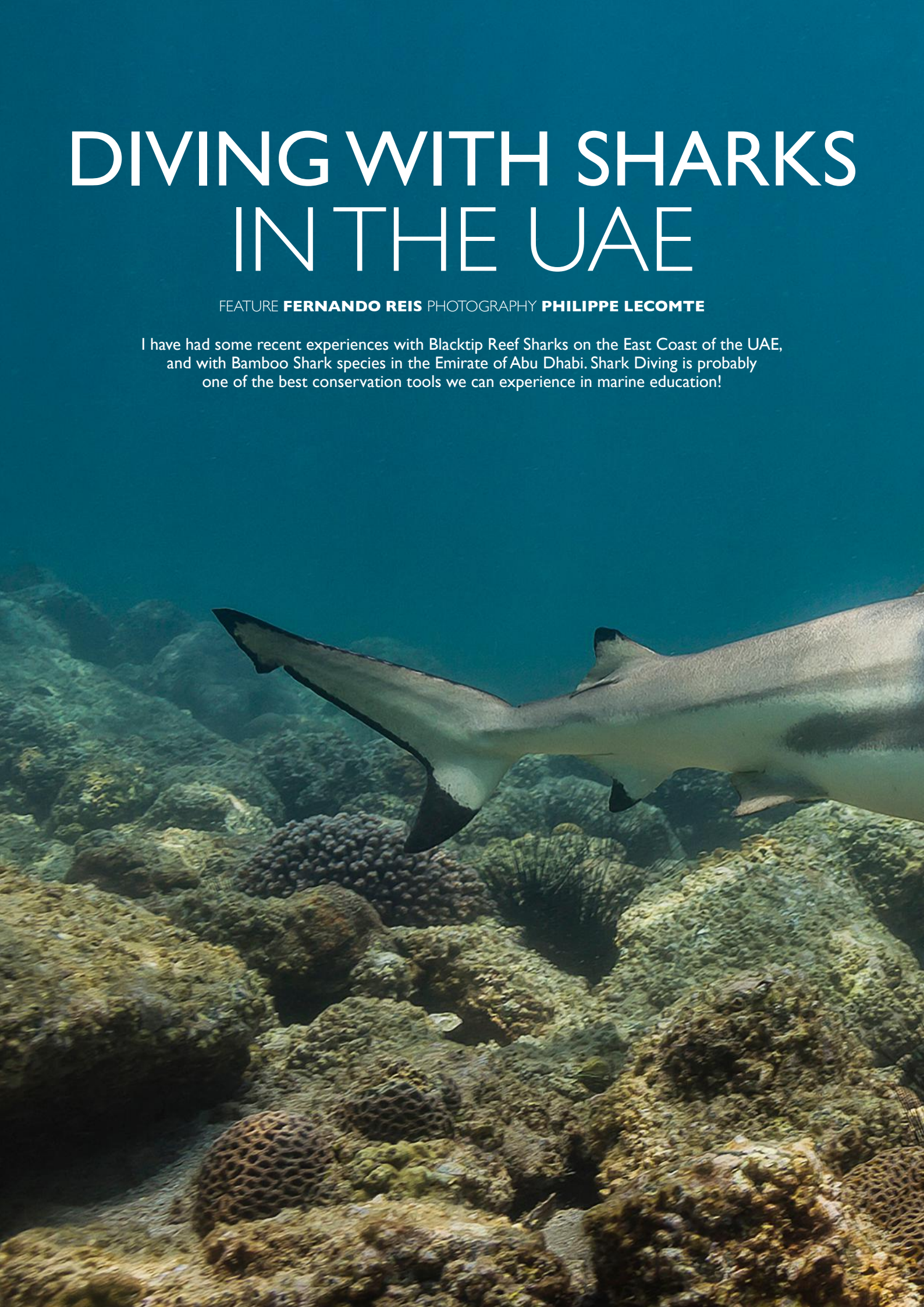
Dubai Duty Free

Full of surprises.

DIVING WITH SHARKS IN THE UAE

FEATURE **FERNANDO REIS** PHOTOGRAPHY **PHILIPPE LECOMTE**

I have had some recent experiences with Blacktip Reef Sharks on the East Coast of the UAE, and with Bamboo Shark species in the Emirate of Abu Dhabi. Shark Diving is probably one of the best conservation tools we can experience in marine education!



Blacktip Reef Shark (Carcharhinus melanopterus)

Blacktip Reef Shark (Carcharhinus melanopterus)

DIVING WITH SHARKS IN THE UAE

Yes! We can dive with sharks in UAE waters. Both in the Indian Ocean and in the Arabian Gulf. This may seem surprising for many divers that are used to travelling quite far away to find interesting propositions for shark diving, but the fact is that we can easily learn a lot about sharks if we try shark diving with some very particular species found in the Arabian Sea. I have had some recent experiences with Blacktip Reef Sharks on the East Coast of the UAE, and with Bamboo Shark species in the Emirate of Abu Dhabi. Shark Diving is probably one of the best conservation tools we can experience in marine education!

The Blacktip Reef Shark (*Carcharhinus melanopterus*) is a common species of the Indo-West Pacific coral reefs, inhabiting shallow reefs and sand-flats of both atolls and high islands and occasionally non-reef environments. They are one of the most abundant apex predators, although their numbers have been reduced by overfishing at many locations. Sharks are one marine group known to show sexual segregation, and on the East Coast around Dibba Rock and around Snoopy Island, it is usually possible to observe females and juveniles swimming around, patrolling the shallow waters of the local house reefs. This confirms the usual habitat segregation and social segregation observed with this species. Habitat segregation occurs when the sexes differ in their use of the habitat, and social segregation is the tendency for a species to form single-sex groups (Mourier et al, 2012). The Blacktip Reef Shark is a very special and important species that deserves better protection. They are quite difficult to photograph as they tend to stay away from divers, but check with your dive guide what the best techniques are and take your time to observe them, breathe slowly, relax and enjoy their presence.

According to Rima W. Jabado and David A. Ebert (2015), in the Arabian Seas region, only three Bamboo Shark (*Chiloscyllium*) species have been confirmed. These Carpetsharks are small, slender sharks mostly with less than a metre in length, although some may reach up to 140 cm. The *Chiloscyllium arabicum* and the *Chiloscyllium griseum* are the most common Bamboo Shark species in the Arabian Seas region, but they can easily be confused. To be sure of the correct species identification, the distance between the first and second dorsal fins must be measured. If this space is shorter than the first dorsal fin base, it is a Grey Bamboo Shark – if the interdorsal fin space is larger than the first dorsal fin base, we are in the presence of an Arabian Bamboo Shark. Like with any other shark species, to learn more about these beautiful sharks you need to dive and observe them peacefully. It's a very easy and casual diving experience, as their natural habitat is based in areas with coral reefs, lagoons and rocky shores on sand-flat bottoms at depths from 3 to 100 m.

THE NATIONAL PLAN OF ACTION

A couple of months ago, the UAE Ministry of Climate Change and Environment published a National Plan of Action for the Conservation and Management of Sharks (NPACMS). According to this important document, there's a total of 43 shark and 29 batoid species recorded in UAE waters of the Arabian Gulf and Sea of Oman. This indicates that shark and batoid biodiversity in the UAE national waters is relatively high. From those, 30 (almost 42%) of shark and ray species confirmed through studies across the water of the UAE are considered to be of global conservation concern and are threatened with extinction (a combination of Critically Endangered (CR), Endangered (EN) and Vulnerable (VU) categories). Finally, few species were considered to be of Least Concern (LC) while 24% were Data Deficient (DD) or Not Evaluated (NE), further highlighting the need for research in order to gain a better understanding of their status and determine the best actions for their management and conservation.

Following the cultural heritage legacy from Sheikh Zayed bin Sultan Al Nahyan who worked in consideration for the protection of the environment in the UAE, this nation is actually signatory to a number of regional and international agreements, including the Convention of Biological Diversity (CBD), Convention on International Trade of Endangered Fauna & Flora (CITES), Convention on Migratory Species (CMS), and the Regional Organisation for the Protection of the Marine Environment (ROPME). The common aim of these conventions is the sustainability of biodiversity resources and minimising the threats facing them (NPACMS).


Bamboo Shark (Chiloscyllium)

The Ministry of Climate Change and Environment has also considered that as sharks are caught by commercial and recreational fishermen as targeted catch, non-target but retained catch (by product), or as non-target and non-retained catch (bycatch) in fisheries principally directed at other commercially important teleost (bony fish) species, it would be necessary to have a special regulation that could promote their conservation and better understanding throughout the major stakeholders and populations with interests in preserving a better future for the natural environment.

THE ACTUAL SHARKS' STATUS

Fishing pressure on sharks has been increasing. Thanks to interviews with fishermen, the geographical extent, gear characteristics, sizes, and target of the species is known. Results collected by the preparation team of the National Plan of Action for the Conservation and Management of Sharks, showed that the fishery was highly opportunistic and varied considerably in fishing behaviours. The existence of a targeted shark fishery fuelled by the shark fin trade, and the high levels of bycatch recorded, indicate that this fishery is likely to have a substantial impact on shark populations locally. In fact, fishermen confirmed that the status of sharks had changed in recent years and that they were witnessing noticeable declines in catches, abundance and average sizes of sharks in UAE Arabian Gulf waters.

Accurate reports on the exact number of landings of sharks are difficult to obtain and most data reported to the Food and Agriculture Organisation of the United Nations (FAO) are likely to be underestimated. It is believed that catches are three to four times greater than reported because most catches of sharks are unregulated, often misidentified, unrecorded, aggregated, or discarded at sea, resulting in a lack of species-specific landings information. This lack of accurate data has made it increasingly difficult to determine the status of species. A recent overview of the status of sharks estimated that one in four shark species is threatened with extinction according to the International Union for the Conservation of Nature (IUCN) Red List criteria (NPACMS).

Details of the observed and predicted number for each IUCN category suggest that almost half of all sharks are Data Deficient (DD), meaning that information is insufficient to assess their status; and that they have the lowest percentage of Least Concern (LC) species of fisheries. IUCN Red List statuses are generally based on global assessments. It is said on this NPACMS, that there has been no regional shark assessments undertaken in the north western Indian Ocean to date. Furthermore, many of these assessments need to be urgently updated as they are over 10 years old and the exploitation of sharks has continued to increase over the years with little management efforts.

In 2017, the Environment Agency - Abu Dhabi, in cooperation with the IUCN Species Survival Commission Shark Specialist Group published a report which provided an overview of the conservation status of *chondrichthyan* (sharks, rays, and chimaeras) in the Arabian Seas Region (ASR) and described the results of a regional Red List workshop held in Abu Dhabi, United Arab Emirates early 2017. That report identified those species that are threatened with extinction at the regional level, so that appropriate conservation action can be taken to improve their status. It indicated that 78 (50.9% species of the 153 *chondrichthyans* assessed) are considered threatened within the Arabian Sea Region – 9.2% Critically Endangered (CR), 22.2% Endangered (EN), and 19.6% Vulnerable (VU). Of these, three species were also flagged as Critically Endangered to Possibly Extinct, as they had not been recorded in the region for at least three decades despite increasing research and survey efforts. A further 27 (17.6% of the species) are considered Near Threatened (NT) and 12.4% Least Concern (LC) (19 species). However, for 29 species (19 %), there was insufficient scientific information available to evaluate their risk of extinction and these are therefore classified as Data Deficient (DD) (NPACMS).

THE THREATS

Sharks of shallow water habitats (like the Bamboo Sharks), on the coast and in the open ocean, are the most seriously threatened. Sharks longer than one metre (such as Blacktip Reef Sharks) have 50% more chance of being threatened. Unsustainable, unregulated target and bycatch fisheries, often driven by global trade demand for meat, liver oil, cartilage and fins are the greatest threat to sharks (David Ebert and Sarah Fowler, 2014).

In recent years, the understanding of the species composition, the abundance and size distribution of sharks and batoids exploited by the fishery in the UAE has improved. The 43 species of sharks recorded indicate that shark biodiversity in the Gulf is relatively high and comparable to other countries in the region when considering that deep water species are precluded from inhabiting these waters. Similarly, the 29 species of rays recorded at landing sites indicates that ray diversity is likely to be high (NPACMS).

As it is recognised on this National Plan of Action, in recent years, there has been progress in gaining a better understanding of shark resources in the UAE through several research projects. There have been notable improvements including the development of an accurate checklist of shark species occurring in UAE waters; facilitating the identification of species in the catch through peer reviewed publications; improving catch and effort data collection through capacity building of fisheries enumerators; and shark-specific management measures to address high-risk species including the ban on fishing sawfish (*Pristidae spp.*), whale sharks (*Rhincodon typus*) and hammerhead sharks (*Sphyrnidae spp.*).

It was thanks to the preparation team from the National Plan of Action for the Conservation and Management of Sharks that experts from the Ministry of Climate Change and Environment, the Environment Agency - Abu Dhabi, the Dubai Municipality, the Environment and Protected Areas Authority in Sharjah, and the Municipality & Planning Department of Ajman, developed this UAE Plan Of Action in a culmination of efforts to conserve the marine environment and develop natural aquatic resources (Dr Thani bin Ahmed Al Zeyoudi – Minister of Climate Change & Environment, 2018).

Despite all of this, the country appears to still be serving as a transit hub and a processing point for many shipments from the Middle East and northern Africa. In addition to fishing pressures, sharks in the UAE may face threats from other factors such as habitat loss, pollution, disturbance from coastal developments or tourism activities and climate change (NPACMS). Diving with UAE shark species is nowadays more and more a matter of conservation and biodiversity marine awareness.

THE GOALS AND OBJECTIVES

The actions in this Plan for Conservation and Sharks Management have an initial four year duration (2018 - 2021), and were developed in view of these four main goals:

1. Improve the knowledge of shark species and fisheries and their role in the ecosystem.
2. Ensure effective policy, legislation and enforcement mechanisms and develop a national, regional and international framework for cooperation.
3. Enable effective conservation through capacity building.
4. Undertake education and outreach programmes to improve awareness of the general public.

The first and fundamental goal of knowledge improvement has established guidelines for its actions: to develop and improve the collection of fisheries dependent data; to improve the understanding of the status of sharks' populations; to improve our understanding of the status of sharks' populations, and; to understand and reduce the direct and indirect anthropogenic causes of declining shark populations.

The second goal, related with future policies and national regulations, has these as its action guidelines: the improvement of the existing legislation to enable the sustainability of sharks and their habitats through policy review; the effectively enforcement of the existing laws through enacting robust implementation mechanisms, and; to initiate and build national, regional and international collaborations.

The third and fourth goals orient their actions to enable effective conservation measures through capacity building, based on promotion, coordination and production of educational actions and essential communication supports. Where explaining the importance of returning live sharks to the sea to maximise their survival, is one of the best examples.

WHAT IS THE NATIONAL PLAN MISSING?

As everyone can see, this is a very interesting plan. However, as it happens with any plan of action, without previously defined quality measurement indicators, these objectives could risk becoming transformed no matter how good the intentions. It is understandable, despite this set of measures, that shark and batoid awareness is absolutely necessary to fix quantified objectives for each specific indicator with the overall time period specified. Measuring those indicators in the beginning of the implementation period of the plan and to fix quantified objectives to the end of the plan's period is fundamental.

Fisheries remain one of the main factors in the decline of sharks. But in fact, sharks in the UAE may face threats from other factors such as habitat loss, pollution, disturbance from coastal development or tourism activities and climate change (NPACMS). The country appears also to still be serving as a transit hub and a processing point for many shipments from the Middle East and northern Africa. So promoting more shark diving in the UAE, in coordination and in parallel with new educational marine initiatives, is nowadays more and more a matter of conservation and biodiversity marine awareness.

Given the needed persuasive arguments and educational tools for the management and conservation of sharks in the Arabian Sea region, generating new non-consumptive economic value in the UAE can generate strong convincing cases for further conservation efforts.

We sincerely hope that the UAE can soon become a worldwide reference of a Shark Conservation region, but to make it happen, sustainable shark diving operators have a major importance. Now, the success of the new National Plan of Action for the Conservation and Management of Sharks, 2018 - 2021 depends totally on its Governance model, which should consider the urgent introduction of a Marketing Management contribution to effectively implement its intentions.

For more information, please consult directly the NPACMS at the Ministry Website:
www.moccae.gov.ae

WHY ARE SHARKS SO IMPORTANT?

As it is known from science, the large majority of fish species that have evolved in the oceans over the last 450 million years, have been shaped by their predators, the sharks. In evolution, the most probable is that sharks are responsible for giving rise to camouflage, speed, fish sizes, schooling behaviour and underwater communication.

Sharks have survived five major extinctions, but they are now being fished out with some large species classified as Vulnerable, Endangered and Critically Endangered of extinction. There are currently many countries that have no sharks left in their waters, just because they have illegally been harvested especially for their fins.

It is quite common to find groups where no one wants to save sharks. Due to some box office movies, the reputation sharks endure nowadays is bad, very bad. That is why so many people fear them. As the British philosopher Bertrand Russell once said, "The one who fears an animal will only see its threatening behaviour." But, when we know something well enough, we will no longer fear it, don't you think?

The IUCN Red List of Threatened Species – the world's most authoritative list – assigns a total of 181 species of sharks and rays to its three threatened categories (CR, EN, VU). The large number of sharks and rays classified as Data Deficient highlights the fundamental need for focused research on these species and the threats that they face. More than 45% of shark and ray species are currently classified as Data Deficient (meaning that information is insufficient to assess the level of threat). Many of these species – the "lost" sharks and rays – have not been seen for decades and may already be extinct.

As "apex" predators, they feed at the top of the food web and help to maintain the balance of healthy marine ecosystems – keeping prey

species in check, culling the sick and weakest animals, and scavenging dead organisms. In fact, many studies have already shown that top predators such as sharks actually lead to greater biodiversity. However, depletion of sharks on the scale that is occurring today allows populations of their prey species to increase, which can lead to an imbalance in the ecosystem and even lead to the collapse of important fisheries. For example, the depletion of sharks in the Atlantic Ocean has contributed to a population explosion of skates and rays, but has lead to a collapse in their prey, scallops. Sharks need protection, not just for their own sake, but for the health of the wider marine environment.

With many shark populations declining sharply amid growing global demand, the UN's Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) has begun to regulate trade and to promote national regulation in shark products amongst its members. For example, on CITES Appendix II, Basking and Whale Sharks were listed in 2002; the White Shark in 2004; and three species of Hammerhead Sharks, Porbeagle and Oceanic Whitetip Sharks, plus the two species of Manta Rays, in 2013. Listing on Appendix II means that countries exporting products from these species will have to collate trade data and issue an export permit for each specimen exported, and first determine that international trade will not harm the species. So, it is hoped that monitoring and regulating by CITES will help to generate higher quality research on sharks and the threats facing them, and that it can ensure a better control of shark products within international trade.

THE SHARKS' VALUE

Numerous case studies around the world have demonstrated the economic value of the sustainable shark diving ecotourism. One country that appears to be a reference of this best practice is The Bahamas. Since the last couple of decades, the sustained national stewardship demonstrated by the Bahamian government has ensured that this important economic resource continues to be a national productive one. In fact, due to management and conservation initiatives implemented over the last 25 years, several tourism related industries have been built around the diverse and abundant elasmobranch assemblages found in The Bahamas. According to a study presented last year by the Shark Research and Conservation Programme, researchers from the Cape Eleuthera Institute, and the University of Bahamas, Andrea Haas, Tony Fedler, and Edward Brooks, established that the Bahamas diving industry is the largest in the world, contributing to more than USD $132 million annually to the Bahamian economy in direct and value added expenditures, especially because of the contribution of sustainable shark diving ecotourism practices.

Nowadays, The Bahamas is home to healthy and diverse shark populations, largely due to a ban on longline fishing in the early 1990s, followed by the establishment of the Bahamian shark sanctuary in 2011. The study, from Haas et al (2017), firmly establishes The Bahamas as the largest shark diving economy in the world that has been formally assessed. It indicates that elasmobranchs have a Total National Economic Impact of USD $113.8 million annually to the Bahamian economy, which represents 1.3% of the $8.5 thousand million GDP in 2014. The majority of this (98.8% or $112.6 million) was derived from shark diving and ray tourism. The economic importance of sharks to The Bahamas underscores the significance of the conservation measures implemented by the Bahamian Government over the last 25 years in the form of the ban on longline fishing and the establishment of the shark sanctuary in 2011. This suggests that ecotourists are visiting The Bahamas because of the healthy shark populations that are mostly there due to the ban on longline fishing in 1993.


Bamboo Shark (Chiloscyllium)

According to the recent study published by the Ministry of Climate Change and Environment "UAE Shark Assessment Report 2018", small bodied sharks (<1000 mm total length (LT)) retailed locally between AED 10 and 20 per kg (USD 2.5 to 6 per kg). Large bodied sharks (>1000 mm LT) in Dubai were valued between AED 8,000 (USD 2,200) and AED 20,000 (USD 5,500) for 20 sharks depending on species and sizes. Fresh meat was auctioned at AED 6 per kg (about USD 1.7 per kg) but could resell at prices up to AED 40 per kg (USD 11 per kg) after drying and packing. This is of great importance to be known.

This report is the first national assessment of shark research and protective measures in the UAE and highlights that there is insufficient knowledge on the biology, ecology and fishing of sharks and rays. Continuous coordinated research will enhance the needed knowledge on sharks and rays for effective and efficient UAE management. One reason more why the National Plan of Action For the Conservation and Management of Sharks should be consider as the building stone to effectively conserve and manage our shark populations in the UAE, supported by the acting diving licensed operators.

There is no doubt nowadays, that a living shark is much more profitable on long term than a dead shark once fished. In UAE, the Marine Reserves around Dibba Rock and Snoopy Island, in Fujairah, are starting to become evident of that too. We deeply believe the new National Plan of Action for the Conservation and Management of Sharks is a very positive step in the right direction. Let's hope it can also be managed in a transparent way, with quantified quality indicators and planned established targets. Because we are divers for the environment, we care about shark conservation and we wish the best success for this first National Plan of Action for the Conservation and Management of Sharks.

MORE INFO:

To find out more about shark behaviours and other sustainable shark diving activities, get in touch.
Email: info@sharksinstitute.org / sharksinstitute@gmail.com
Website: www.sharksinstitute.org

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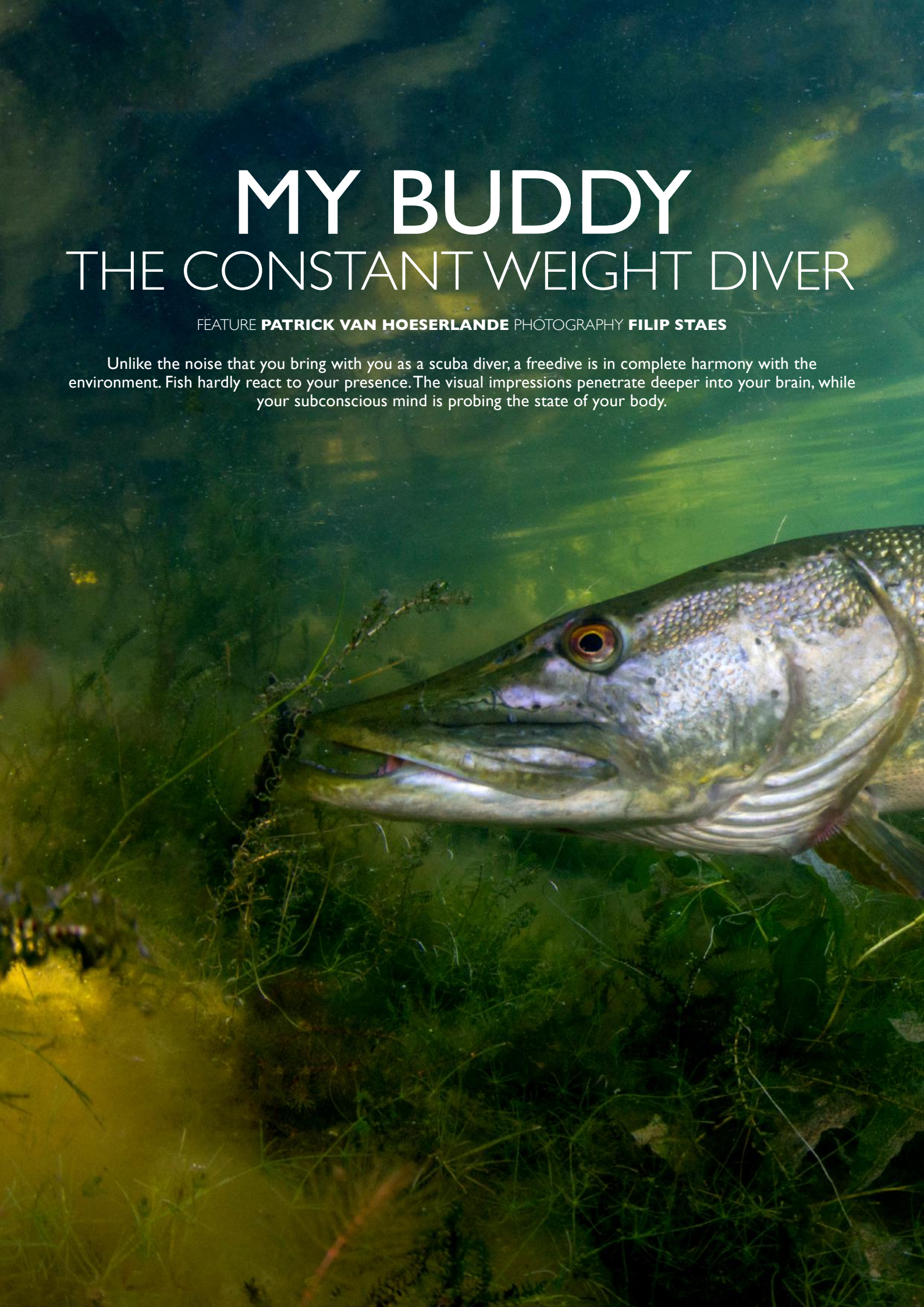
MY BUDDY
THE CONSTANT WEIGHT DIVER

FEATURE **PATRICK VAN HOESERLANDE** PHOTOGRAPHY **FILIP STAES**

Unlike the noise that you bring with you as a scuba diver, a freedive is in complete harmony with the environment. Fish hardly react to your presence. The visual impressions penetrate deeper into your brain, while your subconscious mind is probing the state of your body.



During the preparation of writing my article on freediving courses (see the June 2017 issue – 'Free the Diver') I met my buddy, Kevin Moonen. Over the past few years Kevin has been training for freediving courses through NELOS – the Flemish diving association – and now holds a 3 Star freediving certificate. Although he dives according to the various disciplines like most freedivers, he has a preference for reaching the depths on pure fin power and with a constant weight.

I consciously arrive at the meeting point a little earlier so I have the chance to prepare my equipment before Kevin arrives at the 'Put van Ekeren'. After all, it is easier to interview and photograph someone if you are already good and ready. After welcoming Kevin and catching up, I take advantage of my extra time to take a peek at his dive gear. Of course there is not much to it, besides the snorkel, mask and fins, and a good wetsuit. A freediver does not need much more. What does stand out however, are the extremely long fins sticking out of his dive box. These fins give a good indication of the seriousness with which a freediver approaches his discipline, because they mean an investment and therefore require a positive decision to become a better freediver. As a beginner and still in doubt about freediving, I only have pool fins in my trunk as opposed to the expensive freediving pair.

As with every dive session, we start with the general briefing. The safety measures here are a little different from that for freediving in a deep pool. Although the visibility is that of only a few metres and assessed by compressed-air divers as 'excellent', it is too limited to be able to visually follow a freediver during the dive. Clear agreements before the start of each dive – there are between 20 and 30 dives per open water session – ensures that the buddy knows what will happen to immediately detect when something may go wrong. With this kind of diving, the buddy takes up the role of a safety diver rather than of that of a dive companion.

After setting our keys over to the side, we make our way towards the water via the pontoon between the masses of dive tanks. When I observe all the other divers fully equipped with tanks and weight belts, the true meaning of the word 'free' hits me. The only heavy thing we take to the water is the weight of our buoy. This buoy, to which our dive line is attached, will be our reference point for the next two hours.

Before we start diving, we check our weight. As we will begin with a few horizontal freedives in the shallow part of the lake, we need to make sure that we float when not swimming. The idea is that if something was to go wrong, we will naturally float up to the surface. This is unlikely, because we are diving well within our personal comfort zones, but safety first above all.

During the deep dive, we will go down with a lanyard attached to the line to easily navigate if we get a bit disorientated, but we start the first leg of shallow dives completely free.

Before each dive we tell the other one the direction and distance we plan to swim. Then you ask your buddy if he is ready after which you start your personal preparation. At the end of your preparation you slip into the silent world to fully enjoy your short presence. Unlike the noise that you bring with you as a scuba diver, a freedive is in complete harmony with the environment. Fish hardly react to your presence. The visual impressions penetrate deeper into your brain, while your subconscious mind is probing the state of your body.

While Kevin enjoys the fauna and flora below, I follow him along the surface with the buoy in the direction he has set forth. Although I know that he will not leave a trace of bubbles to show me where he is, I find myself automatically looking for them to surface. Luckily he appears in my field of view inside the briefed distance, after which I carefully monitor his recuperation protocol. I keep an eye on him until he gives me his OK sign and the mandatory observation time of one minute is passed. Then I can prepare myself for my turn.

During each of our relaxed freedives, we quietly explore the waters of the "Put van Ekeren". Together – with one of us from the bottom, the other from the surface – we visit its underwater world and various statues in silence. The latter are not easy to find from the surface with only a rough idea of the reference points. Finding a statue is a combination of luck and good understanding.

With the sun low, we swim with our buoy to the deeper part of the lake. We let the package of lead drop on a spot where the bottom is 15 metres deep. When our line is in its place, I decide to put my thicker dive gloves on. 15 metres means that in each dive we will break through the thermocline and thus experience a big change in temperature. We look down for a brief moment and assess that we can barely see past 7 metres deep. The diving buddy will signal to the surface buddy through the line of his ascent to return to the surface as it will not be possible to visually verify this point as we did in the clear pool water.

Kevin first fastens his lanyard onto the drop line and tells me that he will start to dive in 'free immersion'. This discipline allows a great control of the descent speed and is therefore ideal to start a session of deep diving. I decide to use the same technique for my first vertical dive. The limited visibility and the darkness in the area surrounding the tennis ball – this ball marks the planned depth and thus my turning point – and the sudden change in temperature aren't as bad as anticipated. Luckily. After a few dives we conclude that everything has gone well and we switch to the 'constant weight' technique. The challenge is to now continuously clear our ears whilst keeping the descent speed under control. Once at the planned depth, we turn and give the clear signal, "I'm coming back up". The surface buddy is holding onto the dive line and as soon as he feels the double pull of the freediver, he knows his buddy is coming back up. It is also the signal for him as the safety diver to start his dive to meet the freediver halfway. From that moment on he keeps an eye on his buddy till they both surface. Everything runs smoothly, disciplined and quietly. Above water we enjoy the calmness symbolised by the reflection of the setting sun on the water's surface.

At the agreed time, we collect the dive line with the weight and swim back to the pontoon. We hold a short debriefing and exchange our experiences. Thank you Kevin for being my buddy and safety diver, and for introducing me to freediving in open water. When I leave the parking lot, I mentally tick off one of the many facets of sports diving. I'm curious to what the next buddy experience will be.

Do you know someone with an interesting diving hobby, who would be willing to take me on as a buddy? Or are you such a diver? Please contact me via Email at: **patrick.vanhoeserlande@nelos.be**

Photo by Patrick Van Hoeserlande

Diver: Kevin Moonen
First Dive: 2005 **First Freedive:** 2015
Total Dives: 500+ scuba dives
Club: Lagoon Divers
Certification: 3 Star CMAS Diver
Other Certifications:

- 3 Star Freediver
- Basic Nitrox Diver

Favourite Dive Site Local Waters: Gorishoek "De Blokken" & "Wissenkerke", two dive sites in the "Eastern Scheldt" (Dutch: Oosterschelde), a former estuary and the largest national park in the Netherlands, founded in 2002.
Preferred Type of Dive: A 'constant weight' dive.
Most Spectacular Dive: A freedive in South Africa (Indian Ocean, near the mouth of the "Groot Brakrivier") as part of a population study of sharks. "During this dive we first came across a full-grown moonfish (Mola mola) and later we had an encounter with three white sharks (*Carcharodon carcharias*) that kept circling around us".

EVANESCENT

FEATURE AND PHOTOGRAPHY **PAOLA IDRONTINO**

"When I experienced diving for the first time, I became enchanted with what I saw. There is so much beauty hiding beneath the waves and with this project I wish to bring some of that beauty back out of the ocean".

Born in Italy, Paola Idrontino is a multidisciplinary artist based near Barcelona. She moved to London in 1997 to study art. In 2004 she completed a first class BA (Hons), in graphic design at Central St Martins College, London. In 2005 she launched Papayapie.com, with the intention of exploring new ways of highlighting and dramatising the natural silhouette of the body using costumes and accessories.

She is stirred by a passion for story telling, textile and beauty within nature, otherworldly wearable costumes and creatures from the deep sea. With an underpinning of traditional techniques, she exploits the manipulative properties of fibres and combines them with unexpected and widely contrasting materials, both new and recycled.

"When I experienced diving for the first time, I became enchanted with what I saw. There is so much beauty hiding beneath the waves and with this project I wish to bring some of that beauty back out of the ocean".

In 2016, inspired by the declining health of coral reefs worldwide, Paola began her largest project to date: Evanescent; a 2x4 metre textile and mixed-media sculpture which portrays coral bleaching caused by climate change. This sculpture was completed in May this year.

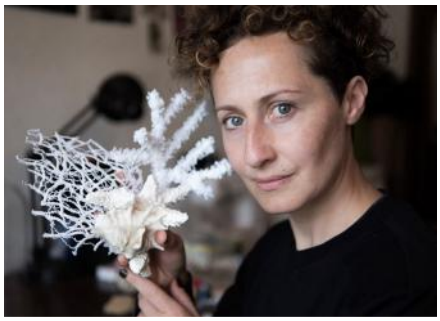
"As an individual, I can take action to change the fate of our world's oceans. As an artist I feel responsible to present the story of our oceans in ways that engage a global audience and create awareness that leads to the necessary action".

Coral Reefs are an Essential Ecosystem:

- They provide spawning and feeding grounds for many types of fish.
- They protect coastal areas from big waves, floods and storms.
- Billions of people depend on coral reefs for food and income from fishing.
- The world has lost roughly half its coral reefs in the last 30 years.
- Climate change, pollution, ocean acidification, and destructive fishing practices are putting pressure on this essential ecosystem.
- Coral bleaching is caused by the progression of global warming and a subsequent rise in sea temperatures.

"No water, no life, no ocean, no us!"
SYLVIA EARLE

The ocean is where we came from…and where we are going…



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FACEBOOK: @paolaidrontinoart

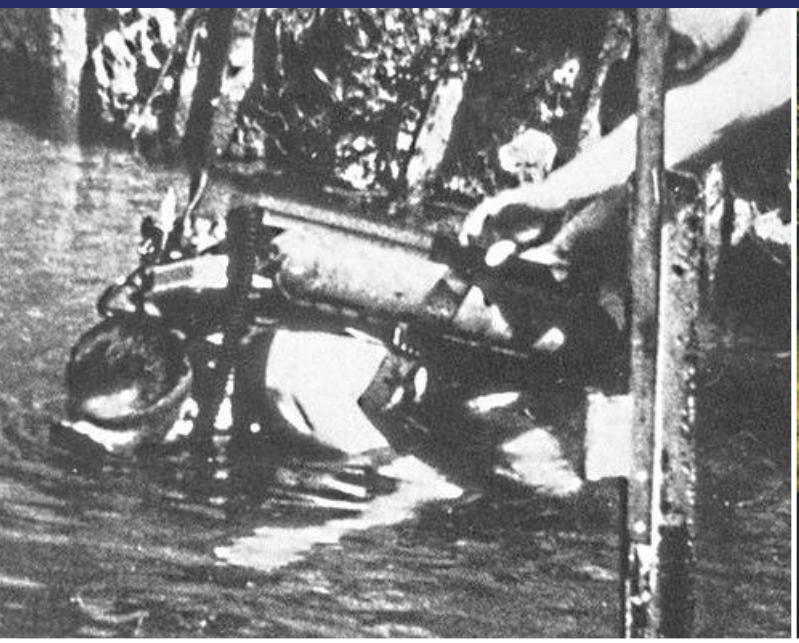
75 YEARS OF SPORT DIVING
HOW IT ALL BEGAN

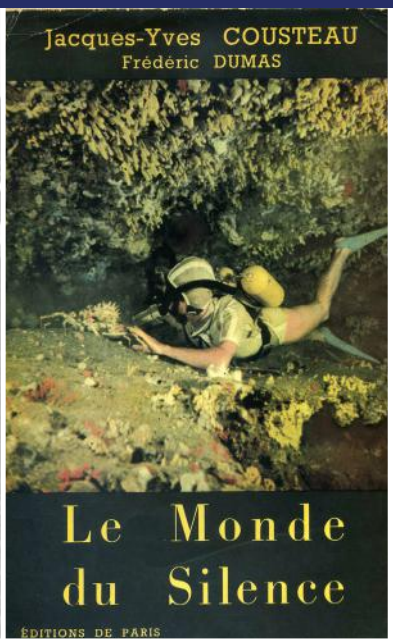
FEATURE **DIRK DERAEDT** AND **PATRICK VAN HOESERLANDE**

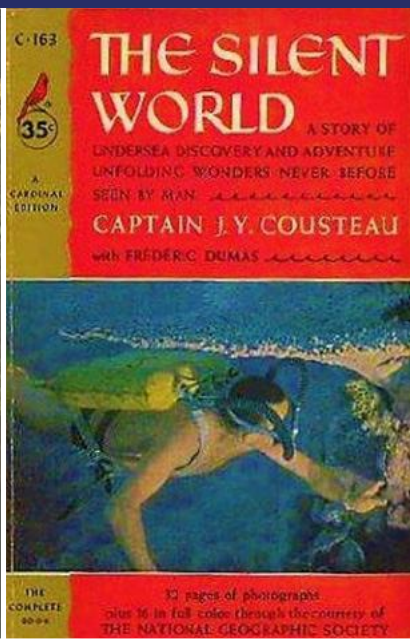
Assigning the origins of sport diving to one person or one company may be a little unjust. Many other dive pioneers, engineers and companies developed similar devices and many organisations introduced diving equipment and organised training.

Citroën converted to be able to drive on gas.


HOUBIGANT







TOP ROW: 1. Winter 1943, Cousteau is testing a first prototype of his regulator in the Marne. **2 & 3.** Book covers by Le Monde du Silence and The Silent World
BOTTOM ROW: 1. The two inventors of 'Le Scaphandre Autonome' – diving legend Jacques-Yves Cousteau (left) and engineer Emile Gagnan. **2.** Prototype of the first Cousteau-Gagnan regulator, also known as the CG43 or the 'Scaphandre Aire Liquide' Photo ©Aqua Lung / M. Cabrère. Photo h: Cousteau is getting ready for a dive with a prototype.

2018 is a special year for us divers. In 1943, diving with an on-demand breathing device that allowed the diver to breathe air under water without a connection to the surface became a reality. This working prototype was designed by Jacques-Yves Cousteau and Emile Gagnan. Designed, however, is not the right word, because their device was based on, among other things, the model for which Benoît Rouquayrol and Auguste Denayrouze filed patents in 1860 and 1864. But more about that later.

Shortly after testing their invention the first regulators, based on the prototype from Cousteau and Gagnan, were marketed under the name Mistral from Aqua-Lung. This commercialization opened the door to diving to the general public. We can therefore say, that 75 years ago, diving as a sport was born. Reason enough to dedicate a number of articles on the first regulators invented. In the context of this anniversary, we will cover the following topics:

How It All Began: we look through the history of the regulator until the Mistral is invented. Le Prieur and Rouquarol-Denayrouze's inventions are well known, but there were many others. For example, Georges Commeinhes invented a working regulator almost at the same time as Cousteau-Gagnan, but died prematurely. We will describe and explain some of these inventions and why they did not make it.

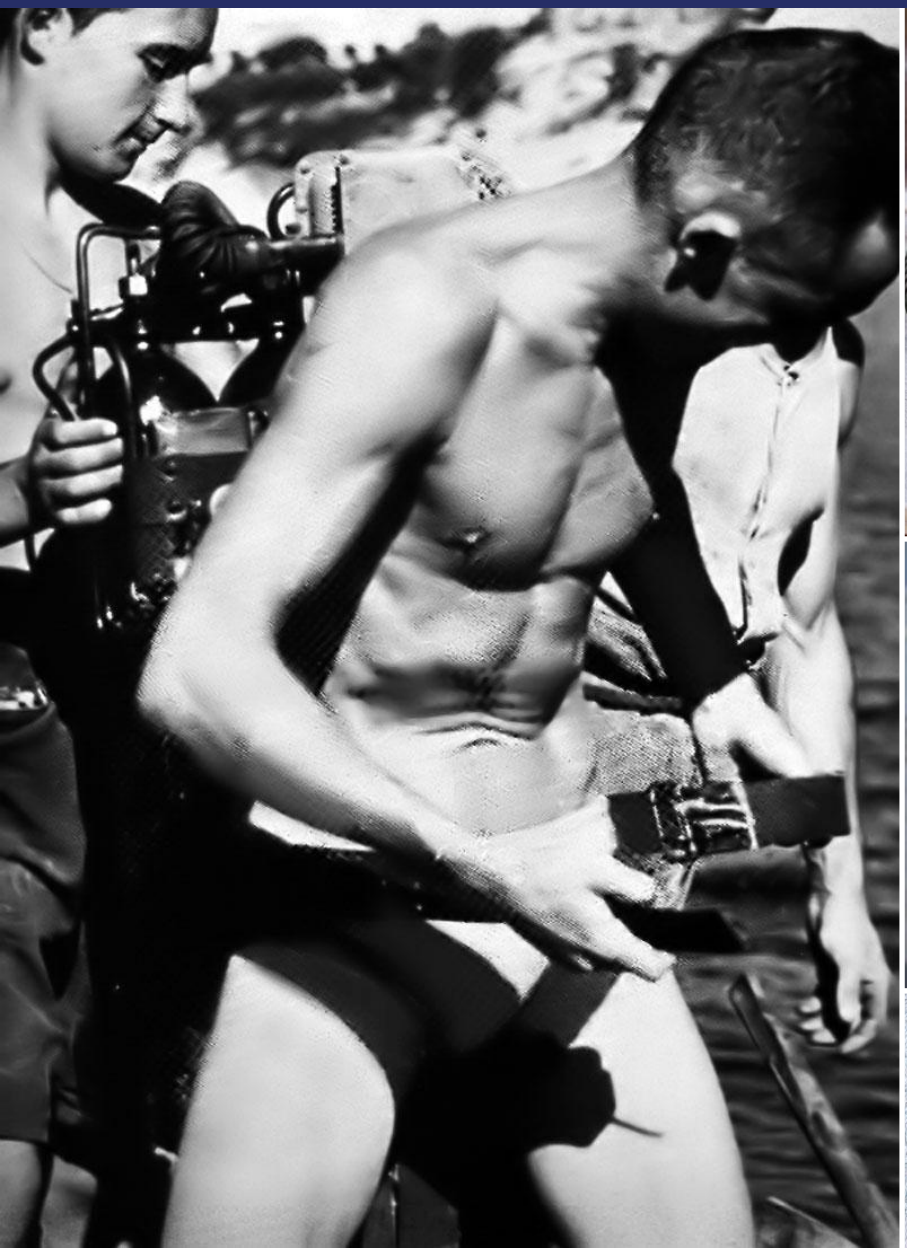
How Does the Single Stage Regulator Work?: in this article we'll delve a little deeper into the technicalities of the first single-stage regulator than what is found in a standard dive book.

Vintage Diving: we'll explore diving with a single stage Mistral.

THE YEARS BEFORE

Although the history of sport diving is only 75 years old, our urge to swim amongst fish is probably as old as our race. We do not know that for certain because no evidence was found. Although some believe the theory of "homo aquaticus", there was no evolutionary return to the aquatic environment as it happened with whales. Throughout the history of mankind we find evidence of a continuous desire to return to the world we as divers know so well. We are still not one with the fish, but we are not far away from that aspiration.

The invention of a technical masterpiece such as the single-stage regulator is the result of the combination of manufacturing possibilities (how exact and how strong can something be produced), material knowledge (what is known and available), many failed experiments (and therefore people willing to take risks), ingeniousness (new ways of solving problems), seeing opportunities and pure luck. 1943 was a year in which all the above-mentioned elements came together. So you may wonder for example, what would have happened if at the time of Rouquayrol-Denayrouze technology would have been mature enough to produce high-pressure tanks, then would they not have been the fathers of diving? And



LEFT: Cousteau getting ready for a dive with a prototype. **RIGHT: 1 & 2.** The legendary Mistral regulator (front and back). Photos by Dirk Deraedt. **3 & 4.** The Royal Mistral regulator (front and back). Photos by John Swinnen.

what if Europe would have lived in peace in 1943? Or if Gagnan as an engineer would not have been interested in gas reduction valves? We must therefore consider every invention leading to the year of 1943 as a necessary step in the development of our sport. Let's take a look at our heroes.

The most famous diver from Antiquity is the Greek Scyllis. When he was brought aboard around 500 BC, he learned that the Persian King was planning to attack the small Greek fleet. He grabbed a knife and jumped overboard. In spite of their efforts, the Persians could not find him and considered him drowned. However, he came back under the cover of the night. He swam from ship to ship with the aid of a hollow straw as a snorkel and cut through all anchor cables. This drove off the entire fleet and a Persian victory was thwarted.

Diving with a hollow tube had its limitations and taking a bag of air underwater did not meet expectations. The search for an improved underwater breathing apparatus started early in history. In the third century BC, Aristotle mentioned a breathing apparatus that allowed a person to stay underwater for a longer period of time. However, much is not known about this device.

In order to have access to larger air supplies other than a pig's bladder, some adventurers experimented with diving bells (in 1535 Guglielmo de Loreno developed the first diving bell). These were in fact nothing more than a large, inverted bucket containing a bubble of air. After a dive, a free diver could, instead of surfacing, swim into the bucket to catch a breath of new air and stay at depth for a little longer and waste less time having to resurface. The diver could repeatedly do this until the air supply was no longer fresh enough. To stay down longer, they had to find a way to refresh the air. In 1650, Otto von Guericke invented the first effective air pump – an air ventilation system which could be connected to the dive bell. Edmund Halley patented it in 1691 as a weighted diving bell with an umbilical cord attached to a surface pump.

The bell and pump scaled-down little by little from a barrel that enclosed the diver (in 1715 John Lethbridge constructed an oak dive cylinder which was placed under pressure via an air hose where the operator could move his arms through holes in the cylinder) to a helmet worn on the diver's head. This system was developed in 1826 by Charles Anthony and John Deane. They patented it in the same year a firemans helmet was secured with straps to the body and connected with an air hose. Hard hat diving was born.

Diving in cold water for longer periods soon required thermal protection, and so the first diving suits came about. From then on, diving evolved fast. In 1828, the Deane brothers used their helmet in combination with a diving suit. A few years later, in 1837, the German inventor, Augustus Siebe who lived in England, had combined the Deane

TOP: Diving pioneers from the Groupe de Recherches Sous-Marines, including Cousteau (far left), Taillez (third from left) and Dumas (second from right).
OPPOSITE PAGE: Jacques-Yves Cousteau's wife, Simone Cousteau – the first female diver donning scuba equipment in 1945.

diving helmet with an air-cured rubber suit. This completely sealed diving suits connected to air pumps on the surface and became the first reliable suit of its kind. Because it is also the prototype of today's models, Siebe was awarded the title of "father of diving" after his death. When we speak about scuba diving and sports diving as we know it today, the inventors had to make away with the air hose. An interaction between technical possibilities and experimental ones was needed. A complex invention is rarely one created from a sudden idea, but usually the result of a continuous improvement of existing ideas, concepts and prototypes put together.

The English inventor William James won the race for the first workable scuba equipment in 1825. Unfortunately, there is no evidence of a dive actually performed with his equipment and his invention was not followed up. It was a dead end – he could hardly claim the title of "founder of recreational diving".

Interesting fact is that in 1828, Lemaire d'Angerville applied for a patent for his invention in which an air bag was placed against a divers chest. Sometimes old concepts are reinvented.

The French mining engineer, Benoit Rouquayrol and Navy lieutenant, Auguste Denayrouz came close to earn the title in 1865 with their patent for the 'Aerophore'. This device consisted of a horizontally fitted steel tank on the back of a diver which was connected via a series of valves to a mouth piece. The innovative element of this device was that the air was only supplied when the diver inhaled. A membrane regulated the breathing pressure as a function of the ambient pressure that came from the low-pressure tank (15 to 25 bar), which was connected to a surface pump via an air hose. The diver could however disconnect the air hose to dive independently for a few minutes. The 'Aerophore' was the first 'on demand' autonomous underwater breathing apparatus and is therefore the forerunner of our modern scuba equipment. For years it was the standard equipment of various navies, and Jules Verne used it in his "20,000 Leagues Under the Sea".

Yet the duo Rouquayrol-Denayrouze did not win the title. Probably due to the technical limitations, they could only use a low-pressure tank, which restricted the diver's autonomy to a maximum of 30 minutes at 10 m in the most advanced version.

We have to wait until 1933 before the concept was greatly improved by the French captain Yves Le Prieur. He improved the invention of Rouquayrol-Denayrouz by combining it with a specially designed valve and a high-pressure tank (100 bar). As a result, the diver had a greater autonomy and was not hindered by all kinds of hoses and lines. However, the device was no longer on-demand. The diver could breathe by manually opening a valve. The exhaled air escaped along the sides of the mask. Le Prieur realised that a great invention alone was not enough to claim the title and so he founded the world's first scuba diving club, called 'Le Club des Scaphandres et de la Vie Sous L'eau'. Too bad for him, his model did not receive enough support to give him a prominent place in history.

Why the 19th century invention of Rouquayrol and Denayrouze was forgotten, we do not know. The device was, however, the basis for further work. Until 1943, a "regulator" provided either continuous air, or after manually opening a valve.

COUSTEAU – GAGNAN

The years before the successful invention, Cousteau and his comrades had made various attempts to – with varying degrees of success – dive with other devices. Experiments with self-manufactured oxygen devices were almost fatal: pure oxygen was inhaled through a rudimentary rebreather, but at a depth of 15 metres the respiratory gas became toxic and Cousteau, after severe convulsions, lost consciousness as a result of which he nearly drowned… With the Fernez apparatus too, in which the diver was supplied with air by a pump through a hose, things went wrong: this time it was Dumas who almost died after a rupture of the hose caused a sudden under pressure in his mask. As mentioned before, Commander Le Prieur's device was too limited in terms of autonomy, so Cousteau continued to look for a device that was both safe and provided the necessary autonomy without being physically dependent on the surface.

In December 1942, thanks to his father-in-law and director of Air Liquide, Henri Melchior, Jacques-Yves Cousteau met the engineer Émile Gagnan from Air Liquide Paris. The latter was specialised in industrial gases and worked on a regulator for truck and car engines to run on coal gas. This regulator was needed to bypass the restrictions on petrol imposed by the Germans during the war. Cousteau understood that the regulator of Gagnan could be converted to advance the device of Rouquayrol-Denayrouze. Together they applied this improvement. After a few unsuccessful attempts, they succeeded and managed to put together an incredibly safe, reliable, and easy to use device. In January 1943, they connected this regulator to a dual air tank, and a mouthpiece. They tested this configuration in the middle of winter, in the river Marne.

The test dive was not without its problems. Upright, there was a constant flow rate with the head lower – however, Cousteau barely got any air. The device worked satisfactorily only in the horizontal position. Disappointed, he left the icy water, but on the way back home the two men made some adjustments, including a second hose so that the exhalation takes place against the membrane in order to minimize the pressure differences.

THE FIRST SCUBA DIVE

In June 1943, at 'La Plage de Barry', a small beach in Bandol in southern France, a skinny 33-year-old man gets ready to step into the water. Besides a diving mask, fins and a weight belt, he carries on his back a combination of three steel compressed air cylinders. At the top, the unit is equipped with a device the size of an alarm clock, which is connected to a mouthpiece by means of two rubber hoses. The man is an officer of the French navy and is called Jacques-Yves Cousteau. Cousteau is not alone, he is assisted by two friends – Philippe Taillez, a colleague marine officer and Frédéric Dumas, at that time the best free-diver and underwater hunter of the Côte d'Azur. Also present is Simone Melchior, Cousteau's wife.

Cousteau enters the water. After Dumas hangs several kilos of extra lead on his belt, Cousteau drops to the bottom until he lands on the sand a few metres deeper. "I could breathe without any trouble. There was a soft whistle when I inhaled and a faint gush when I exhaled again. The regulator adjusted the pressure precisely to my needs. With a feeling of being on forbidden territory, I was looking into the silent world underwater." The first ever scuba dive had become a reality.

FRAMEWORK

A HISTORICAL PLACE

The 'Plage de Barry' in Bandol is located on the Rue Albert. Since 1997 there is a memorial that refers to this first memorable dive, "Ici en 1943, les pionniers de la plongée sous-marine, J.Y Cousteau, F. Dumas, P. Tailliez, procéderent aux essais du scaphandre autonome." [Translation: Here in 1943, dive pioneers, J.Y Cousteau, F. Dumas, and P. Tailliez, continued their tests in autonomous diving]. On the other side from the street is the 'Villa Barry', where Cousteau and his friends lived during the war. Now it is a hotel.

From then on, the trio – Cousteau, Taillez, and Dumas – made hundreds of dives. First in familiar places on the French Côte d'Azur, which they knew well from their countless free dives, and later, with the "Groupe de Recherches Sous-Marines", in other places all over the Mediterranean. Step by step they dove deeper, and with it, the underwater activities and the field of action expanded. The team photographed and filmed everything, they hunted for fish and dived all the wrecks. The French navy mines were laid, submarines were filmed, and the effects of explosions on the human body were tested.

FRAMEWORK

BOOK TIP: LE MONDE DU SILENCE

If you want to know the full story of these first dives, we recommend you read the book 'Le Monde du Silence', in which Cousteau and Dumas describe the pioneer years of scuba diving. The book is a series of fantastic adventures and anecdotes in the period from the first dive (1943) to the purchase of the Calypso (1950). That is if you can find the book, as unfortunately no more recent editions exist.

French version: 'Le Monde du Silence', Livre de Poche, 1959, ISBN-13 978-2253006572. Not to be confused with the film, 'Le Monde du Silence', a documentary about the first expeditions with the Calypso, about the period after 1950.

COMMERCIALIZATION AND FURTHER DEVELOPMENT

Cousteau and Gagnan patented their invention in 1945 under the names, "Scaphandre Cousteau-Gagnan 1945" and "CG45" and, for export to English-speaking countries, "Aqua-Lung". The actual commercialization began a year later, on the 26th of May 1946, with the creation of "La Spirotechnique", a subsidiary of Air Liquide. The logo of the brand was inspired by a historical underwater photo from 1943 – the steering wheel of the Dalton. This wreck is located near l'Ile de Planier, Marseille. The photograph was taken during the film "Epaves", the very first film recorded with the help of diving equipment of the Cousteau-Gagnan brand.

The CG45 is the first scuba regulator that came on the market. CG45 is actually a two-stage release, in which the breathing gas is reduced to the ambient pressure in two phases from the high pressure tank, a process for which a fairly complex mechanism is required. Both stages are located in one housing.

In 1955, "La Spirotechnique" presents an improvement (and partly also a simplification) of the CG45: the "Mistral". The Mistral is extremely simple in design and a very robust one-stage regulator in which the cylinder pressure is reduced in one step to the ambient pressure.

In 1963, "La Spirotechnique" introduces an improved version of the Mistral with the name "Royal Mistral". Again a single stage regulator, but more user-friendly and some versions have a high pressure port for the connection of a manometer. A DIN connection will then also become possible.

SUCCESS STORY

The Mistral becomes a success story, not only in France and Europe, but all over the world. Under the license of "La Spirotechnique", similar regulators worldwide are marketed by other producers and with other brand names. In the 50s, 60s and 70s, most people learned how to dive with a Mistral.

Although the Mistral was the preferred workhorse for many navies (the French navy used the Mistral until 1989) and other professional divers, in recreational diving during the 70s, the model was beaten by the more user-friendly two-stage single hose regulators, and "La Spirotechnique / Aqualung" lost its dominant market position.

The iconic Mistral, with its large chromed housing and the two ribbed rubber hoses that join together in a mouthpiece, is the regulator of the pioneers of our beloved sport. Not without melancholy, these pioneers look back to the charms of diving with a Mistral, and they muse on the bubbles escaping at the back, and the taste of water that they swallowed occasionally.

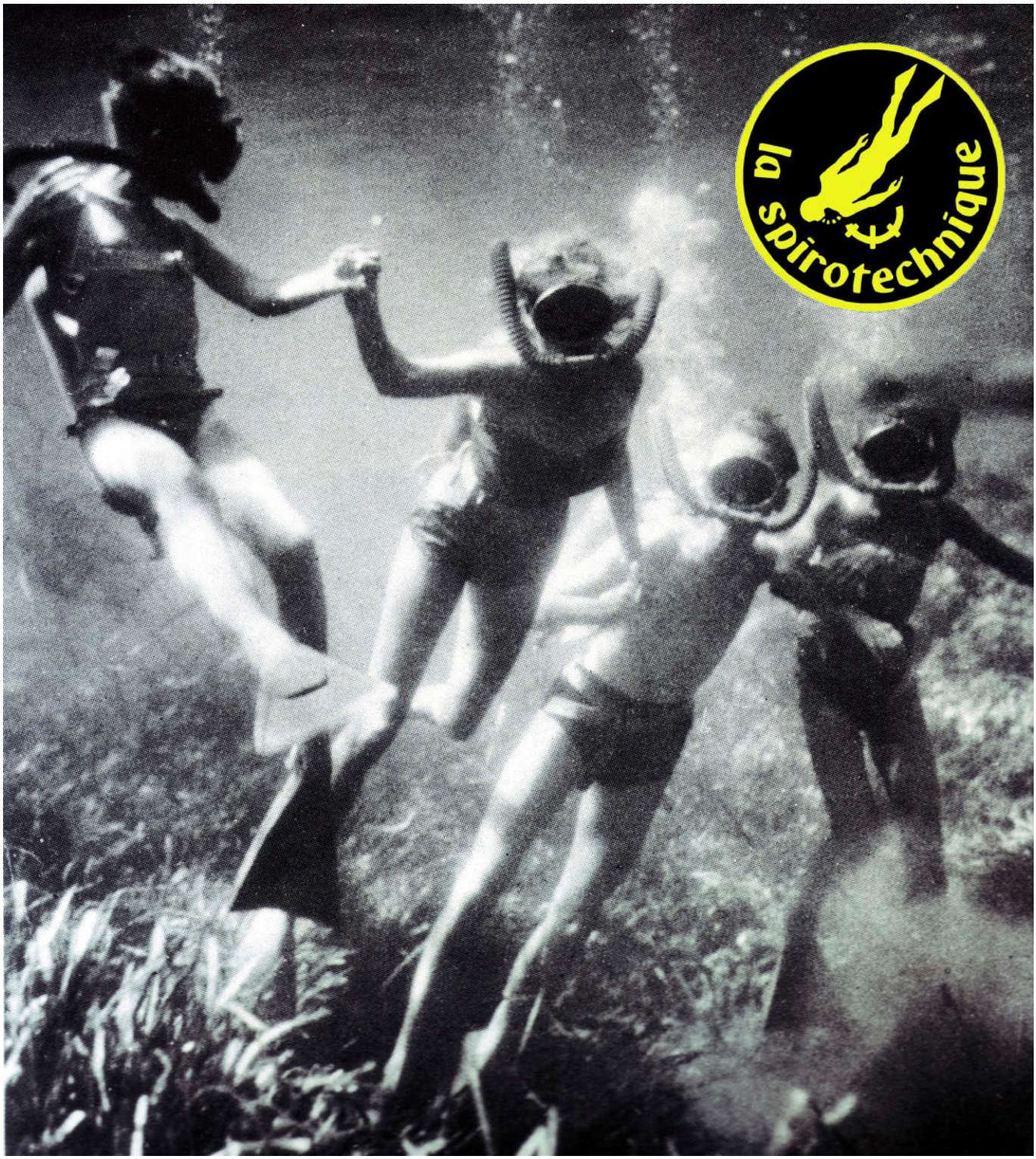
EPILOGUE

Assigning the origins of sport diving to one person or one company may be a little unjust. Many other dive pioneers, engineers and companies developed similar devices and many organisations introduced diving equipment and organised training. Nevertheless, the crucial role of the duo, Cousteau-Gagnan can hardly be overestimated. Making the CG45 and especially the Mistral available to the general public in the post-war years, certainly for recreational purposes, is the basis for the development of diving as we know it today. The phenomenal books and documentaries of Jacques-Yves Cousteau and his team did the rest.

FRAMEWORK

NOTEWORTHY FACTS

The first hundreds of dives with autonomous compressed air equipment were of course made by Cousteau himself, first on his own initiative together with his companions, Dumas and Taillez, and from 1946 as members of a research group set up by the French navy, the GRS (Groupe de Recherches Sous-Marines). It



MAIN PHOTO: The Cousteau underwater family portrait. L-R: Cousteau's son Jean-Michel, his wife Simone, Jacques-Yves Cousteau himself, and his son Philippe.
TOP RIGHT CORNER: La Spirotechnique's logo.

goes without saying that these very first dives also yielded many 'firsts', of which we mention a few below. The story of all these – some dramatic firsts – is described in detail in 'Le Monde du Silence':

- **The First Female Diver:** Cousteau's wife Simone Melchior.
- **The First Youth Divers:** Cousteau's sons, Philippe and Jean-Michel.
- **The First Wreck Dive:** on a tugboat submerged during the second world war, at a depth of 15 metres, in the port of Toulon.
- **The First Cave Dive:** 24th of August, 1946 with the GRS in the siphon of the Fontaine de Vaucluse near Avignon.
- **The First CO Poisoning:** during the above-mentioned cave dives where Cousteau and Dumas had a near fatal incident. They were taken out of the water by their employee Maurice Fargues at the very last minute.
- **The First Fatal Accident:** 17th September, 1947, Maurice Fargues of the GRS crashed in a record attempt to deep dive with Aqua Lung. At a depth of 120 metres he lost consciousness by nitrogen narcosis and/or oxygen poisoning.
- **The First Underwater Documentary:** 'Epaves' (1943) in which both the cameraman and the 'actors' dove with compressed air equipment.
  www.youtube.com/watch?v=shv9f3rJ9cU

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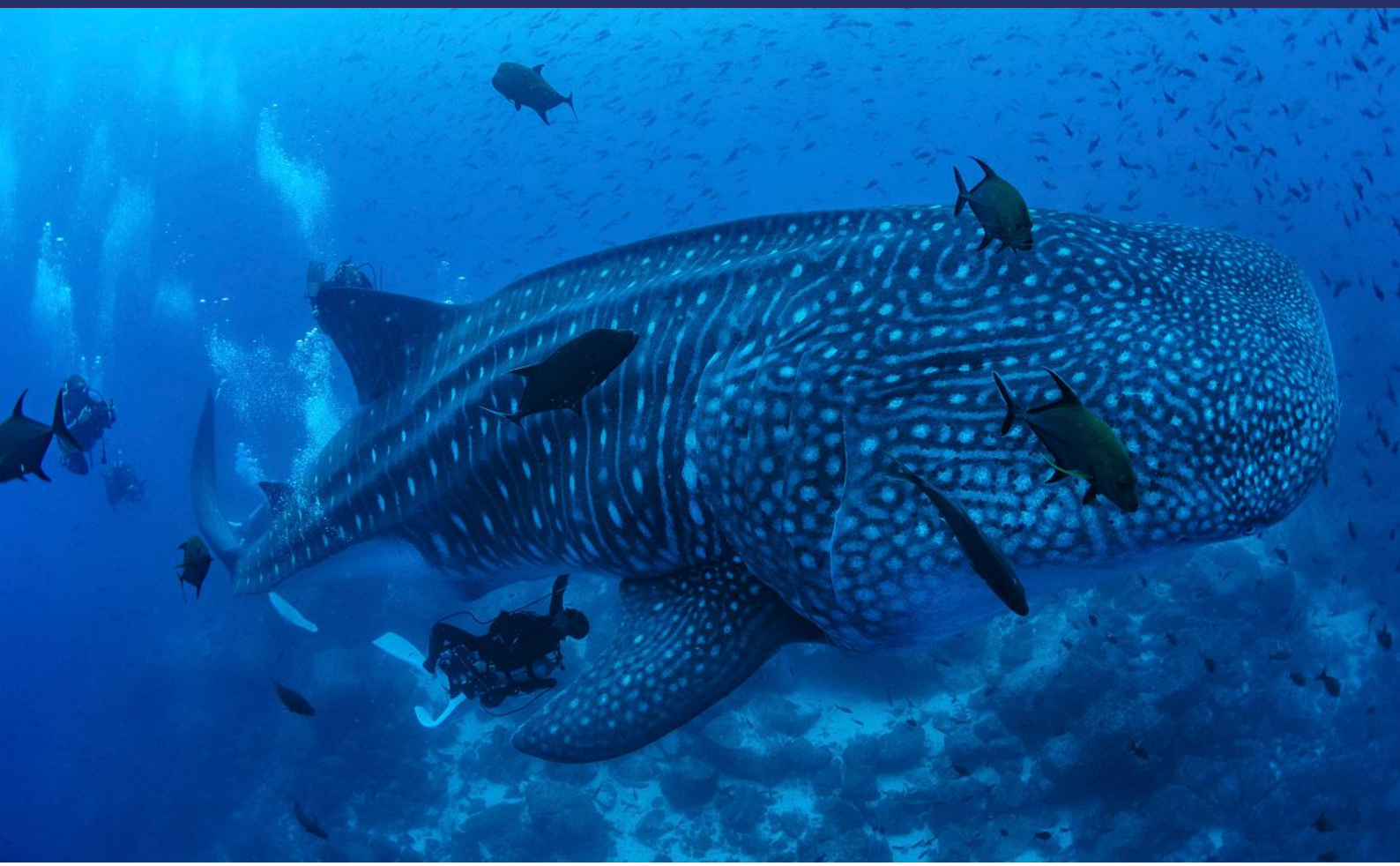
Information about the first scuba equipment can be found on numerous websites, including:
www.frogmanmuseum.free.fr
www.spiro-vintage.com

Dr. Rui Matsumoto taking an Ultrasound.

UNDERWATER ULTRASOUND
& FIRST EVER BLOOD SAMPLING ON ADULT WHALE SHARKS, EARTH'S LARGEST FISH

FEATURE **MARINE MEGAFAUNA FOUNDATION**
PHOTOGRAPHY **SIMON J PIERCE – WWW.SIMONJPIERCE.COM**

Innovative techniques used on Whale Sharks in the Galapagos to find out more about their reproduction.



TOP: Dr. Rui Matsumoto taking an Ultrasound. **BOTTOM ROW:** 1. Tagged Whale Shark at Darwin Island. 2. Alexandra Watts taking a tissue sample. 3. Jonathan Green inspecting satellite tag clamped to tip of dorsal fin.

Researchers in the Galapagos have successfully completed ultrasounds on free-swimming whale sharks, and taken blood samples from adult whale sharks for the first time ever in the wild. The incredible results allowed them to see and identify reproductive organs, such as the ovaries, and even developing follicles. These technologies hold promise for finally unlocking the mystery of breeding in the world's largest sharks.

A team of global whale shark experts, comprised of scientists and conservationists from the Galapagos Whale Shark Project (Ecuador), Galapagos National Park (Ecuador), Okinawa Churashima Foundation (Japan), University of San Francisco/Galapagos Science Center (Ecuador) and the Marine Megafauna Foundation (USA), has just returned from a two-week expedition to Darwin Island, in the far north of the Galapagos Archipelago.

This remote volcanic island is one of the few places where huge adult female whale sharks, up to 14 m (45 ft) in length, are commonly seen each year. The main aim of the expedition was to assess the sharks' reproductive state.

Jonathan R. Green, the expedition leader and founder of the Galapagos Whale Shark Project, notes, "Almost nothing is known about the reproduction of these giant sharks. After I first saw these huge female whale sharks in the far north Galapagos, I realised that this was a great opportunity to learn more. We've been able to put together an experienced team to research sharks in this remote area, one of the world's most isolated dive sites."

Dr. Simon Pierce, an expedition member from the Marine Megafauna Foundation, explains further, "Whale shark breeding is a mystery. Only one pregnant shark has been physically examined so far, back in 1995 in Taiwan. That 'megamamma' shark had 304 little whale shark eggs and pups inside, all less than 60 cm in length."

The team conducted scans using a 17 kg ultrasound system in a waterproofed case. Whale sharks have tough protective skin, more than 20 cm thick on some individuals, so the 30 cm penetration of the ultrasound waves proved a challenge – not to mention the difficulty of carefully checking the whole belly area of a gigantic shark while it is swimming. Dr. Matsumoto had to use a propellor system mounted on his air-tank to keep up with the sharks.

"We use some interesting technology anyway, but working with the Okinawa team was something else", commented Dr. Pierce. "I felt cool by association. We saw dive groups a couple of times at the site, and I can only imagine what they thought – why is that guy diving with a briefcase? And a jetpack?"

Dr. Matsumoto reports that the initial

TOP: Kiyomi Marakumo taking a whale shark's blood sample. **BOTTOM ROW:** Photos by Jonathan R. Green. 1. The Research Team. 2. A different method was used to attach a satellite tag by clamping it to the tip of the dorsal fin. Close-ups of the tags. (www.galapagoswhaleshark.org/)

results were promising. "We confirmed the presence of follicles in the ovaries but none of the images captured embryos or egg capsules inside the uterus. These adult female sharks we saw at Darwin Island might be on their way to mate further offshore. I am confident that we can judge the sexual maturity, and probably also determine the pregnancy of whale sharks in the field, using the underwater ultrasound".

The researchers attached satellite-linked tags to the sharks to track their onwards movements. Professor Alex Hearn from the University of San Francisco/Galapagos Science Center explains, "We've tagged whale sharks in Galapagos before, but there are lots of predatory sharks at Darwin and they often try to eat the tags, which can rip them out of the whale sharks almost immediately. To reduce early tag loss, we tried a different method on this trip, clamping the tags to the tip of the dorsal fins. All tags are transmitting well, so we should get great information on where these sharks swim over the months to come."

Project member Dr. Alistair Dove, from Georgia Aquarium, notes that these tags could document some amazing behaviours: "Whale sharks are already known to be the deepest-diving of all fish. The current depth record is 1,928 m – well over a mile – set by a juvenile whale shark. Larger, older animals can generally dive deeper than young smaller ones, so perhaps we will challenge that record."

Kiyomi Murakumo, from Okinawa Churashima Foundation, successfully collected blood samples from six adult sharks – no easy job. Her colleague, Dr. Ryo Nozu, analysed the results immediately following the trip: "Sex steroid hormone levels in the blood are an excellent way to monitor reproduction in individual sharks. This study measured levels of estradiol, progesterone and testosterone of wild, adult female whale sharks for the first time in the world. Estradiol could be associated with follicular development, and progesterone could be involved in ovulation and pregnancy. Over time, as we sample more whale sharks, we can build up a complete picture of their reproductive cycle by combining the blood sampling with the ultrasonography."

Jonathan R. Green added, "These big female sharks are not going to give up their secrets easily. One thing is clear, there's a lot of work still to do to understand the reproductive processes of this endangered species. However, this trip proved that it is possible to research their breeding in the wild. We'll continue to hone our techniques and build upon this knowledge, as we need to understand these enigmatic sharks and protect them through their life cycle."

This project was supported by Galapagos Conservation Trust, Planeterra Foundation and Temperatio.

We spent a good 2 hours taking a lot of shots of the final sunset in Arborek, with its blue sky of various tones, the orange sun on the horizon, playful fish underwater and a beautiful long peaceful jetty inbetween, capturing the moment perfectly.

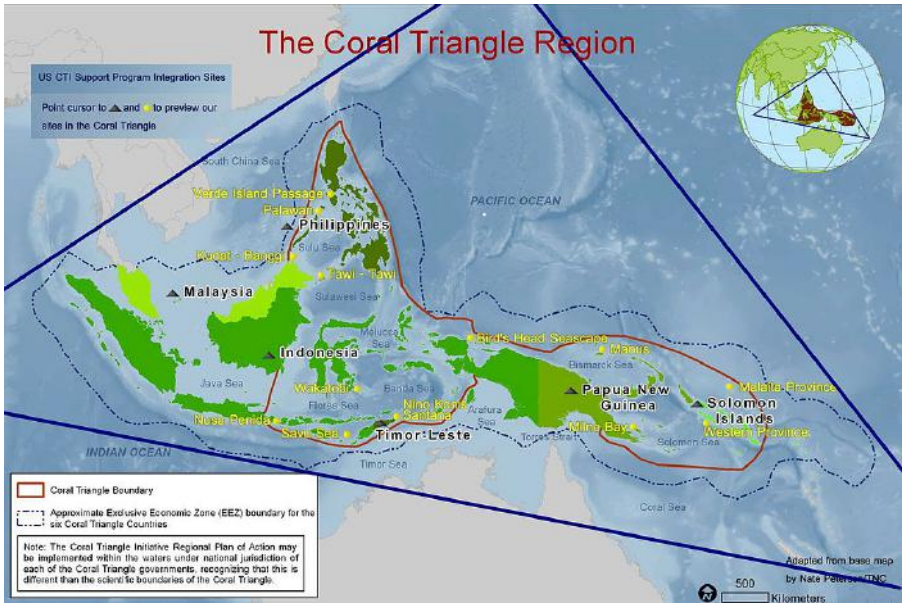
RAJA AMPAT

THE HEART OF THE CORAL TRIANGLE

FEATURE AND PHOTOGRAPHY **LEVENTE ROZSAHEGYI (@LEVENTE.PHOTOGRAPHY)**

We visited 36 dive sites, a number of islands, trawled to collect samples from the water, measured coral sizes, counted the number of fish, had a few blackwater dives and of course, we had a lot of fun.

The spectacular panoramic view, consisting of 46 images taken from one of the islands on Misool Island.



This story has been running since the early 20th Century when plastic was invented by a Belgian immigrant in New York state. This invention changed the world so much, that we are currently fighting for the earth's existence. I am sure many of you are aware of the plastic island that floats in the northern Pacific and now in many other places around the world. Time is running out! Ocean Geographic has been working with various organisations trying to prevent our earth from becoming inhabitable.

My personal story is parallel to our plastic one. In November 2011, I decided to go diving on a liveaboard in Honduras, to dive around the beautiful island of Utila. In our lifetime, one event leads to another – one person we meet, leads to another. During this trip, I met an amazing Australian couple – Mick and Anastasia who travel and dive around the world. The island of Utila is famous for its diverse underwater life and its whale sharks. At this point, I used to have a point and shoot camera that did not produce great results or quality photos. During this trip I got to see Mick's amazing photos he had taken with his SLR and underwater setup, and I decided that I needed to invest myself. After a fair bit of research and USD $5k later in the summer of 2012, I had my first SLR setup – not the top of the range – but a good enough entry level.

Fast forward a year to October 2012. I went to my first Ocean Geographic trip to Papua, to Cenderawasih Bay based on Mick and Anastasia's recommendation. This was the first time I was introduced to the so-called Bird Head, the amazing remote islands of Indonesia. The Cenderawasih Bay is famous for its whale shark population that feeds on fishermen's nets in September and October each year. The phenomenon is fascinating from above and also from within the water, swimming with these gentle giants.

Fast forward again a few years to April 2017 when I already had an upgraded underwater setup, and a few competition wins under my belt.

Ocean Geographic announced an expedition for October 2018: "**ELYSIUM – ARTISTS FOR THE CORAL TRIANGLE** which engages the world's finest artists, photographers, scientists, musicians, and writers to produce a benchmark record of the flora, fauna and vista of the heart of marine biodiversity in a perspective no one has ever seen before."

The crew comprised of some of the best artists, photographers and marine scientists around the world to provide a valuable view of the current situation of the heart of the Coral Triangle. This part of the world hosts the most species of marine life in the whole world, hence it is the most affected by Global Warming, which will most probably reduce the underwater population dramatically in the coming years.

I applied to become a part of this fascinating trip in 2017 and I was thankfully accepted. My journey started quite a few months earlier as I had to prepare for this nearly 2 week trip by boat. Given the fact that we would be at sea without any connectivity (awesome by the way) for a while, any equipment I took had to have a backup, with a backup, of the backup.

There were three boats involved in the expedition to take on the three routes:

ROUTE THREE: MOLA MOLA
Cenderawasih Bay to Dampier Strait (Raja Ampat) – Sorong.
Gateway Airport: Nabire* maybe Biak
Principal Focus: Whale sharks, signature reefs of Raja Ampat, mantas, birds and rainforest.

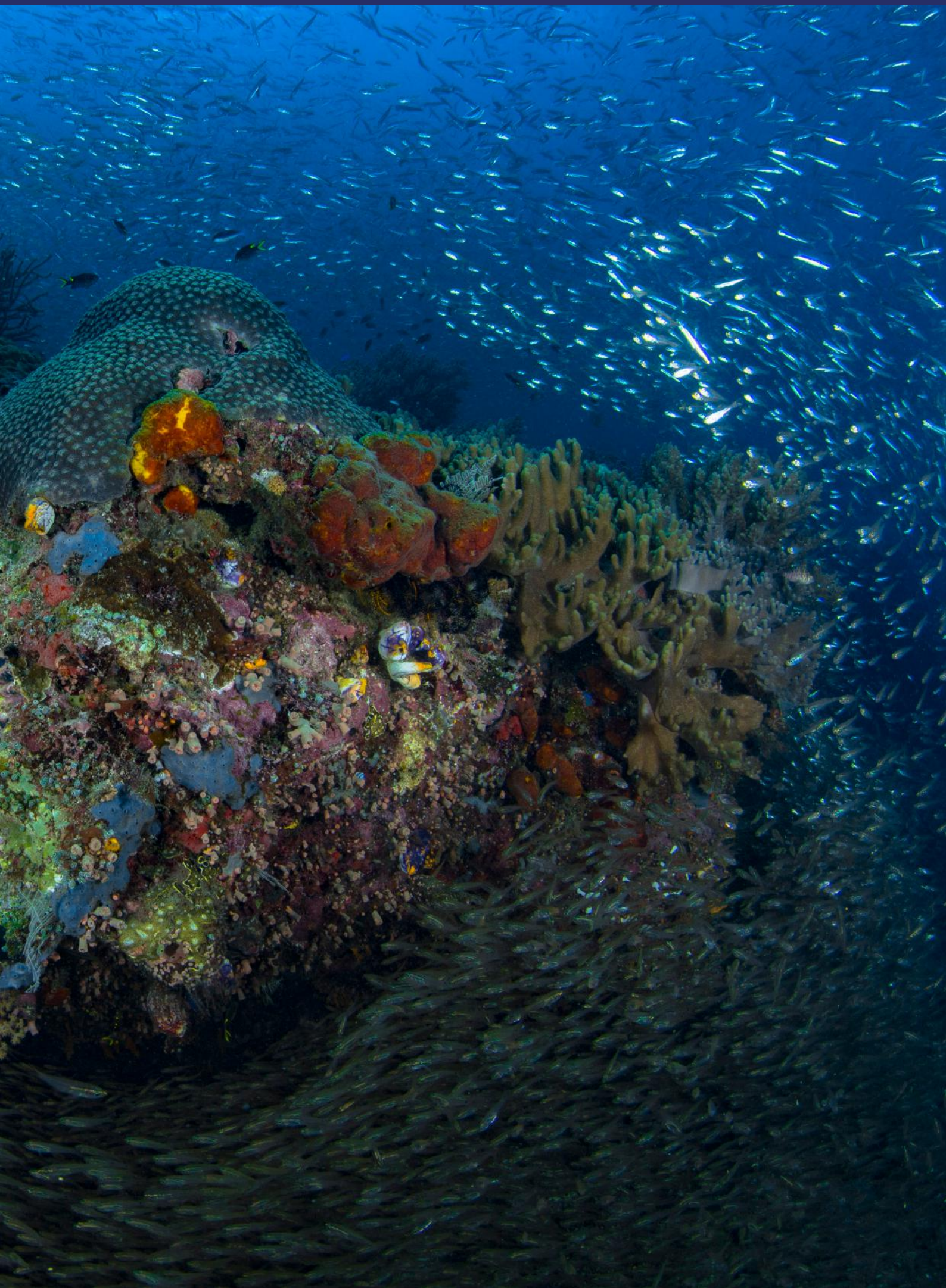
ROUTE TWO: MV GAIA LOVE:
Triton Bay, Misool, Dampier Strait – Sorong
Gateway Airport: Kaimana
Principal Focus: Most colourful soft coral reefs in Indonesia, possible whale sharks, bait balls, mantas, signature reefs of Raja Ampat, birds and rainforest.

ROUTE ONE: MSY DAMAIL II
Banda Sea to Misool (Raja Ampat South) – Sorong
Gateway Airport: Saumlaki
Principal Focus: Hammerheads, sea snakes, mantas, bait balls, signature reefs of Raja Ampat, birds and rainforest.

I flew to Jakarta through Emirates, and all the members met in one of the hotels near the airport for a pre-expedition meeting. Approximately 50 people from all around the world turned up, including Michael Aw (main organiser), David Doubilet, and Ernie Brooks, just to mention a few of the top names of the industry.

The first decision we had to make came from the weather report as our original planned route had to be altered. The Mola Mola hit a reef during the Tsunami in August so that needed repair, then the weather in the bay was not good enough for us to sail to Cenderawasih Bay. Collectively we made a decision, no whale sharks. Safety first. Our boat the Mola Mola would stay in Raja Ampat and cruise around the whole area.

All of a sudden, we had to quickly book



Our liveaboard, the Mola Mola on Route 3.

new flight tickets and sort reimbursements for 16 people. However, the crew took off to 3 different destinations in the evening on overnight flights. Just to put it in perspective on how big this country is, Sorong is about an 8 hour flight from Jakarta, and Jakarta is 8 hours from Dubai.

My great friend Cici was waiting for us at the airport when we landed in Sorong, the capital of Raja Ampat. It was great to see her after a number of years. The team consisted of divers, artists, painters, photographers and videographers, literally from all around the world. If I'm not mistaken, USA, Australia, Spain, Singapore, Indonesia, Germany, Mexico, South Africa and Turkey.

We boarded our vessel the Mola Mola, with us being her first commercial dive trip in the afternoon just before sunset. The plan was to dive for 11 days and make our way back to Sorong to then meet the other vessels. Plans are good, but they don't always work out. Our vessel, the Mola Mola had just come out of the dock as a brand new boat. Even though she looked great, she had some insulation issues and leaked when we hit some rain and also found some other issues with the design, however instead of complaining about it, our team laughed it off and made us a real team for survival!

Imagine 16 people with almost all of us with SLR underwater cameras. It's a gadget dream and a nightmare all at the same time, having to make sure everything works before getting underwater. There have been a number of technical hiccups to nearly all of us. One dome port's factory seal decided to come loose and leaked, one strobe started flashing by itself, some sync cables stopped working, a macro zoom lens wouldn't focus, just to name a few. However overall, we managed to help each other out with some backups we had brought along and it all worked out in the end.

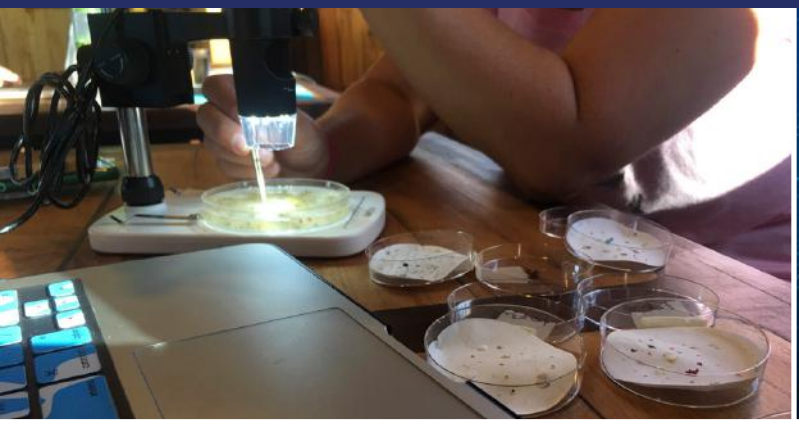
During the 11 days we visited 36 dive sites, a number of islands, climbed the Raja Ampat islands, trawled to collect samples from the water, measured coral sizes, counted the number of fish (imagine that), had a few blackwater dives and of course, we had a lot of fun.

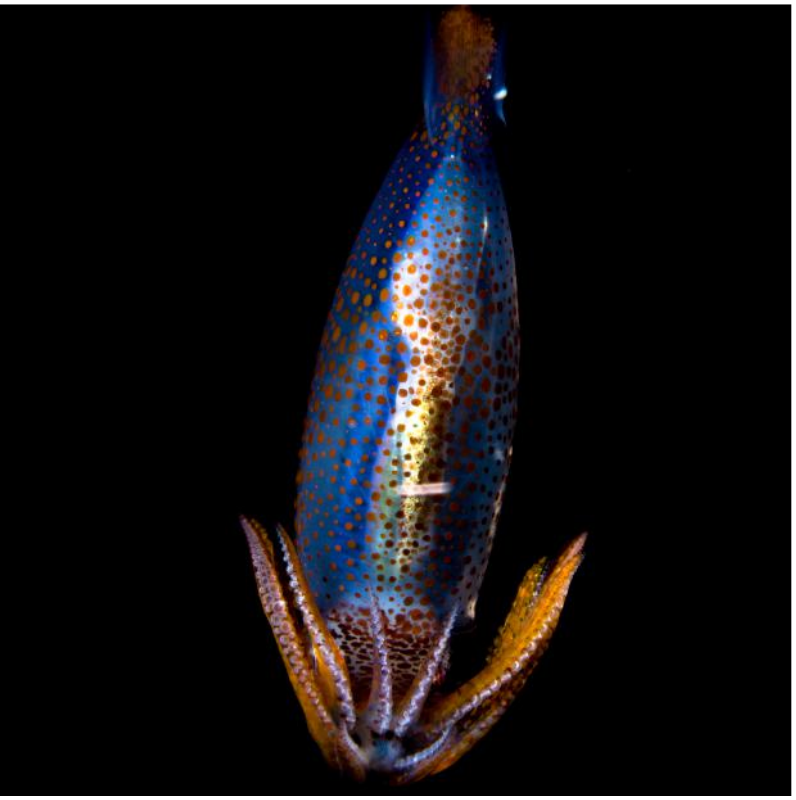
The first few days were the warm up sessions, however we saw some amazing natural phenomenons at Yanbubak Jetty.

We dove at Manta Sandy (very surprising name for a dive site) hoping for mantas. I had dived here before, 6 years prior, and had one of the best manta experiences with 3 mantas swimming around me, all to myself.

On this trip, we only got to see one manta that swam away within a few minutes with the whole team waiting in standby mode for more to come. Sadly nothing more turned up, so after an hour with still 100 bars left, we started ascending to the surface. The set of islands provide beautiful scenery to come back up to.

Coming to our fourth day's evening, we planned our first blackwater dive, which is a night dive but instead of being on a reef, it is done in the open sea, preferably in very deep water, say 600 metres. We placed a massive torch on a 5 metre line and dropped it down into the water. Three of us were connected to a metal hatch at 5 metres with a further 5-10 metres of slack. Each diver has his own lights, and torches. The idea is






TOP LEFT: Our dedicated team collected plastic samples from the surface of the water. **TOP RIGHT:** School of silverside fish. **BOTTOM LEFT:** Tiny squid sizing in at 1 cm in length from the blackwater dive. **BOTTOM RIGHT:** We started a night dive that ended up being a great blackwater dive. This tiny slug was trying to get away from me, it was a super-fast swimmer.

to "sit" and wait. The lights attract plankton, and plankton attracts little alien lookalike creatures. There was a tiny squid sizing in at 1 cm in length. I saw this little one coming out of an ink cloud and both my buddy and I froze in confusion for about a minute, but thankfully it was enough time to take a photo.

Misool island is simply full of fish. All the sites we visited, we found thousands of small fish swimming and living together around the corals. Most of the dives had rather strong currents around bommies or large pinnacles. The dive site consists of a large number of fan corals, surrounded by glass fish. They swim in unison with the water movements, so a tiny current would create a spectacular show.

After a long day of diving, we decided to get to land and climb a small rock. It had very sharp loose stones on it and not practical or a good idea to climb in flip flops, but I flew my drone and took a panoramic image consisting of 46 images. The result was spectacular and worth the climb in flip flops.

On day 9, we reached Citrus Ridge, the mangroves dive site. This location provided some amazing split shot opportunities. The water was super calm with the sun just rising, and we had plenty of time to spend in the water near the surface.

I am in favour of split shots, these photos are taken at the surface of the water, usually when its rather calm and can show what is under and what is above sea-level. There aren't that many places where this is possible as I would need corals or fish to be near the surface. Even though the dome port and the fish eye lens I used covered a very large area, it however only makes sense to have "action" close to the surface.

I found something of great interest in Indonesia – mangroves meet the coral reef and live together in harmony. The combination of both these habitats creates a very unique situation, and I was very happy to have calm waters when we arrived. The mangrove and the coral reef ecosystems have a very important symbiotic relationship, that enhances tropical and subtropical coastal environments. The coral reefs are largely dependent on coastal mangrove forests, that stabilise shorelines, improve water quality, remove pollutants, and provide nursery habitat that maintain fisheries. The mangroves create an umbrella over the corals that don't get exposed so much to sunlight, so the corals can survive living and growing literally on the surface of the water.

We dove at 3 different jetties. Jetties drag a lot of life around them, and wide angle and macro are the two lenses you want with you at these moments. I could spend hours just around a jetty looking for interesting creatures.

We visited and interviewed people on two islands, Sauwenderek and Arborek. On Sauwenderek, we asked about their habits with plastic. We played with the kids and I followed them with my drone which they had probably never seen before and they tried to shoot it down with plastic straws!

THIS PAGE: Yanbubak Jetty Bird's eye view. **OPPOSITE PAGE:** Yanbubak Jetty locals playing.

Indonesia is the second largest plastic trash producer in the world. People there have no idea about the garbage they throw away and the effects it has on the environment. Unfortunately all the big production companies in the country package everything in plastic, starting from the chocolate bars, plastic bottles, and other various items. Sadly the people of these islands haven't yet realised how the poor management of rubbish disposal is going to affect their everyday lives. Most of these people are fishermen, or live off very limited tourism.

Arborek is more advanced in tourism with 4-5 options on the island, however don't expect a 5 star hotel. They are mostly home stays, where you stay with the locals in very limited luxury, whereas Sauwenderek is even more limited. Surprisingly the island has solar power and quite an infrastructure with running water and some electricity.

I was very keen to revisit Sauwenderek island as I had taken a very nice split shot back in 2012 and wanted to recreate it. Unfortunately it didn't happen this time around, it was an afternoon dive and the sun wasn't in the right position to light up the corals which was very disappointing. In the meantime, I flew my drone to see what else I could capture from above. The sun started to set but came out of the clouds at the west end of the island. It made both myself and my friend Matty do a double take! Matty made himself a 50 cm dome port to take split shots. He and I rushed back to the boat to get our cameras and rushed back to the jetty.

We spent a good 2 hours taking a lot of shots of the final sunset in Arborek, with its blue sky of various tones, the orange sun on the horizon, playful fish underwater and a beautiful long peaceful jetty inbetween, capturing the moment perfectly.

The three vessels met in Sorong on day 11. It was great to see the same people we had parted with in Jakarta again, we got onto each other's boats, greeted each other and shared stories and experiences. The other two vessels had rough weather during the first few days of their trip, however they saw a huge fin whale as a payoff.

We spent two days debriefing in Sorong in a hotel. It was a very intense two days, there were a lot of presentations and stories to go through. The expedition is considered a success! We collected a lot of samples from the water, which the scientists have still yet to analyse in detail. We also counted the fish population in certain areas – more like the number of species – and the health of the coral reefs. Some areas were quite bleached but generally speaking, the Raja Ampat area is still quite healthy despite all the pollution coming from the major cities. The sad part of the story is that even in Sorong, plastic is literally everywhere on the streets.

The next morning, most of the group flew back to Jakarta together to have a closing lunch at the Golf Club near the airport before everyone flew back to their respectful destinations.

I came back to Dubai with a lot of memories and a lot of photos to work on.

Ocean Geographic will shortly publish a book on this Elysium Expedition and present it through the many underwater events they will take part in around the world.

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DIGITAL ONLINE 2019

EDA'S UNDERWATER PHOTOGRAPHY AND FILM COMPETITION

SUBMISSIONS OPEN: SUNDAY, 6th JANUARY 2019 | **SUBMISSIONS CLOSE:** SUNDAY, 28th APRIL 2019 @ 11:59 PM (GST)

Digital Online 2018's Awards Night and Exhibition Opening at the American University in Dubai (AUD).

DIGITAL ONLINE'S MAIN OBJECTIVES ARE:

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

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

DIGITAL ONLINE 2009-2019

Digital Online will be celebrating its 10th Anniversary! The competition was realised in 2009 as there were no other underwater photography competitions existing in the UAE at the time. Digital Online was introduced by EDA for resident photographers to develop a relationship and human interaction amongst those unfamiliar with the underwater world environment. The competition holds both local and international marine life categories to offer variety between our local and international diving enthusiasts.

The film category was introduced as an extension to the competition in 2012 to share our underwater world through motion pictures and deliver a better understanding of the habitats and surroundings.

The event, now going into its 10th year, sees the continuous and steady growth of new underwater photographers taking part and joining our regular yearly participants. The enthusiasm and passion strives on, and the drive to bring our underwater world's conservation to the forefront increases over time. The purpose of Digital Online is to keep our underwater world visible by displaying its hidden beauties and to exemplify its importance to all life on Earth through the powers of its ecosystems.

The event has attained equal success with the non-divers who come to support the participating photographers and videographers at the Awards and Exhibition Opening Night. Whether it's through discussion or articles brought to our readers through our free quarterly magazine, Divers for the Environment, the inspiration the event brings is a success in its own right.

COMPETITION CLAUSE

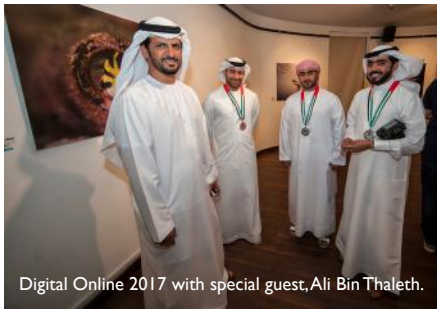
EDA does not disclose photographers' names during the judging process. The competition is run fairly and without prejudice, professionally adhering to all of Digital Online's rules and guidelines throughout.

DIGITAL ONLINE

جمعية الإمارات للغوص

EMIRATES DIVING ASSOCIATION

PHOTOGRAPHY AND FILM COMPETITION



Digital Online 2017 with special guest, Ali Bin Thaleth.

THE DIGITAL ONLINE RULES AND GUIDELINES 2019

RULES AND GUIDELINES

- Digital Online is open to all photographers and videographers of all skill levels with a valid EDA membership status. EDA membership must be renewed if expired in order to take part.
- Each competitor can only win one prize or prize package.
- Winners will choose their own prize.
- Participants are obligated to follow environmental conservation regulations and to respect the underwater world during the process of taking their stills and video. Be advised that any damage to the 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.
- By entering the competition, entrants declare that they own copyright of the submitted photographs and films and it entails an automatic acceptance of all the rules. EDA reserves the right to publish images in the 'Divers for the Environment' magazine, EDA's social media pages and on the EDA website. Images will also be used in any future promotional material for EDA events and competitions royalty free, but copyright remains with the photographer. Use of images or video will require no additional written or verbal permission from the photographer or videographer.
- 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 winners will be announced and their work displayed at the exhibition and award ceremony on the 22nd of May 2019 at the American University in Dubai. Participants who do not make it to the evening of the event will be asked to collect their prize from the EDA offices.
- Sponsors' prizes will be announced in the March 2019 magazine issue.
- We pledge to run this photography and video competition ethically and with integrity. Our judges have volunteered their time to help. The photographers' details remain hidden to the judges during the judging process.
- All judge's decisions are final.

REGISTRATION AND UPLOADING ENTRIES

- Submissions can be entered from Sunday, 6th January 2019.
- The entry deadline is Sunday, 28th April 2019, at 11:59pm (GST – Gulf Standard Time).
- 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:
  - Name-Macro.jpg
  - Name-WA.jpg
  - Name-UAE.jpg
  - Name-BW.jpg
  - Name-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 Adobe RGB 1998 or sRGB colour space.
- Video submissions must be in mp4 format with the Videographer's name as the file name.
- The preferred method of entry is electronically, however, if this method is not possible due to slow internet connection, you are able to submit via DVD, memory card or stick. Please note, media will not be returned.
- You will receive an email to confirm your registration and photo/video upload. If you do not receive one within 24 hours, your email may not have come through and you may need to try again.

Good luck to everyone taking part in Digital Online 2019. 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.

PHOTOGRAPHY CATEGORIES

Photographers may enter one photo per category.

Details to include with each photo submission:

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

3. **BEST OF THE UAE** (DSLR/MILC & COMPACT)
   Definition: Any underwater subject taken in the UAE and the Musandam.

4. **BLACK & WHITE** (DSLR/MILC & COMPACT)
   Definition: Black & white photography is timeless and elegant. Focus on tonal contrast, shapes and textures and the composition of the shot.

5. **COMPACT CAMERA** (COMPACT ONLY)
   Definition: Point & shoot photographers only.

VIDEO CATEGORY

Videographers may enter one film.

Title: CHASING TALES

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

- 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.

IMMERSIONE ITALIANA
SPECTACULAR DIVES IN ITALY

FEATURE AND PHOTOGRAPHY **SIMONE CAPRODOSSI**

The Christ of the Abyss is a protector to divers and sailors in these waters. Looking up to the surface through his open arms is a truly special moment of inspiration and fills you with even more love and awe for the sea.

Cristo degli Abissi (the Christ of the Abyss).

ABOVE: Portofino Faro's large groupers out on the hunt. **OPPOSITE PAGE:** Massive boulders of the Punta Torretta are covered in yellow sponges, creating lots of hiding nooks.

Italy is pretty much on most tourists' bucket list, be it for the food, the art and history, the shopping, skiing in the winter, or beach holidays in the summer. Yet, it is still not really on the top of anyone's mind as a diving destination despite offering some incredibly unique diving opportunities, and some of the best marine protected areas in the Mediterranean.

As an Italian living abroad, I have never picked my home country as a diving choice myself. I have travelled far for the most extreme diving trips available without ever taking the time to explore my own home shores. This year I got the chance to take a longer break and decided to spend a few weeks back home as a tourist and finally managed to do some Italian diving whilst sharing time with family and friends.

There are hundreds of amazing dive locations along the 8,000 km of Italian coastline, and I just managed to squeeze a few diving days into my holiday. I thought I would share my experience with two areas that are amongst the most beautiful and on the top list of tourist destinations as they hold some of the most famous hotspots in Italy.

DIVE: the Portofino Marine Protected Area when visiting Genoa, The Ligurian Riviera and the Cinque Terre.

The Portofino Marine Protected Area is one of the oldest marine parks in Italy and thanks to vigilant enforcement of no fishing zones and control on marine activities for over 15 years, its underwater environment is extremely rich in sea life and corals are thriving at depth.

You can dive there from several dive centres located about an hours drive from Genoa, in the area from Camogli, to Portofino and Rapallo. We went diving with the great team of Massub in the port of Lavagna (www.massub.com). They run daily two tank trips and offer delicious focaccia during the safety stop.

We started diving the point of the cape under the Portofino Lighthouse, descending into the clear Mediterranean blue, with 30-40 metres visibility! Massive boulders from the cape edges create a striking landscape of underwater mountains with huge schools of fish swimming around in the blue, and large groupers on the hunt – unafraid of divers. A sight that is practically impossible in non protected areas as all large fish have been taken out and the rare survivors stay well hidden from human activity.

Further along the cape, the site of Punta Torretta descends to a steep wall which between 25 and 35 metres, is covered in purple and red gorgonians and a great variety of corals and sponges. On the ascent, some massive boulders are covered in yellow sponges which host resting groupers, and moray eels lay hidden between the rocks.

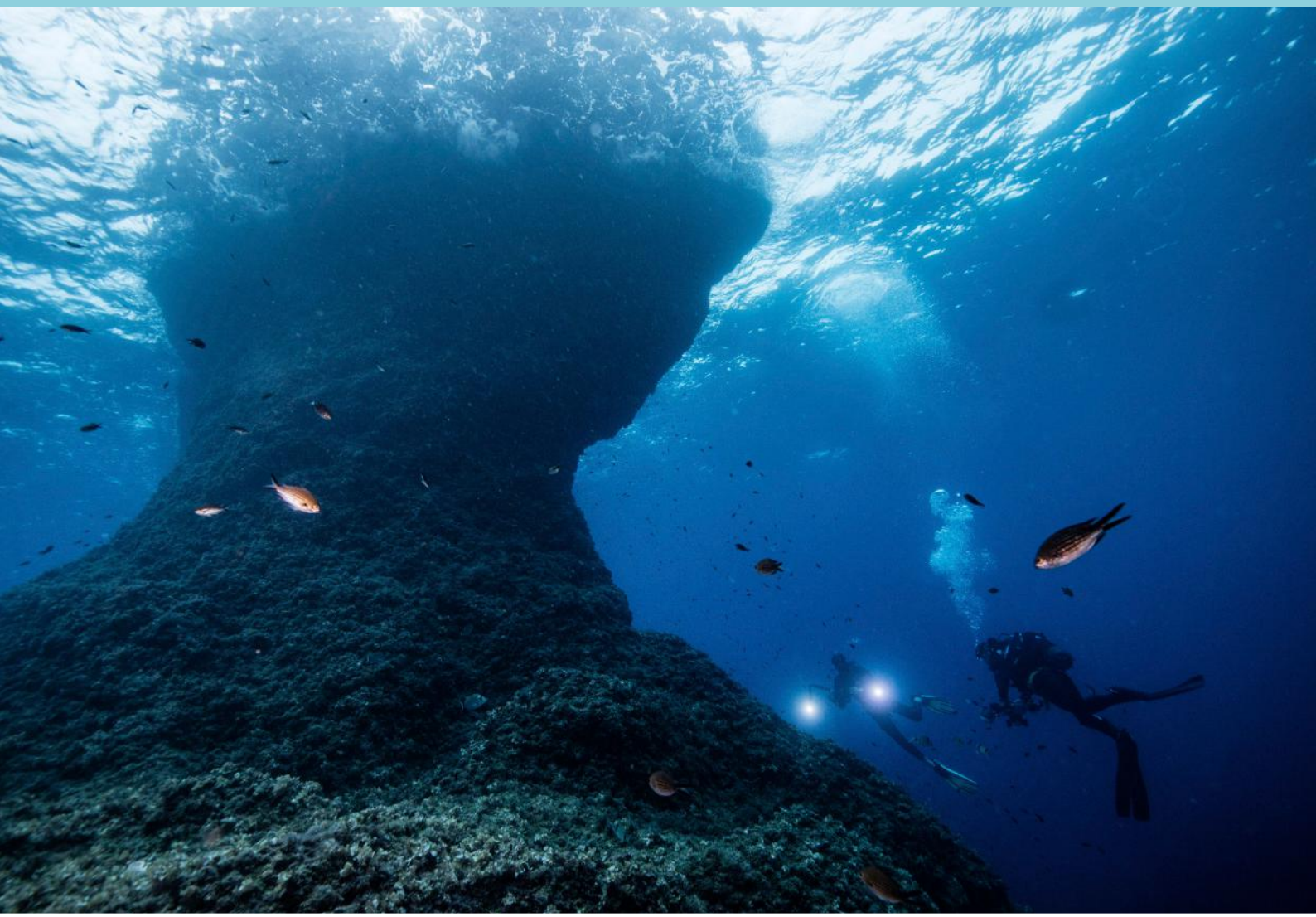
The classic icon in this area not to be missed, is the easy dive to see the Cristo degli Abissi (the Christ of the Abyss).

The bronze statue of Christ was originally placed in the bay opposite the Monastery of San Fruttuoso on the 22nd of August 1954, at an approximate 17 metres depth near the spot where Dario Gonzatti, the first Italian to use scuba gear died in 1947. He is a protector to divers and sailors in these waters. Looking up to the surface through his open arms is a truly special moment of inspiration and fills you with even more love and awe for the sea.

For more inspiration to dive this area look up the amazing work of Italian photographer, Isabella Maffei who has photographed these waters for years and was kind enough to give me advice on my diving.

DIVE: Banco di Santa Croce and Punta Campanella and explore the submerged Roman city of Baiae when visiting Naples, Pompeii and the Amalfi Coast.

Moving a few hundred kilometres south to another classic tourist hotspot from Naples to



ABOVE AND OPPOSITE TOP PAGE: The beautiful structures of Punta Campanella at the very tip of the Sorrento peninsula and its yellow corals.
OPPOSITE PAGE BOTTOM FIRST ROW: Campanella's school of barracudas and purple gorgonians breaking up the very blue of the open sea.
BOTTOM SECOND ROW: The beautiful dive site of Banco di Santa Croce / Sea fans and a shark egg – a scene almost unique in the Mediterranean.

Pompeii, to Sorrent, and the Amalfi Coast, it is again worth getting in the water between a pizza and a sightseeing tour for some outstanding diving.

The Sorrento Peninsula hangs out towards the island of Capri between Sorrento and Positano and is another historical marine protected area of Italy. There are several dive centres found along the coast. We went diving with Punta Campanella Diving Center (www.puntacampanelladiving.com) that is perfectly placed in the small port of Massa Lubrense and is only a short boat ride to all the sites on the Marine Park of Punta Campanella, and a 40 minute ride to the Banco di Santa Croce.

Gianluigi, the Dive Centre Manager, personally took us out to dive Punta Campanella itself, the very tip of the Sorrento peninsula. It is a stunning dive with a huge pinnacle culminating into a rocky outcrop. 30 metres of red and purple gorgonians and yellow corals around its base break the very blue of the open sea. Swimming out into the blue, massive schools of barracudas surround the divers, then we return to the edge of the cape on a very interesting bottom of massive boulders and caves full of fish, and tainted by sponges.

In the bay between Sorrento and Naples there is another unmissable dive site, the Banco di Santa Croce. It is another protected area established in 1993, and quite strictly managed with limited number of divers per day. It consists of five large rock pinnacles well off the coastline. The Banco is close to the estuary of the Sarno river which brings a lot of nutrients attracting a plethora of marine life. Due to the richness of the waters here red and yellow gorgonians and yellow sponges already thrive in the first 18 m. As the depth increases down to 50 metres, so does the concentration of sea fans, often covered with shark eggs, a scene almost unique in the Mediterranean. Looking up from the depth through clear visibility when it is available, the pinnacles stack up like mountains dwarfing the divers and pelagic fish like eagle rays, tuna, bonito and dorado are often spotted in the blue or during the safety stop.

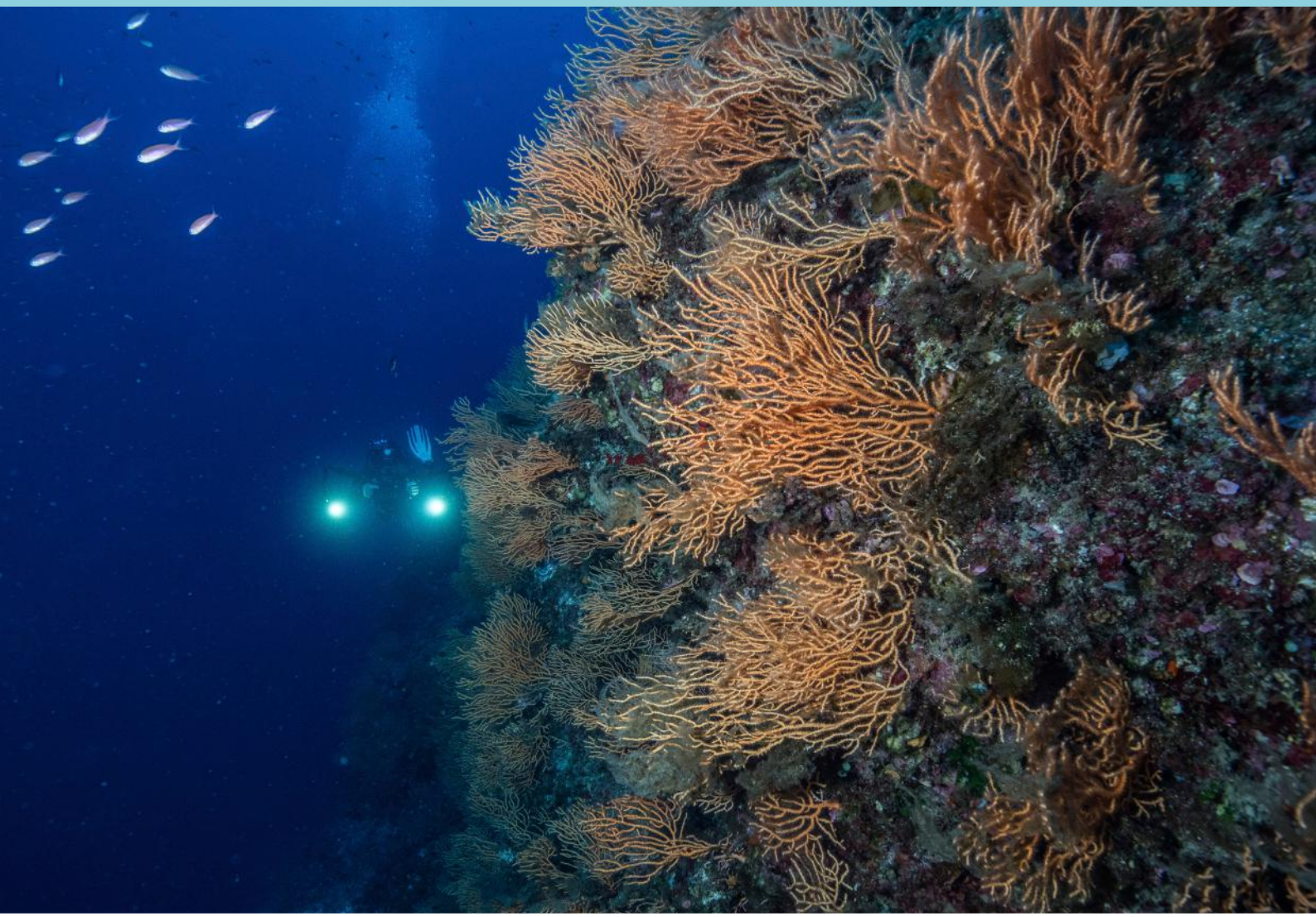
Moving slightly north of Naples is probably the most special and uniquely Italian dive site I have been blessed to experience. It is the submerged Roman city of Baia.

The area is called Phlegrean Fields – meaning burning fields in greek – and it is a very active seismic area connected to the neighbouring Vesuvius Volcano that wiped out the city of Pompeii in 79AC. Back in Roman times, over 2,000 years ago, this area was a thriving residential area for the rich Romans who enjoyed the good weather and the thermal waters, and even hosted the Emperor's villa and thermal baths.

Over the centuries due to seismic activity, the coastline sunk and the town of Baia slowly disappeared underwater. It was rediscovered in 1940 during a recognition flight in war times and it took another 30 years until a major storm hit the bay, revealing a number of statues and remains of ancient villas to reactivate the archeological work and bring to light many of the treasures of Baia.

The Archaeological Underwater Park of Baia was opened to divers only 10 years ago, and it is now possible to explore some of the sites.

There are a few dive centres in the area that offer excursions to Baia and diving around the islands of Ischia and Procida nearby. We went diving with Centro Sub Campi Flegrei (www.centrosubcampiflegrei.it) which was the first dive centre to start recreational diving in the archaeological park. The dives are very easy



OPPOSITE PAGE: The Roman City of Baia and the Villa of Protiro. The perfectly preserved 2,000 year old mosaic floors appear after the guide lifts a cloud of silt, and then disappears again under the veil of sand. **ABOVE:** The surreal diving experience through the gallery of statues at the Nympheus of Claudius.

and shallow in just 8 metres of water and snorkellers can follow the divers from above and pop down when some of the highlights are revealed.

The dive to the Villa of Protiro starts on an unassuming dull sandy bottom where the guide starts moving the sand, creating a rather messy cloud of silt. As the sand starts to settle, you start to glimpse the shiny white of perfectly preserved mosaic floors that magically reveal themselves in all their splendour. It is just incredible to witness these 2,000 year old floors appear from nothing, to then disappear again under the veil of sand.

The other top dive is to the Nympheus of Claudius that is actually an exploration of the Emperor's Baths. The emperor's marble seat is still there at the opening of the nympheus that is a semcircular space surrounded by a gallery of statues. The statues are replicas as the originals were taken out and are on display in the Archaeological Museum in the gorgeous castle of Baia, but they have been in the water long enough to look as close to the originals as is possible. From the statues you then meander through paved underwater roads, to neighbouring villas with different floors, and other beautiful mosaics. It's such a surreal diving experience like no other. Again this area would deserve several more days of diving, but even with 2-3 days you can experience these highlights.

For more inspiration here you can look at the amazing work from underwater photographers Marco Gargiulo, who was my kind advisor for this area, and Mimmo Roscigno an icon of Italian underwater photography.

The next time you think of going on an Italian holiday, have a look at what dives you could pair with your leisure days. It's every bit worth it!

DIVE CENTRE RECOMMENDATIONS:

MASSUB DIVING CENTER
Lavagna – Italy
Tel: +39 0185 599121 or +39 335 6435624
Email: info@massub.com
www.massub.com

PUNTA CAMPANELLA DIVING CENTER
Lubrense – Italy
Tel: + 39 3384712360, +39 3383158841
Email: info@puntacampanelladiving.com
www.puntacampanelladiving.com

CENTRO SUB CAMPI FLEGREI
Pozzuoli – Italy
Email: info@centrosubcampiflegrei.it
Tel: +39 081 8531563
www.centrosubcampiflegrei.it

PHOTOGRAPHERS TO CHECK OUT:

ISABELLA MAFFEI
www.isabellamaffeiphoto.com

MARCO GARGIULO
www.marcogargiulo.com

MANTAS, MOLAS & MUCK DIVING

LOTS OF M-VALUE ON THE ISLANDS OF THE GODS

FEATURE AND PHOTOGRAPHY **JESPER KJØLLER**

Eastern Bali has everything going for it. You can dive with the biggest and the smallest, and everything in-between. But the island has so much more to offer divers and vacationers. In fact, Bali deserves the reputation of being one of the finest holiday destinations in the world – below and above the surface.

The mantas are totally oblivious to all the scuba divers, freedivers and snorkellers at Manta Point.

Eastern Bali has everything going for it. You can dive with the biggest and the smallest, and everything in-between. But the island has so much more to offer divers and vacationers. In fact, Bali deserves the reputation of being one of the finest holiday destinations in the world – below and above the surface.

Brrr! The chilly water trickles into my 3mm wetsuit and I'm reminded of the fact that we are paying a price for the nutrient-rich water. The cool upwelling from the great depths close to Nusa Penida's Manta Point, draws the large filter feeders to the area. So, in that respect, the cooler the better. The thermometer on my dive computer has plummeted to 23° Celsius, way below the more agreeable 27-28°C we have enjoyed during our previous dive days in Bali. But after only a few minutes, a manta appears at the scene and we completely forget about the temperature. The huge animal swoops over a large pinnacle in front of me and disappears again. It takes me by complete surprise and I just shoot images from the hip without much time to adjust the camera. With anticipation, I look at my display. Did I at least get a few decent shots of the large animal despite the maybe less than optimal exposure settings? Who knows? Will it be the only manta we see today? While all my attention is directed at my camera for a moment, I hear my wife's muffled shouts in her regulator situated behind me. I turn around and see her pointing at a train of a dozen large mantas coming straight at me. Okay, so that is how it is going to be…

Manta Point is a cleaning station and the mantas normally hang out here to enjoy the grooming service of the cleaning wrasses. It is common or almost guaranteed to see at least a couple of mantas during a one-hour dive here, but today we are really lucky. Between 12 and 15 large mantas swirl over the shallow pinnacle again and again, and the spectacle is absolutely splendid. They are all over the place and they come really close. The mantas are totally oblivious to us and the countless other scuba divers, freedivers and snorkellers in the water. If the mantas were bothered by humans, they would have disappeared a long time ago as the popular site is frequented by a large number of dive boats every day and has been so for many years.

After maybe 45 minutes of more or less constant action, the manta train suddenly leaves the cleaning station. The frigid temperature creeps back into our awareness as we end the dive with a big smile. On the surface, while waiting for our dive boat to pick us up, Bernd, one of the divers in our group asks, "So why is it called Manta Point?". Uncharacteristically funny and ironic for a German.

PASSIONATE DIVERS

I've known Jan and Henriette Bebe since the beginning of the millennium when I trained them as PADI Instructors in Odense, Denmark. A few years after, the couple realised their dream and left their normal jobs in favour of a career as managers in the diving industry in South East Asia. After a couple of years in North Sulawesi, they relocated to Bali when they got the bid to manage Lotus Bungalows and its associated dive centre, Gangga Divers. Here, Jan is in charge of all the diving activities, but even though Henriette manages the resort, she is also delighted to be a part of the dive team during busy periods. In fact, diving is still such a strong passion for both of them that they spend almost all of their holidays going to exciting dive destinations such as the Galapagos, Raja Ampat, and Palau. So far, they have been enjoying life in Bali for over ten years and they have no plans to leave anytime soon.

The resort and dive centre are based in Candidasa Bay – strategically situated in the centre of Bali's East Coast diving scene. From here, there is easy access to the dive sites around Nusa Penida, the local boat dives on the coast and the shore-based sites in the Tulamben area.

NUSA PENIDA

Today we plan to splash around at Nusa

The endangered Hawksbill sea turtle (*Eretmochelys imbricata*) are very common around Nusa Penida.

Penida's Malibu Point. Jan has promised us good chances to meet with Mola molas, which we try not to jinx by articulating the M-word. It is the right season and apparently Malibu Point is one of the go-to places for encounters with these ocean sunfish. This is a typical representative of the dive sites on the northern side of Nusa Penida. The topography consists of a sloping reef that eventually disappears deep beyond 30 metres. Here and there, enormous barrel sponges grace the landscape with their modernist shapes and the fish life is really prolific. Hawksbill sea turtles are fairly common – we have seen at least one or two on every dive. All dives around the island are drift dives. It is all about negotiating the ever-changing current that sweeps the shores of the small island surrounded by deep water in the channel between Bali and Lombok. There are no permanent moorings here – you are picked up at the end of the dive after a safety stop at your surface marker buoy.

The trick to find the Mola mola is to look for thermoclines indicating cold water upwelling from the deeper depths and to keep an eye out for unusual congregations of the brightly coloured bannerfish that usually surrounds the large creatures. The yellow and white bannerfish are easier to spot against the dark background and the fish perform a grooming service that seems to be the reason for the Mola molas visit to the shallower water.

15 minutes into the dive I see Jan waving his arms – he points out in the blue and throws us the "hang loose" hand signal normally associated with Hawaiian surfer dudes. Used underwater, the gesture with the pinkie pointing down and the thumb pointing up while the remaining fingers are closed in a fist, implies a Mola mola.

We make the mistake of approaching the animal a little bit too quick, but I still manage to get a few good shots before it decides to leave the premises. Many hang loose-signals are exchanged in our group while the Mola mola lazily disappears in the background.

TONGUE IN CHEEK

Ever since I first learned about the parasites that eat the tongue of clownfish, I find myself unable to swim past a colony of Nemos without checking if one or more of them are attacked by the cruel tongue-eating isopod, *Cymothoa exigua*. On three different occasions around Nusa Penida, I've actually been lucky enough to find an affected specimen with the tell-tale two black dots staring straight at me, but unfortunately I have my wide-angle lens attached every time – not ideal for capturing a creature the size of a pinhead inside the mouth of a fairly small fish that moves as if on a steady diet of Red Bull and double espressos.

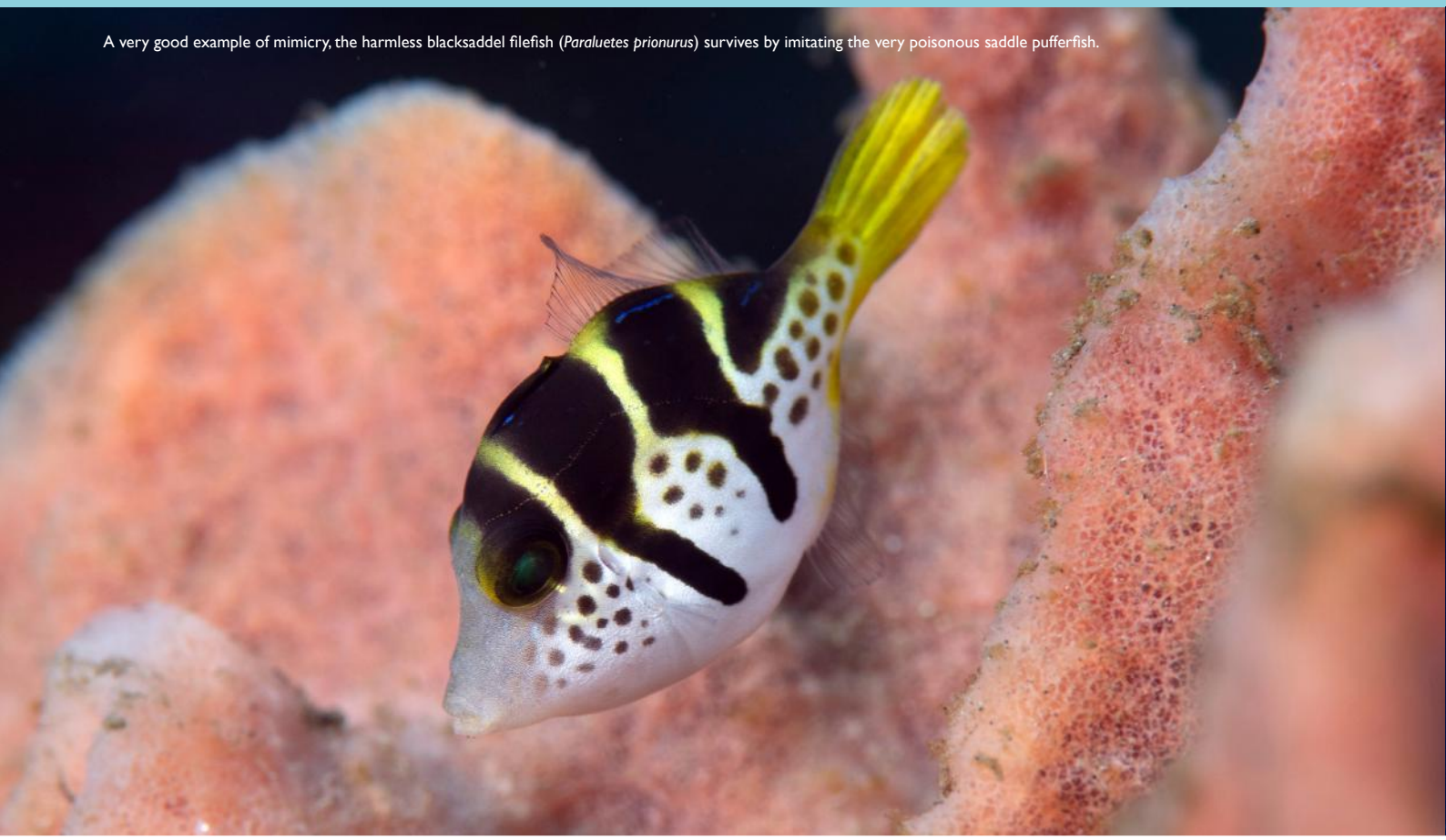
Among other exciting encounters on our Nusa Penida dives are the banded coral snake – one of the most poisonous animals on the planet. The snake is normally very good-natured and just rummages around the reef looking for morsels. I've often heard that it cannot bite a diver even if it wanted to – the snake's mouth is simply not wide enough. However, it's a hypothesis that I have no intention of challenging.

THE JETTY

From the resort, a 20 minute minibus ride each morning brings us to Badang Bai harbour. Before we arrive, the tanks for the day's dives and our gear are already in place on one of the two comfortable speedboats. The equipment has been rinsed the day before and is now assembled again ready for a new day of diving. The only thing left for us to do is analyse the nitrox cylinders. The staff is well trained and very helpful. They know the routine by heart and they are always a step ahead.

The normal routine is two dives before lunch around Nusa Penida, but with an option to do a third dive after dropping the two-dive guests off again in Badang Bai. We opt for the local afternoon dive every day and just

A very good example of mimicry, the harmless blacksaddel filefish (*Paraluetes prionurus*) survives by imitating the very poisonous saddle pufferfish.



BOTTOM ROW: 1. A white banded cleaner shrimp (*Lysmata amboinensis*) servicing a honeycomb moray eel (*Gymnothorax favagineus*). 2. The two small dots looking out from the clownfish's (*Amphiprion percula*) mouth are the eyes of the tongue-eating louse, a parasitic isopode (*Cymothoa exigua*). 3. The pretty dorid nudibranch (*Hypselodoris bullockii*) is a common species of nudibranch on the slopes of Seraya Secrets. 4. Two giant frogfish doing a splendid job of being imperceptible on the long poles under the Tanah Ampo Jetty.

a few minutes from Badang Bai, our favourite dive is Tanah Ampo Pier. The 150 metre long jetty is part of a failed attempt to establish a cruise ship terminal. The project never came into fruition and the half-finished pier is now frequented by leisure fishermen on top and divers below.

The 15 metre long poles holding the jetty is now a vertical muck dive. Every square inch of the thick poles is covered with marine life. It's a very good example of the nature takeover that occurs when artificial reefs are put in place. We spot plenty of nudibranches, cuttlefish, juvenile batfish, blennies, cute juvenile box fish stonefish, cockatoo wasp fish and the mighty harlequin mantis shrimp. But for an aficionado like me, the abundance of frogfish is the main attraction and I even encounter two giant frogfish swimming in close formation – something I've never seen before. The long poles under the pier also create a very photogenic scene for wide angle photography so it can be a little bit of a dilemma to choose the right lens.

THE PORTER GIRLS

Tulamben is a legendary dive site. Here the wreck of USAT Liberty rests only a few fin-kicks from the shore. The 120 m long US Army Cargo Ship was beached during WWII after being torpedoed by a Japanese submarine in 1942, but in 1963 the nearby volcano Mount Agung erupted and the tremors pushed the wreck out on the sandy slope. The wrecks rest on the side between 10 and 30 metres and is a very easy dive. Even though Liberty is rather worn out by earthquakes, volcanic activity and hordes of divers, the wreck is still worth a visit – if nothing else, because the Tulamben dive experience is not just about the dive itself. The procedure here is unlike anything. You will be met at the parking lot by the famous porter girls with towels on their heads. They will insist on carrying your equipment to the

A sharp image of the very often nervous and jittery whip coral goby (*Bryaninops yongei*) requires a lot of patience.

BOTTOM ROW: 1. The blue ribbon eel (*Rhinomuraena quaesita*) can grow up to a metre long, but usually hides most of its body in its hole. 2. A small frogfish dangling its lure in the hope to tempt unsuspecting pray to swim in front of its mouth. 3. A juvenile jewel pufferfish (*Canthigaster solandri*) hiding within a beautiful red sea fan is always such a great photographic opportunity. 4. The pygmy seahorse (*Hippocampus bargibanti*) – the superstar of muck diving.

shore and you might as well swallow your pride and let them haul your gear, as you will have to pay for the service anyway. Besides, they carry the loads with grace and a smile. The assembled scuba units are carried on their heads, weight belts over the shoulders and scuba bags in a free hand. They are well organised and share the income at the end of the day. The dive equipment transportation service they provide more or less supports an entire village and many of them have worked in this racket most of their life.

There is a couple of nice shore dives to be done next to the wreck, but the highlight of our day in the area is the dives at Seraya Secrets.

GETTING TO SERAYA SECRETS

A few miles south of Tulamben, we head down a dusty gravel road. After a few minutes, we arrive at a small settlement at the water's edge in the shade of the trees. The small community here consists of a few shacks, a small shop, primitive toilets and an outdoor shower at the water's edge.

As soon as we stop, a pack of villagers virtually attack our minibus and empty its contents almost in a frenzy. They even offload the already used tanks and other items that we really do not need. Our driver and guide from the resort know the drill and they just let it happen. It is easier to just put the unneeded things back into the car afterwards than explain or try to manage the event.

We could have easily carried the equipment ourselves from the bus to the concrete platform at the water's edge where the gear is setup, but that's the way the system works here. The locals apparently like to earn the few rupiah we pay to dive from their village. Besides, after they help us to empty the bus, they leave us alone and continue with their daily chores – which seems to not be

very much. There is a friendly and peaceful atmosphere in the small community. There are only a few other divers here – a stark contrast to the busy wreck site. The children play with a rope swing, chickens peck at the dirt and the adults have seen thousands of divers before so they couldn't care less. The small kiosk serves tea, coffee and cold water. And if should you find yourself in need of a box of staples, they have those also!

I look around and I almost feel like I'm in a Mediterranean milieu. The dry and brownish undergrowth and even the smell are not typically tropic. The volcanic soil in the foothills of Mount Agung and the scarce rainfall compared to other areas of the Island creates a different and drier and more barren environment.

MUCK DIVING IN GOOD VIZ

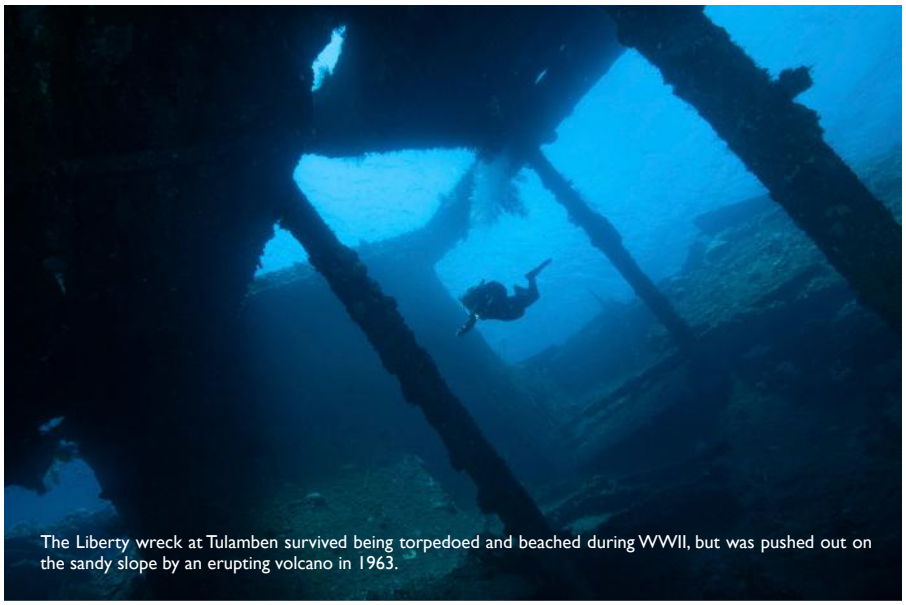
From the concrete platform, there is only a short walk to the rocky shore. We already know that this is going to be a muck dive where the attraction is diminutive marine life and similar to the famous muck diving sites in Sulawesi's Lembeh Strait, the volcanic substrate here creates optimal conditions for a critter hunt.

We have heard that there is a chance to see the superstar of any macro dive: the famed pygmy seahorse, *Hippocampus bargibanti*. We do not find the little bugger on the first dive, but we spot plenty of the usual suspects that are typical for muck dives in the coral triangle: sea moths, ribbon eels, nudibranches, frogfish and plenty of harlequin ghost pipefish – not to mention plenty of crustaceans such as cleaner shrimps, harlequin shrimps and emperor shrimps.

We liked the dive so much that we asked our guide to do it again even if we were scheduled to do another dive. We also want another chance to try and spot the elusive *bargibanti*. This time we are successful and we actually find two specimens sitting close together. We can only spend a short time with them as they are found down at 27 metres.

The swim upslope is again a pure joy with photogenic critters everywhere.

We end the dive after spending 15 minutes on a couple of artificial reef structures placed in shallow water. They are teeming with life that you could easily devote an entire dive here and never run out of photo subjects, especially in the juvenile category. As muck and macro dives go, Seraya Secrets can compete with the best. On some parameters – such as visibility and the occasional larger pelagic encounter – it even exceeds the top sites in Lembeh Strait. I leave the water with a heavy heart. This is a dive I just have to do again. And again.



The Liberty wreck at Tulamben survived being torpedoed and beached during WWII, but was pushed out on the sandy slope by an erupting volcano in 1963.

The bright schooling banner fish (*Heniochus diphreutes*) are usually the first thing you spot when searching for Mola molas.

CAT POO CHINO

Ubud in the uplands is the epicentre for Balinese crafts and culture. The town is surrounded by rainforest and the famous terraced rice paddies. The area is dotted with temples and ancient holy sites. Visit the monkey forest, one of the picturesque waterfalls or a coffee plantation where they produce the celebrated Kopi Luwak – the world's most expensive coffee. The civet cat (the luwak) eats the coffee beans, the bean passes through their digestive system and the next day the excrement is picked up and processed. The beans are fermented inside the animal in a way that makes the coffee milder and more aromatic. I don't know who first got the idea to produce this cat poo chino, but after tasting it we had to agree that is was rather delicious, if somewhat overpriced.

Bali is a vibrant place with so much to offer – also above the surface. The diving is world class with a great variation, but it would really be a shame to visit the Island without at least a couple of days of sightseeing on land. It is easy and cheap to rent a car with a driver and the rich culture, the fantastic landscapes and the friendly people are so captivating that it is difficult to leave Bali without a strong urge to come back as soon as possible.

LOTUS BUNGALOWS

Under the shade of the coconut trees on the edge of the water, Lotus Bungalows is an excellent stepping stone to discovering the unknown treasures of east Bali. Situated away from the tourist areas, it is perfect for both divers and non-divers who are ready to discover the cultural and the underwater gems of Bali.

ADDRESS: Candidasa Main Road, Karangasem, Bali, Indonesia
EMAIL: info@lotusbungalows.com **TEL:** +62 363 41104
WEBSITE: www.lotusbungalows.com

FACT FILE

MOLA MOLA

The ocean sunfish or Mola mola is the biggest bony fish in the oceans. It grows on average to over three metres and weighs a ton. The largest specimen ever recorded was a female weighing 2,200 kilos – that's the equivalent of a pickup truck.

The scientific name Mola mola is derived from the Latin word mola which means millstone and describes the disc-like shape of the fish. Their teeth are fused together giving the fish a beak-like mouth that is always open. A Mola mola can be brown, grey, white or spotted and are found in temperate and tropical oceans around the world.

The common name ocean sunfish derives from the fact that the giant fish loves to bask in the sun. They are frequently seen lying on their side at the surface, catching some rays. The reason for the basking behaviour is not known but the fish might be warming up after a long, deep dive, or they may want to attract seabirds to eat parasites from their skin. The Mola mola often jumps high in the air and that is also believed to be an attempt to knock off parasites.

Despite their size, Mola molas are very gentle creatures and do not harm divers. They can easily suffocate on plastic bags as plastic debris can resemble their favourite food, jellyfish. They are also victims of bycatch every year.

TRAVEL FACTS

HISTORY

Bali was included in the "Republic of the United States of Indonesia" when the Netherlands recognised Indonesian independence on the 29th of December, 1949.

Today, Bali is a popular holiday destination, which has seen a significant rise in tourists since the 1980s. Tourism-related business makes up 80% of its economy. The island is renowned for its highly developed arts, including traditional and modern dance, sculpture, painting, leather, metalwork and music.

GEOGRAPHY

Bali is located eight degrees south of the equator between Java and Lombok. The island's area is 5,632 km^2. The population is approaching 4.5 million, of which one-fifth lives in the capital, Denpasar.

RELIGION

The origins of Balinese Hinduism can be traced back to the 5th Century BC. Hinduism was gradually displaced by the coming of Islam from the 14th Century AD. However, due to the Balinese culture of isolationism, Bali became the only part of Indonesia to remain predominantly Hindu. The Balinese religion permeates daily life and is apparent everywhere. You can't walk many metres without seeing temples or shrines, offerings to the Gods, ceremonies or sacrificial rituals taking place.

TRAVEL

From Europe most flights to Ngurah Rai International Airport south of the capital Denpasar goes via hubs such as Dubai, Doha or Singapore. The transfer time from the airport to Lotus Bungalows is two hours in often dense traffic.

CURRENCY

Indonesian Rupiah. 100.000 IDR is roughly worth 5.50 GBP.

COMMUNICATION

Lotus Bungalows offers a free and relatively stable resort-wide WiFi.

TIME ZONE

UTC +08

DIVING SEASON

The diving is good all year. The Mola mola season is August to October. Temperatures vary as upwelling and oceanic currents from the south are common. Expect around 27-28 degrees Celsius, but be prepared for the occasional local drop of rain.

LANGUAGE

Most of the inhabitants speak both Balinese and Bahasa Indonesian, the official language of Indonesia. Many workers in the tourist industry also speak English.

SCHEDULE

Gangga Divers offers two boat dives in the morning from the harbour in Padang Bai, a 20 minute minibus transfer from the resort. From Padang Bai there is a 15 to 45 minute comfortable speedboat ride to the different dive sites round Nusa Penida. Lunch is served on the boat after the second dive and consists of very tasty local dishes Nasi (rice) or Mie (noodles) Goreng. After returning to the harbour, the boat leaves for a third dive around the local coastal dive sites for those who want to do another dive.

HEALTH

Don't travel to Bali without valid dive insurance that covers evacuation and recompression therapy. There is a chamber in Denpassar. Drink plenty of water to avoid dehydration in the heat, but do not drink the tap water.

ELECTRICITY

220 Volts in continental power sockets, so bring an adapter for UK style appliances and chargers.

BACK TO BASICS

FEATURE **NICHOLAS BIRD, M.D., MMM**

Decompression illness is a fascinating condition that lurks in the shadows of divers' minds, reminding us that we are vulnerable and that our push to explore is tempered by potential consequences. Whether ascending from depth or travelling to high altitudes, as we move outward and upward from Earth's centre, the ambient pressure decreases. Under the right circumstances this can initiate a complex interplay between physics and physiology that leads to injury.

Divers face two types of decompression-related injury: decompression sickness (DCS) and arterial gas embolism (AGE). Collectively, these conditions are often lumped together and referred to as decompression illness (DCI). Their common origin is the process of decompression, but their underlying causes differ significantly.

AGE

AGE is the disabling injury in 29 percent of dive fatalities and is likely associated with insufficient gas supply, which is the trigger in about 41 percent of dive accidents. Emboli are actual or potential blockages of blood vessels by foreign material. They can be composed of gas, blood clots, fat, tumours, amniotic fluid or bacterial vegetation. In the case of AGE in divers, the emboli are made up of gas in the arterial bloodstream resulting from lung over expansion or pulmonary barotrauma (a physical injury to lung tissue resulting from pressure change). These injuries allow gas to escape from the small air sacs of the lungs (alveoli) and enter the arterial bloodstream.

Boyle's law – which states the volume of a quantity of gas will increase as ambient pressure decreases – explains lung over expansion on ascent. The reverse of this law is also true: The volume of a quantity of gas will decrease as ambient pressure increases with descent. Divers face the highest risk of pulmonary barotrauma in shallow water. The greatest pressure differential experienced by divers in the water column (relative to the ambient pressure at the surface) occurs within the first 10 to 15 feet (3/4 mt).

Expansion of gas beyond the point that the alveoli can accommodate it results in lung tissue damage and enables air trapped in the lungs to escape into the pulmonary veins, which return oxygenated blood to the heart. When this happens the escaped air can enter the heart and traverse to the brain, where acute neurological injury may occur. The speed with which this happens explains the rapid onset of symptoms following a dive – AGE occurs within minutes.

Pulmonary barotrauma can also manifest as free air in the mediastinum (an area in the chest between the lungs), which is known as pneumomediastinum, or it may manifest as a pneumothorax (air in the chest cavity outside the lungs). The greatest threat to divers is an AGE that reaches the brain, a condition known as cerebral arterial gas embolism (CAGE).

Symptoms of CAGE manifest at or near the surface immediately after a dive, and approximately 50 percent of divers who suffer CAGE experience sudden unconsciousness. Others may have acutely altered mental status or loss of coordination or strength, which are signs and symptoms of stroke and are the result of restricted blood flow to parts of the brain. Those who survive the initial injury may spontaneously revive within minutes, showing varying degrees of neurological injury or even a return to normal function.

Regardless of apparent normality, all victims of pulmonary barotrauma, AGE or CAGE should be evaluated urgently in a hospital emergency department. Neurological symptom recurrence is known to happen in patients with apparent full recoveries. The consensus among hyperbaric physicians is that anyone who shows signs of neurological injury after a dive should be evaluated. People diagnosed with AGE should receive hyperbaric oxygen therapy (chamber treatment).

CT scans of the head are often part of these patients' initial evaluation when they reach the emergency department. It is important to assess the existence of brain lesions or a stroke prior to initiating hyperbaric chamber treatment – not because hyperbaric treatment will worsen the condition but because bleeding in the brain requires immediate surgical intervention. Ruling out intracranial bleeds and blood clots which can also cause acute neurological injury, is an important step; the absence of these factors supports the diagnosis of diving-related AGE and the use of hyperbaric oxygen therapy.

DCS: BUBBLE TROUBLE

DCS is associated with the absorption of inert gas (nitrogen or helium) into tissue coupled with an ascent to reduced ambient pressure, where the elimination of the gas may result in bubble formation. This promotes inflammation and tissue trauma.

Integral to understanding this disease are the gas laws of Boyle, Henry and Dalton. Boyle's law explains why we must inhale progressively greater numbers of gas molecules per breath as we descend for our bodies to maintain pressure in our chest equal to that of the ambient environment. The increased number of gas molecules in our lungs relative to those in our blood and tissues creates a diffusion gradient, which, according to Henry's law, drives the gas molecules into solution. Which and how many of these molecules we absorb is defined by Dalton's law and is also influenced by differences in blood flow to different parts of our body.

The longer and deeper we dive, the more gas we absorb. When sufficient quantities of inert gas come out of solution and form bubbles during ascent, local and systemic inflammatory and vascular reactions may ensue, potentially leading to a broad range of clinical manifestations. Unlike AGE, DCS bubbles exist primarily in the venous bloodstream and within tissues, and symptoms may not appear for several hours.

DCS is linked to an inert gas load (decompression stress) and the presence of bubbles in the bloodstream. Although high bubble scores (as evaluated by ultrasound) are not diagnostic of DCS, they indicate considerable decompression stress and are more highly associated with the onset of DCS symptoms than lower scores. Symptom onset time is roughly correlated with inert gas load: Higher loads are associated with quicker onset and more rapid progression of symptoms. A fascinating aspect of DCS is that symptom onset often occurs well after bubbles are detectable. Thus, while bubble detection is an indicator of decompression stress, it is not a diagnostic criterion.

Current research in DCS is focused on biological markers that can be detected in the blood. Investigators are exploring the potential association between decompression stress and the presence of membrane micro particles (membrane-bound vesicles shed from a variety of cell types) in the blood. Microparticle levels increase in association with many physiological disease states as well as with the shearing stress caused by bubbles in the blood. The working hypothesis is that certain microparticles (possibly induced by inert gas bubbles) may initiate, be a marker of or contribute to the inflammatory response that leads to DCS. This investigation goes beyond the pure bubble model.

While bubbles in the blood certainly play a key role in the development of DCS, their presence or absence doesn't reliably predict DCS symptom onset. Investigating this process at the molecular level may teach us a great deal more about DCS, providing insights that we hope will improve the effectiveness of both prevention and treatment.

TREATMENT

Hyperbaric oxygen (HBO) is the definitive treatment for DCS and AGE. Prior to definitive care, breathing 100 percent oxygen can expedite inert-gas washout, reduce symptom severity and enhance treatment effectiveness.

The most common and accepted initial chamber treatment protocol is the US Navy Treatment Table 6. Depending on patient status, these treatments may be extended or repeated. DCI is treated with equal effectiveness in both mono place and multi place chambers. Mono place chambers treat one person at a time, and patients are unaccompanied by medical staff. Multiplace chambers enable the simultaneous treatment of multiple patients and medical staff accompaniment, which is important for seriously injured people.

EVACUATION

Dive accidents can be frightening, and once DCI is suspected, many divers fail to consider alternative explanations for the symptoms. To ensure that other severe injuries, illnesses and conditions are considered, DAN recommends that injured divers seek medical evaluation at the nearest hospital or medical clinic. If DCI is indeed the diagnosis, the staff and, if necessary, DAN can initiate a timely transfer to an appropriate and available hyperbaric facility.

Dive accidents prompt many questions. After you have contacted local emergency medical services, contact the DAN Emergency Hotline at +39 06 4211 5685, or encourage the treating facility to do so. DAN can provide pertinent medical information as well as assist with planning and coordinating an evacuation.

GAS LAWS RELEVANT TO UNDERSTANDING DCI

Boyle's Law: At a constant temperature, the volume of a given gas is inversely proportional to the ambient pressure. To maintain a neutral lung volume as we descend on scuba, we inhale proportionally more gas molecules per breath.

Dalton's Law: The total pressure exerted by a gas mixture is equal to the sum of the partial pressures of each individual gas in the mixture. As we breathe more gas molecules per breath on descent, the potential impact of elevated partial pressures becomes important. Nitrogen narcosis results from an elevated partial pressure of nitrogen.

Henry's Law: At a constant temperature, the amount of a given gas that dissolves into a liquid is directly proportional to the partial pressure of that gas above the liquid. In physiological terms, this gas pressure exists in our lungs relative to the gas pressure in our blood. The greater the pressure of gas in our lungs, the more gas will dissolve into our blood and tissues. This is the basis of decompression sickness.

AN UNEXPECTED EARPLUG

FEATURE **MARTY MCCAFFERTY**

The diver was a 58-year-old man with approximately 150 lifetime dives. He had hypothyroidism (low thyroid hormone levels) for which he took levothyroxine daily. He had no other medical problems and reported being physically fit.

THE DIVES

The diver and a companion were on vacation in the Caribbean and planned to dive every day. They had scheduled two morning and two afternoon dives each day. On their first dive, the seas were calm and the current was minimal. After a site orientation and a dive briefing, they descended to 20 metres for 35 minutes while breathing air.

The dive was mostly uneventful, but the diver reported minor difficulty equalising his right ear. He stated that it was not sufficient to cause discomfort or make him abort the dive. As he was removing his equipment, however, he began to feel dizzy. The dizziness soon became true vertigo (a sensation of spinning), and he vomited twice. He also had difficulty standing.

The boat's crew placed the diver in the recovery position and provided oxygen at as high a concentration as possible. The oxygen did little to improve his symptoms. Once all the divers were back on board, the vessel returned to the dock. The crew contacted emergency medical services (EMS) while the boat was under way, and the EMS crew met them at the dock. En route to the hospital, the diver realised the vertigo was subsiding. When they reached the hospital, he was able to sit upright, and the nausea had resolved.

THE EVALUATION

The hospital staff worked efficiently to evaluate this diver. They performed an electrocardiogram (ECG) and routine blood tests to determine if there were any cardiovascular problems. The doctor performed a neurological examination and found that the diver could walk normally without assistance. He could easily walk heel to toe and maintain his balance. His coordination, reflexes and motor function were all normal. He displayed no short-term memory problems, and his only complaint was muffled hearing in his right ear.

The doctor examined his ears. The left ear appeared normal with no signs of barotrauma. The doctor could not evaluate the right ear because of impacted cerumen (earwax) blocking the ear canal. After irrigating the wax from the canal, the doctor was able to evaluate the diver's eardrum, which displayed some minor redness. Removal of the wax had relieved the diver's muffled hearing. All test results were normal, and the diver was released back to the resort. The doctor recommended that the diver not dive the next day as a matter of prudence but said he could resume diving the following day provided he had no further problems.

DISCUSSION

It is impossible to state with absolute certainty what occurred with this diver. From the available information we can reasonably speculate what may have happened. The body naturally produces cerumen, which is necessary for good ear health. Some individuals, however, are more prone than others to accumulate too much cerumen. This condition has little to do with hygiene and is easy to manage. It is also easy to not know that you have excess cerumen buildup until it creates a problem.

The excess cerumen can act as a nonvented earplug. As the water pressure increases during descent, an air space may be between the cerumen plug and the eardrum. The plug is forced inward toward the eardrum, compressing the air space. This compression was likely the reason the diver had some difficulty equalising his right ear. The compressed air did not allow the eardrum to move easily when he was equalising the middle-ear space on his right side.

The cerumen plug can be forced deeper into the ear canal during descent. During ascent, it will probably not return to its original position (even though the air that was compressed will expand as the ambient pressure decreases). This can cause a pressure difference between the two ears, which can trigger alternobaric vertigo, a spinning sensation caused by differential pressurisation of the ears.

The fact that this diver did not have acute symptoms at first suggests that the expanding air had a passage to escape through the cerumen. When the diver's symptoms worsened abruptly, that passage had likely become blocked, and the expanding air then triggered alternobaric vertigo. During the ride in the ambulance the diver experienced reduced symptoms, and he reported complete resolution of his symptoms, besides muffled hearing, when he arrived at the hospital. The expanding air most likely found a passage through the cerumen that allowed the pressure on both ears to be equalised.

CONCLUSION

This scenario could happen to any diver. Prevention is easy: Consider irrigating your ear canals prior to leaving on dive vacations. Earwax-removal kits are available at local drug stores. You can also use a simple bulb syringe to flush the ear canals with warm, soapy water. As with anything related to your physical health, be sure to discuss this condition with your health-care provider.

The crew of this dive vessel did the right thing in ensuring this diver got evaluated by a medical professional. If you have any symptoms or concerns after diving, do not hesitate to contact the DAN Emergency Hotline. Before leaving for your next dive adventure, make sure your DAN membership is still active. If it isn't, join DAN or renew your membership at **www.daneurope.org**

DAN | AlertDiver

UPCOMING EVENTS

DIGITAL ONLINE 2009 – 2019

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

COMPETITION OPENS: Sunday, 6th January 2019
COMPETITION CLOSES: Sunday, 28th April 2019

Digital Online will be celebrating its 10th Anniversary!
The Rules and Guidelines 2019 can be found on page 87.

EDA MOVIE NIGHT WITH VOX CINEMAS

VOX CINEMAS سينما

MOVIE TBC | VOX Cinemas, Mercato Mall
Wednesday 6th February 2019 | 18:30 Registration, 19:00 Start

We have two new documentaries in the pipeline, but we have to wait for the screening approvals to know in which order we will be showing them to you. We will announce whether we will be screening 'BLUE' or 'SHARKWATER EXTINCTION' closer to the time. Keep a look out for the announcement.

HYPERBARIC CHAMBER CONTACT NUMBER UPDATE

NON-EMERGENCIES
Call these numbers on weekdays from 7:30am-2pm:
Tel: 04 416 6666 / 055 548 8838

EMERGENCIES
Please call these numbers for emergencies only:
Tel: 999 / 04 609 5555

BIG NEWS!

A MEMORANDUM OF UNDERSTANDING (MOU) HAS BEEN SIGNED

The Ministry of Climate Change & Environment and the Emirates Diving Association signed an MOU to enhance their collaboration in preserving and rehabilitating the marine environment and sustaining its resources. The MOU was signed by HE Dr Thani Al Zeyoudi and EDA's Chairman – HE Essa Al Ghurair.

DID YOU KNOW?

CLEAN SWELL – Ocean Conservancy's Trash Collection Mobile App

Join a global movement to keep beaches, waterways and the ocean trash free. Head out to your favourite beach and use the app to easily record each item of trash you collect. Then share your efforts with family and friends.

With Clean Swell, simply "Start Collecting" trash wherever you are around the world and the data you collect will instantaneously upload to Ocean Conservancy's global ocean trash database. The data delivers a global snapshot of ocean trash, providing researchers and policy-makers insight to inform solutions. Join the thousands of International Coastal Cleanup® volunteers who are working for a cleaner ocean by picking up the millions of pounds of trash that wash onto beaches around the world. Even check out your Cleanup history, so anytime, anywhere you can see the impact you've had on making our ocean a cleaner and healthier ecosystem.

- Record every item of trash you collect.
- Share your Cleanup results and impact with friends via Facebook, Twitter, and email.
- Track the location of your Cleanup (only if you have enabled GPS or Location on your device) and your total distance cleaned.
- See the total weight of the trash you collect.
- Keep a historical record of your Cleanup efforts.
- Create ocean trash solutions by contributing to a global database and helping to identify trends.
- Learn scientific facts about the impact of trash on ocean animals and what you can do to help.

Available on the App Store and Google Play

EDA
جمعية الإمارات للغوص
Emirates Diving Association

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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DIVE MENA EXPO

26 FEB – 2 MAR 2019

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The Dubai International Boat Show breathes new life into the Dive MENA Expo with the key principle of building a community driven event, bringing divers together to network, learn and inspire.

To ensure the success of your business, Dive MENA Expo is targeting **154,000+ certified divers in the GCC**, here's why you should attend:

- **Partnerships with Dive Clubs** hosting their members at the show
- **Celebrity Dive Speakers** in partnership with Emirates Diving Association
- **Interactive dive experiences** on the show floor
- **Special priced stand packages**

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