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MAKING A CONSERVATION IMPACT

- CHRISTMAS GIFT IDEAS • **REEF CHECK NEWS** • UAE DEEP-WATER SHARK SPECIES DISCOVERY
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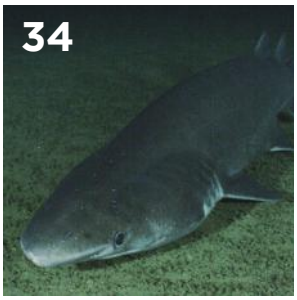


REGULARS

NEWS

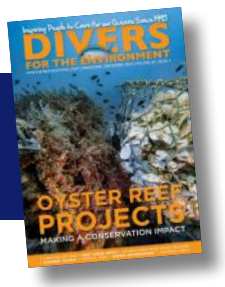
REEF CHECK

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 2025. Send all articles, feedback or comments to: magazine@emiratesdiving.com

COVER

PHOTO BY ALLY LANDES
Oyster Reef Projects | Making a Conservation Impact



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HEALTH & SAFETY

EDITOR & GRAPHIC DESIGNER

ALLY LANDES
Ally is EDA's Project Director, Event Planner, Graphic Designer, Editor, and Photographer. She created and introduced 'Divers for the Environment' back in December 2004 as a free educational tool to share information by scientists, conservationists, underwater photographers, and other like-minded individuals from all over the world with a passion to conserve and protect our delicate marine life and underwater world.

THE CONTRIBUTORS

Meet the quarterly contributors who share their passions and stories with our readers. Want to contribute?
Email: **magazine@emiratesdiving.com**

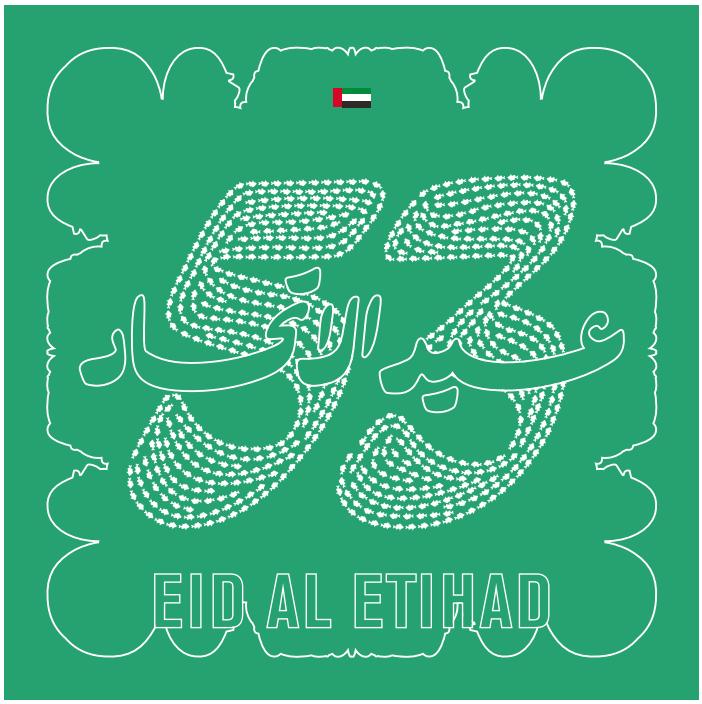
DR HENRIK STAHL
Henrik is the Dean of the College of Marine Science and Aquatic Biology at the University of Khorfakkan. With over 20 years of experience in marine science, his professional career spans from deep-sea exploration to shallow coastal ecosystems, from the Arctic to the Tropics. Today, Henrik is passionate about advancing marine research and education in the UAE, and about sustainable ocean management and conservation.

DR JOHN A. BURT
Dr John A. Burt is a Professor of Biology at New York University Abu Dhabi, specialising in marine ecology and conservation. He is co-director of the Mubadala Arabian Centre for Climate and Environmental Sciences, where his team seeks to expand our understanding of the magnificent ecosystems and organisms that occur in the UAE's Arabian Gulf and Gulf of Oman waters.

AHMED AL-ALI
A UAE national from Sharjah, Ahmed took a deep interest in his country's natural history and has dedicated most of his time to bird watching. Combining his knowledge and photographic skills, his images have taken a unique and artistic style with educational messages to share. He has won many photography awards, locally and internationally, in addition to his work appearing in published literature, scientific papers and university projects. Ahmed has a Master degree in Science and Environmental Science from UAE University.

PHILIPPE LECOMTE
Having followed in his father's and brother's love for the sea, French diver and underwater photographer Philippe, took to underwater photography in 2006 after having moved to Abu Dhabi in 2003 and now seldom travels without his camera.

NAIRIKA BHARUCHA
Milaidhoo Maldives' resident Marine Biologist Nairika Bharucha inspires guests every day, sharing her passion for marine conservation, sustainability, reef management and the wonder of ocean ecosystems. She is responsible for coral propagation and managing the coral nursery, educating guests about the delicate reef ecosystem and making their underwater encounters truly unforgettable.



EID AL ETIHAD

IBRAHIM AL-ZU'BI
Co-Founder

What an incredible end-of-year initiative we had for Cleanup Arabia 2024! We couldn't be prouder of our ocean loving community of partners and members. 117 volunteers and 71 divers joined us with our partners: DP World, Imdaad LLC, P&O Marinas and P&O Maritime, and D-Marin. We removed a total of 2,197.9kg of waste from this year's two locations for our coastal and underwater clean-ups!

Well done to everyone for removing as much rubbish as was possible, and to everyone who counted all the items at Port De La Mer! We filled 104 bags of waste at Mina Rashid, but with a lot of plastics such as ropes, bags, and food containers breaking down into smaller pieces, it made it impossible to count individual items at such a large scale. This was an incredible group effort.

We are thrilled to share so many great ocean stories in this issue from so many of our passionate contributors. There's something for everyone.

I would like to wish everyone a Happy 53rd UAE Eid Al Etihad, marking the historic moment on the 2nd of December 1971, when the United Arab Emirates was founded through the unification of seven emirates. The name emphasises the theme of "Union" (Etihad), which is central to the country's identity, symbolising heritage, unity, strength, and national pride.

I also want to wish you all a Merry Christmas, and a Happy New Year. We look forward to seeing you in the new year at the next EDA events and activities, and to new diving adventures within the UAE and around the world.

Stay tuned, we've got lots of things lined up for you in 2025!

Happy reading and safe diving,

Ibrahim Al-Zu'bi

Ibrahim Al-Zu'bi

LOOKING FOR CHRISTMAS GIFT IDEAS FOR DIVERS & OCEAN LOVERS?

1. EDA MEMBERSHIP

Gift EDA Membership to those you love so they can take part in all the EDA marine environmental events and activities. Our social events are not just for divers, we've got something for everyone to enjoy.

www.emiratesdiving.com/membership-form

2. THE MEMBERSHIP BENEFITS

Check out the EDA Membership benefit discounts to gift equipment or courses available from the various UAE dive centres listed on our website. You will find some great stocking fillers.

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3. THE PHOTOGRAPHY BOOK

Get a beautiful A3 hard back photography book of The Best of Digital Online of all our EDA Members best images entered into our underwater photography and film competition from 2011-2017.

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4. SHARK OR TURTLE T-SHIRTS

Get an EDA Shark or Turtle T-shirt, available in black, blue or white (while stocks last).

Each T-shirt comes with a UAE tag on the bottom left seam making it extra special for UAE visitors to remember you by.

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5. NUDIBRANCH CALENDAR 2025

Get a copy of the Nudibranchs of the United Arab Emirates Calendar with photography by Gordon T. Smith. This one is for all the nudibranch fans out there!

OPTIONS TO BUY A COPY:
Message Gordon directly to buy a copy
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6. OCEAN ART

Melissa Goodenough's artwork is a portal to the sea, capturing the gentle dance of her brush on canvas, the hidden expressions of cephalopods, and the hypnotic textures of the ocean.

www.melissagoodenough.com
www.instagram.com/melissa_goodenough_art

THE SCIENCE BEHIND THE DEPTH

HOW YOUR BODY ADAPTS TO THE SPORT OF FREEDIVING

BY **BASSEL OUNAH – APNEA ZONE** PHOTOGRAPHY **JAKOB BOMAN**

Freediving is quite an excellent combination of physical stamina, concentrated mental faculties, and simply communing with the ocean. It is well beyond holding one's breath and plunging into the water; it's actually about how one's body can change and adapt to the deep pressure. Some physiological adaptations within the human body might help us survive beneath the waves. In this article, we look at some fascinating science behind how our body reacts to being underwater, from the mammalian dive reflex to hypoxia, and what exactly changes in our body when we're in extreme conditions underwater.

THE MAMMALIAN DIVE REFLEX: YOUR INNER DOLPHIN

The magic happens when your face hits cold water. Your body sends off the mammalian dive reflex – a range of physiological responses that slows your heart rate, reduces the amount of oxygen used, and shunts blood towards the organs. The dive reflex is common to all mammals, including humans, and it probably evolved to help us survive in water.

BRADYCARDIA: The first thing that occurs with the dive reflex is this. This fancy term-bradycardia, just means the slowing of the heart rate. In other words, your heart beats more slowly, using less oxygen on every beat, and saves that oxygen for the more vital organs like the brain and the heart itself.

PERIPHERAL VASOCONSTRICTION: If the heart rate has already started to slow down, the blood is then shifted from superficial areas, such as your arms and legs, and routes to the core of your body. This ensures that the brain and heart are prioritised with the precious blood throughout your dive.

BLOOD SHIFT: This sets in when your lungs shrink in size due to the tremendous pressure from a deep dive. Your body automatically sends blood to the lung tissues to cushion them should the latter collapse because of the pressure.

Basic automatisation is likely one of the reasons freedivers can achieve such a magnitude of depths without a breathing apparatus. They literally "hack" their biology to be able to spend extended amounts of time underwater safely.

HYPOXIA: The Art of Flourishing Without Oxygen

Central to this sport is coping with hypoxia or, more precisely, low oxygen levels. Whereas for most of us, the urge to breathe seems to occur within a window of 30 to 90 seconds of breath-holding, the trained freediver can

push through this barrier at times for several minutes. How does this happen?

They increase their carbon dioxide tolerance. While one holds their breath, the urge to breathe is not because of the lack of oxygen, but because of the amount of carbon dioxide, or CO2 building up within the blood. Freedivers train their bodies to be more tolerant of increased levels of CO2, which holds off the urge to breathe and therefore, extends the time they can stay underwater.

OXYGEN EFFICIENCY: With time, it is a fact that frequent freediving makes the utilisation of oxygen by your body more constructive. In other words, as a freediver, your body develops more red blood cells, transporting oxygen to muscles more effectively, which helps you stay underwater for a more extended period.

ANAEROBIC METABOLISM: your body starts gradually switching its mode of metabolism from aerobic to anaerobic. This process allows cells to make energy without using oxygen; this system is less effective and can only be maintained in short spurts. Training teaches a freediver how to smoothly transit between the two energy systems, which prolongs the time a freediver can spend in the water.

PRESSURE: HOW DEPTH AFFECTS YOUR BODY

The deeper one goes, the greater the water pressure. Under a standard set of rules, the pressure on the body doubles for every ten metres or 33 feet deeper one goes in a dive. On the other hand, the human body is very resistant to such an increase in pressure.

PNEUMOTHORAX COMPRESSION: Over 10 metres, the pressure becomes strong enough to let the air in your lungs compress and let them shrink to only a fraction of their surface volume. Blood shift in the mammalian dive reflex floods the lung tissues with blood; it plays the central protective role, saving them from collapse under pressure.

SPLEEN CONTRACTION: The spleen is an intrinsic oxygen tank that contracts during a dive. This releases more red blood cells into the circulation, increasing the body's oxygen-carrying capability.

HIGH-PRESSURE ADAPTATION: With time, professional freedivers become more resistant to pressure effects on their bodies and can hence plunge beyond 100 metres without their bodies experiencing damage.

SAFETY MEASURES:

Knowing When to Surface

Impressive as these bodily adaptations may be, they do have their limits. By paying attention to physical limitations, the freediver will be better able to avoid dangerous situations such as shallow water blackouts and hazardous situations when oxygen levels become too low just before surfacing. Paying attention to those cues one's body gives and keeping in mind appropriate controlled ascents are the keys to maintaining safety while on deep dives.

Ultimately, the fundamental basic science underlining the sport of freediving is a testimony to how awesome the human body can be – from the mammalian dive reflex to the methods of conserving oxygen. Our bodies are wired so that they adapt and enable us to explore an underwater world. Practice and knowledge will allow the freediver to safely push their limits toward greater depths and a deep connection with being beneath the surface.

As one plunges deeper into the world of freediving, he learns that every dive is not only about endurance but also a testament to how remarkable the human body can be.

This article looks into some incredible physiological mechanisms that enable man to survive, even thrive, in an underwater world whether a complete neophyte or a seasoned freediver. Familiarity with deep physiology brings appreciation for this incredible sport!

THE TIDES, THE MOON AND CURRENT

BY **GORDON T. SMITH**

Do you ever wonder why you dived a site last week and it was nice and relaxed with no current, and then the following week at the same time, at the same site, you were drifting off the dive site or worse, hanging on to the mooring line like a flag in the wind?

WHAT'S HAPPENING?

In short, it's GRAVITY!

Simply put, the tidal movements between high and low tide times will cause current due to water movement between the high and low tide times.

In general, most dive operations have a schedule to follow in order to maximise the use of their boats, and will want to have two morning dives and two afternoon dives, and quite frankly, it's the only way to run an efficient business and accommodate as many divers as possible. But, this is done without taking into consideration what the conditions will be like on the day due to currents.

TIMING IS EVERYTHING!

Backward rolling off a dive boat into current can be stressful if you have to swim to the front of the boat to get to the mooring line. The best option really is to get dropped off up-current and drift onto the mooring line or shot line, and thus ensure you are descending down directly onto the dive site. You really don't want to be swimming against the current when you're at the back of a four boat queue on Inchcape 1.

Similarly, when ascending in a strong current could have you hanging on to the mooring line horizontally, trying to share a piece of rope a metre in length with five or more other divers at the safety (or deco) stop.

In general, there are two high tides per day and two low tides per day, (with some exceptions), but sticking only to the United Arab Emirates (UAE), that is the general rule. There's a high tide, followed by a low tide, followed by a high tide, then another low tide around six hours apart… ish.

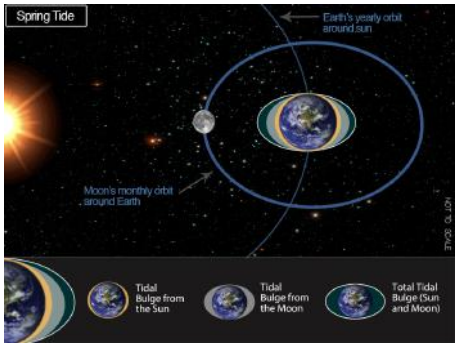
This is primarily due to the Lunar semidiurnal tides, which are in a 24 hour and 50-minute cycle, so a bit more than six hours between the tides.

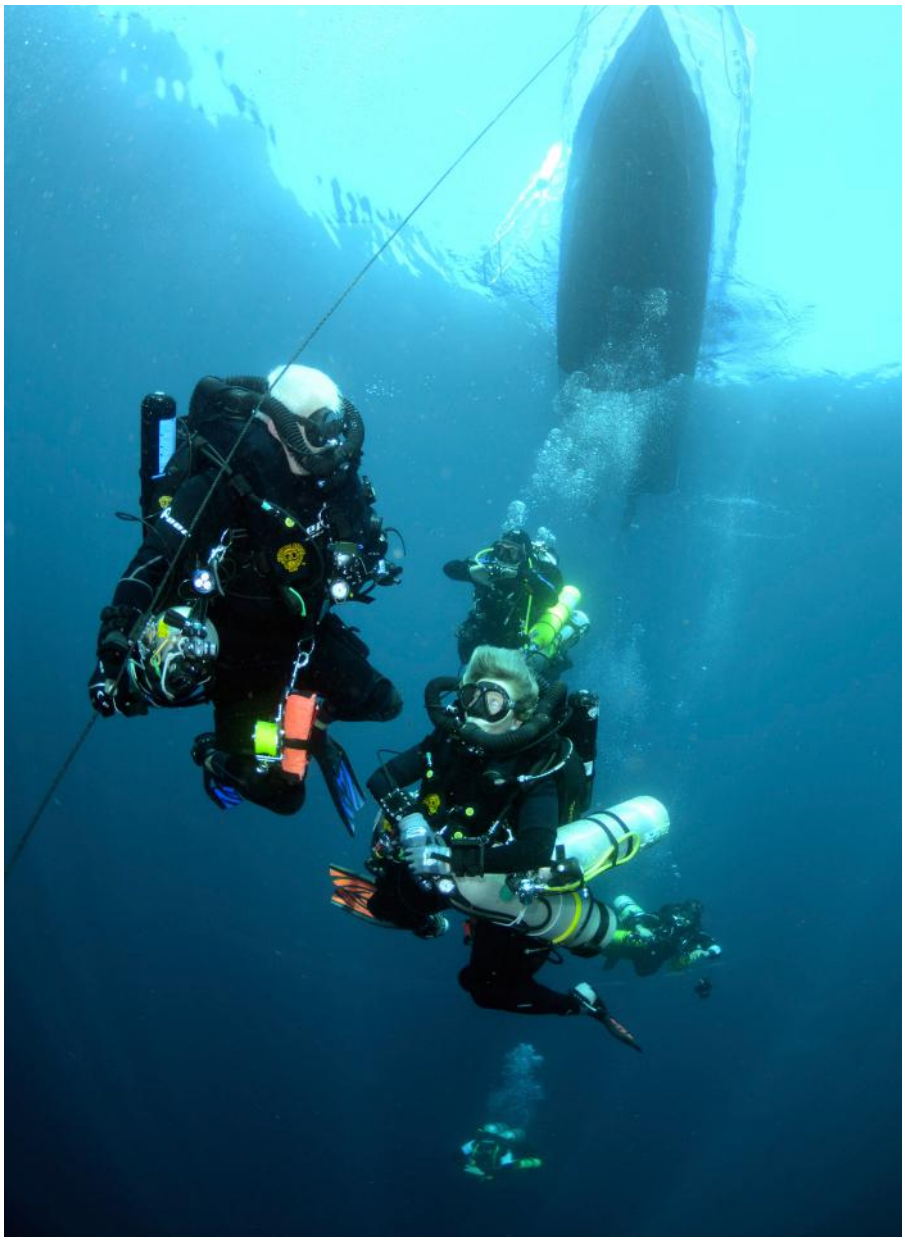
BUT THAT'S NOT ALL OF IT

Regular divers will know that some high tides are higher during certain periods of the month, in particular during a full moon, and during a new moon. These extra high tides, known as spring tides, will mean more current in specific places, and especially in several geographical areas where waterways get narrower due to an island in close proximity to the shore, causing the current to flow faster than a part of the coastline with no offshore island.

Additionally, there can be certain shorelines (where there is a distinct inlet), where a resonance is caused by the water moving in and out of that inlet that produces extreme tidal differences – eg the Bay of Funday in Canada.

In simple terms, these tides are due to the





ABOVE: Diagrams from National Oceanic and Atmospheric Administration.

gravitational effects produced by the moon on the earth, causing a bulge of water on the side of the earth, directly facing the moon, and also a bulge on the opposite side of the earth due to the delayed timing of this gravitational pull.

Remember though, the earth is rotating, so these two bulges are, in general, stationary with respect to the moon, which is also rotating around the earth.

In other words, the two high tides are almost a permanent feature, but with the earth and the moon's movement, they change to low tides at different times of the day.

Now, let's throw in another object that has a gravitational effect on the earth – the Sun.

This burning mass of fire at the centre of our solar system produces a semi diurnal tide as well as an annual tide. The latter of which is every 365.24 days, giving us the highest tides when the earth is closest to the sun on the second of January every year, and convexly the lowest tides are on the second of July.

A combination of the moon's position to the earth and the sun is what gives us spring tides. When the high tides are higher than normal, and neap tides, when the tidal movement is less. Therefore less water movement, meaning less current.

SO, WHEN'S THE BEST TIME TO DIVE?

In order to avoid current, the best time is one hour before high or low tide, until one hour after high or low tide. This period is known as slack tide, when there will be very little water movement during that period.

If you really want to avoid any current, then the tidal movement is always less during neap tides when the moon is at half.

But wait, the dive centre is still launching the boat out at 09:00 irrespective of what the tides are doing, so it's a good idea to know what the tides are for the specific dive site you are going to dive and be prepared.

High tide at the Fujairah Marine Club will be different from high tide at Dibba marina further north, so please be aware of the geography of the country where you are diving and assess the conditions using an appropriate tide timetable. Personally, I use an App by Tideschart.

When I was doing a lot of technical diving off the east coast of Fujairah several years ago, we always planned our dives on the Ines and Anita around slack tide in order to avoid strong currents whilst doing our long deco stop at 6m.

One thing you don't want to deal with after a deep dive, is a long deco stop in current hanging onto a shot/mooring line. In these cases, it's best to deploy a DSMB and drift, but this could be problematic if there is a lot of boat traffic, and the dive boat captain has to follow several DSMBs.

THE INTERNATIONAL UNION FOR CONSERVATION OF NATURE SPECIES SURVIVAL COMMISSION'S **FIFTH MEETING IN ABU DHABI**

Hosted by the Environment Agency – Abu Dhabi (EAD), the Fifth Leaders' Meeting of the International Union for the Conservation of Nature's (IUCN) Species Survival Commission (SSC) kicked off on the 25th of October in the capital of the UAE.

The meetings, that ran between the 25th and 28th of October in Abu Dhabi, brought together 300 leaders and experts in species conservation from across the globe.

Speaking during the opening ceremony were: Her Excellency Razan Khalifah Al Mubarak, President of the IUCN via video; Her Excellency Dr Shaikha Salem Al Dhaheri, EAD's Secretary General; Dr Grethel Aguilar, IUCN Director General, who addressed the audience virtually, and Dr Jon Paul Rodríguez, Chair of the SSC. In attendance were His Excellency Ghanim Al-Hajeri, General Manager of Al Ain Zoo, His Excellency Abdulla Ahmed Al Qubaisi Managing Director of the International Fund for Houbara Conservation (IFHC) and His Excellency Abdulla Ghurair Al Qubaisi, Director General of IFHC.

During the opening ceremony, EAD was honoured by the IUCN SSC for improving the Scimitar-horned Oryx (SHO) status from 'Extinct in the Wild' to 'Endangered' on the IUCN Red List, marking a global first after over 20 years. The Agency's collaboration with Chad's Ministry of Environment and partners has helped Oryx numbers exceed 650 in total.

Her Excellency Razan Khalifah Al Mubarak on the occasion, said, "This gathering holds a special place in our hearts, as it reunites us in the spirit of our 2008 initial meeting in Al Ain. The United Arab Emirates, guided by the enduring legacy of Sheikh Zayed bin Sultan Al Nahyan and the visionary leadership of His Highness Sheikh Mohamed bin Zayed Al Nahyan, President of the UAE and Ruler of Abu Dhabi, continues to prioritise species conservation on the national and global stage."

She added, "Today, as we convene, the 2024 United Nations Biodiversity Conference is also taking place in Colombia. This synchronicity between our meeting and the conference highlights the global momentum for biodiversity conservation. It also serves as a reminder of the significant strides made during COP28, hosted by the UAE, where we placed nature at the centre of the climate dialogue. This pivotal moment recognised the crucial connection between biodiversity and climate action, affirming nature's role as an essential ally in our efforts to mitigate climate change, enhance resilience, and promote sustainable development."

She elaborated, "The work of the Species Survival Commission, supported by the critical data from the Red List of Threatened Species, is pivotal in this context. This information is essential to meeting the targets of the Kunming-Montreal Global Biodiversity Framework, empowering policymakers, conservationists, and communities to make informed decisions and take effective actions rooted in scientific evidence."

She stated, "We are thankful for Abu Dhabi's support of these vital efforts. The Environment Agency – Abu Dhabi and the Mohamed bin Zayed Species Conservation Fund, which marks 15 years of significant contributions, have supported almost 3,000 projects affecting 1,800 species globally. Many of these grants have directly contributed to Red List assessments, exemplifying our belief that species conservation is a shared responsibility that transcends borders."

Her Excellency Dr Shaikha Salem Al Dhaheri,

Indian Ocean Humpback Dolphin

during her opening statement, said, "Today, species conservation entails more than just government endorsements. With 300 experts gathered here and backed by the SSC's vast network of over 10,000 members and nearly 200 specialist groups, which represent the critical mass for global species conservation."

She added, "The IUCN is recognised globally for its knowledge products, such as Red Lists, and as species experts, you carry a crucial responsibility to advance species conservation, especially in regions that lack the capacity and resources. Establishing Centres for Species Survival is a positive step forward, and I am pleased to learn that 20 such centres have been set up."

She stressed, "Though we face large-scale species extinctions, our collective efforts can change this trajectory. Together, we can protect, restore, and reverse the fortunes of many species. Here in Abu Dhabi, we deeply value this and have taken bold steps to protect and restore our biodiversity. Restoration of the two iconic species deeply intertwined with our environment and culture—the Arabian Oryx and the Houbara – is among our most notable conservation achievements. The Scimitar-horned Oryx reintroduction in Chad is another noteworthy example. The restoration programme we started along with our partners, precisely a decade ago, has been hugely successful with over 650 individuals now living in the wild in Chad, leading to improvement in the species' conservation status."

Dr Jon Paul Rodríguez, expressed what makes the meeting unique, "The 5th SSC Leaders' Meeting stands out for its focus on the interconnected crises of biodiversity loss, climate change, and human well-being. This gathering will uniquely highlight how the regenerative power of nature and the role of animals, fungi, and plants in regulating ecosystems offers solutions to these global challenges. With a special emphasis on how conservation and ecological restoration can address these crises together, the meeting will provide an invaluable platform for exploring sustainable strategies to secure the future of our planet."

Created in 1948, IUCN is now the world's largest and most diverse environmental network, harnessing the knowledge, resources and reach of more than 1,400 member organisations and around 16,000 experts, and is a leading provider of conservation data, assessments and analysis. Its broad membership enables IUCN to fill the role of incubator and trusted repository of best practices, tools and international standards.

The IUCN Species Survival Commission (SSC) is a science-based network with over 10,000 members in 186 territories. Being the largest of the IUCN's seven expert Commissions, the SSC's members work independently and with various IUCN Units to build knowledge on the status and threats to species, and provide advice, develop policies and guidelines, and facilitate conservation planning. Via this approach to its work, SSC catalyses conservation action and enables IUCN to influence policy and assist societies in biodiversity conservation.

ENVIRONMENT AGENCY – ABU DHABI, IN PARTNERSHIP WITH THE MINISTRY OF CLIMATE CHANGE AND ENVIRONMENT AND EMIRATES NATURE-WWF, **LAUNCH THE NATIONAL GUIDELINES FOR MANGROVE RESTORATION**

In line with the Abu Dhabi Mangrove Initiative (ADMI), the Environment Agency – Abu Dhabi (EAD), in collaboration with the Ministry of Climate Change and Environment (MOCCAE) and Emirates Nature-WWF, launched a first-of-its-kind 'Guidelines for Mangrove Restoration in the UAE'.

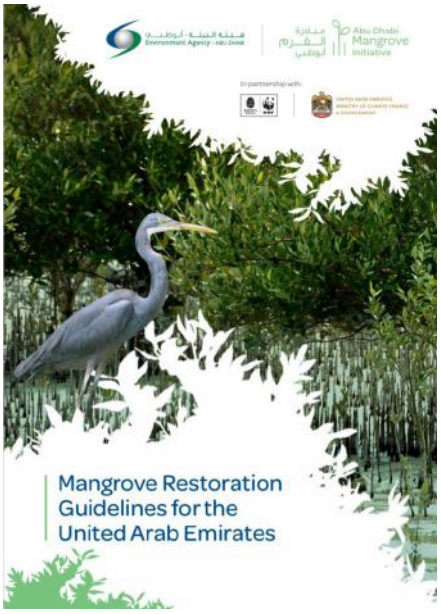
As the first national publication to provide specific guidance for mangrove restoration in the UAE, the Guidelines also cover the planning of a successful restoration project, considering the country's unique mangrove ecosystems and environmental conditions.

The Guidelines aim to serve as a beacon for future restoration efforts in the UAE and around the world. The objective is to create a legacy document that will support future mangrove restoration initiatives, ensuring their long-term vitality and associated ecosystems on the local and international levels.

Her Excellency Dr Shaikha Salem Al Dhaheri, Secretary General of EAD, on the occasion says, "In alignment with the Year of Sustainability, we honour the legacy of the late Sheikh Zayed bin Sultan Al Nahyan, the nation's Founding Father, whose pioneering mangrove restoration efforts have long established responsible stewardship of mangrove forests in the UAE. His passion for marine and coastal environments saw the first mangrove plantation project initiated in 1966 along Abu Dhabi's coast – a clear demonstration of his vision and commitment to ecological preservation. Today, we also celebrate the launch of the 'Guidelines for Mangrove Restoration in the UAE', in partnership with the Ministry of Climate Change and Environment and Emirates Nature-WWF."

Her Excellency added, "This comprehensive and detailed national practice guideline for mangrove restoration is the first publication to provide specific guidance tailored to the local context. It aims to consolidate the expertise and knowledge established in the UAE, providing guidelines that will benefit all mangrove restoration initiatives both within the UAE and the wider region. Our recommendations are aligned with global best practices. It will also help all our stakeholders to benefit from the technological innovations applied in the UAE to enhance restoration efforts."

HE Dr Mohammed Salman Al Hammadi, Assistant Undersecretary for Biodiversity and Marine Life Sector, and Acting Assistant Undersecretary for the Food Diversity Sector at MOCCAE said, "Our close cooperation with the Environment Agency – Abu Dhabi and Emirates Nature-WWF on the 'Guidelines



for Mangrove Restoration in the UAE' reflects our joint commitment to preserving this key ecosystem. This guideline confirms the UAE's recognition of mangroves as one of the most important nature-based solutions for climate action and helps achieve the country's commitment to plant 100 million mangroves by 2030, which will significantly contribute to the UAE's achievement of climate neutrality by 2050. The guide also aims to raise national capabilities and assist decision makers and field work teams in the proper management of mangrove rehabilitation operations and projects. The document was developed in accordance with a scientific methodology and clear guidelines that rely on a comprehensive technical assessment, developing appropriate solutions and methods for the rehabilitation of mangrove trees, and following up through periodic monitoring programmes."

His Excellency added, "Conserving and restoring mangroves are complex processes and require strategies and scientific methodology, which makes the 'Guidelines for Mangrove Restoration in the UAE' crucial to enhancing mangrove cover locally. In line with global best practices, the guide provides advanced insights for undertaking restoration projects in the UAE to identify ways to maximise their economic, social and environmental benefits."

His Excellency praised all national efforts and initiatives, whether they originated from the government or private sector or from civil society organisations, that have contributed to planting and preserving mangroves, in addition to raising community awareness of their importance – all of which supports the realisation of the national goal to plant 100 million mangrove trees by 2030.

Laila Abdullatif, Director General at Emirates Nature says, "Mangroves and other blue carbon ecosystems in the UAE are essential components to ensure the well-being of our people, the vibrancy of our biodiversity and the sanctity of our climate. This report serves as a north star for mangrove and ecosystem restoration across the region. I encourage the wider community to leverage these insights and utilise a science-driven approach to achieve effective conservation and lasting success."

On an international level, the Guidelines support the Mangrove Breakthrough initiative – a joint effort by The Global Mangrove Alliance (GMA) in collaboration with the UN Climate Change High-level Champions and other partners – to accelerate global mangrove restoration. The Mangrove Breakthrough's guiding principles and global target are restoring and protecting 15 million hectares of mangroves, as well as halting their destruction, by 2030. On a national level, the document will help accelerate the roadmap for the 'National Carbon Sequestration Project', which aims to plant 100 million mangroves by 2030 across the country.

TO TEST THE READINESS AND EFFECTIVENESS OF EMERGENCY PLANS
EAD CONDUCTED A TABLETOP EXERCISE TO MITIGATE RED TIDE AND FISH KILL EVENTS WITH 16 ABU DHABI GOVERNMENT AGENCIES

The Environment Agency – Abu Dhabi (EAD) recently conducted a tabletop exercise (Med 1/2024) that explored possible responses to the phenomenon of red tide and fish kill events in coordination with the Emergencies, Crises and Disaster Management Centre Abu Dhabi.

The exercise saw a total of 16 Abu Dhabi government entities gather to test their readiness to confront and respond quickly and effectively to threats and emergencies caused by the risk of red tide and fish kills in the emirate.

"The Environment Agency – Abu Dhabi is the leading entity regarding the risk of red tide and fish kills based on the emirate's local risk register – an integral part of the integrated system for emergency, crisis and disaster management at the local level in Abu Dhabi. This system aims to raise the readiness of the concerned entities to confront and respond quickly and effectively to emergency situations and threats of all kinds," said Eng. Khaled Mohammed Al Hajri, Director of the Emergency, Safety and Business Continuity Office at the Agency.

Al Hajri pointed out that during the simulation exercise (Exercise Tide 1/2024), various possible scenarios which require the fullest readiness and preparedness of all relevant authorities were reviewed. He stressed the importance of committing work teams from each government entity to activate the general response plan for red tide events and fish deaths due to the importance and impact on the speed of our response in dealing with the danger and reducing their effects.

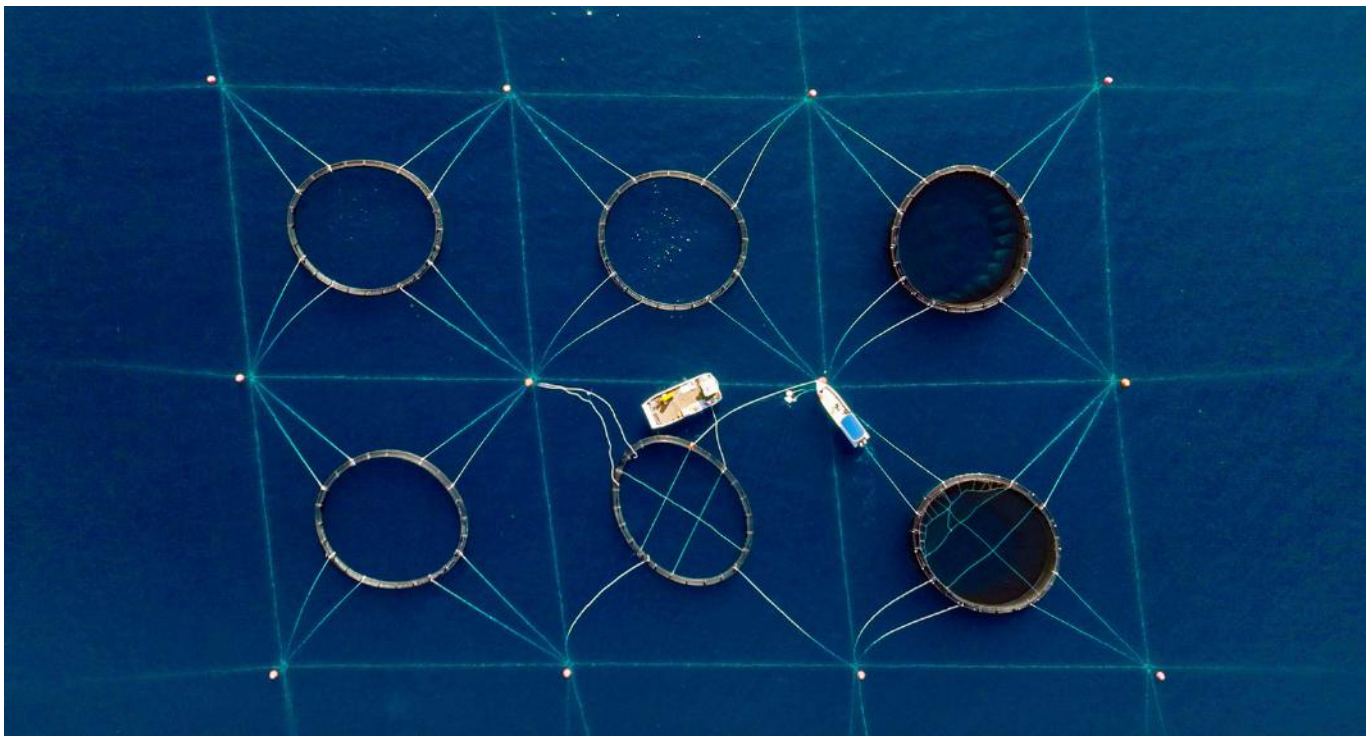
By conducting such exercises, EAD seeks to achieve several main objectives. The most important is to raise the readiness of all relevant work teams by providing an element trained on unified concepts within the emergency and crisis management system. This helps assign roles and responsibilities, increasing the teams' experience and skills development, while fostering a spirit of cooperation and a 'one team' ethos. It also raises the readiness of assets and resources required to support emergency and crisis operations by testing the efficiency of mechanisms, equipment, and smart systems for exchanging information and financial resources required to respond in emergency and crisis situations. This is achieved by measuring the extent of the systems' compatibility and the availability of resources during response operations.

These exercises also aim to raise the quality of the planning, preparedness, and institutional readiness process by measuring how effectively the emergency response plan was implemented, while raising the quality of the emergency response and recovery process by measuring the speed and effectiveness of response procedures, investigating event data, collecting evidence, and following up on recovery processes. In addition, they help identify the most affected areas by assessing the likelihood of future risks and determining their severity to develop appropriate proactive mitigation measures, as well as to identify strengths and opportunities for continual improvement during emergency situations in accordance with the best local and international practices and standards related to aspects of the emergency and crisis system.

The exercise included interactive discussion sessions during which ideas and experiences were exchanged, and a set of practical recommendations were presented to comprehensively improve the quality of marine water in a sustainable manner. The most prominent recommendations included enhancing cooperation between the public and private sectors, the application of modern water treatment technologies, and raising community awareness of the importance of preserving the marine environment.

UNDER THE DIRECTIVES OF HAMDAN BIN ZAYED,

EAD LAUNCHES SEA CAGE AQUACULTURE PROJECT IN ABU DHABI USING ARTIFICIAL INTELLIGENCE TOOLS FOR FIRST TIME IN THE MIDDLE EAST



Under the directives of His Highness Sheikh Hamdan bin Zayed Al Nahyan, Ruler's Representative in Al Dhafra Region and Chairman of the Board of Directors of the Environment Agency – Abu Dhabi (EAD), and in alignment with the vision of Abu Dhabi's sustainable aquaculture policy, the Agency launched the first sea cages aquaculture project in the Emirate of Abu Dhabi.

The project, which is located southeast of Delma Island within Al Dhafra Region, aims to conduct scientific studies and research on culturing local fish species using floating aquaculture cage systems and develop environmental protocols for sustainable sea-based aquaculture in the emirate of Abu Dhabi. In addition, the project will contribute to relieving pressure on wild fisheries resources and addressing climate change impacts. Furthermore, it will support food security objectives in light of the increasing demand for seafood and encourage future investments in the sector.

The project will also be equipped with an advanced monitoring and data collection system, utilising artificial intelligence – which makes it the first of its kind in the Middle East. It aims to implement solutions to manage aquaculture operations with high efficiency and will use environmental sensors to monitor marine water quality parameters, including: temperature, pH, salinity, dissolved oxygen, turbidity and ammonia levels. This will also be augmented by underwater and surface cameras to track fish behaviour, feeding efficiency and a smart gateway for data transmission, powered by solar panels.

Prior to establishing the project, EAD implemented a state-of-the-art integrated hydrodynamic and environmental modelling to establish sustainable aquaculture development zones in the Al Dhafra Region. The modelling was carried out to determine the maximum biomass of fish that can be sustainably cultured within selected sites without impacting the environment. The model also included components to study wave and particle movements and water quality to ensure environmental sustainability of the selected sites.

The project consists of six floating sea cages, capable of producing 100 tonnes of fish annually. Targeted fish species included various local high value species such as Gabit, Safi, Hammour and Sheri, whereby 168,000 Safi Arabi, 122,000 Gabit, 100,000 Shaam and 90,000 Shaari were released.

Her Excellency Dr Shaikha Salem Al Dhaheri, Secretary General of EAD said, "As part of our efforts to promote sustainable aquaculture in the emirate and implement our sustainable aquaculture policy initiatives, we are conducting the first aquaculture cage project southeast of Delma Island, which will include the cultivation of local fish species that are vulnerable to overexploitation."

She added, "The project is aligned with the UAE government's vision that prioritises the development of aquaculture due to its potential economic and environmental benefits, while reducing pressures on the decline in natural fish stocks. A careful survey was conducted to determine the most suitable location for the project, using hydrodynamic modelling and a comprehensive survey of various sites."

EAD, IN COLLABORATION WITH THE YAS SEAWORLD RESEARCH & RESCUE CENTRE, **SUCCESSFULLY REHABILITATED AND RELEASED 10 GREATER FLAMINGOS FROM AL WATHBA WETLAND RESERVE**

The Environment Agency – Abu Dhabi (EAD), in partnership with the Yas SeaWorld Research & Rescue Centre Yas Island, Abu Dhabi, has successfully rehabilitated 10 greater flamingos rescued during February's harsh weather event effected by Al-Mizr's low pressure at the Al Wathba Wetland Reserve. Heavy rains were accompanied by exceptionally large hail showers, which greatly affected the reserve.

Ahmed Al Hashemi, Executive Director of the Terrestrial and Marine Biodiversity Sector at EAD, said, "The Agency's rangers in the reserve were monitoring the greater flamingo population across the reserve's wetlands from the storm's early hours. It became obvious that hailstones had injured many birds and so EAD immediately activated an emergency response, assigning four teams to rescue the injured birds, and transport them to the Yas SeaWorld Research & Rescue Centre for treatment and rehabilitation.

"The teams also succeeded in rescuing seven newly hatched chicks, aged between one to three days, which were also provided with immediate care at the Centre. In addition, four eggs that were about to hatch were rescued to ensure that the chicks remained under the Centre's care and supervision. Examinations and autopsies of the birds done from which samples were taken in coordination with the Yas SeaWorld Research & Rescue Centre revealed serious injuries due to hailstones."

Al Hashemi explained that the incident is a rare natural phenomenon that has never been recorded before in the UAE. Globally, it is also considered a rare occurrence, which resulted in the loss of several flamingos due to the heavy hailstorm and the effect of climate change on biodiversity.

"These events prove the readiness of the Environment Agency – Abu Dhabi and its partners to respond instantly and contain any crisis. We proudly expand our efforts in saving wildlife by collaborating with our partners and together with Yas SeaWorld Research & Rescue Centre we were able to successfully return the saved flamingos back to their habitats."

Robert Yordi, General Curator of the Yas SeaWorld Research and Rescue Centre and SeaWorld Abu Dhabi added, "In the wake of the challenging weather conditions faced by a flock of greater flamingos in Abu Dhabi, the Yas SeaWorld Research and Rescue Centre was pleased to collaborate with the Environment Agency – Abu Dhabi as part of this successful rescue operation.

The storm had left these magnificent birds in bad condition and our team of animal rescue experts and veterinarians worked diligently to rescue, transport and care for the flock in order to ensure a safe return of the birds that survived to their natural habitat. Partnering with EAD on this rescue operation is part of our larger mission to conserve and protect the marine wildlife, habitats and ecosystems across the UAE and the Arabian Gulf. For nearly 60 years, SeaWorld has rescued over 41,000 animals and is one of the largest marine rescue organisations in the world. We look forward to continuing to support marine wildlife rescue work across the region in the future."

It is expected that greater flamingos, which breed in several batches during the winter and early summer in the reserve, will reproduce again, recovering the losses due to the hailstorm. The reserve recorded 1,270 breeding pairs in the 2023-2024 winter breeding season and therefore the reserve is expected to recover losses of the 2023-2024 nesting season without the need for any human intervention.

The Agency has been monitoring both terrestrial and marine bird species at Al Wathba Wetland Reserve since 2002. Since 2005, the Agency has been using advanced satellite-tracking devices to monitor the movement and migration patterns of the greater flamingos from the reserve to northern areas during the summer.

The Greater Flamingo is a largely migratory species, returning annually to Abu Dhabi from breeding colonies in Central Asia. However, groups of greater flamingos reside in some of the UAE's major wetlands, including Al Wathba Wetland Reserve and adjacent coastal sites.

The 4.5-square kilometre inland Al Wathba Wetland Reserve is managed by EAD, and was established as Abu Dhabi's first protected area in 1998 under the directives of the late Sheikh Zayed bin Sultan Al Nahyan following successful flamingo breeding seasons. The reserve is the only location in the Arabian Peninsula where greater flamingos breed regularly.

During the winter months, the reserve hosts more than 4,000 greater flamingos, which usually breed during this period. A site of global importance, the reserve was the first site in Abu Dhabi to join the international Ramsar List of Wetlands. In 2018, the International Union for Conservation of Nature (IUCN) included Al Wathba on its worldwide Green List of protected areas and nature conservation areas.

SPECIES EXPERTS' MEETING CONCLUDES WITH DECLARATION THAT SAVING SPECIES IS INTEGRAL TO PROTECTING NATURE

The 5th IUCN Species Survival Commission (SSC) Leaders' Meeting concluded in Abu Dhabi, with conservation experts and leaders issuing a powerful declaration affirming that "Saving Species Sustains Life."This landmark gathering brought together more than 300 conservation leaders to address the urgently needed interconnected solutions to protect biodiversity, stabilise climate, and support human well-being.

The declaration issued by SSC members and partners conveys the critical role of species in ensuring clean water, food security, cultural connections, economic stability, and social justice. It calls on diverse sectors – including governments, businesses, Indigenous peoples and local communities, religious groups, and individuals – to prioritise species conservation within their actions, strategies, and giving, recognising that protecting animals, fungi and plants is fundamental to sustaining life on earth.

"The declaration, Saving Species Sustains Life, reminds us that the fate of biodiversity is deeply intertwined with our own, affecting everything from climate stability to human health and wellbeing. Our actions to protect species are, in essence, actions to safeguard our collective future," said Razan Al Mubarak, IUCN President.

AS THE DECLARATION STATES:
Saving Species Sustains Life. We know how to save species and we have proved that conservation works. SSC has doubled its actions since our 2019 Abu Dhabi Call for Global Species Conservation Action, even as threats continue to emerge and accelerate. The world has already committed to the Sustainable Development Goals, the Kunming-Montreal Global Biodiversity Framework and the Paris Agreement. Saving species is fundamental to achieving these commitments.

This 2024 declaration was created to inspire urgent and widespread action on behalf of all species. While climate action and area-based measures are critical to protecting and restoring nature, species conservation is also an essential part of this effort. SSC members asserted that species conservation underlies achieving the Sustainable Development Goals, Kunming-Montreal Global Biodiversity Framework (KMGBF) and the Paris Agreement. This call to action, advanced by SSC members in line with Reverse the Red and the global conservation community, calls for the world to rally to protect and restore the species that sustain us all.

Reflecting on the meeting's achievements, SSC Chair Prof Jon Paul Rodríguez stated, "The urgent need to conserve species is at the heart of SSC's mission. This declaration amplifies our commitment to act for biodiversity, climate resilience, and human well-being. With support from communities, governments, civil society and individuals worldwide, we can build a sustainable future that values and conserves all life."

For more than 15 years, with the dedicated partnership of Environment Agency – Abu Dhabi (EAD), SSC Leaders' Meetings have served as a vital platform for global conservation strategising, collaboration, and action. Since the inaugural meeting in 2008, these gatherings have driven advancements in species conservation, making the SSC Leaders' Meeting an indispensable event on the conservation calendar. This year's event emphasised the regenerative power of nature and the crucial roles of animals, fungi, and plants in sustaining ecosystems, regulating climate, and supporting life. Together, the SSC Network continues to play a pivotal role in halting extinctions, reversing species declines, and driving species recovery efforts worldwide.

The 2024 SSC Leaders' Meeting builds upon the foundational 2019 Abu Dhabi Call for Global Species Conservation Action, which underscored species conservation as a shared priority and responsibility. It inspired the 2023 launch of IUCN Global Species Action Plan, which was presented at the Convention on Biological Diversity meeting in Nairobi. Continuing this legacy, the 2024 declaration renews IUCN's commitment to empowering communities, supporting governments, and engaging civil society and businesses to prioritise species conservation at all levels and achieve the goals and targets agreed to in the KMGBF.

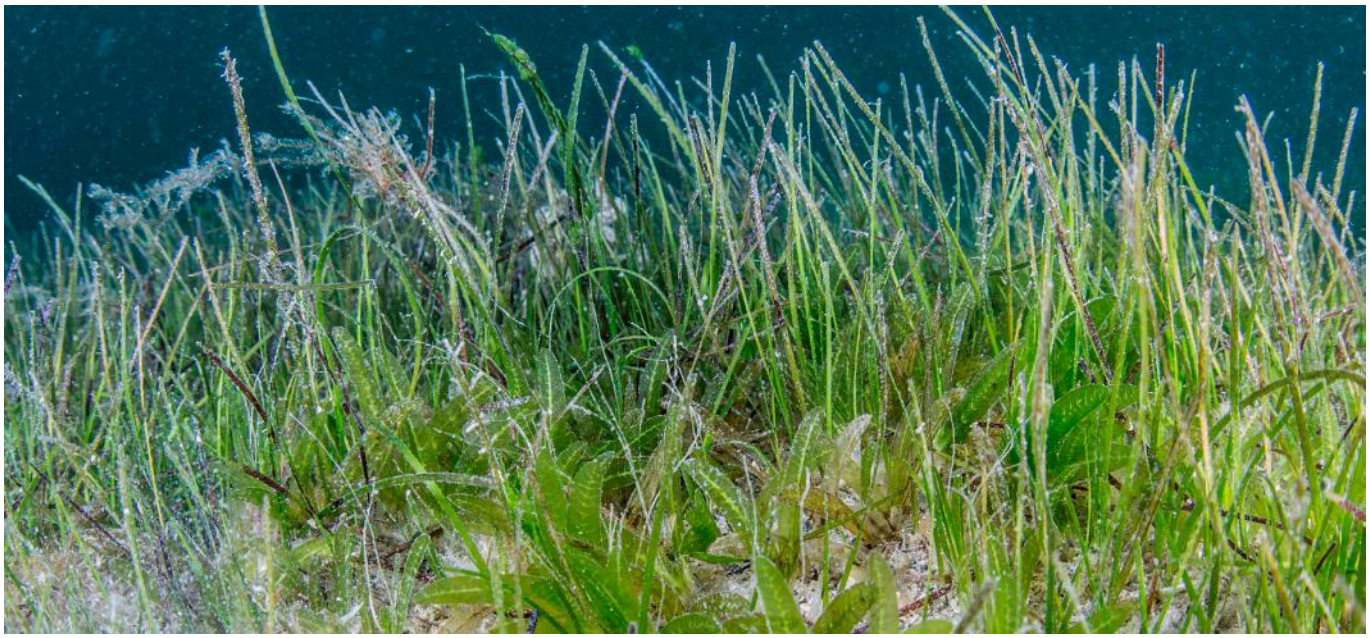
"The 'Saving Species Sustains Life' declaration from IUCN Species Survival Commission sends a powerful message: species conservation and the protection of biodiversity is essential for ensuring our survival. Species protection is critical in sustaining clean water, food security, cultural heritage, economic stability, and even social justice," said IUCN Director General Grethel Aguilar, "With over 10,000 members, the SSC is IUCN's largest commission, and along with numerous supporters, we call on all sectors – governments, businesses, Indigenous Peoples, communities, and individuals – to make species conservation a priority in their strategies to protect life on Earth."

"Actions taken by the Species Survival Commission for species conservation since the last Abu Dhabi declaration in 2019 have doubled. This is a reason for optimism and gives us hope as we need to further intensify our efforts to protect threatened species and take stock of the situation during the next IUCN World Conservation Congress in Abu Dhabi in October 2025," said Her Excellency Dr Shaikha Salem Al Dhaheri, EAD Secretary General. "Despite over 46,000 known species being at an imminent risk of extinction where we will lose forever the social, economic, health and other benefits they provide, we have been reintroducing species such as the Arabian and Scimitar-horned Oryx. It is our collective responsibility to take actions to protect them and fulfil our obligations under different conventions and agreements and our own individual responsibilities."

The IUCN Species Survival Commission is the world's largest volunteer conservation-science network with over 10,000 members globally. It is mandated by the Members of IUCN (national and subnational governments, NGOs, businesses, and Indigenous peoples' organisations) to develop and apply the evidence base to conserve species. This unique body includes biologists, ecologists, health and social scientists, educators, community representatives, economists and government officials.

SSC generates knowledge for the IUCN Red List of Threatened Species™, the world's most comprehensive information source on the global conservation status of animal, fungi, and plant species. SSC experts have unique insight into the extent to which species are undergoing unprecedented and growing threats from unsustainable human activities, as reflected in the IUCN Red List.

FOR THE FIRST TIME IN THE MIDDLE EAST, ABU DHABI TO HOST 16th INTERNATIONAL SEAGRASS BIOLOGY WORKSHOP IN 2026



The Environment Agency – Abu Dhabi (EAD) announced that for the first time in the Middle East, Abu Dhabi will host the 16th International Seagrass Biology Workshop (ISBW) in 2026.

The announcement was made by the World Seagrass Association (WSA) and the International Union for the Conservation of Nature – Sea Grass Specialist Group (IUCN – SSG) on the 1st of August 2024.

The ISBW, first held in Kominato, Japan in 1993, is a platform that brings together governments, scientists, researchers and specialists in the field of coastal and marine environments, to focus on global seagrass issues, improve seagrass knowledge, develop networks, and advocate for seagrass protection and conservation. In addition, the biennial ISBW aims to help support and monitor global research on seagrass and provide a space to describe and foster positive management outcomes for coastal seagrass environments.

Her Excellency Dr Shaikha Salem Al Dhaheri, Secretary General of EAD said, "For the first time in the region, Abu Dhabi has been selected to host the 16th International Seagrass Biology Workshop in 2026, further enhancing its pioneering role in the field of biodiversity conservation, and affirming our regional leadership position in coastal and marine research. This accomplishment is an extension of the commitment of EAD to the Seagrass Breakthrough 2030.

"The UAE has continued to protect seagrasses under Federal Law, No. 24 of 1999 on the Protection and Development of the Environment, recognising them as natural ecosystems of ecological importance and we are doing everything possible to protect restore and rehabilitate as many as possible so these important plants can continue to play crucial roles in supporting diverse wildlife and providing crucial ecosystem services."

She added, "Seagrass offers significant advantages in mitigating climate change, protecting biodiversity and propels our achievement of sustainable development goals. Our ongoing research has shown that Abu Dhabi's seagrass beds store as much as 52 tonnes of blue carbon per hectare, and is one of the nature-based solutions to combat climate change. We have future plans to expand studies related to seagrass and their resilience and adaptation to climate change in the region, as well as rolling out restoration guidelines tailored for the restoration of genetically diverse and resilient local species."

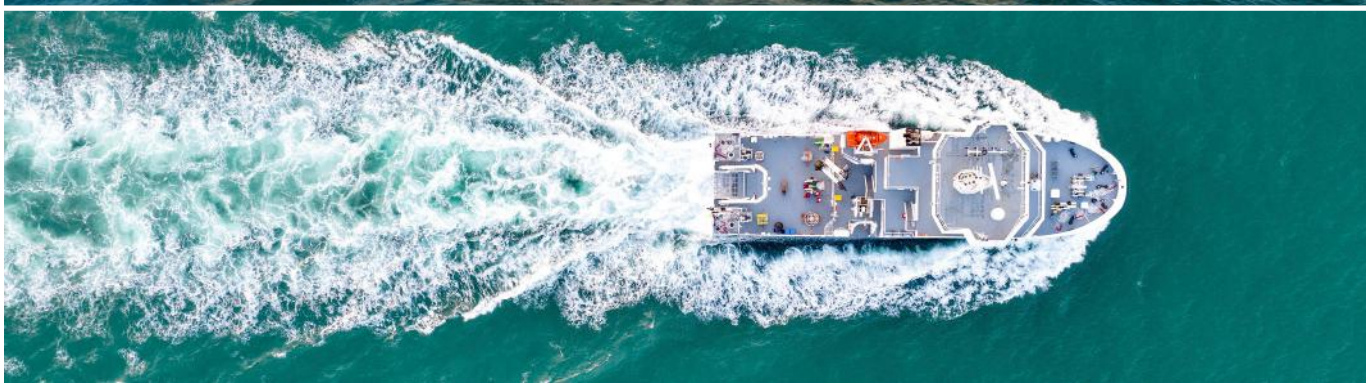
Ahmed Al Hashmi, Executive Director of the Terrestrial and Marine Biodiversity Sector said, "EAD being selected to host the workshop is a culmination of its efforts in the field of seagrass conservation, and since 2001, we have been using a variety of survey methods. The mapped extent of the emirate's seagrass area is well over 3,000 square kilometres accounting for over 98 percent of the seagrass area in the United Arab Emirates with the main concentrations found around Marawah Marine Biosphere Reserve and Al Yasat Marine Protected Area."

He added, "In Abu Dhabi's waters, seagrass comprise three main habitat-forming species. They are distributed over a range of various sediment types, tidal zones and depth gradients of inshore water, and both monospecific, as well as mixed species meadows are found in the emirate. Today, we are exploring innovative solutions to enhance the monitoring, restoration, and overall conservation of these meadows. By testing up-to-date sonars, cameras and sensors and integrating AI technologies, that is validated by the long-standing knowledge and the extensive data and information available at EAD, we aim to achieve significant advancements in this field.

"The three seagrass species of Abu Dhabi are vital for biodiversity. They support more than 3,000 dugongs – the worlds' second-largest population – and over 4,000 green turtles. They also provide nursery habitats for a range of commercially important fish, pearl oysters, shrimps, and various other species that use them for food, shelter, and growth. They are very resilient and can tolerate extreme fluctuations of marine water temperatures."

Seagrass is found in the shallow waters of 159 countries on six continents, from the tropics to temperate systems and can live entirely submerged in seawater. While covering only 0.1% of the ocean floor, seagrass sediments store up to 18% of oceanic Blue Carbon, making it one of the world's most efficient carbon stores.

EAD'S ADVANCED MARINE RESEARCH VESSEL 'JAYWUN' WINS BEST LARGE RESEARCH VESSEL 2023



The Environment Agency – Abu Dhabi (EAD) has announced that for the first time in the Middle East, its most advanced marine research vessel 'Jaywun' has won the Work Boat World Award for Best Large Research Vessel for 2023 from Baird Maritime – one of the world's premier maritime publishing houses.

The Work Boat World Best Vessel awards are given to companies that have commissioned, designed or built the best vessel for a particular category. Each participant was reviewed during 2023 and the winner was then judged on the design, build and functionality of the vessel. Winners were also selected on the basis of a combination of quality, innovation, reliability, utility, economy, sustainability and style.

Ahmed Al Hashmi, Executive Director of the Terrestrial and Marine Biodiversity Sector at EAD said, "For Jaywun to be recognised in a country as far as Australia as the Best Large Research Vessel for 2023 by Baird Maritime confirms that our efforts and reputation have reached beyond the borders of the UAE. It is a big win for Abu Dhabi and the Environment Agency – Abu Dhabi. After a rigorous review process of Jaywun for this award, for the first time in the Middle East it was selected as the winner from a long list of vessels from all across the globe. This affirms the vessel's leadership position and that it truly is the most advanced marine research vessel in the region due its innovative technological attributes and progressive equipment which make it unique."

He added, "As a scientific body with decades of experience we are always keen to share our expertise and we would like to be known as a leader in oceanography and marine research and by receiving this accolade we are on the fast track to achieving this goal."

Neil Baird, Founder of Baird Maritime stated, "The impressively well-equipped and very versatile Jaywun has been impeccably built to serve the Environment Agency – Abu Dhabi for many years. With a hydrodynamically excellent design, she is both economical and long-ranging. She is also very quiet so she is perfect for her various oceanic research roles."

He added, "The vessel is designed to operate locally, regionally and internationally, and in the harshest weather and situations. It is also perfect for the hot, saline and shallow waters of the Arabian Gulf and the deeper oceanic sea in the Gulf of Oman. Her equipment is sufficiently extensive as to permit and enhance every aspect of oceanographic research. All those assets have been encapsulated in an attractive and purposeful looking research ship."

Baird Maritime, launched in the 1970s, produces the leading maritime new portal www.BairdMaritime.com, home of the world-famous Work Boat World, Fishing Boat World, Ship World and Ausmarine publications.

Work Boat World is the only truly global workboat site and reaches the vast majority of decision makers across the globe, with a readership built upon 40 years of magazines, trade shows, conferences and online presence all over the world.

PADI LAUNCHES UNPRECEDENTED GLOBAL REFERRAL PROGRAMME TO DRIVE NEW BUSINESS FOR THE DIVING INDUSTRY

PADI® provides unparalleled support to its global membership base, launching a new diver acquisition campaign that encourages scuba divers to recruit their friends and family as their new dive buddies with incentives and benefits for everyone.

"PADI's Seek Adventure. Save the Ocean Together referral Programme is the latest example of PADI's investment in creating more business for our members and the diving industry as a whole," explains Kristin Valette Wirth, Chief Brand and Membership Officer for PADI Worldwide.

"The referral Programme is simple and builds on the passion of scuba divers," continues Valette Wirth. "We are inspiring, encouraging and enabling divers to refer their friends and family members to diving and bring them into the world's largest community of ocean lovers and rewarding them for doing so."

HOW THE PROGRAMME WORKS

The newly launched global referral programme makes its debut this month on a global scale and is designed to send new diving recruits to the 6,600 PADI Dive Centres and Resorts and 128,000 PADI Professionals through word of mouth of the already 30 million certified PADI Divers.

Starting today, PADI Divers of all levels will be able to log into their PADI Account to send a 15% off link for the PADI Open Water eLearning course to their friends and family.

As an extra incentive, when the referee takes advantage of their gifted 15% off link, this unlocks a 30-day trial to PADI Club* for the referrer – giving them immediate access to discounts on PADI's eLearning Programmes and certification cards, a FREE ReActivate Programme, and a subscription to Scuba Diving magazine digital version.

"By referring a friend, it is a two-for-one deal on staying connected, giving and getting exclusive discounts, and saving the ocean together. PADI is investing big in this campaign and we're encouraging our community of divers, dive professionals and dive centres and resorts to do the same," continues Valette Wirth.

PROVIDING PADI MEMBERS WITH MARKETING TOOLKITS

Designed to be the top-of-funnel marketing asset for all members to use, this referral Programme builds upon the trust and loyalty current customers have with new potential consumers – making it an effective tool to generate more certifications and new business leads to leverage.

Whether it is referring new PADI Open Water Divers or encouraging family and friends to continue their education together, PADI has created a marketing toolkit for members to use and make their own – with four mini-campaigns ready for them to choose from.

"These four mini-campaigns for the referral programme focus on the core values of why you want to learn to dive in the first place: seeking wellness, connection, education, and purpose," says Valette Wirth.

The referral programme also feeds into the PADI Master Scuba Diver Challenge, providing professional members an extra incentive to sell more PADI Courses to their customers – with a chance to win a dream dive trip to the Maldives.

"By using the referral programme and other PADI campaigns for your own business, we are continuing the legacy of inspiring the world to seek adventure and save the ocean together."

To access the marketing toolkit visit the Marketing Hub on the PADI Pro Site.

Visit the PADI Pros Blog for more information on how to incorporate the referral programme into your business: **https://pros-blog.padi.com/seek-adventure-save-the-ocean-together-a-scuba-diving-referral-campaign/**

DESCENT

HOW STEPPING OUT OF A COMFORT ZONE UNLEASHED OCEAN-INSPIRED ART

BY **ARWA MOHAMMED – XPHOTODXB**

Melissa Goodenough's artistic journey is as unique as her creations. After 13 years as a singer, Melissa transitioned into a full-time painter, exploring various styles like abstract, portraiture, and large-scale decorative pieces for interior designers. Her early work focused on textured art that invited viewers to reach out and touch, creating a playful, unique experience. These pieces brought a serene and warm feeling into any space, captivating viewers spirits throughout the day.

A pivotal moment in her artistic evolution came her first ocean-themed artwork, 'Descent'. This piece, inspired by her first dive, captures the profound effect of stepping out of her comfort zone and exploring the hidden beauty of the underwater world. 'Descent' symbolises the thrill of discovery and self-belief born from that initial dive, a moment immortalised by her husband on video.

Since that dive, every day has become a source of inspiration, infusing her work with a deeper connection to her subjects. Melissa's fascination with marine life led her to explore cephalopods up close, particularly cuttlefish, whose colour-shifting and textured skin sparked her curiosity. As part of her journey as a citizen scientist, Melissa delved deeper into their mesmerising world, uncovering the complex science behind their colour-shifting abilities. She discovered that cuttlefish skin is covered in thousands of tiny pigment cells known as chromatophores, which expand or contract to instantly blend in with their surroundings or convey messages. This rapid colour change is only part of the story; cuttlefish skin contains three specialised layers – chromatophores, iridophores (cells that reflect light), and leucophores (cells that scatter light).

These layers work together to produce a broad spectrum of colours and textures, allowing cuttlefish to adapt to different environments seamlessly. But what fascinated Melissa most was the cuttlefish's ability to alter its skin texture. Using small muscles called papillae, these creatures raise or lower sections of their skin to mimic the surfaces of sand, rocks, or coral in a realistic, 3D effect. This deep dive into the anatomy and capabilities of the cuttlefish made her realise that it is, quite literally, a living work of art, with pigmented cells that serve as nature's own ink palette.

Melissa's work stands out not only for her passion but for her dedication to truly understanding her subjects. Each artwork she creates documents her journey, embodying the brave and whimsical spirit with which she approaches her art. Her pieces personify marine creatures, reflecting a curiosity about what these beings might feel or think while observing the human behind the lens.

One of the unique aspects of Melissa's work is that it's inspired by real images, often captured by herself or fellow artists. Her collaborative spirit has led to fascinating artistic exchanges, where she and other photographers interpret the same marine creatures in different mediums.

In her painting, Pharaoh Cuttlefish (below), Melissa drew inspiration from one of fellow diver, Nasser Bakkar's photographs. This dynamic interplay between photography and painting adds a magical quality to her work, showcasing two artistic interpretations of the same subject – one captured through the camera lens and the other translated onto canvas. Through these collaborations, Melissa creates a visual diary of the underwater world, blending her curiosity with the creativity of her peers to reveal the sea's wonders in a new light.

In Melissa's art, viewers find more than a painting; they discover a journey of exploration, an intimate connection with the ocean, and the spirited curiosity that drives her every brush stroke. Her artwork is now available for purchase on her website. Each piece is a portal to the sea, capturing the gentle dance of her brush on canvas, the hidden expressions of cephalopods, and the hypnotic textures of the ocean.

www.melissagoodenough.com
www.instagram.com/melissa_goodenough_art

Photos by Nasser Bakkar

MALAYSIA HOSTS TWO SUCCESSFUL DIVEHEART EVENTS WITH THE PADI ADAPTIVE PROGRAMME FOR ACCESSIBLE TOURISM IN THE ASIAN REGION

Photo by Martin Ritter – B&J PADI 5-Star Dive Centre

Diveheart Malaysia in collaboration with the Mimpi Perhentian Resort Terengganu, Ministry of Tourism, Arts and Culture (MOTAC), University Malaya Medical Centre (UMMC), the Rotary Club and University Malaysia Terengganu (UMT), successfully completed the first Diveheart annual event hosted by the Mimpi Perhentian Resort Terengganu from the 7th to the 9th of October. 10 students were welcomed to participate from the Special Hearing-Impaired School, and Sekolah Kebangsaan Pendidikan Khas Besut, Terengganu.

Despite living close to the coastal area of Besut, most of the students had never set foot on a boat, let alone on an island. This gave them the opportunity to enjoy a short break with their teachers to discover how it feels to snorkel and scuba dive feeling zero gravity, while learning more about the marine life.

A special Eco Marine presentation was given by Dr Farah, a lecturer of Environment & Marine Pollution from UMT to provide insights on the importance of marine conservation to the students.

STORIES OF COURAGE

Diveheart Malaysia was proud to introduce Muhammad Afkar Daniel, a 10 year old right hand amputee Adaptive Diver who was trained by Syed Abd Rahman with Kids Scuba to have successfully completed his PADI Junior Open Water Course.

Muhammad Afkar is a paediatric patient from the University Malaya Medical Centre and he is the first hand amputee PADI Junior Open Water Diver for Persons with Disability certified in the region.

BREAKING BARRIERS AND DIVING DEEP

Another special guest diver was 28 year old Nabilah Mohd Azahar aka Bella, who is a right leg amputee. Bella has a diploma in tourism and she is a PADI Divemaster Trainee.

During her initial diver training in Curacao in the Caribbean in 2021, Bella suffered severe injuries when she was struck by a boat propeller. Bella's unwavering dedication and commitment to her dreams shined through after she met Syed Abd Rahman from Diveheart to restart her underwater journey. After a few pool scuba adaptive trainings, she successfully redid her open water diving experience after her traumatic diving accident.

Diveheart Malaysia would like to thank all our collaborative partners, dedicated volunteers, and honoured guests for a triumphant event.

We hope this annual event raises awareness on Persons with Disabilities to address accessible tourism in Malaysia.

Diveheart Malaysia's second event was held on Tioman Island in participation with RHB Bank, Ocean Harmony with the Department of Fisheries COT Population Control Programme, alongside collaborative partners from University Malaya Medical Centre (UMMC), and the Department of Fisheries Malaysia with B&J PADI 5-star Dive Centre.

It was another successful Adaptive Scuba event for 2024, featuring Diveheart's Adaptive divers: Ms Nooraishah Arshad, and Ms Bella Azahar. It was Diveheart's mission to empower individuals with disabilities through scuba diving to participate in the Crown-of-thorns Sea Star (COTs) Population Control Programme. This initiative supports coral growth and recovery by managing the coral predator in helping to maintain ecological sustainable levels.

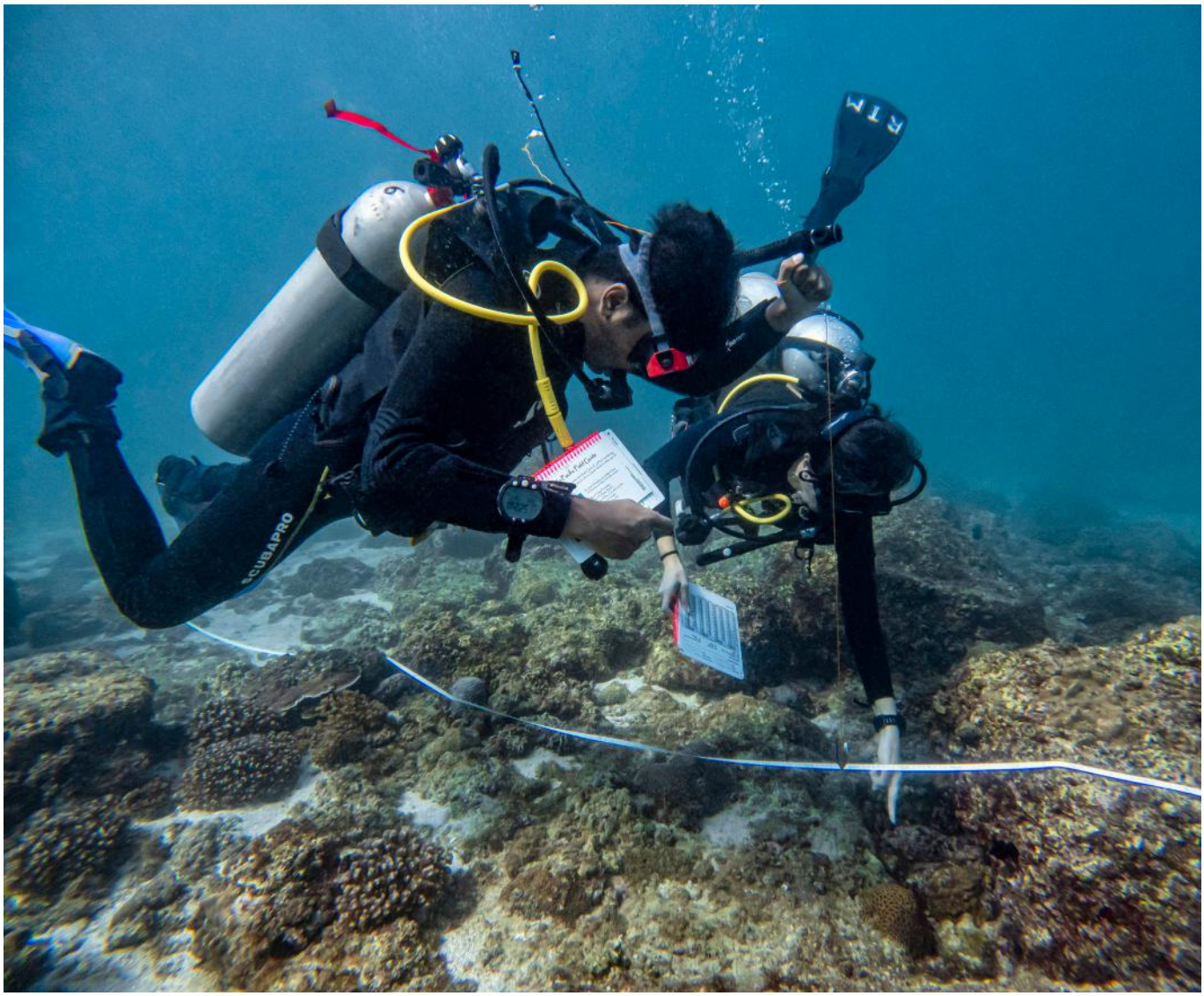
We were honoured to have the support of the distinguished VIPs at this event:

- Tuan Hj Syed Abd Rahman – Ambassador, Diveheart Malaysia
- Dr Nazirah Hasnan – Director, University Malaya Medical Centre (UMMC)
- Adissadikin Ali – Managing Director, RHB Islamic, RHB Bank Bhd
- Roshan Jaffar – Head of Strategy, RHB Islamic Bank
- Haji Idros Bin Yahya – CEO, Tioman Island Development Authority (TDA)
- Zainal Rahman, PADI Course Director B&J PADI 5-Star CDC Dive centre Tioman
- Managing Director, Department of Fisheries (DOF)
- Dr Jillian Ooi – University Malaya Marine
- Dr Affendi Yang Amri – Institute of Ocean and Earth Sciences (IOES), University of Malaya (MSc)

Our heartfelt thanks go to our dedicated Diveheart volunteers, media and videographer teams covering the entire programme on the island, including the amazing camera crew from B&J Dive Centre, RTM & RHB Bank.

WE CONGRATULATE OUR NEWLY CERTIFIED ECO DIVERS

PHOTOGRAPHY **ALLY LANDES**



On Sunday the 3rd of November, we congratulated our new group of Reef Check Eco Divers. It was another fantastic day out in our underwater world in Dibba, Fujairah with Divers Down, led by Rania Shawki Mostafa who certified 8 EDA members to assist in future Reef Check surveys to better care for our reefs.

Well done to Alaa Alsharif, Angela Manthorpe, Christina Davison, Loredana Manushaqa, Matthew B. Nobles, Rima Aboul Khoudoud, Timidu Weerawardhana, and Vickie Langton.

3 more members are scheduled to take their practical certifying dive on the 8th of December. Watch this space!

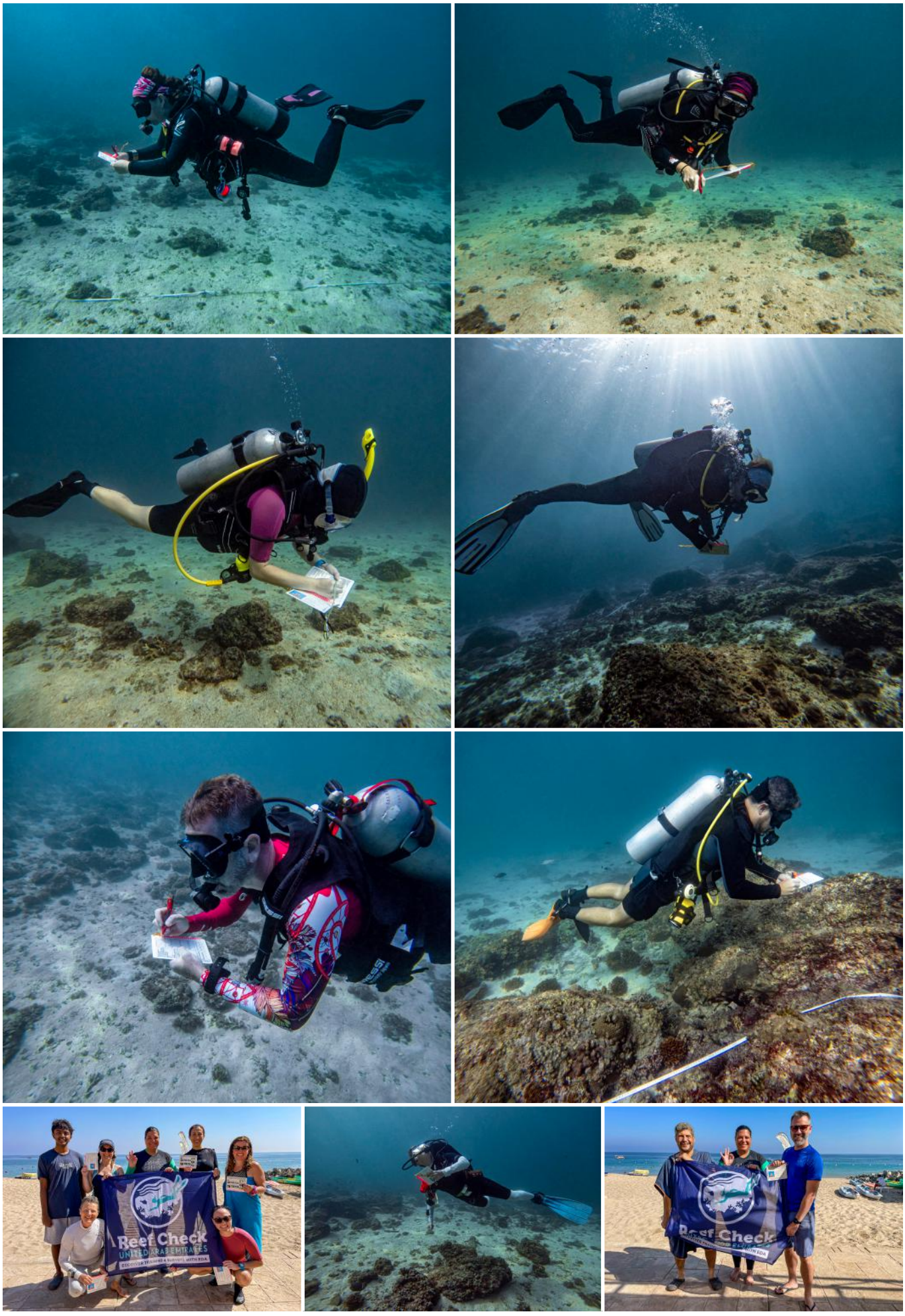
ABOUT REEF CHECK

If you are interested in knowing more about our marine environment, collecting data from our local reefs and getting more out of your dives, this may be what you are looking for. When you join a Reef Check EcoDiver training, you will learn about our local ecosystems and you will be able to participate in our regular survey dives which will help us to understand the threats our corals are facing by providing important data.

By joining our Reef Check monitoring team, you can help monitor and track the world's reefs. Reefs, both tropical and temperate, are in a state of crisis, today they look vastly different from what they did 30 years ago. Big fish are scarce and some marine creatures have disappeared completely. Over 45% of the world's reefs are severely threatened by human activities including overfishing, pollution and global warming. By becoming a certified Reef Check diver, you can help track the health of our reefs by participating in monitoring surveys and conservation worldwide.

Until now, EDA has trained more than 100 divers with Reef Check methodology. By dividing the divers in different Reef Check teams, we are able to collect data at different sites in the UAE, with particular focus in the Marine Protected Areas (MPAs) in Dibba and Al Aqah, as well as in Abu Dhabi. By collecting data on a regular basis, EDA will be able to monitor the status of coral reefs in the UAE, which will help us understand the principal threats that our marine environment is facing at the moment, and the actions that need to be implemented in order to re-establish a healthy ecosystem in the area.

To find out about our Reef Check courses, go to: **www.emiratesdiving.com/events/reef-check**


Reef Check
UNITED ARAB EMIRATES

REEF CHECK TO DEVELOP APPRENTICESHIP PROGRAMME FOR A MORE DIVERSE WORKFORCE IN MARINE SCIENCE

Reef Check Foundation was recently awarded a $200,000 grant from the California Department of Industrial Relations (DIR). This grant is part of an investment announced by Governor Gavin Newsom in July to increase apprenticeship opportunities that will help break career barriers for opportunity youths across California, helping them launch into their future careers.

Reef Check will develop an apprenticeship programme to create a pathway into marine research through scuba diving. This first-of-its-kind apprenticeship will allow participants to gain the necessary skills to work in marine research, conservation and management by providing an alternative to the traditional 4-year college education. This grant will allow us to develop a competency-based Youth Registered Apprenticeship Programme for Marine Science Research Technicians.

"This COYA investment accelerates and broadens access for a more diverse workforce in marine science, ocean conservation, marine resource management, ocean recreation/ecotourism, and other Blue Economy jobs," said

Jan Freiwald, Executive Director of Reef Check Foundation. "Youths will have opportunities to connect to an entirely new community of marine scientists, ocean conservation practitioners, and marine resource managers."

Reef Check's Dive into Science (DIS) offers scuba and scientific diving certification courses, ocean stewardship training, and marine science educational opportunities to low-income and BIPOC populations who have been historically excluded from the marine science and resource management space. DIS is a 30-month programme that incorporates classroom and ocean-based field instruction. Participants are trained and certified in Open Water, Advanced, and Rescue scuba, the American Academy of Underwater Sciences (AAUS) scientific diving, and Reef Check's citizen science-based subtidal reef health monitoring protocol for kelp forest ecosystems.

The funding was made available through DIR's Division of Apprenticeship Standards (DAS) California Opportunity Youth Apprenticeship Grant (COYA). COYA is a new funding source to develop and test innovative practices to increase the participation of opportunity youths in pre-apprenticeship and apprenticeship programmes that help youths enter and advance in high quality careers. Our apprenticeship programme builds on Reef Check's 27 years of conducting citizen science reef monitoring programmes worldwide, 17 years monitoring kelp forests and marine protected areas in California, and 5 years of engaging Opportunity Youth and Adults, and Tribal Populations in our DIS programmes.

DIVE INTO SCIENCE
PROGRAMME UPDATES AND SUCCESSES

BY **MORGAN MURPHY-CANNELLA, DIRECTOR OF EDUCATION**

Reef Check's Dive into Science Programme is gaining momentum with a string of great successes taking place this season! Several cohorts have completed their Open Water and Advanced dive courses, earning their respective certifications and expanding their marine science knowledge along the way. Keep reading for updates on the Northern California Tribal programme and those involving the Coastal Chumash and Tongva communities, the Tolowa Dee-ni' Nation, and Los Angeles and Antelope Valley foster youth.

THE NORTHERN CALIFORNIA TRIBAL PROGRAMME

This year we successfully completed three Open Water and two Advanced cohorts, marking significant milestones in our ongoing efforts to provide scuba certification and marine education to Indigenous communities in northern California. The participants in this programme represent a rich tapestry of heritage, coming from the Sherwood Valley Band of Pomo Indians, Kashia Band of Pomo Indians, Dry Creek Rancheria Band of

Pomo Indians, Yurok Tribe, Yokayo Tribe, and Pinoleville Pomo Nation.

Our programme's impact extends beyond their initial certification. Several members of Kashia Band of Pomo Indians from our first cohort have taken their scuba education to the next level by completing Rescue Diver and American Academy of Underwater Sciences (AAUS) Scientific Diver certifications at the UC Davis Bodega Bay Marine Laboratory. We are excited they have taken what they learned in Dive into Science and expanded on it by becoming scientific divers. Esther Stra and Ely Scott, two Environmental Technicians from Kashia Band of Pomo Indians, will use their AAUS certification for work on kelp and abalone restoration projects along the Sonoma Coast for their Tribe. This certification enables them to steward the ocean and aid in the restoration of their Tribe's most culturally significant species, the red abalone. This early success of the programme serves as a strong motivator for following cohorts that are working towards their scientific diving certification.

This programme has been made possible thanks to the generous support of the Coastal Conservancy's Explore the Coast grant. Their funding has been instrumental in providing these transformative experiences, enabling us to foster a deeper connection between Indigenous youth and their coastal heritage while promoting environmental stewardship.

COASTAL CHUMASH AND TONGVA COMMUNITIES

This programme has achieved remarkable success, having certified two cohorts of Coastal Chumash and Tongva community youths. Each cohort had the unique opportunity to travel to Pimu (Catalina Island) and complete the first phase of the programme at the Catalina Island Marine Institute (CIMI). During this phase, participants earned their Open Water certification while diving in the clear waters surrounding Pimu Island, immersing themselves in the island's rich marine environment. Special recognition and thanks go out to CIMI for their invaluable support and partnership in making this programme a reality. We are particularly proud of our second cohort, which was comprised of all women and non-binary participants, as they all completed their certification and are eager to continue to dive. This programme will offer further opportunities in the upcoming months. Students will hone their skills and continue to deepen their engagement with the marine environment during additional scuba dives and during their Advanced scuba training.

Looking further ahead, the programme will expand to include Rescue Diver training, Reef Check Kelp Forest Monitoring, and participation in the American Academy of Underwater Sciences (AAUS) programmes next year.

This programme would not have been possible without the generous support of the California Natural Resources Agency Youth Community Access Programme. Their funding has been crucial in enabling us to provide these life-changing experiences to the youths of the Coastal Chumash and Tongva communities.

TOLOWA DEE-NI' NATION

We are thrilled to announce the commencement of the Ghvtl shu'-srnelh-'i: Kelp Guardian project in collaboration with the Tolowa Dee-ni' Nation (TDN or the Nation). This programme achieved its first significant milestone this fall with the successful completion of Open Water scuba certification of all participants.

The primary goals of the Kelp Guardian project are twofold: to provide scuba training and citizen science education that will enhance the capacity of TDN Natural Resources staff, and to empower them to effectively monitor their ancestral coastal territory. By integrating traditional ecological knowledge with modern scientific methods, this programme aims to develop a ghvtlh-k'vsh (kelp) monitoring programme that is both culturally meaningful and scientifically robust, tailored specifically to the unique environmental conditions of TDN ancestral lands.

This course will take place in and around the Crescent City area and along the Smith River, locations that hold deep significance for the Tolowa Dee-ni' people. By training TDN staff in scuba and citizen science, we hope to equip them with additional tools needed to actively engage in the stewardship of these vital marine ecosystems. This programme is funded by California Sea Grant.

LOS ANGELES AND ANTELOPE VALLEY FOSTER YOUTHS

This year, our Los Angeles and Antelope Valley foster youths programme reached a significant milestone as participants completed their Advanced scuba course in the clear waters of the Channel Islands. This experience provided invaluable opportunities for participants of this cohort to dive from a boat and explore Marine Protected Areas, allowing them to witness firsthand the beauty and biodiversity of these critical marine environments.

Building on this success, we are excited to announce that two more cohorts are scheduled to begin their Skin Diver certification soon. These courses serve as an essential foundation, preparing participants for the Open Water certification by familiarising them with basic snorkelling and breath-hold diving skills. This progression not only builds their confidence in the water but also lays the groundwork for their continued scuba training.

To further enhance their marine knowledge and foster a deeper connection with the ocean, we are taking field trips to the Heal the Bay Aquarium. These excursions will provide the youths with interactive learning experiences where they can explore marine life up close and gain a better understanding of the importance of ocean conservation. This programme is funded by the Outdoor Equity Grants Programme, created through AB 209 and administered by California State Parks, Office of Grants and Local Services.

REEF CHECK BAJA
A STORY OF BINATIONAL COLLABORATION FOR KELP FOREST CONSERVATION

In the coastal regions of San Diego and Ensenada, Reef Check and our partners at EcoCiMaTi and UABC (Universidad Autónoma de Baja California) piloted an initiative to better understand threats facing kelp forests in our shared oceans. Driven by a shared commitment to safeguarding the vital kelp ecosystems surrounding the Coronado Islands, the team worked over the course of a year to recruit and train a binational group of citizen scientists, to conduct Reef Check surveys, and engage communities on both sides of the US-Mexico border in our efforts. The project was developed to address the urgent need for ecological monitoring and community awareness of the state of kelp surrounding the Coronado Islands, and was made possible thanks to grant support from the San Diego Foundation.

Some of the highlights of the year-long project were: We developed training materials in both Spanish and English. These materials ensured that all participants could fully engage in the project's activities regardless of their primary language. The training provided divers with the skills needed to conduct ecological surveys and also empowered them with knowledge about kelp forest conservation strategies.

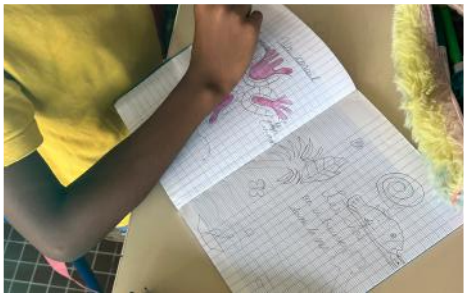
One of the most remarkable achievements of this project is the successful recruitment and training of an 18-member binational team of scuba divers from San Diego and Mexico. This diverse group – comprising individuals from government, academia, the fishing cooperatives, and the recreational dive community, brought together a wealth of knowledge and experience. This was the spark for establishing a long lasting, binational network to ensure the ongoing monitoring and conservation of kelp beds in the region. Participants were empowered with the knowledge and skills needed to actively participate in kelp forest conservation. These divers are now equipped to take on leadership roles in future monitoring and restoration efforts.

The ecological surveys conducted by the team yielded critical data on the current state of reefs around the Coronado Islands. This data highlighted the seemingly local extirpation of foundational macroalgae such as giant kelp (*Macrocystis pyrifera*) and California sea palm (*Eisenia arborea*). Additional monitoring efforts indicated an overabundance of herbivores, mainly sea urchins and gastropods, suggesting that overgrazing is hindering kelp recruitment. These findings are crucial for informing future restoration efforts, as they provide insight into one of the key challenges facing the recovery of kelp forests in the region.

Looking ahead, we are collaborating with our partners to develop a Reef Check Baja programme as a critically important ongoing transboundary project to monitor and protect the health of the kelp in our project sites. Our long-term vision is to create a self-sustaining programme that monitors reefs and to develop restoration projects from Oceanside to San Quintín. By establishing a comprehensive and ongoing restoration programme, we hope to see the revival of kelp forests and the ecological benefits that they provide.

"TI MOUN": REEF CHECK FOR KIDS IN MARTINIQUE

BY **MAGALI COMBES, L'ASSO-MER** PHOTOS **MARGAUX LEWANDOWSKI/L'ASSO-MER 2024**



Created in 2016 in Martinique in the Lesser Antilles, the NGO L'Asso-Mer aims to raise awareness and educate people about the marine environment, participate in its protection and management, and improve knowledge and monitoring of the marine ecosystems by using citizen science programmes.

The NGO runs various educational activities, and in particular, hosts three "Educational Marine Areas", a full-year programme in which a class takes on the role of manager for a small marine area in their town, practicing scientific surveys, identifying conservation stakes and proposing to implement management measures.

In 2021, L'Asso-Mer became coordinator for Reef Check Martinique, which is now comprised of four survey stations, among which is a snorkelling station created in 2023 and named after recognised marine scientist and lifelong educator of local youths, Dr Romain Ferry. This station, easily accessible but full of marine life, opened the way for the "Ti Moun" programme.

To adapt the Reef Check protocol for kids, the team started by simplifying the survey by breaking indicators down to only four categories for each of the protocols (eg for substrate: algae, live coral, dead coral, rock/sand). The goal here is for kids to understand the role and importance of the main indicators, and to be able to recognise and count them easily.

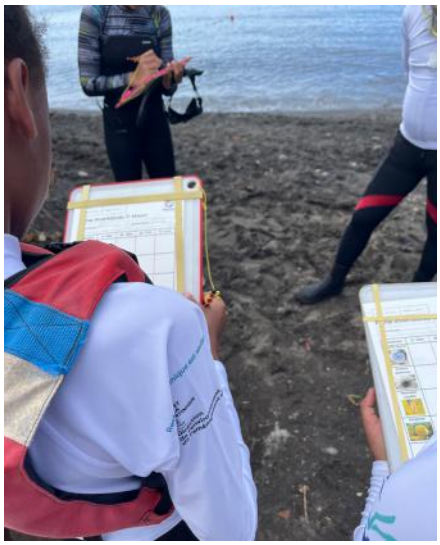
The programme runs over five sessions: three learning sessions in class, one fieldwork session, and finally a results interpretation and advocacy session. To facilitate this, several educational tools were developed by the team, some of them also proving useful for adults:

- Three underwater videos simulate a survey, with species pointed out for identification
- An 8m (26ft) mat presenting a giant view of the substrate, where people have to point and identify features
- Slide shows in parallel with a "Ti Moun" booklet in which each child finds the essential information and has to fill in some activities (with various difficulty levels adapted to grade level)
- The "Ti Moun" data sheet and automated result sheets, aid in the interpretation of the results

The first classes testing the programme (4th & 5th grade, 8-10 years old, and high schoolers, 14-15 years old) really enjoyed becoming marine scientists of their town. Many of them are not used to looking underwater, and were amazed by the wonders of their local rocky shore. They successfully learned the life cycle of coral, the role of various fish on the reef, and the methods for evaluating reef health. All of this made them really want to continue exploring the sea and protect their local reef. Objective complete!

For next steps, L'Asso-Mer plans to design dedicated data-entry tablets instead of using waterproof paper. After this successful testing phase, the programme will be open to more classes for the 2024-2025 school year.

We thank our Reef Check sponsors, ODE Martinique and DEAL Martinique, as well as our education sponsors, Martinique Marine Park (PNM/OFB) and ODE Martinique.



THE LATEST HAPPENINGS WITH REEF CHECK MALAYSIA

BY **REEF CHECK MALAYSIA**

Reef Check Malaysia (RCM) shares all their latest news – a positive update on coral bleaching, their recent attendance at the UN Ocean Decade Conference, a new project in Mersing, the search for a more cost-effective solution to handle waste management, outreach efforts on Redang Island, and corporate sponsor conservation programmes on Tioman.

CORAL BLEACHING MONITORING IN MALAYSIA

The good news is that recent NOAA data shows that the warm water causing coral bleaching is receding, but we're not completely out of the woods just yet.

REEF CHECK MALAYSIA AT THE UN OCEAN DECADE CONFERENCE

In April, our colleague Adzmin Fatta, represented RCM at the UN Ocean Decade Conference, held in Barcelona, Spain. Adzmin delivered an oral presentation on "Science-Based Approach to Empowering Local Communities", mainly using RCM's 'Community-Based Coral Restoration Project' funded by the IKI Small Grants as a reference. He emphasised a science-based approach to empowering local communities in marine conservation, which aligns with Ocean Decade Challenge 1 (Ocean Literacy).

As the Programme Manager at Reef Check Malaysia, Adzmin heads our efforts in Semporna, Sabah, working closely with indigenous and local communities for more meaningful conservation and management of our marine biodiversity.

NEW PROJECT LOCATION

Say "hello" to the newest addition to Reef Check Malaysia! At the beginning of the third quarter of this year, our colleagues in Mersing began expanding their work scope to include seagrass monitoring, among other efforts. This is in line with RCM's recent shift in our focus. RCM now has 6 main project locations across Malaysia.

Our colleagues kicked off the project by meeting with two schools and a few partners to discuss the proposed marine environmental awareness programme and activities for the year. We then conducted two indoor awareness programmes with these schools, involving a total of 202 students, as well as an awareness programme with participants from one of our collaborator companies, during which we covered basic knowledge and understanding of mangroves, seagrass and coral reef ecosystems. We also discussed the roles of corporations and industries in protecting and preserving the environment.

WASTE MANAGEMENT EFFORTS SEEKING MORE COST-EFFECTIVE OPERATIONS

RCM has been working on waste management on Mantanani Island in Sabah since late 2018. Over the years, the local islanders have shown support and are now very much involved in the entire programme, which is now partially managed by a few local volunteers themselves.

In mid-June, our team on Mantanani Island sent out 62 bundles of compressed plastics weighing almost 700kg to the mainland in Kota Belud. The company that bought the recyclables paid us RM50 for it, which we used to cover the cost of transportation. In the second quarter of 2024, we successfully sent out 1,720kg of general trash to the landfills in Kota Belud.

Despite the programme progressing well, one major issue we face is the total cost of sending the collected waste out of Mantanani Island, including costs of boat rental and transport on the mainland. The amount received from selling the recyclables is insufficient to cover the entire expenses incurred. We are still looking for a more cost-effective solution to handle the waste management programme on the island.

MULTIPLE STAKEHOLDER ENGAGEMENT EFFORTS IN REDANG ISLAND

RCM's team on Redang Island organised a consultation session with the various scuba dive operators on the island to gauge their feedback on ways to generate local income through conservation activities on the island. The feedback received is useful in helping us plan the next steps that will help the local islanders earn income while protecting their island. Our team also took the opportunity to discuss current RCM efforts on the island. A majority of these operators were very supportive of our current work and expressed interest to continue participating in our activities too.

Towards the end of June, we conducted an awareness programme with the students of the local school on the island, SK Pulau Redang. Among the activities were a classroom presentation and discussion, as well as colouring and building their own marine ecosystem scenery. We hope that these programmes will be able to instill a sense of love and ownership of the marine environment among these students.

TIOMAN ISLAND CONSERVATION – COLLABORATIVE EFFORT

Our Tioman team has been carrying out conservation programmes with several organisations who made a visit to the island. The first was a 'Coral Rehabilitation & Cultivation Sustainability Programme' in conjunction with Watsons 'Blue Beauty' Campaign. The Watsons team made "coral pots" and 35 blocks for coral reef rehabilitation, conducted a DIY workshop with bottles, and presented a mock check to RCM.

A team from KPMG Malaysia, a long-time partner and sponsor of RCM also visited Tioman Island participating in several activities such as the EcoDiver course, reef rehabilitation activities and a rubbish clean-up. The group also carried out reef rehabilitation efforts at existing coral nursery sites.

In June, SC Johnson, whom we are collaborating with this year, visited our team on the island. The collaboration involves microplastic sampling at 3 selected sites around Tioman Island. During this visit, we conducted activities such as a Crown-of-Thorns (COTs) clean-up, building of "coral pots" and a clean-up of the reef rehabilitation sites.

Reef Check
UNITED ARAB EMIRATES

Join the Reef Check
ECODIVER CERTIFICATION COURSE

LEARN TO CONDUCT REEF CHECK SURVEYS TO COLLECT DATA ON REEF HEALTH, AND HELP ASSESS CLIMATE CHANGE IMPACTS

When you join a Reef Check EcoDiver Training Course, you will learn about our local ecosystems and you will be able to participate in our regular survey dives which will help us to understand the threats our corals are facing by providing important data.

EDA
جمعية الإمارات للغوص
Emirates Diving Association

EMAIL: reefcheck@emiratesdiving.com **WEBSITE:** www.emiratesdiving.com/events/reef-check

EDA IS A NON-PROFIT NGO ACCREDITED BY UNEP AS AN INTERNATIONAL ENVIRONMENTAL ORGANISATION

MARELUX

TAKING THE INDUSTRY BY STORM

FEATURE **MIKE RALL**

Marelux have been pushing the limits and developing some of the most useful and user friendly underwater equipment and accessories on the market.


MARELUX

The UAE's underwater photography and cinematography community is small, but it is quickly growing in size and skills. Unfortunately, the underwater camera equipment locally available has never been able to keep up with the market being so small, but things are rapidly changing!

Marelux are a relatively new underwater camera equipment company but have taken the industry by storm, with innovative designs and many new patented products. The brand's housings and accessories offer a combination of affordability, functionality, and durability. This can be seen by the list of world class Brand Ambassadors.

Marelux have been pushing the limits and developing some of the most useful and user friendly underwater equipment and accessories on the market. They are focussing on the future, which is the Mirrorless camera, and supports all the major brands such as Sony, Canon, Nikon, and Olympus.

COLOUR

They are the first to give shooters the option to pick one of 5 colour choices for all of the housing models, with some of the favourites being Yale Blue, Olive Green and Burgundy.

ACCESSORIES

Their Apollo Strobes are some of the highest performing strobes on the market for their size, and can be wirelessly triggered using the Lumilink Optical Trigger. The Flashfuel or MiniBatt can double the battery life of your camera without any external accessories. Housings and accessories arrive to you in well laid out hard cases and bags. Marelux are backing up their products with a 2 year warranty and excellent service support.

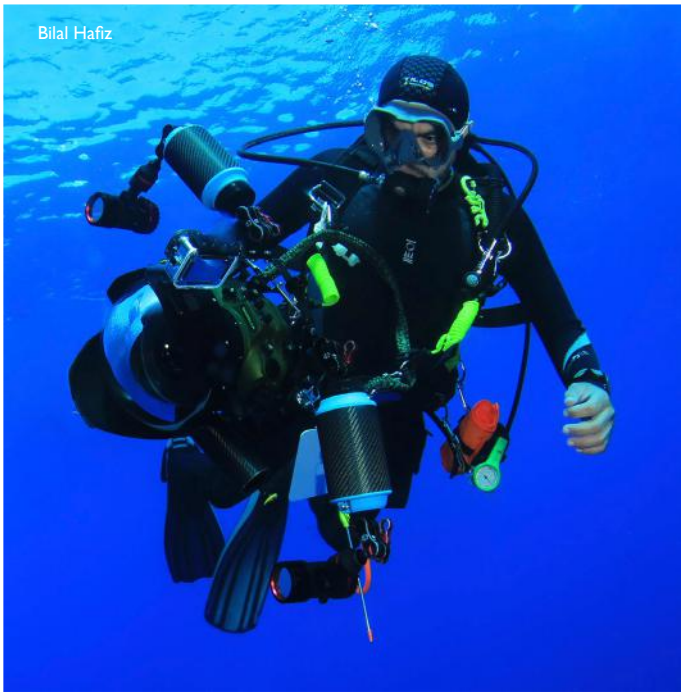
The introduction of Marelux underwater housings to the UAE and KSA markets by Base Films/Marelux UAE & KSA is a significant development for local underwater shooters. The region is known for its ease to travel to its excellent diving destinations, and the rich underwater biodiversity and healthy reefs are a paradise for underwater photography enthusiasts. However, the availability of high-quality underwater camera equipment has often been limited to online purchases, making it challenging for shooters to access the support and guidance needed, and can be extremely intimidating to new users.

Moreover, Marelux's presence in the Middle East comes with localised customer support


Mohammed Ibrahim


Levente Rozsahegyi

Thamer Habis


Bilal Hafiz

and service by the Base Films Team who have over 15 years of experience shooting underwater, a crucial factor for shooters who need timely repairs, maintenance, and general advice. This support network enhances the appeal of Marelux products, making them a reliable choice for shooters who need dependable equipment in a region where service options have historically been limited. This availability means that both amateur and professional shooters in the region now have access to world-class underwater housings without needing to import them from abroad, which often involves high shipping costs, import taxes, and delays.

Marelux housings have already been used by many local underwater photographers and cinematographers to capture imagery for high end TV commercials, documentaries, magazines, and by hobbyists.

Many of the well known shooters in the community have switched over to Marelux, with more joining the team all the time.

IN THE UAE

Mohammed Ibrahim:
www.instagram.com/aquacyclography

Levente Rozsahegyi:
www.instagram.com/levente.rozsahegyi.photography

IN KSA

Thamer Habis:
www.instagram.com/thamer.habis

Bilal Hafiz:
www.instagram.com/bilalunderwater

MARELUX

In collaboration with the Emirates Diving Association, Base Films are offering all EDA Members a 5% discount on all Marelux equipment for the foreseeable future.

As the brand continues to expand and innovate, Marelux will become even more of a staple in the underwater shooting community, not just in the Middle East, but globally.

FOR MORE INFO:
www.basefilms.ae/marelux-uae-ksa
www.instagram.com/marelux_uae_and_ksa

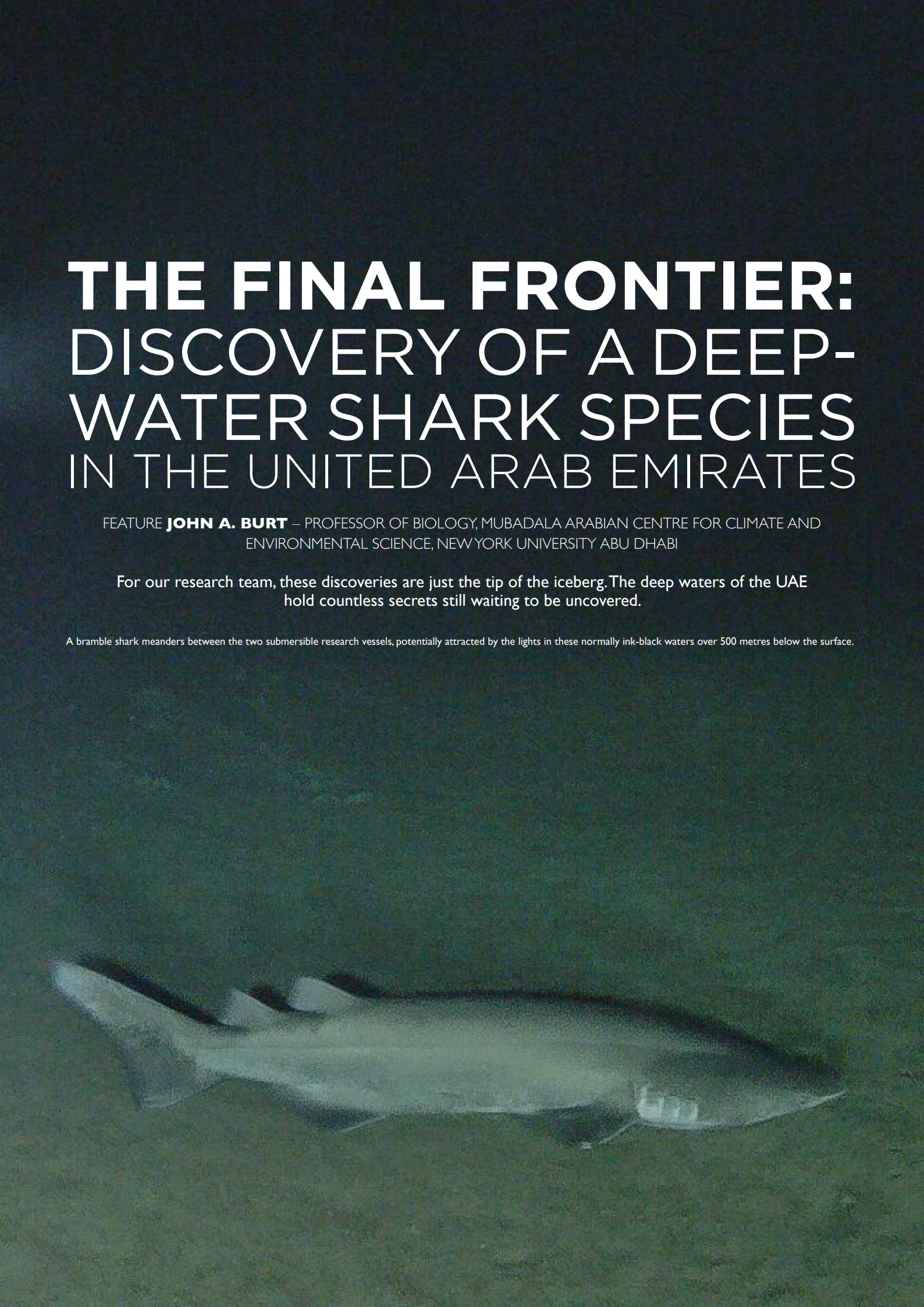
CALL/WHATSAPP TO ENQUIRE:
+971 50 557 9638

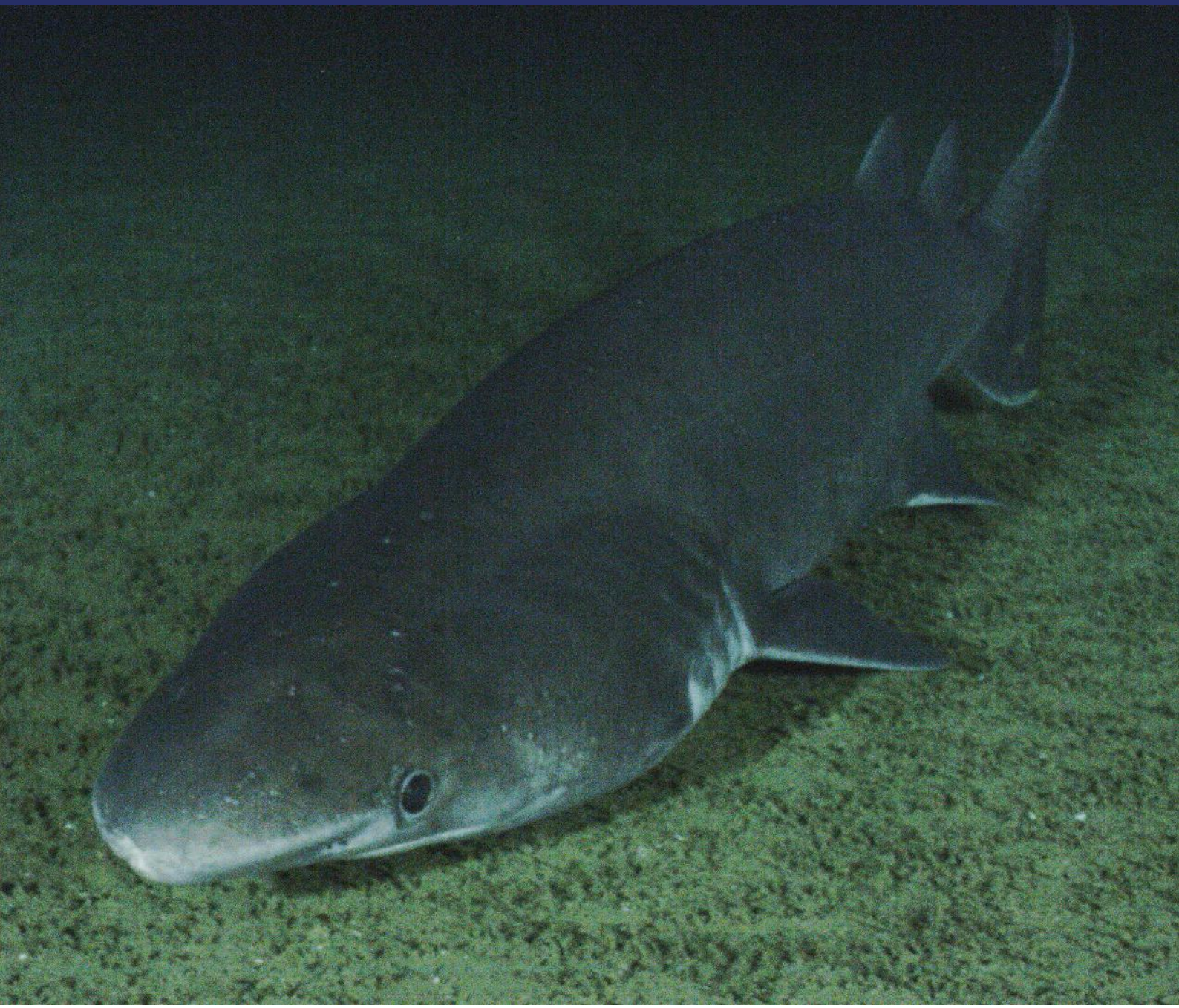
THE FINAL FRONTIER: DISCOVERY OF A DEEP-WATER SHARK SPECIES IN THE UNITED ARAB EMIRATES

FEATURE **JOHN A. BURT** – PROFESSOR OF BIOLOGY, MUBADALA ARABIAN CENTRE FOR CLIMATE AND ENVIRONMENTAL SCIENCE, NEW YORK UNIVERSITY ABU DHABI

For our research team, these discoveries are just the tip of the iceberg. The deep waters of the UAE hold countless secrets still waiting to be uncovered.

A bramble shark meanders between the two submersible research vessels, potentially attracted by the lights in these normally ink-black waters over 500 metres below the surface.





The first records of bramble sharks (Echinorhinus brucus) for the United Arab Emirates were made during submersible dives at 780 meters depth off the coast of Fujairah.

The oceans cover more than 70% of our planet, yet much of this vast realm remains unexplored, especially the deep seas. For the diving community in the United Arab Emirates (UAE), the allure of the underwater world is often centred around the shallow coral reefs and other marine life that fringes the coastline. However, recent explorations have revealed that the deep waters off of our east coast holds even more mysteries than previously imagined.

In a groundbreaking discovery, a team of researchers, utilising the advanced capabilities of the OceanX research vessel OceanXplorer, discovered a population of bramble sharks (*Echinorhinus brucus*) in UAE waters – a species not previously known to occur in the Emirates. This article lays out the journey of this discovery, the technology that made it possible, and the implications it holds for marine exploration and conservation in the UAE.

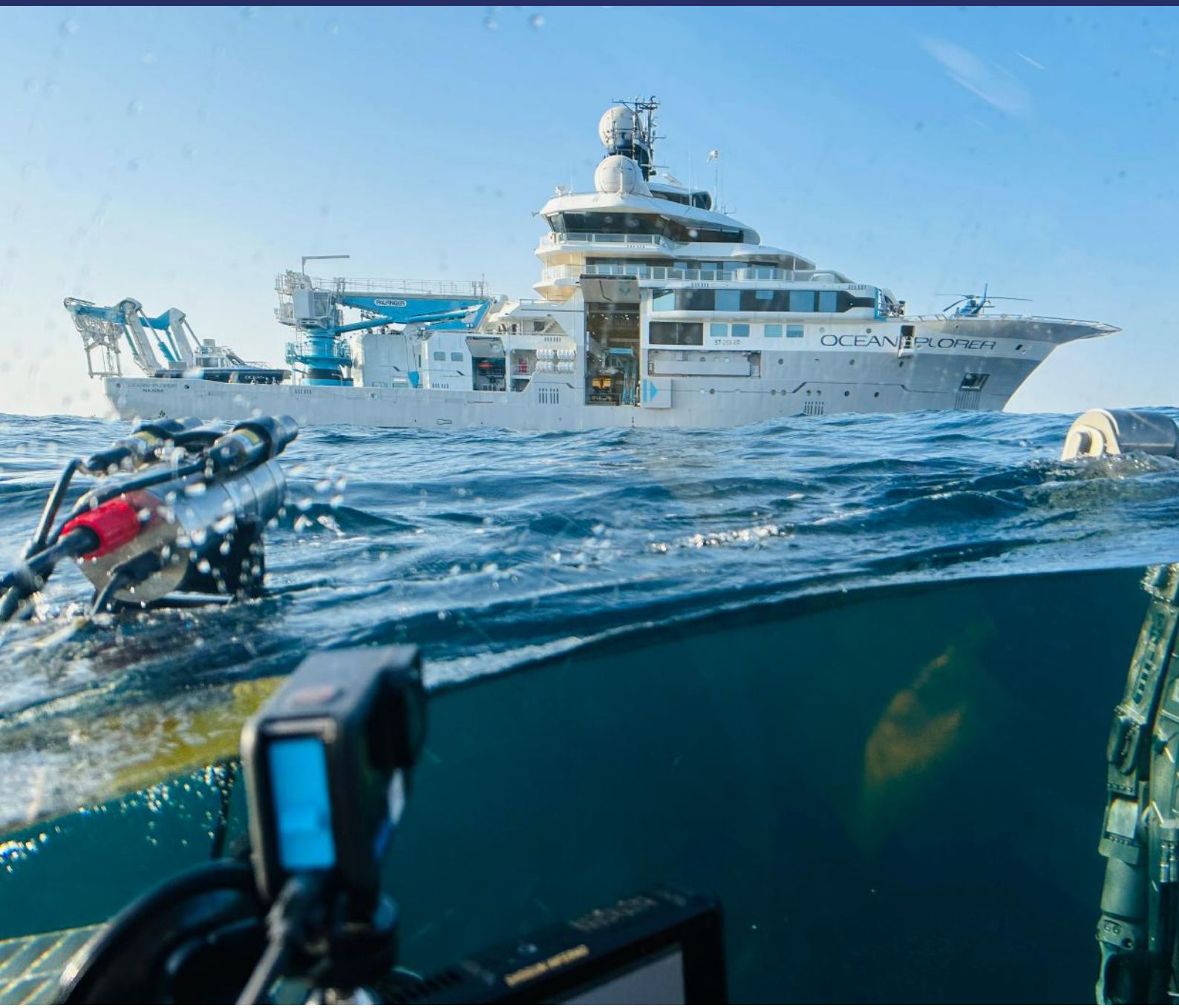
THE UNKNOWN DEPTHS OF THE UAE'S EAST COAST

The east coast of the UAE, bordering the Gulf of Oman, descends rapidly into deep waters that have remained largely unexplored. While recreational diving in this area typically ranges up to 40 metres in depth, beyond lies a world shrouded in darkness and mystery. Other than a handful of technical dives performed in mesophotic depths down to 150 metres, the vast majority of the UAE's Gulf of Oman waters remain unknown. These depths, reaching over 1,000 metres, are home to ecosystems and species that have yet to be studied.

Recognising the potential for new discoveries, our marine biology research team at New York University Abu Dhabi embarked on an ambitious mission in December 2023. Partnering with OceanX, a pioneering ocean exploration initiative, we aimed to explore these depths using state-of-the-art technology to develop a better understanding of the organisms and ecosystems that occur in this largely unknown frontier of the Emirates.

THE OCEANX MISSION: TECHNOLOGY ENABLING DISCOVERY

The OceanXplorer is not just any research vessel; it's a floating research laboratory equipped with some of the most advanced marine exploration technology in the world. Central to our mission were several key pieces of equipment. The first were two Triton submersibles – manned submersible vessels capable of carrying three people to depths of 1,000 metres, featuring large acrylic spheres that provide a nearly 360-degree view, allowing researchers to observe deep-sea environments directly. Named Neptune and Nadir, these vessels were respectively



The research vessel OceanXplorer, operated by OceanX, conducted a research mission across the UAE in November and December 2023 that included marine scientists from New York University Abu Dhabi.

configured for scientific surveys and collections or for world-class digital media collection – both important components of documenting our journey into the deep. In addition, our team utilised an unmanned remotely operated vehicle named Chimera (an Argus ROV) that is capable of diving to an incredible 6,000 metres depth and has state of the art scientific and media capacities; it is operated by two pilots sitting aboard OceanXplorer, tethered to this remarkable instrument by just a 1-centimetre-wide cable spooling down into the deep darkness. With these technologies, we could venture into the crushing depths of the mesopelagic zone, opening up a new frontier for marine research in the UAE.

THE JOURNEY TO A REMARKABLE DISCOVERY

Our primary objective on this component of the research mission was to map the seafloor and study deep-sea ecosystems and organisms. On the 17th of December 2023, during a dive off the coast of Fujairah at approximately 800 metres depth, our team observed something extraordinary shortly after touching down on the sea bed.

As the submersible's lights penetrated the darkness, a large, shadowy figure emerged. It was a shark unlike any we'd seen in these waters. Covered in thorn-like scales called dermal denticles, the creature was a bramble shark (*Echinorhinus brucus*). Over the subsequent hours of the dive, we encountered multiple individuals, indicating the presence of a resident population. Utilising the submersible's ultra-high-definition cameras and a laser image scaling system, we captured detailed footage and measurements of the bramble sharks. The sharks displayed calm behaviour, often approaching the submersible out of curiosity, allowing for prolonged observation of individuals.

THE BRAMBLE SHARK: AN ENIGMATIC DEEP-SEA DWELLER

The bramble shark is a species rarely seen by humans due to its preference for deep-water habitats ranging from 400 to 1,000 metres. It can grow to over 3 metres in length and is characterised by its rough skin studded with thorny denticles, giving it an almost prehistoric appearance.

Globally, bramble sharks are considered vulnerable to extinction under the IUCN Red List framework, with threats including by-catch from deep-sea fisheries and habitat degradation. Their presence in UAE waters was previously undocumented, making this discovery particularly significant as a first record of this species in the Emirates.

RV OceanXplorer is equipped with state-of-the art submersibles and a remotely operated vessel capable of working at depths of 1,000 metres or more, and technology that allowed the NYU Abu Dhabi research team to explore the deep offshore waters on the UAE's east coast. John A. Burt (left) has boarded the submersible Neptune in preparation for launch [and, yes, I love my job!].

IMPLICATIONS FOR MARINE SCIENCE AND EXPLORATION IN THE UAE

The discovery of bramble sharks holds significant implications for marine science and exploration in the Emirates. Firstly, it expands our knowledge of the region's biodiversity, highlighting the largely undocumented fauna living in the deep-sea environments off our coast. This finding underscores that the UAE's underwater realm is more diverse than previously understood, with unique species out there still awaiting discovery.

Understanding the presence and distribution of vulnerable species like the bramble shark is crucial for conservation efforts. By documenting these sharks in UAE waters for the first time, we can develop targeted strategies to protect these sharks and their habitats. This includes assessing potential threats from human activities and exploring measures to mitigate these impacts.

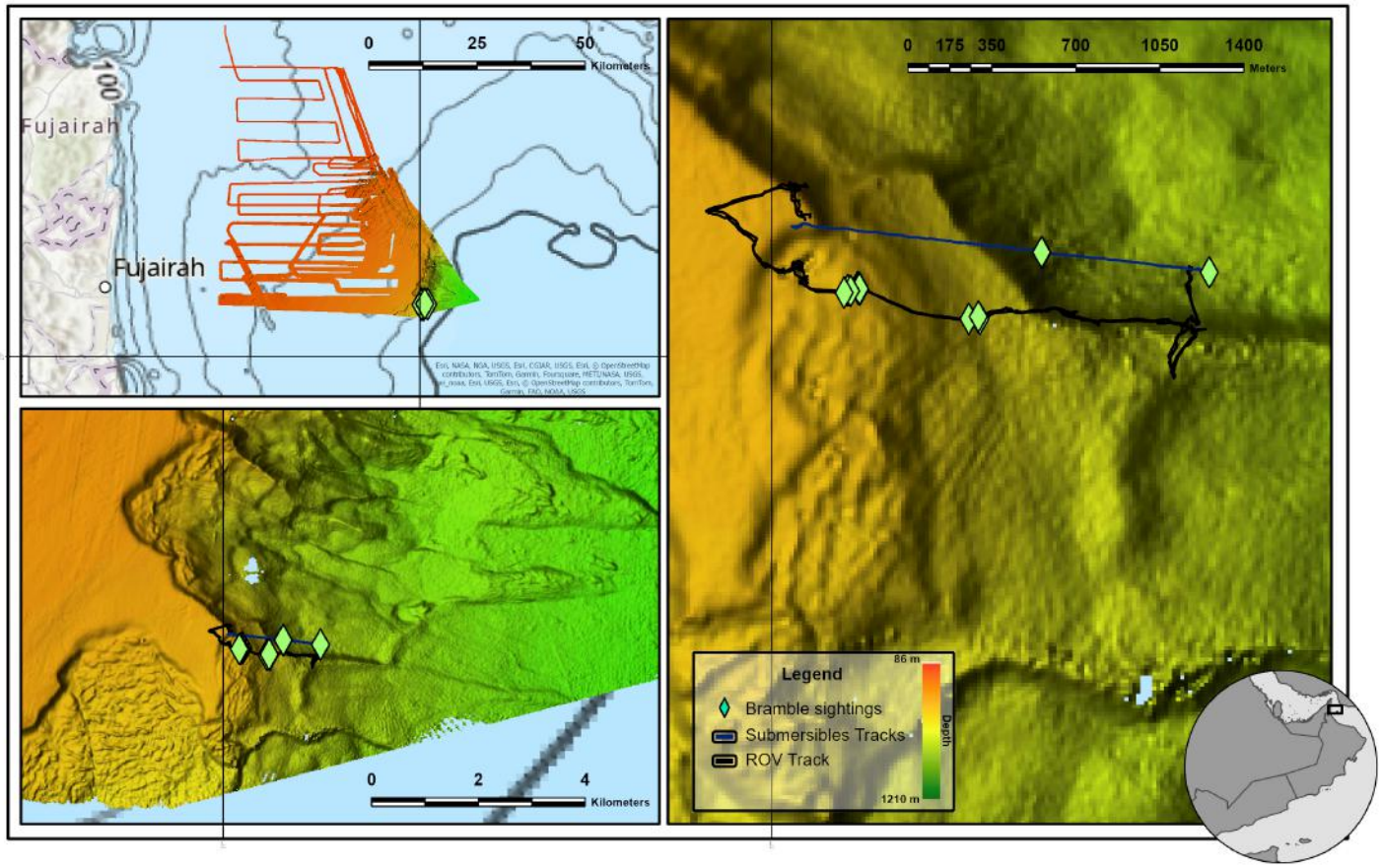
Moreover, this discovery serves as an inspiration for further exploration. It demonstrates that significant scientific findings are possible in our own backyard, encouraging continued efforts in marine research. The realisation that such rare and enigmatic creatures inhabit nearby waters fuels curiosity to explore the unknown, not only among scientists but also within the diving community and the public at large.

PLUMBING THE DEPTHS: DISCOVERIES CONTINUE

Our mission didn't stop with the bramble shark. We also documented the first known mesophotic coral reef in the Emirates. located at 148 metres depth off of the coast of Fujairah. This reef supports a diverse community of deep-water corals, including species adapted to low-light conditions and a number of species that are likely to be new records for the UAE and even the wider Arabian Sea. An article detailing these findings will be published soon, and we will keep readers abreast of this work in a future edition of Divers for the Environment.

For our research team, these discoveries are just the tip of the iceberg. The deep waters of the UAE hold countless secrets still waiting to be uncovered. Inspired by these findings, we hope to expand our research off of the UAE's east coast, where we hope to develop a more comprehensive understanding of these hidden ecosystems and the fauna they contain.

Bramble sharks are considered vulnerable to extinction under the IUCN Red List of species. This first record of their occurrence in the UAE suggests that further research and conservation efforts are warranted in the Emirates.



Overall, there were 17 individual sightings of bramble sharks made during the four-hour ROV and submersible dives, providing evidence of a widespread population of this species between 460 and 720 meters depth off the coast of Fujairah. Further exploration of this area to understand the status and distribution of this species is warranted.

ABOUT THE AUTHOR

Dr John A. Burt is a Professor of Biology at New York University Abu Dhabi, specialising in marine ecology and conservation. He is co-director of the Mubadala Arabian Centre for Climate and Environmental Sciences, where his team seeks to expand our understanding of the magnificent ecosystems and organisms that occur in the UAE's Arabian Gulf and Gulf of Oman waters.

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INGESTION OF MARINE DEBRIS
IN JUVENILE SEA TURTLES IN ABU DHABI

FEATURE **MOHAMED ALMUSALLAMIA, AHMED AL ALI, SAEED ALJABERI, HIMANSU DAS, KOSMAS PAVLOPOULOS, AND SABIR BIN MUZAFFAR**
PHOTOGRAPHY **MOHAMED ALMUSALLAMIA**

Marine plastics and other debris constitute a major threat to many marine species. Over 12 million tonnes of plastics are estimated to reach the oceans annually, causing adverse effects on hundreds of marine species. The Arabian Gulf is a small, sub-tropical and semi-enclosed gulf with extreme environmental conditions with high potential to accumulate marine debris.

Green turtle (*Chelonia mydas*)

Hawksbill turtle (*Eretmochelys imbricata*)

Marine plastics and other debris constitute a major threat to many marine species. Over 12 million tonnes of plastics are estimated to reach the oceans annually, causing adverse effects on hundreds of marine species. The Arabian Gulf is a small, sub-tropical and semi-enclosed gulf with extreme environmental conditions with high potential to accumulate marine debris.

Sea turtles are especially vulnerable to plastic ingestion although data on marine plastics in juvenile sea turtles from this region is limited. Juvenile sea turtles are also vulnerable to cold stunning triggered by different environmental factors. We collected stranded sea turtles from different sites along the Abu Dhabi shoreline to characterise timing of strandings in relation to environmental factors. We also evaluated the marine debris ingested by sea turtles.

Live individuals collected were kept in controlled conditions to allow them to recover. During this period, marine debris in feces were sorted and enumerated. In addition, individuals that were dead during collection were necropsied and the plastics in their gastrointestinal tracts were characterised. Industrial plastic pellets, sheet-like user plastics, and thread-like user plastics were recorded. All the live turtles (n=55) passed plastics with their feces, and 85% of the necropsied turtles (n=47) had plastics in their gastrointestinal tracks. Plastic fragments constituted the largest proportion of marine debris recorded from turtles, followed by industrial pellets. We suggest that juvenile sea turtles that float for extended periods under mats of Sargassum eat vesicles or air bladders that resemble industrial pellets in their shape and size.

Timing and location of strandings was associated with dominating Shamal winds in the Arabian Gulf. Condition of individuals that are cold-stunned could be further exacerbated by plastic ingestion. Long-term assessment of plastics in coastal zones is needed to better understand plastic pollution in the Arabian Gulf and to mitigate impacts on marine species.

INTRODUCTION

Global production of plastics exceeds 300 million metric tonnes per year (Nelms et al. 2015) and there has been a concomitant increase in mismanaged plastic wastes (Oslte et al. 2019). As a result, an estimated 8-12 million tonnes of plastics reach the oceans annually (Oslte et al. 2019) and at least 267 marine species are known to be affected by plastics in the oceans (Schuyler et al. 2012). Plastics originate from anthropogenic sources on land and are discarded eventually reaching the sea. Small, enclosed or partially enclosed seas, such as the Mediterranean Sea or the Arabian Gulf (Persian Gulf) with poor water circulation, are particularly vulnerable to plastic accumulation due to high densities of humans living in their coastal zones and slow turnover rates of their water masses (Cózar et al. 2015, Karkanorachaki et al. 2018, Uddin et al. 2020, Habib and Thiemann 2022, Stöfen-O Brien et al. 2022). Fragmentation and physical breakdown of plastic particles due to temperature and wave action can reduce the size of plastic particles to <5mm

(microplastics) that are widely distributed across marine ecosystems (Schuyler et al. 2012). Plastics are classified according to size as follows: microplastics (1-1000 µm), mesoplastics (1-10 mm), macroplastics (>1 cm) (Bermúdeza and Swarzenskia, 2021). Further subdivisions of plastics are proposed based on their likelihood of being assimitated by different types of plankton, including micro-sized plastics (20-200 µm), meso-size plastics (200-2000 µm) and macro-size plastics (0.2-20cm), with notable overlaps in earlier classifications (Bermúdeza and Swarzenskia, 2021). Organisms as small as plankton and as large as whales can ingest or incorporate plastics and trophic interactions could trap them in food webs, with a variety of harmful impacts across food webs (Schuyler et al. 2012, Alidoust et al. 2021).

Sea turtles are especially vulnerable marine species that regularly ingest plastics either directly or indirectly (through ingestion of food that contain trapped plastic particles) (Schuyler et al. 2012, 2013, Nelms et al. 2015, Eastman et al. 2020, Renzo et al. 2021, Yaghmour et al. 2018a, 2022). All sea turtle species are categorised as vulnerable, endangered or critically endangered by the International Union of the Conservation of Nature with one species being data deficient (Mazaris et al. 2017). Fisheries activities, coastal development, predation (gulls, foxes, stray dogs) and egg exploitation constitute important threats to sea turtles (Casale et al. 2010). Additionally, vessel collisions and pollution are reported from most countries with sea turtle populations.

It has been estimated that over 150,000 sea turtles per year are captured as bycatch in the Mediterranean Sea, with over 50,000 caught in pelagic longlines, 40,000 by trawls, 35,000 by demersal longlines, and 30,000 by set nets (Casale et al., 2008). The resulting estimated mortality of sea turtles is over 50,000 per year (Casale and Margaritoulis 2010). Thus, bycatch related injuries or mortality could account for major declines in sea turtle populations (Hazel & Gyuris 2006, EWS-WWF, 2015). In particular, Green turtles (*Chelonia mydas*) and Loggerhead turtles (*Caretta caretta*) are especially threatened in the Mediterranean Sea from plastic bags, fishing lines, or other marine debris and fisheries industries wastes (Casale and Margaritoulis 2010). Discarded or lost fishing line, fishing hooks or other gear may get attached to sea turtles, often becoming embedded in flippers or around the neck that could result in secondary infections (Yaghmour et al. 2018b, Lima et al. 2022, Vanucci et al. 2024). Ingested fishing lines could cause damage to the intestinal mucosa and ingested fishing hooks could cause punctures in the intestine, causing weight loss, decline in foraging abilities and death (Yaghmour et al. 2018b, Lima et al. 2022, Vanucci et al. 2024). The Arabian Gulf hosts a very high shipping density, with over 44,000 vessels traversing almost every part of the Arabian Gulf (EWS-WWF, 2015; Bateni et al. 2022, Yaghmour et al. 2024). Hawksbill turtles in the Arabian Gulf do most of their foraging in shallow waters where commercial shipping is less of a threat. However, traditional fishing vessels operating in these waters often collide with turtles (EWS-WWF, 2015).

Plastic ingestion is a serious threat to sea turtles that often consume large quantities of marine plastic and other debris that resemble typical food items such as jelly fish (Eastman et al. 2020, Renzo et al. 2020, Yaghmour et al. 2018a, 2018b, 2022). Pathological effects of plastic ingestion in sea turtles include obstruction or blockage in the intestinal tract, perforations or other injuries in the intestinal walls and malnutrition, all of which could lead to poor health, reduced reproductive success and mortality (Schuyler et al. 2012, 2013, Nelms et al. 2015, Eastman et al. 2020, Renzo et al. 2020, Yaghmour et al. 2018a, 2022). All seven species of sea turtles have been reported to ingest anthropogenic marine debris (Hart et al. 2013, Colferai, 2017, Yaghmour et al. 2018a, 2022). Increasingly, sea turtles from around the world show high levels of plastic and other debris in their gastrointestinal tracts, reflecting the high levels of plastic debris in the environment (Schuyler et al. 2012, 2013, Nelms et al. 2015, Eastman et al. 2020, Renzo et al. 2020, Yaghmour et al. 2022).

The Arabian Gulf is a sub-tropical and semi-enclosed basin with extreme environmental conditions (Hamza, 2015). This very shallow sea, has an average depth of 35m, and is connected to the Indian Ocean through the Strait of Hormuz. During summers, the Gulf is the hottest sea on the planet, particularly in the shallow southern basin where sea surface temperatures (SSTs) regularly exceed 35°C in August. Sea surface temperatures are also highly variable among seasons, ranging over 20°C between summer and winter (Vaughan, 2019). There is a tendency for marine pollution to accumulate (Naser 2013, Al-Salem et al. 2020, Uddin et al. 2020, Stöfen-O Brien et al. 2022) and there is a need to determine the extent of pollution using standardised methods, particularly with respect to macro-, meso- and microplastics (Al-Salem et al. 2020, Stöfen-O Brien et al. 2022). In the Arabian Gulf, marine plastics have been characterised from adult, stranded Green turtles, Hawksbill turtles and Oliver-Ridley turtles from the east coast of the UAE (Yaghmour et al. 2018a, Yaghmour et al. 2022). The extent of plastic ingested by juvenile sea turtles is not well characterised globally (Schuyler et al. 2012, Eastman et al. 2020).

Five species of sea turtles have been recorded in the Arabian Gulf, of which the Hawksbill turtles (*Eretmochelys imbricata*) and the Green turtles are abundant (Al Ameri et al. 2022, Yaghmour et al. 2024). Hawksbill turtles are critically endangered and are distributed in tropical waters (Mortimer & Donnelly 2008). Genetic studies indicate distinct Indo-Pacific and Atlantic populations, although individuals from different nesting sites often converge in foraging areas (Arantes et al. 2020). Islands in the Arabian Gulf are nesting grounds for the Hawksbill turtles from the greater Indo-Pacific populations (Arantes et al. 2020). They have a three-month nesting season from April to June, which is shorter than the 6-12 months reported elsewhere (Chatting, 2018). During the extended periods of high temperatures during the summers (June-August), the turtles engage in temporary migration to an average of 70km to deeper waters with lower temperatures at northern latitudes, returning after 2-3 months (September-October) to their feeding grounds (Pilcher et al., 2014). Green turtles are the most abundant sea turtle in the UAE, although they do not seem to breed within the Arabian Gulf, with only few, relatively rare nesting sites recorded (Yaghmour et al. 2024). Individuals of different cohorts forage on sea grass beds, mainly in western Abu Dhabi waters. Loggerhead turtles, Olive Ridley turtles (*Lepidochelys olivacea*) and Leatherback Sea Turtles (*Dermochelys coriacea*) occur in relatively low abundance within the Gulf, with only a limited number of records (Yaghmour et al. 2024).

Stranding of turtles have been recorded worldwide and could result from 'cold stunning', a form of metabolic stress induced by lowered temperatures (Innies et al. 2007, Flint et a. 2015). Sea turtle strandings and their distribution are possibly affected by vessel collisions, marine currents and marine plastic ingestion (Hart et al. 2006, (Ve´lez-Rubio, 2013, Wilcox et al. 2018). Strandings seem to occur year-round although there could be temporal patterns with greater strandings occurring in warmer months suggesting that other environmental factors could influence strandings (Ve´lez-Rubio, 2013, Tomás et al. 2008, Innies et al. 2007, Flint et al. 2015). In the Arabian Gulf, the most extreme negative temperature anomalies occur in winter (below 20°C) coinciding with the Shamal, a cold north wind which blows from the Iranian highlands into the area of low atmospheric pressure over the Arabian Peninsula (Lopez, 2017, Vaughan, 2016). Cold stunned juvenile hawksbill turtles are driven onshore by currents and wave actions triggered by these strong winds during the winter (Pilcher et al., 2015). Adults could also get stranded after drowning in debris from fishing gear (Pilcher et al., 2014). Increase in stranding events could reflect changes in the marine environment including temperature anomalies. Furthermore, anthropogenic wastes could increase the frequency of stranding events in severely stressed environments (Wilcox et al. 2018).

To this end, we collected stranded juvenile sea turtles from Abu Dhabi to (i) determine spatial and temporal distribution of strandings; and (ii) quantify plastic or other marine debris ingested by stranded turtles.

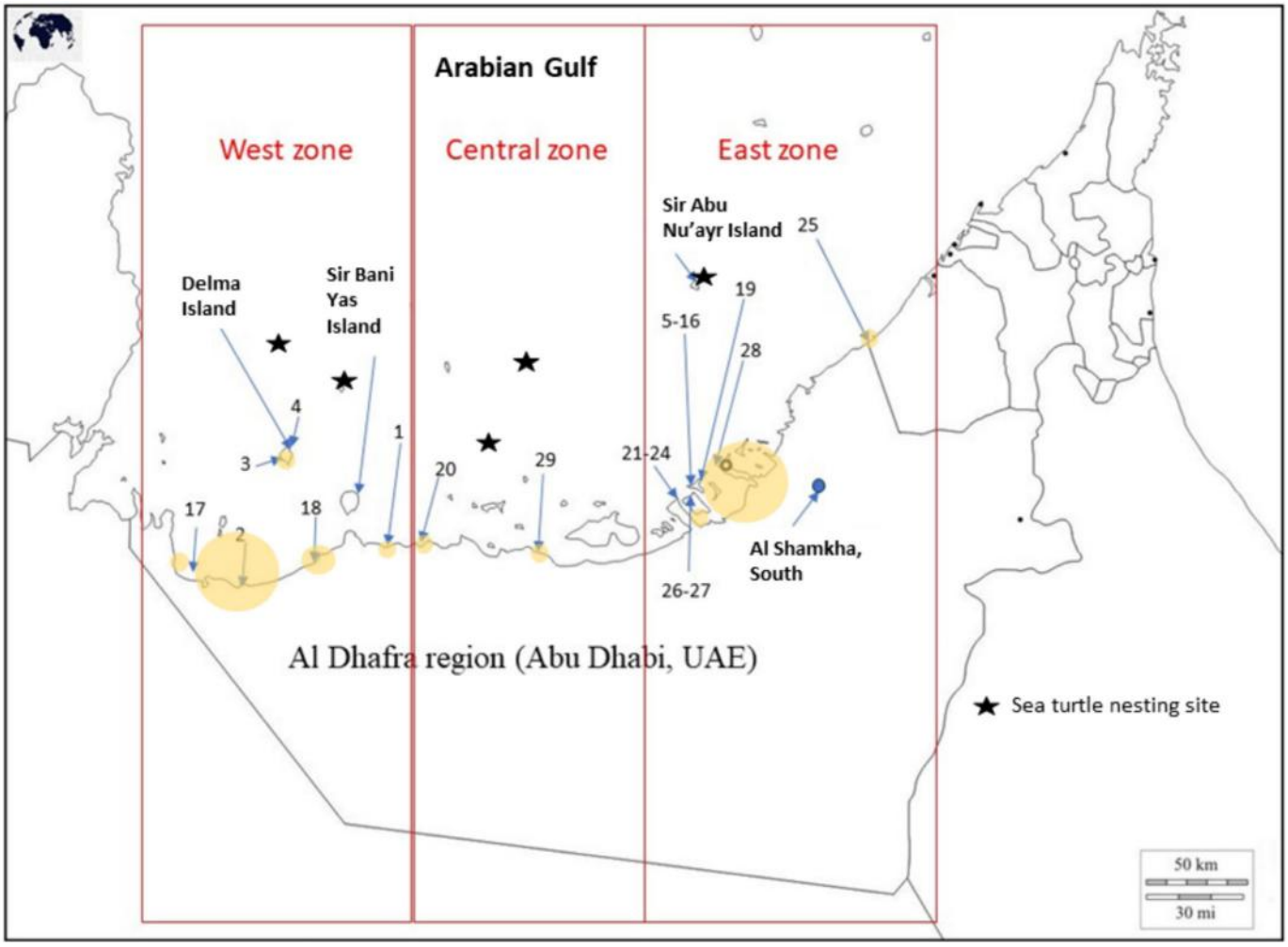


FIGURE 1: Study area showing the sampling sites (numbers), locations of sea turtle nesting areas (stars) and the strandings used in this study along the west, central and east zones of Abu Dhabi.

METHODS AND MATERIALS

STUDY AREA

The coastline of the United Arab Emirates (UAE) stretches for 350km (Abdessalaam, 2007). The Emirate of Abu Dhabi is the largest of the seven emirates that makes up the UAE (Abdessalaam, 2007). The study area consists of the coastal waters of Abu Dhabi (Fig. 1).

The coastline of Abu Dhabi was divided into three zones, namely a) the west zone, including Dalma island having the lowest human population; b) the central zone; c) and the east zone including the city of Abu Dhabi, that faces the highest anthropogenic pressure caused by the high concentration of human population (Lopez, 2017).

FIELD SURVEYS & DATA COMPILATION

Volunteers conducted beach surveys on foot or by car, recording the date, time and location of the observed strandings, the curved carapace length notch to tip (CCLn-t)(Bolten, 1999), and status (dead or alive). Photos were taken for species identification and record keeping purposes. Turtle species were visually identified in the field using characters in Pritchard and Mortimer (1999). The data received by the Marine Assessment and Conservation (MAC) team in the Environment Agency – Abu Dhabi (EAD) on turtle stranding reports from the general public and from several stakeholders that manage different parts of the coastline in Abu Dhabi and the Tourism Development & Investment company (TDIC) was compiled.

LIVE TURTLE RECOVERY, REHABILITATION AND RELEASE

Turtles that were found alive during the field surveys of Al Dhafra region were transported to Al Shamkha (south) for rehabilitation. Turtles rescued from Delma Island were rehabilitated and released on the island. Turtles were kept individually in 72 x 50 x 38cm individual tanks (storage containers that were free of paint or other hazardous materials. Tank conditions were maintained with a salinity of 20-35ppt, pH of 7.2-8.5 and temperature of 20-30°C and the water was replaced daily or every other day. The turtles in rehabilitation were provided a diet of squid, mackerel, vegetables, crab and shrimp constituting up to 5% of their bodyweight daily using free feeding technique or assisted feeding technique as needed (Bluvias et al., 2010). The health of rehabilitated turtles were assessed by veterinarians and healthy turtles were released from Saadiyat Island Resort, Jumairah as part of a public programme organised by the Environment Agency – Abu Dhabi.

FECAL SAMPLE ANALYSIS FROM LIVE TURTLES

Fecal matter was collected directly from the tanks to analyse ingested food items before stranding. The feces were collected every day before the water was changed, using a 1mm mesh net. The net was then placed under running water and the remaining residual was collected and kept to dry in room temperature (30°C) for four weeks. The invested items were categorised according to Galgani et al. (2011) into three main categories a) plastics, b) rubbish other than plastic, c) other pollutants. Individual items were weighed using a digital scale.

DEAD TURTLE COLLECTION AND NECROPSIES

Turtles that were found dead during the field surveys of Al Dhafra region were recorded, photographed, measured and collected if they were freshly dead. These turtles were placed in labelled bags with a unique reference number, date and location and CCL. Dead specimens were necropsied. Necropsy of 14 juvenile hawksbill turtles (CCL ranging from 9-16cm) was performed by SAJ. Turtles were first defrosted in room temperature (24-30°C) for 6 hours. Each turtle was cleaned and external parasites were removed. The plastron was removed with a pair of sterile scissors

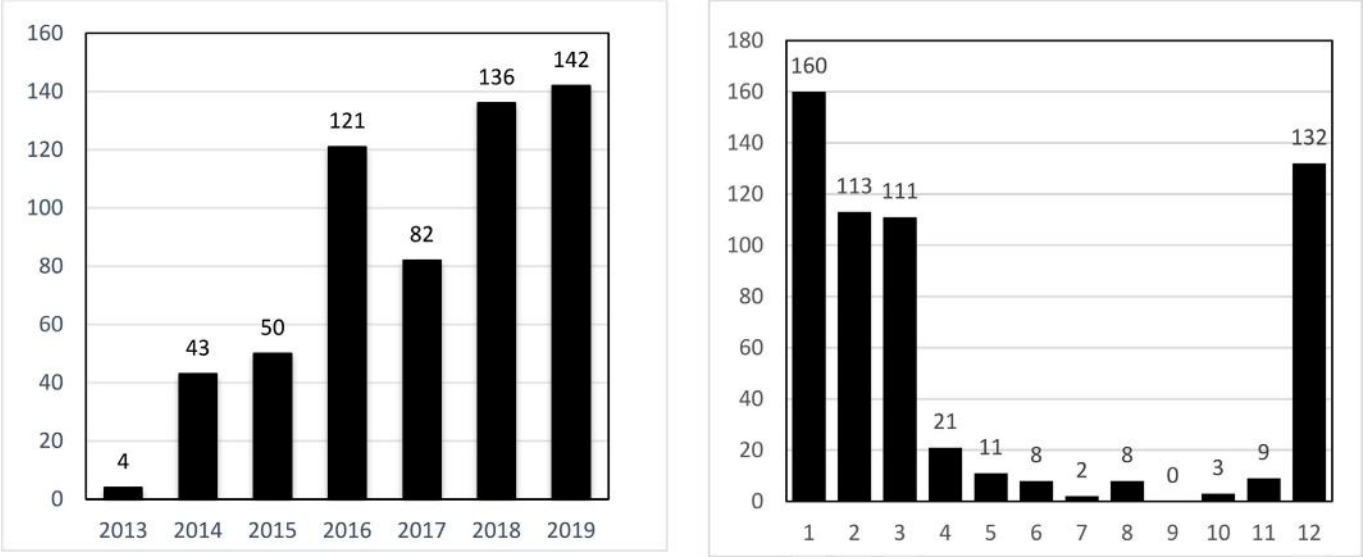


FIGURE 2: a) Number of strandings reported per year from 2013 to 2019 and b) Number of strandings per month.

in order to examine the internal organs. The gastrointestinal tract was extracted from the esophagus to the distal part of the cloaca and tied on both openings to preserve all the content on a 1mm sieve (Galgani et al. 2011). The gastrointestinal lumen was exposed by a transverse incision to observe any pathological changes. Any ingested food, plastic particles or debris were washed over the sieve. All identifiable contents of the gastrointestinal tract of each turtle were separately preserved in labelled bags (Poppi and Marchiori, 2013).

RESULTS

NUMBER & SPECIES COMPOSITION OF STRANDINGS & THEIR DISTRIBUTION

A total of 578 turtles were stranded with only four strandings recorded in 2013 gradually increasing to 142 strandings in 2019 (Fig. 2). The strandings consisted of three species: Green turtles n=24, Hawksbill turtles n=502, and Loggerhead turtles (*Caretta caretta*) n=3. A total of 49 strandings were reported without pictures and without mentioning the species and were therefore classified as unknown. Thus 86.8% of the strandings reported were of Hawksbill turtles. Turtles were reported as either alive (n=443) or dead (n=86). The majority of the live turtles were also in very stressed conditions and in some cases suffered from severe dehydration. Some turtles were found dead, most likely recently, with the head and/or front flippers missing suggesting that they were possibly predated on by foxes or cats, since tracks of both species were found near the turtles. The mean size of Hawksbill turtle hatchlings was 13.92cm, suggesting that these stranded turtles were from the previous peak hatching season (between May and July).

SPATIAL DISTRIBUTION & SEASONALITY

Turtle strandings were recorded from 29 beaches covering a total distance of approximately 82 kilometres of which 51.5km was from the western zone that contained 28% of the strandings. The beaches in the central zone were about 4.2km and contained 1% of the strandings. The east zone, that was 26.3km, contained 71% of the strandings (Fig 2). The site with the highest number of recorded strandings (n=111) was site number 9 (Saadiyat Public Beach) within the East zone, followed by site number 2 (Barakah) within the West zone (n=108) (Table 1). We observed an overall increase in the number of strandings during the study period (Fig 2a) and there was marked seasonality in strandings. The highest number of strandings were observed in the winter season (December to March) and it contained 89.3% of all strandings (Fig. 2). The lowest number of strandings was observed in summer (June to September) containing only 3.1% of all standings. The highest number of strandings were in January (n=160) followed by December (n=132), followed by February (n=113) and March (n=111) and no strandings in September.

FECES ANALYSIS

One hundred percent of the fecal matter of the rehabilitated turtles (n=55) passed micro-, meso- or macroplastics with their stool (Figs. 3 and 4). Debris found were from two main categories: plastics and other pollutants (Fig. 3). Industrial plastic pellets, sheet-like user plastics (plastic bag fragments), thread like user plastics were recorded (Fig. 4a). In addition, foamed user plastics, miscellaneous plastic fragments and 'other' balloon fragments were also found. The total number of plastics found in the fecal matter collected from the rehabilitated turtles from 18 January 2019 to 12 May 2019 was n=97. Identifiable biological findings included feather lumps, sponge, oyster, algae and insects, although their quantities were small. In terms of numerical abundance, the bulk of the recovered plastics consisted of industrial pellets (26%) and miscellaneous fragments (28%), while sheet-like (14%) and thread-like (11%) plastics were also prominently recorded (Fig. 4b). In terms of percentage weight, balloons (42.5%) represented the most abundant component of the microplastics in fecal materials, followed by pellets (34.1%), fragments (15.8%), threads (3.9%), foam (0.9%) and sheets (2.65%).

NECROPSY

Necropsy of juvenile hawksbill turtles were from the west zone (Thumayriyah Island, Shuwaihat, Barakah and Sila beaches). Decomposition was observed in all of the turtles due to the long-term freezing, signs of dehydrating in the carcasses, showing sunken eyes, and dry skin. The blood and internal organs showed partial decomposition yet still identifiable, as we extracted the gastrointestinal tract (Poppi and Marchiori, 2013). Five out of the 14 turtles had necrotic tissue scar expressing an old injury and narrowing of the lumen of the ileum. During the content examination all ingested matter was located in the colon. The majority of the gastrointestinal tract contents was of unidentifiable digested matter, with a noticeable concentration of semi digested type of brown algae. Only the identifiable undigested or partly digested content was collected and classified in two main categories: anthropogenic debris and organic prey.

85% of the turtles examined had some type of plastic in their gastrointestinal tracts. Seven turtles contained industrial plastic pellets and five turtles contained plastics including sheet like user plastics. A total of three turtles contained threadlike user plastics and three turtles had foamed user plastics (Figs. 3 and 4). A total of five turtles contained fragments of plastics. The total number of plastics found in the gastrointestinal tract of dead sampled turtles was 50.

A feather lump was found in one turtle. Identifiable organic findings were also collected, recorded, and segregated to 4 sub-categories namely, Sargassum air bladders, oyster, mollusk, barnacle, stone, and insects although

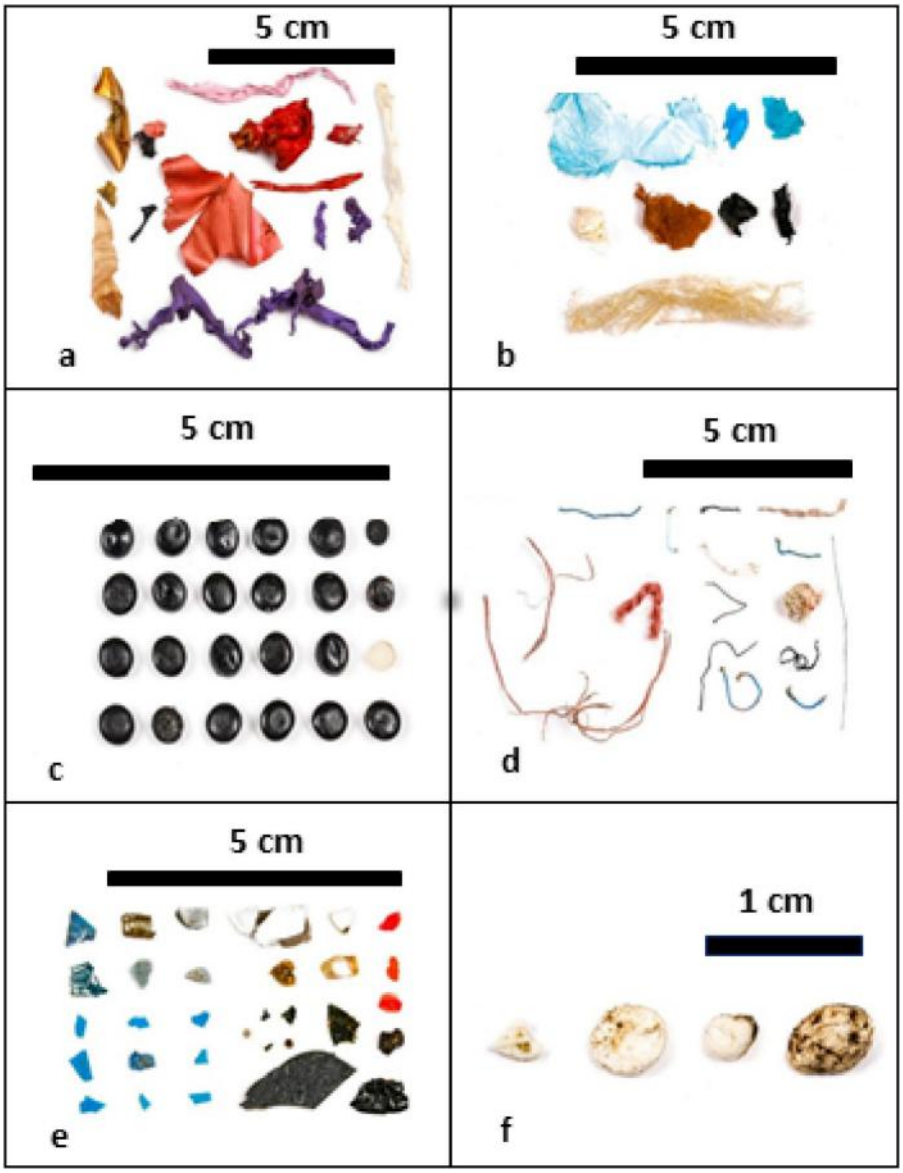


FIGURE 3: Marine microplastic items recovered from stranded juvenile sea turtles. a) industrial plastic pellets, b) sheet-like plastic bag fragments, c) thread-like plastic fragments, d) foam plastic, e) balloon fragments, and f) other plastic fragments.

they were found in few turtles. Necropsied individuals had more sheet-like plastics (18%) and less miscellaneous fragments (18%) compared to the fecal samples (Fig. 4b). Other forms of plastics were represented in similar proportions in the necropsied individuals compared to fecal samples.

TURTLE RELEASE

A total of 38 turtles were released (Dalma: n=7; Shuweihat site: n=31) after rehabilitation provided they displayed signs of good health and recovery. These signs included weight gain, proper mobility, ability to dive and stay on the bottom of the tank, good reflexes and responses to stimuli.

DISCUSSION

ENVIRONMENTAL FACTORS AND STRANDING EVENTS

We observed significant strandings and high levels of marine plastics of juvenile turtles in along the Abu Dhabi coastline. The turtle strandings could be attributed to environmental factors in the Arabian Gulf. The seasons in the Arabian Gulf can be divided primarily into summer (Jun-Sep) and winter (Dec-Mar), with fall (Oct-Nov), and spring (Apr-May) representing short, transition seasons (Walters, 1990). The dominant wind in the region mainly blows from the north-northwest throughout the year (Thoppil and Hogan 2010, Senafi, 2015, Senafi and Anis 2015, Yu et al. 2016, Vaughan, 2016, Lopez, 2017). These winds grow stronger in summer (velocities of 7-13ms−1) when they are known as summer shamals, often lasting for weeks (Senafi, 2015). In winter the strong northwesterly winds develop extreme velocities of up to 15-20ms−1 near the surface at the centre of the Arabian Gulf and are known as winter shamals (Al Senafi, 2015). A Shamal day is defined as a west-north westerly or northerly wind with an hourly average speed 9.85ms−1 blowing during at least 3h day−1. Two consecutive shamal days are required for a Shamal to be classified as a Shamal event (Al Senafi, 2015, Al Senafi and Anis 2015). Shamal events occur at higher frequencies during the summer months (May-July) compared to the winter months (December to March) (Thoppil and Hogan 2010, Al Senafi 2005, Al Senafi and Anis 2015, Yu et al. 2016).

Over the last decade or so, shamal events have become more frequent causing sudden changes in temperature (increases in summer and decreases in winter), changes in pressure and concomitant changes in relative humidity (Senafi and Anis 2015). Although we did not quantitatively analyse meteorological data in relation to turtle strandings, our strandings broadly seemed to coincide with periods of high Shamal activity. In addition, the consistent increase of strandings in recent years is consistent with a changing climate with increasing frequency of Shamal events (Thoppil and Hogan 2010, Fahad Al Senafi, 2015, Senafi and Anis 2015, Yu et al. 2016). Thus, we suggest that our observations of juvenile turtle strandings could be linked with cold stunning associated with temperature anomalies and higher frequency of Shamal events (Pilcher et al., 2014, 2015, Senafi and Anis 2015).

The hatchlings likely undertook a seven-month journey across pelagic areas drifting with floating Sargassum patches (Chacon, 2004). The source of these hatchlings are likely to be nest sites scattered on several islands surrounding the west and east zones (Pilcher et al. 2014). Over 150 nests of Hawksbill turtles occur within Abu Dhabi distributed over several different islands, with an estimated 8,000+ hatchlings successfully leaving nest sites annually (assuming 58% hatching success, Pilcher et al. 2014). Furthermore, sites such as the Sir Bu Na'air Island could add a further 16,000 hatchlings to this number (AlSuweidi et al. 2017, 2018, 2019) totalling to over 24,000 hatchlings annually. In our study, the annual average of stranded juvenile hawksbill turtles from 2015 to 2019 is about 100 turtles which continued about 0.41% of the average number of annual hatchlings. However, it must be mentioned that many individuals are eaten by scavengers or are lost at sea and are therefore never recorded. Thus, the actual number of juvenile turtles that perish from cold stunning and temperature anomalies is likely much higher.

The high frequency of strandings in the east and west zones of our study were consistent with known coral reefs and nesting areas nearby. For example, Saadiyat reef is located north of Saadiyat Public Beach, the site with the highest number of strandings in the east zone. Similarly, the Barakah site, with the second highest number of strandings overall and the largest in the west zone, has two coral reef sites located about 10km north. The mean size of 13.92cm indicated that most turtles were juveniles. Juvenile Hawksbills in the Caribbean region with carapace lengths of 20cm begin to appear in developmental habitats, such as coral

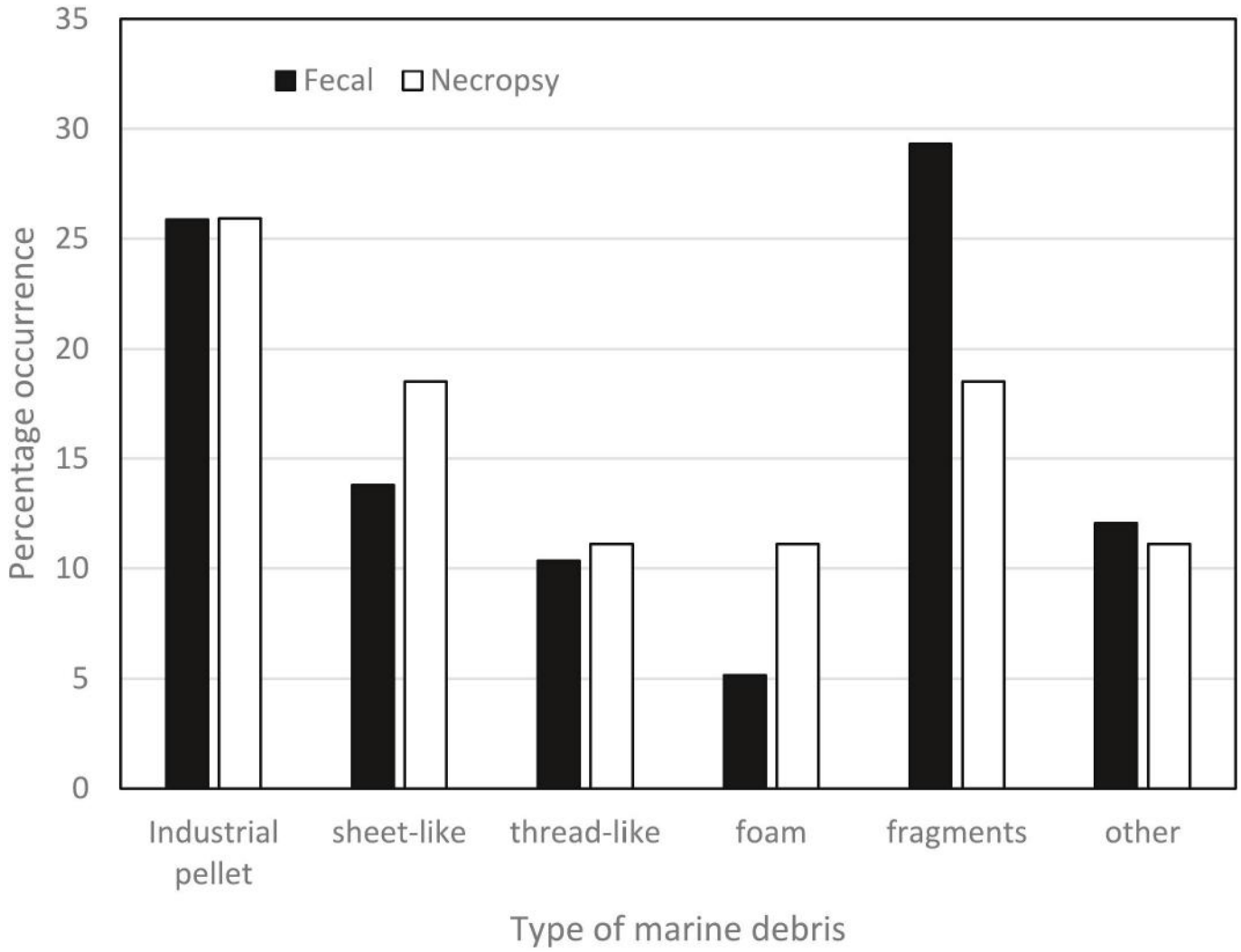


FIGURE 4: a) Number of individual particles of different plastic particles and b) Percentage occurrence of different plastic fragments in the fecal material (black bars) or Gastrointestinal tracts (white bars) of necropsied juvenile, stranded turtles.

reef zones (Chacon 2004). Thus, we speculate that high abundance of juveniles in these areas originating in nearby nesting sites resulted in high numbers stranded during Shamal events.

PLASTICS IN JUVENILE TURTLES

The rise of marine plastics and other debris in the Arabian Gulf has been well recognised in recent years (Naser, 2013, Al Salem et al. 2020, Uddin et al. 2020, Stöfen-O Brien et al. 2022). We report for the first time significant quantities of microplastics from juvenile marine turtles in the southern Arabian Gulf. Industrial pellets and plastic fragments were the most common type of marine debris found in fecal material. Rising levels of industrial plastic pellets have been reported as early as the 1990s from the Arabian Gulf (Khordagui and Abu-Hilal 1994). Industrial plastic pellets were already abundant inside the Arabian Gulf in the 1990s, compared to the outside the Arabian Gulf (Fujairah-Oman shoreline of the Gulf of Oman) (Khordagui and Abu-Hilal 1994). More recently, large numbers of industrial pellets are regularly encountered in the Arabian Gulf, with higher densities occurring close to industrial areas compared to areas with less industrial plastic production (Abayomi et al. 2017, Alidoust et al. 2021). Furthermore, industrial plastic pellets tend to accumulate more polycyclic aromatic hydrocarbons, hopanes, and polychlorinated biphenyls in areas that are in close proximity to industrial areas (Alidoust et al. 2021).

Since the plastic pellets could cause obstruction of the movement of food within the gut, alter gut microflora and cause assimilation of persistent organic compounds in the gut, our observations of higher relative abundance of plastic pellets in the juvenile turtles is of high importance (Biagi et al. 2021, Yaghmour et al. 2022). Interestingly, marine debris in adult green turtles from Kalba and Khor Kakkan on the east coast of the United Arab Emirates consisted primarily of thread-like and sheet-like plastics (Yaghmour et al. 2018a). Similarly, industrial plastic pellets formed a relatively small portion of the consumed marine debris compared to other types of plastic debris found from juvenile sea turtles in the Indian Ocean and Pacific Ocean coastlines of Australia (Duncan et al. 2021). This difference could be due to a difference in location. For example, the Arabian Gulf typically has more industrial pellets inside compared to the outside (e.g. the east coast of UAE or Oman) (Khordagui and Abu-Hilal 1994, Alidoust et al. 2021). The higher abundance of industrial plastic pellets in juveniles could also reflect a difference in behaviour and ecology of juveniles compared to adult turtles. It is possible that juvenile sea turtles that float for extended periods under mats of Sargassum or other algae, also eat Sargassam vesicles or air bladders (Fuentes et al. 2006) that resemble industrial pellets. Most of the industrial pellets in our samples were dark grey and therefore resembled some of the darker (brown) algae that often are carried as clusters in the pelagic waters. Thus, we suspect that the juvenile sea turtles in the Arabian Gulf could be mistaking the highly abundant dark grey industrial pellets for vesciles from Sargassam or other algae.

In our study, plastic fragments constituted the largest proportion of marine debris in the fecal material, and it was relatively well represented in necropsied individuals. Furthermore, sheet-like plastics were similar in proportion in the necropsied individuals although the extent in fecal materials was lower. Thread-like plastics were even less abundant compared to sheet-like plastics or fragments. Plastic fragements

were also reported to be most abundant in juveniles of several species of sea turtles originating in the Pacific Ocean coast of Australia (Duncan et al. 2021). In contrast, juvenile turtles originating in the Indian Ocean coastline had a greater proportion of thread-like plastics, followed by sheet-like plastics and then relatively small portions of fragments. Thus, there are considerable differences in the extent of different types of plastics in juvenile sea turtles depending on location, possibly driven by oceanic circulation patterns and proximity to sources of plastics (Alidoust et al. 2021, Duncan et al. 2021).

Furthermore, Yaghmour et al (2018a)'s finding of sheet-like and threat-like plastics as dominant items in the gut of adult sea turtles in the east coast of the UAE could reflect differences in the behaviour and feeding habits of adults and juveniles. Continuous monitoring of stranded sea turtles of different age groups could help to explain these differences in plastic types in the gut. Long-term monitoring and assessment of plastics in coastal zones (including the sediments and water column) and their relationship to nearby industries are needed to better understand the extent of plastic pollution and to mitigate their impacts on the marine environment.

ACKNOWLEDGEMENTS

We would like to thank the Environment Agency – Abu Dhabi for providing the necessary permits to complete this study, National Centre of Metrology for providing the necessary climatology data, Ahmed Al-Ali for his technical support, Buthaina Al Qubaisi for providing some of the data used in this thesis in 2017, Dr Haifa Ben Romdhane for her technical support, Dr Himansu Das for his technical support, Hind Al Ameri for her technical support, Ibrahim Bugla for his technical support, Prof Kosmas Pavlopoulos for his technical support, Saeed Al Jabry for his technical support, more importantly the keen volunteers that helped during the beach survey time in Al Dhafra region, Abdulla Al-Qubaisi, Hassan Al Maeeni, Juma Al Qubaisi, Khalifa Al Qubaisi.

RESEARCH PERMIT

All forms of scientific research projects on the physical and biological environment in Abu Dhabi emirate must obtain a No Objection Certificate (NOC) from the Environment Agency – Abu Dhabi (EAD) through completing and submitting an application form. The technical guidance document for scientific research permitting in Abu Dhabi emirate has detailed information and advice on this process and can be downloaded from the EAD website. We also downloaded and completed the scientific research No Objection Certificate application, and obtained our research NOC No. 9735.

Green turtle (*Chelonia mydas*)

CLEANUP ARABIA

DP WORLD & EDA REMOVE OVER TWO TONNES OF WASTE FROM DUBAI'S COASTLINE

PHOTOGRAPHY **ALLY LANDES**

117 volunteers and 71 divers joined EDA's annual end-of-year Cleanup Arabia initiative, with DP World as strategic partner. The underwater and coastal clean-up at the two locations removed 2,197.9kg of waste!

AN EVENT BY: EDA جمعية الإمارات للغوص Emirates Diving Association

STRATEGIC PARTNER: DP WORLD

حملة النظافة العربية

CLEANUP ARABIA

SINCE 1995

CLEAN-UP PARTNERS:

Imdaad

P&O

D Marin

Ocean Conservancy

ABOVE & OPPOSITE PAGE: The D-Marin Port De La Mer Marina dive clean-up team on the 2nd of November who successfully pulled through and collected 565.2kg of waste.

The Emirates Diving Association (EDA), in partnership with DP World, P&O Marinas, P&O Maritime, Imdaad LLC and D-Marin, successfully removed 2,197.9kg of ocean waste as part of this year's Cleanup Arabia end of year initiative.

The event took place in two stages. On the 2nd of November at D-Marin Port De La Mer Marina, 45 divers and a 15-strong support team removed 565.2kg of waste from the marina's waters, and on the 9th of November at Mina Rashid, 26 divers and 102 volunteers cleaned both the beach and surrounding waters, removing 1,632.7kg of waste.

Discarded pallets, with an estimated weight of 4-5 tonnes, which could not be taken on the day, were gathered together and prepared for collection by Imdaad LLC at a later date.

"EDA's mission is to conserve, protect and restore the UAE's marine resources, and one of our most important initiatives to achieve this is Cleanup Arabia, which has been tidying the UAE's coastal areas for almost three decades now," said Ibrahim Al Zu'bi, Co-Founder of the Emirates Diving Association. "Human trash that pollutes the ocean environment doesn't just pose a threat to marine wildlife, but breaks down into microplastics that makes its way into our own food chain as well. Removing this waste is essential to a healthy environment for future generations, which is why we are extremely grateful for the support of DP World for these initiatives to protect the UAE's coastlines."

Nabil Qayed, Executive Vice President – Corporate Support at DP World GCC added, "With a major coastal presence through our ports, terminals and other assets, we have a key role to play in maintaining clean oceans and contributing to biodiversity preservation. The partnership with EDA aligns with the UNSDG goal to protect life below water, and we are committed to preserving our planet for future generations by reducing emissions across our global portfolio, protecting ecosystems and enhancing and restoring oceans."

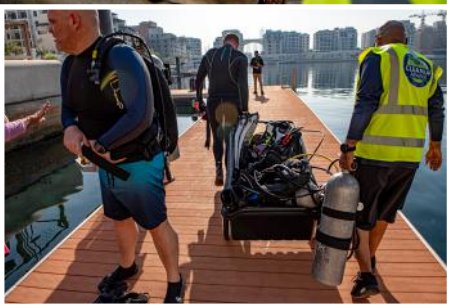
DP World's support for Cleanup Arabia 2024 is part of its ongoing partnership with the Emirates Diving Association, which has already led to four coastal clean-ups in Dubai. The partnership has previously supported a research study with the University of Khorfakkan on the harmful Crown-of-Thorns Sea Star (CoTS) outbreak, leading to a culling operation to protect UAE East Coast coral reefs.

Cleanup Arabia was first launched by EDA in 1995, bringing together ocean enthusiasts and environmental activists to protect the coastal areas of the UAE. To date, the initiative has removed a total of 61,542.9kg of waste from the country's coastal areas.

A big congratulations to everyone involved for such an incredible effort!

www.emiratesdiving.com/events/cleanup-arabia

WANT TO JOIN OUR EVENTS?
Acquire EDA membership, or renew it here to register to all our social events and activities:
www.emiratesdiving.com/membership-form



D-MARIN PORT DE LA MER | DUBAI	
15 Support Team + 45 Divers	
MOST LIKELY TO FIND ITEMS	**TOTAL**
Grocery Bags (plastic)	1
Other Bags (plastic)	14
Beverage Bottles (glass)	4
Beverage Bottles (plastic)	10
Beverage Cans	5
Cups, Plates (paper)	2
Food Containers (foam)	1
Food Containers (plastic)	9
Food Wrappers (candy, chips, etc)	6
FISHING & BOATING	
Line, nets, traps, rope, etc	10
Foam Dock Pieces	1
ILLEGAL DUMPING	
Construction Materials	74
PERSONAL HYGIENE	
Gloves & Masks	10
OTHER ITEMS/DEBRIS	
Clothing	3
Other Plastic Waste	83
Other Waste (metal, paper, etc)	9
OTHER ITEMS NOT LISTED	
Mobile Phone	1
Mops	1
Carpets	6
Blanket	1
Plastic Wheelie Bins	4
GRAND TOTAL OF ITEMS	**255**
TOTAL BAGS COLLECTED	**34**
TOTAL WEIGHT (KG)	**565.2**

PAGE SPREAD: The Mina Rashid beach and dive clean-up teams on the 9th of November who successfully collected 1,632.7kg of waste from the beach and underwater.

MINA RASHID | DUBAI	
102 Beach Volunteers + 26 Divers	
MOST LIKELY TO FIND ITEMS	**TOTAL**
Other Bags (plastic)	N/A
Beverage Bottles (plastic)	N/A
Beverage Cans	N/A
Bottle Caps (plastic)	N/A
Food Containers (plastic)	N/A
Lids (plastic)	N/A
FISHING & BOATING	
Line, nets, traps, rope, etc	N/A
ILLEGAL DUMPING	
Construction Materials	N/A
OTHER ITEMS/DEBRIS	
E-cigarettes	N/A
Footwear (shoes/slippers)	N/A
Other Waste (metal, paper, etc)	N/A
OTHER ITEMS NOT LISTED	
Plastic Traffic Barrier	1
Plastic Barrel 210ltr	1
Plastic Chair	1
Plastic Crates	N/A
Plastic Buckets	N/A
Metal Paint Buckets	N/A
Buoys	N/A
Plastic Jerry Cans	N/A
White Goods	2
Tyres	2
5 Gallon Water Bottle	1
Brushes and Mops	N/A
GRAND TOTAL OF ITEMS	**N/A**
TOTAL BAGS COLLECTED	**104**
TOTAL WEIGHT (KG)	**1,632.7**

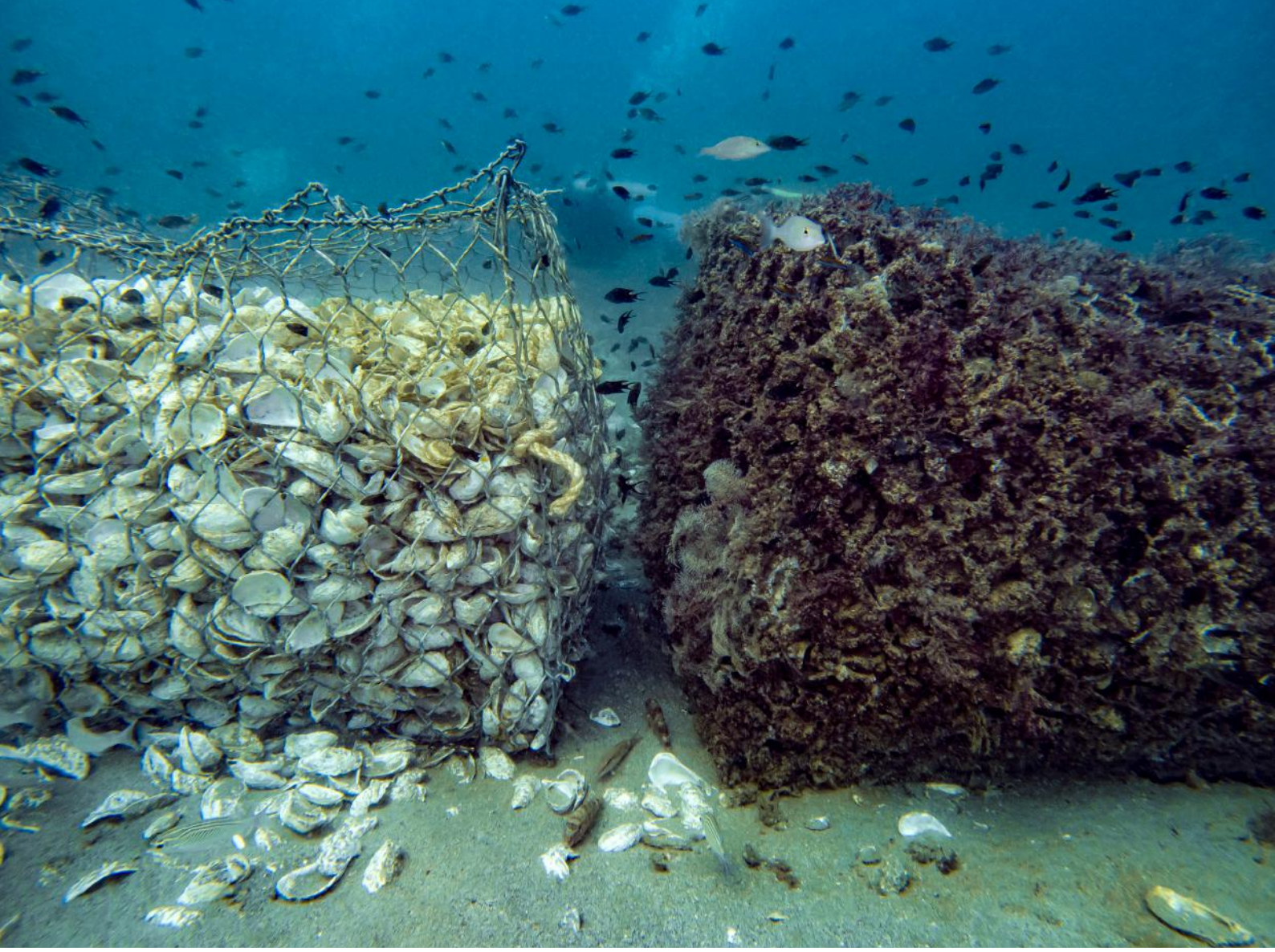
OYSTER REEF PROJECTS

MAKING A CONSERVATION IMPACT

FEATURE **HENRIK STAHL** PHOTOGRAPHY **ALLY LANDES**

Oyster farming, like that practiced at Dibba Bay, is one of the most sustainable forms of aquaculture as oysters require no feed inputs and instead filter the water they inhabit, improving water quality and providing essential ecosystem services.

The clear difference between a reef structure dropped 11 months ago versus one dropped recently clearly demonstrates the potential benefits of the project in recycling oyster shells to create ocean habitats for marine flora and fauna.



ABOUT DIBBA BAY OYSTERS

Nestled between the backdrop of the Hajar Mountains and the Indian Ocean, the Dibba Bay Oysters farm consists of 9 hectares of offshore concessions in the warm waters of Dibba which are home to diverse marine life and coral reefs. Due to the purity of the water and the abundance of plankton, the oysters quickly grow into a world-class product with exceptional meat ratio, clean white shells, and a delicious fresh taste.

THE REEF CREATION PROJECT

The Dibba Bay team know that oyster reefs offer a wealth of benefits to the marine environment; they are one of the most ecologically diverse and productive ecosystems on the planet.

The programme involves collecting empty oyster shells from Dibba Bay outlets in Dubai and Fujairah, as well as their hotel and restaurant partners, curing them in Dibba and packing them into structures. The shell structures are then returned to the ocean in Dibba where they act as substrates to support the settlement of native shellfish, which provide the building blocks for a vibrant new ocean reef habitat. EDA have partnered with Dibba Bay for an initiative in which the diving community of members can contribute a small amount with their annual membership renewals towards the Reef Creation Project.

www.dibbabay.com/about-us/reef-creation-project

REPORT BY DR HENRIK STAHL – DEAN AT THE UNIVERSITY OF KHORFAKKAN

EDA Members who have contributed to the Dibba Bay Oyster Reef Creation Project through EDA's Local Conservation Impact Plan were invited on an exclusive field trip. On the 4th of October, 6 of those members visited the Dibba Bay Oyster Farm facility for a grand tour, where they got to taste the locally-produced Dibba Bay Oysters, and dive at the Oyster Reef Creation Project site to learn more about the initiative.

Our group of divers witnessed the 2 different phases of this artificial reef project, including the first stage which was established in November 2023, now covered with a very healthy 11 months of growth of flora and fauna, and the recently deployed second phase of the reef that has yet to transform.

The oyster reef was strewn with small schools of varied species of fish, lots of juvenile scorpionfish laying camouflaged amongst the oyster shells, an undulated moray eel, juvenile groupers popping out and hiding amongst the gaps, and cleaner wrass busy at work. There was also an abundance of red algae, feather stars, tunicates, bivalves, barnacles, hydroids, crinoids, hermit crabs, cuttlefish eggs, and the tiniest *Caloria indica* nudibranchs that added an extra splash of colour to the reef.

After the dive, we were treated to the delicious oyster tasting session that did not disappoint, and a very informative tour of the facility, including the land-based nursery where the tiny oyster spat are grown to size before being placed in the lantern cages in the ocean.

The members were amazed to learn that Dibba Bay oysters grow to market size much faster than european oysters. In France, for example, it may take three to four years to get the oysters to grow to a good size, whereas Dibba Bay oysters take only nine months. This is largely because of the favourable conditions of the Gulf of Oman.

Higher water temperatures in the Gulf most likely accelerate oyster metabolism and growth. In contrast, European waters experience significant seasonal temperature variations, with colder periods slowing oyster development.

High nutrient availability promotes growth as upwelling events in the Gulf of Oman bring nutrient-rich waters to the surface, enhancing primary productivity and providing a plentiful food source for oysters.

High salinity levels in the Gulf compared to European waters, means more available calcium carbonate to build the oyster shells. In European waters, salinity is lower and may fluctuate due to freshwater inputs from rivers and seasonal changes, potentially impacting oyster physiology and growth rates.

Extended growing season in the Gulf compared to European waters. The warm and stable conditions in the Gulf of Oman allow for a nearly year-round growing season for oysters. In contrast, European oysters often experience a shorter growing season, limited by colder temperatures and reduced food availability during the winter months.

Oyster farming, like that practiced at Dibba Bay, is one of the most sustainable forms of aquaculture, as oysters require no feed inputs and instead filter the water they inhabit, improving water quality and providing essential ecosystem services. By recycling the oyster shells collected from restaurants in the UAE to build artificial reefs, this project takes sustainability a step further by supporting ocean conservation. We are therefore excited to watch this artificial reef project continue to develop and thrive, and to observe the different species that choose to inhabit this new ecosystem, knowing that this area used to be just sand and silt!

EDA'S LOCAL CONSERVATION IMPACT PLAN

100% of our members' donations go directly to Dibba Bay to help fund the operational aspect of collecting the shells, creating the new structures, transporting them to the site, and placement. The payment can be made when members acquire or renew their annual EDA Membership.

EDA Annual Membership Fee: AED100

Additional and Optional EDA Local Conservation Impact Fund: AED180
(Total to Pay: AED280 = Membership + Impact Fund)

To participate in our Impact Plan for Dibba Bay's Oyster Reef Creation Project, go to the link on our website for the payment instructions:
www.emiratesdiving.com/membership-form

ZAYED UNIVERSITY TEAM ATTEND BIGGEST MARINE MAMMAL SCIENCE CONFERENCE TO PROTECT MARINE MAMMALS IN THE ARABIAN GULF

FEATURE **BRYANA COPE & ADA NATOLI, ZAYED UNIVERSITY – UAE DOLPHIN PROJECT**

Indian Ocean humpback dolphins make a global scale splash!

The overall theme of this year's conference, 'Culture and Conservation: Fishing for Change' highlights the need for collaboration between conservation managers and fishers to work together toward lasting and impactful change to mitigate the issues affecting marine mammals; bycatch, entanglement and habitat loss due to overfishing. Pictured here is an Indo-Pacific bottlenose dolphin in Dubai during the 2021-2024 survey entangled in a fishing line, the damage to its dorsal fin is extreme and the fate of this dolphin is unknown.

ABOVE: Evidence of healed entanglement on a humpback dolphin during the 2021-2024 Dubai survey. Interesting research was presented during the SMM Film Festival at the conference on using on-demand ropeless fishing gear. This new technology is being developed and tested by the Canadian Wildlife Federation with local fishers and utilised when whales are detected in the area. With the ropeless fishing gear, fishers would be able to fish in zones closed when whales are nearby so as to not lose out on their income for that period of time, and cause no harm to the whales in the area. This could be a solution for areas in known high traffic dolphin habitats in Dubai coastal waters.

This November, marine mammal researchers from across the globe gathered in Perth, Australia, for the 25th Biennial Conference on the Biology of Marine Mammals, hosted by The Society for Marine Mammalogy. With the theme "Culture and Conservation: Fishing for Change," the conference explored the intersection of human cultures and marine mammal conservation, emphasising the need to address anthropogenic threats, foster sustainable human-marine mammal relationships, and integrate indigenous and western knowledge for successful conservation. Over 1,300 participants from 80 countries shared over 1,000 presentations during the event, showcasing innovative research and conservation initiatives.

Inspiring plenaries held by world-renowned high profile researchers span from the importance of considering animal welfare for addressing conservation issues, to the challenges of protecting species on the brink of extinction such as the little Maui Dolphin and the Vaquita. They presented the fascinating behaviour of the Indo-Pacific bottlenose dolphins, studied for decades along the west coast of Australia, and how humpback whales revolutionise and evolve their songs across generations and transfer them across populations.

UAE-based researchers delivered pivotal insights into regional marine mammal conservation, underscoring the importance of citizen science, long-term monitoring, and policy interventions.

Dr Ada Natoli, Assistant Professor at Zayed University and founder of the UAE Dolphin Project Initiative, presented 'Citizen Science Data of Cetaceans in the Arabian/Persian Gulf: Occurrence and Habitat Preferences of the Three Most Reported Species'. This presentation highlighted the success of the Report a Sighting campaign, which has collected over 1,500 public records since 2012. This data was instrumental in supporting the inclusion of Dubai waters in the Southern Gulf and Coastal waters Important Marine Mammal Area (**www.marinemammalhabitat.org/immas**) and identifying habitat preferences among the three most frequent coastal species (Natoli et al., 2021), demonstrating the power of public participation in advancing scientific understanding.

Complementing this, Bryana Cope, Research Assistant at Zayed University showcased findings from the ongoing Dubai Dolphin Survey in her presentation, 'Importance of Continuous Dedicated Monitoring to Support Cetacean Conservation in Highly Anthropogenic Impacted Coastal Waters: A Lesson from Dubai, United Arab Emirates.' Her work emphasised the critical need for dedicated long-term monitoring to protect cetaceans in heavily urbanised coastal regions, where these species may still occur but major threats are still not clearly identified, and population density is low, and unlikely detected by traditional environmental impact assessments. From the Environment Agency Abu Dhabi, Dr Hind Al Ameri presented 'Unveiling the Effects of Net Fishing Bans on Mortality Rates: A Case Study from Abu Dhabi, UAE'. This research demonstrated the significant reduction in dugong mortality following the implementation of fishing net bans, underscoring the role of policy-driven conservation measures.

Additionally, critical challenges facing the Indian Ocean humpback dolphins (*Sousa plumbea*) were brought to the global scale. Across the range researchers spotlighted critical challenges faced by this coastal dolphin through three additional insightful presentations and a poster. Among the highlights was an award-winning presentation by Shaunak Modi of the Coastal Conservation Foundation in Mumbai, India.

ABOVE: Members of the Indian Ocean Humpback Dolphin Network at the Biennial Conference on the Biology of Marine Mammals presented six presentations on the endangered Indian Ocean humpback dolphin, *Sousa plumbea*. Visit the hudonet.org website to learn more about this collaborative network across the entire species range.

His study 'Indian-Ocean Humpback Dolphins & Fisheries: Surviving the Urban Seascape of Mumbai, India' examined the species' struggle to navigate an increasingly anthropogenic marine ecosystem. This pioneering research represents a milestone for the Indian Ocean Humpback Dolphin Network (HuDoNET), advancing both public engagement and scientific understanding of the species' plight.

Complementing this research, Ketki Jog of James Cook University, India, presented 'Social Ecology of the Interactions between Indian Ocean humpback dolphins and fisheries in Sindhudurg, India'. Her work emphasised the intricacies of the dolphin-fisher relationship and proposed community-driven conservation strategies that integrate local fishers as partners to ensure mutual benefit.

Sasha Dines of Stellenbosch University, South Africa presented 'SWORD: Signature Whistles For Occurence, Recapture And Density For Indian Ocean Humpback Dolphins, Sousa plumbea in South Africa'. Her research showcased the effectiveness of passive acoustic monitoring in studying this low-density species, presenting it as a key tool for non-invasive population tracking and density estimation.

The poster presentation by Sohini Dudhat of the University of St Andrews, India, 'Using the Proportion of Species Strandings to Unveil Temporal Dolphin Stranding Trends in Oman, Northwest Indian Ocean' drew from an impressive 22 years of citizen science data. Her findings highlighted the importance of sustained, long-term monitoring and the value of citizen engagement in uncovering stranding patterns, providing a critical foundation for developing targeted conservation initiatives.

Together, these studies exemplify the necessity of science-driven conservation, cross-border networks, and inclusive community participation in addressing the growing threats to marine biodiversity. For further insights into HuDoNET's collaborative efforts, consult last quarter's feature, 'A Cross-Borders Collaborative Approach to Vital Species Conservation', and explore their work at hudonet.org. HudoNet is a global initiative aimed to galvanise conservation for the Indian Ocean humpback dolphin, jointly led by Zayed University, the University of Pretoria and St Andrews University.

It was also extremely useful to connect and exchange experiences on "sister" species such as the Atlantic Ocean humpback dolphin in West Africa (CCAHD) and the Indo-Pacific humpback dolphin in eastern Asia and identify common challenges.

Overall it was an invaluable opportunity for the Zayed University team to meet in person with researchers from the region and across the world, exchange knowledge, perspectives and opinions, and bring to international attention the status of marine mammals in the UAE and the broader Gulf region.

For more information on the conference check out their website at **www.smmconference.org**, and if you are interested in becoming a member of The Society for Marine Mammalogy, more information can be found here **https://marinemammalscience.org**.

REFERENCES

Natoli, A., Moura, A. E., & Sillero, N. (2021). Citizen science data of cetaceans in the Arabian/Persian Gulf: Occurrence and habitat preferences of the three most reported species. Marine Mammal Science, 1–21. https://doi.org/10.1111/mms.12865

U.A.E. DOLPHIN PROJECT

REPORT YOUR SIGHTINGS!

If you encounter a whale or dolphin, collecting information is extremely useful to us.

1. Take videos or photos (if you can). You are there in that moment so you become the scientist. Every image of any quality is better than nothing and will help experts to confirm the species. If you can take photographs and videos when you are on the side of whales or dolphins when fins are clearly visible, it can help scientists track the individuals, but please keep a safe distance!

2. CALL as soon as possible if you are witnessing a special sighting, or you encounter a dead animal so experts can hopefully reach the site and gather more information.

3. Take note of the date, time, and approximate location – if GPS is not available, a dot on google maps works great! Also report how many individuals you see.

4. You can send your data to us via:

sightings@uaedolphinproject.org
www.uaedolphinproject.org
www.facebook.com/UAEDolphinProject
www.instagram.com/uaedolphinproject
+971 56 671 7164
+971 50 955 1742 or +971 56 671 7164

THE FUJAIRAH RESEARCH CENTRE'S ARTIFICIAL REEF AND CORAL RESTORATION PROJECT

FEATURE AND PHOTOGRAPHY **FUJAIRAH RESEARCH CENTRE**

The Fujairah Research Centre continues to lead in marine conservation initiatives by showing that blending age-old wisdom with scientific methods is crucial for safeguarding the long-lasting health of our world's marine environments.

In a groundbreaking effort to advance marine conservation, the Fujairah Research Centre launched an innovative initiative that combines different practices with contemporary scientific methods to restore coral reefs and boost marine biodiversity. This pioneering approach is significantly different than common ways of artificial reef projects.

Utilising natural materials such as palm leaves and oyster shells in artificial reefs, harnessing their ecological benefits to rejuvenate marine ecosystems. It also demonstrates a unique synergy that not only revitalises underwater habitats but also embodies the UAE's unwavering commitment to sustainable development and environmental stewardship, setting a new standard for conservation efforts globally. Fujairah Research Centre's new method of using palm leaves and oyster shells for coral propagation is inspired by techniques rooted in Emirati culture for over a century. This unique blend of traditional knowledge and contemporary science represents a significant leap forward in efforts to safeguard marine biodiversity. Moreover, the use of these materials will minimize the cost of waste management and support the efforts of the UAE in the circular economy which aims to enhance resource efficiency and reduce waste.

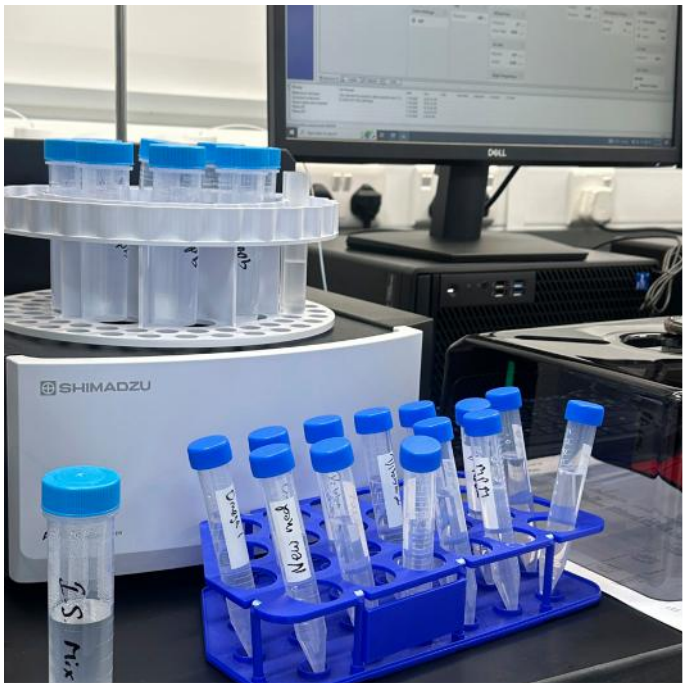
By utilising these abundant natural materials, the Fujairah Research Centre effectively reduces reliance on synthetic alternatives, thereby promoting sustainability. The biomaterial structures created from these resources offer crucial habitats for a diverse range of marine species, significantly enhancing ecosystem health. This approach not only supports natural coral growth and regeneration but also ensures long-term sustainability. Recent analyses reveal a substantial increase in coral propagation and marine biodiversity in the areas where this technique has been implemented, underscoring its positive environmental impact.

Our artificial reef structures are designed for easy deployment directly from a boat, requiring only a small team of divers. This easy process eliminates the need for heavy equipment such as cranes, reducing operational costs, logistical complexity, and environmental disruption. Deploying the reefs with minimal equipment allows for greater flexibility and faster setup. Additionally, it minimises the risk of damage to both the structures and the marine environment, ensuring the integrity of the reef and promoting sustainable restoration efforts.

The monitoring and assessment is a part of the artificial reef project the Fujairah Research Centre has developed and implemented advanced technologies to enhance marine conservation efforts:

1. **Deployment of marine buoys:** Fully constructed in Fujairah, these buoys provide real-time water quality data, enabling continuous environmental monitoring and allowing for timely detection of environmental changes, supporting proactive management.
2. **Use of a Remotely Operated Vehicle (ROV):** Equipped with a high-definition camera, to collect visual data from the seabed and marine environments with precision and efficiency. The ROV minimises human intervention and reduces survey risks, especially in challenging underwater conditions.
3. **AI model for marine species identification:** This model identifies and counts marine species, including fish and corals, enhancing biodiversity assessments and ecological insights, ensuring accurate species identification, and facilitating data-driven decision-making for conservation strategies.

Together, these tools contribute to sustainable marine resource management and improved ecosystem resilience.



One of our main objectives is to bring people together to create a real impact in the ocean: Youth, Volunteers, Academia, Government, local community, and restaurants. We teach people of all ages about threats to the ocean as well as the skills needed for conservation field projects including the collaboration with oyster restaurants and farms to collect the oyster shells and use them in our artificial reef. Creating impact at scale requires a large team with diverse skills. We actively bring partners together for a positive impact.

"Our vision for this project is to set a new way for marine conservation that prioritises sustainability and innovation. By leveraging abundant natural resources and advanced technologies, we are not only addressing the urgent challenges facing our coral reefs but also fostering a deeper connection between people and the ocean. The integration of artificial reefs, with real-time monitoring through marine buoys and ROVs, allows us to gather valuable data while minimising human impact on delicate ecosystems. We believe that by collaborating with diverse stakeholders – from local communities to academic institutions – we can create a comprehensive approach to marine conservation that leads to tangible, long-term results for our environment," explains Dr Fouad Lamghari Ridouane, Director of the Fujairah Research Centre.

Maryam Alhefeiti, a marine researcher at Fujairah Research Centre said, "Our approach merges traditional Emirati practices with scientific methods, allowing us to restore coral reefs in a way that honours both our cultural heritage and the latest advancements in marine biology. By using natural materials like palm leaves and oyster shells, we not only enhance the structural complexity of marine habitats but also create ecosystems that support a diverse range of marine life. This project represents a significant step forward in our commitment to marine conservation, and it is important to see how it inspires both local communities and future generations to take an active role in protecting our oceans."

Eng Ahmed Nabil added, "As an IUCN expert in the field of coral conservation, I am thrilled to be a part of the FRC artificial reef and coral restoration project. The innovative methods we are implementing, such as cutting-edge techniques in reef design and coral transplantation, are truly groundbreaking. It's exciting to witness the positive impact these efforts are having on reef ecosystems, and I am proud to contribute to such a forward-thinking and collaborative initiative. These projects represent a vital step toward safeguarding marine biodiversity for future generations.

The Fujairah Research Centre is leading the way in coral restoration and artificial reef projects by implementing cutting-edge scientific methods and world-class measures throughout every phase of the process. From the initial conceptualisation and design stages to monitoring and verifying the results.

With a focus on research, innovation, and data-driven strategies, we are setting new standards in marine conservation."

The Fujairah Research Centre continues to lead in marine conservation initiatives by showing that blending age-old wisdom with scientific methods is crucial for safeguarding the long-lasting health of our world's marine environments.

For more information about the Fujairah Research Centre's initiatives and ongoing research, please visit: **www.frc.ae**

DIVE LOCAL
AND GET TO KNOW THE SPECIES

FEATURE AND PHOTOGRAPHY **AHMED AL-ALI**

Dive in and discover the UAE's marine life in more depth.

CORAL CRAB

This is a crab and not a shrimp as most divers think. This Coral Crab – also known as Tuberculate Coral Crab – is a small, camouflaged decorator crab from the family Epialtidae found across the indo-Pacific Ocean. It mainly lives on spiral black coral (clearly not black as named, but that is another story for another day). It is a highly camouflaged crab, and it blends very well with its host. It even decorates itself with bits of coral and algae on its carapace (the back shell of its body) making it indistinguishable from the coral thus avoiding predators and helping it thrive in its livelihood.

This crab has a major role in coral reef ecosystems. It feeds on scavenging detritus (organic matter) accumulated over the coral and drifting plankton and algae. Its camouflage not only helps it find food and avoid predation, but it also helps it breed safely by safeguarding its eggs between the stinging coral polyps (coral extending arms), guaranteeing its survival in the ecosystem.

This crab is very similar to another shrimp species that is very popular amongst underwater photographers. However, there is a big difference in anatomy (body structure) between shrimps and crabs. They both share the love of scavenging. The split between shrimps and crabs in anatomical and behavioural actions really shows the evolutionary adaptations of the fascinating marine life and ecosystems.

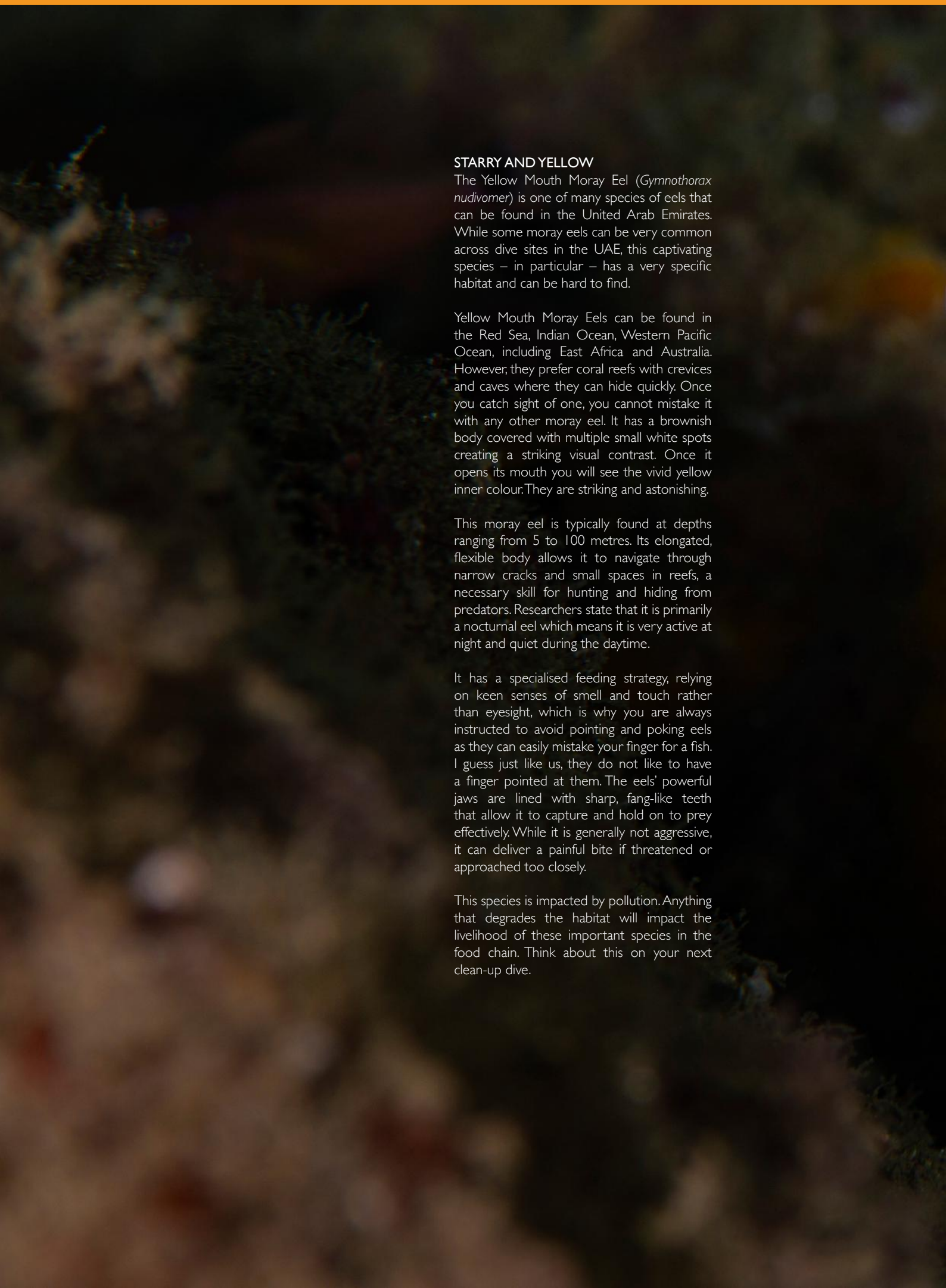
TIGER GOBY

A visually distinctive species of goby, the Tiger Goby (*Bryaninops tigris*) is a very small gobyfish species found in the Indo-pacific region (Indian Ocean and adjacent part of the Pacific Ocean). This small fish can be seen on coral branches and it is very distinctive with a bold tiger-like stripe along its translucent body which is the perfect camouflage to avoid predators.

The Tiger Goby can be found at depths down to 40 metres and is well known for its strong site loyalty (meaning it tends to stay in the same area as it has a symbiotic relationship with its coral host. The fish removes debris from its coral, keeping it clean and healthy whilst using its camouflage to ambush its prey. It feeds on small planktonic organisms (the very small living creatures) such as small fish that have just hatched from eggs (larva) and other tiny and macroscopic crabs and shrimps. The Tiger Goby is a sharp hunter due to its amazingly large eyes that are adapted to finding these tiny creatures as they move crossing paths with the fish.

The Tiger Goby's circle of life is fascinating. The parents usually pick the individual coral at the end of the coral branch. The female comes to lay her eggs and sticks them to the coral and leaves the rest to the male as he guards the eggs with his life. These fish are only 3.5cm long. How amazing is that!

Be aware of your finning technique while diving. Damaging a coral with your fins has consequences for both the coral and the amazing life it may be hosting. Become a better diver, be an aware diver.



STARRY AND YELLOW

The Yellow Mouth Moray Eel (*Gymnothorax nudivomer*) is one of many species of eels that can be found in the United Arab Emirates. While some moray eels can be very common across dive sites in the UAE, this captivating species – in particular – has a very specific habitat and can be hard to find.

Yellow Mouth Moray Eels can be found in the Red Sea, Indian Ocean, Western Pacific Ocean, including East Africa and Australia. However, they prefer coral reefs with crevices and caves where they can hide quickly. Once you catch sight of one, you cannot mistake it with any other moray eel. It has a brownish body covered with multiple small white spots creating a striking visual contrast. Once it opens its mouth you will see the vivid yellow inner colour. They are striking and astonishing.

This moray eel is typically found at depths ranging from 5 to 100 metres. Its elongated, flexible body allows it to navigate through narrow cracks and small spaces in reefs, a necessary skill for hunting and hiding from predators. Researchers state that it is primarily a nocturnal eel which means it is very active at night and quiet during the daytime.

It has a specialised feeding strategy, relying on keen senses of smell and touch rather than eyesight, which is why you are always instructed to avoid pointing and poking eels as they can easily mistake your finger for a fish. I guess just like us, they do not like to have a finger pointed at them. The eels' powerful jaws are lined with sharp, fang-like teeth that allow it to capture and hold on to prey effectively. While it is generally not aggressive, it can deliver a painful bite if threatened or approached too closely.

This species is impacted by pollution. Anything that degrades the habitat will impact the livelihood of these important species in the food chain. Think about this on your next clean-up dive.

THE ORANGE DIAMONDS OF DUBAI

FEATURE AND PHOTOGRAPHY **ARWA MOHAMMED – XPHOTODXB**

I observed orange glows sparkling everywhere. Despite diving in this location for two years, I had never encountered such reflections before. Initially, I was concerned when some of them seemed to vanish as I approached them, or split into multiple reflections. With over four years of experience diving in UAE waters and more than 50 night dives, this was a novel experience.

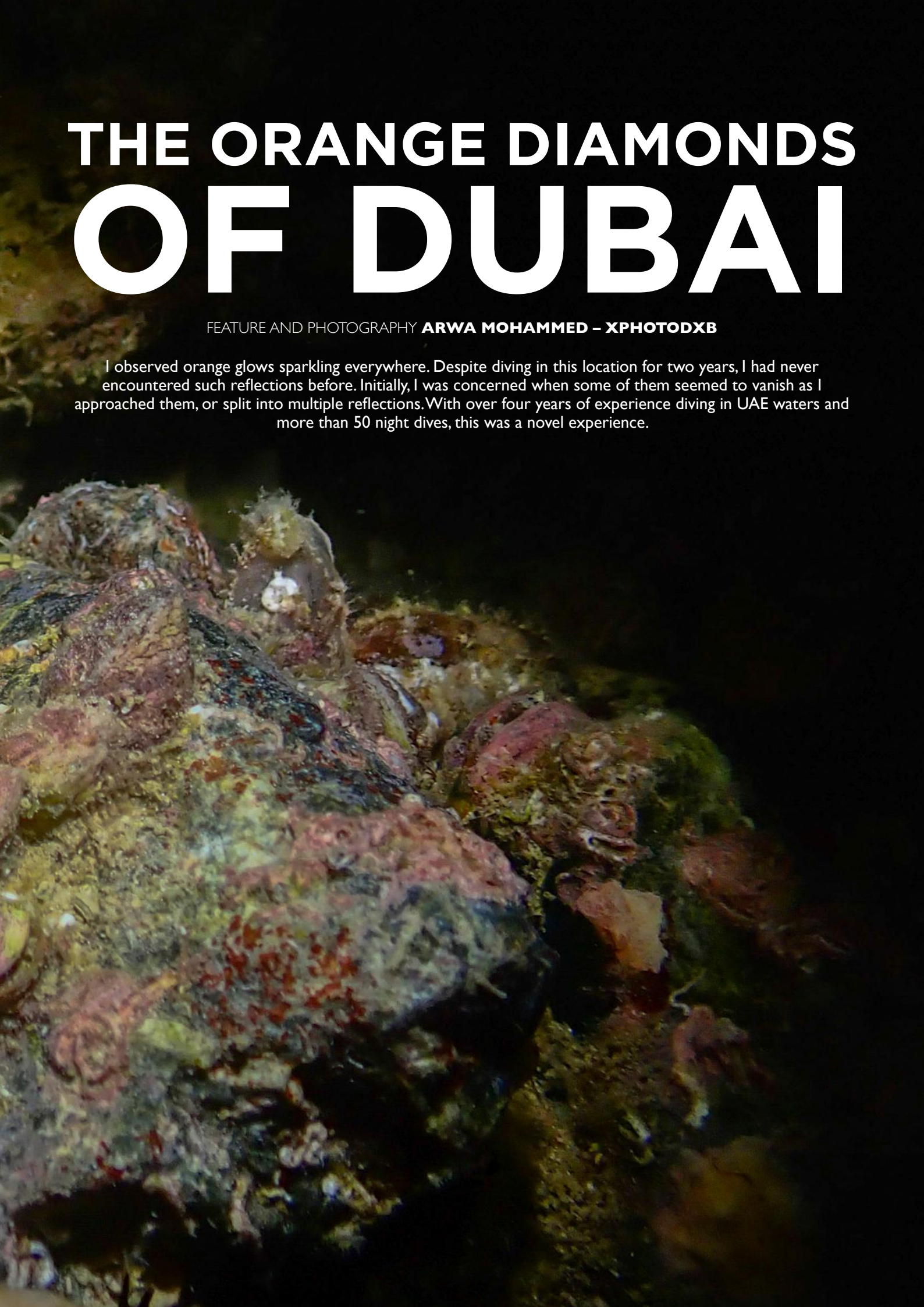
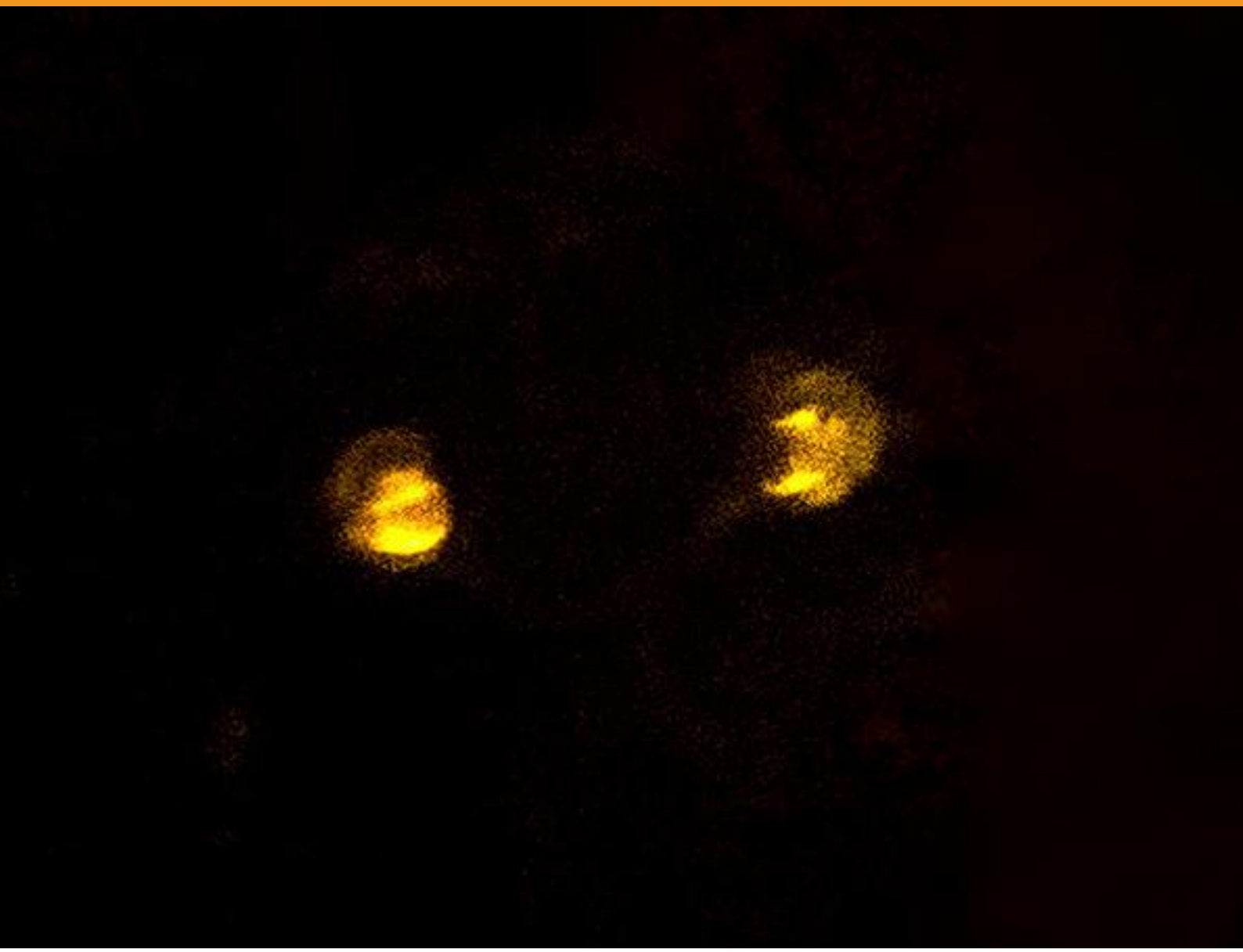


Photo by Hussein Ibrahim



As an emerging underwater filmmaker, I discover something new everyday. I am excited to share a recent revelation: through a combination of research and serendipity, I stumbled upon an intriguing phenomena such as orange reflections on seabeds and marine seagrass during a recent dive. Balancing the roles of spotter and photographer proved challenging. My tendency to over-pack led to clutter underwater, which sometimes made my dives stressful. To alleviate this, I decided to simplify my tasks by eliminating the need to hold a light, thus keeping my hands free. I purchased a headlamp, initially concerned that it might interfere with bubbles from my mask during cleaning. Fortunately, this was not an issue. I later discovered a more streamlined design that was both functional and aesthetically pleasing.

Using the new headlamp, I was thrilled to dive hands-free for the first time. However, I noticed an unusual phenomenon: I observed orange glows sparkling everywhere. Despite diving in this location for two years, I had never encountered such reflections before. Initially, I was concerned when some of them seemed to vanish as I approached them, or split into multiple reflections. With over four years of experience diving in UAE waters and more than 50 night dives, this was a novel experience. Upon investigating the largest of these reflections, I discovered that what I had thought were reflecting diamonds, were actually beautifully illuminated shrimp eyes. I turned off the headlamp to use my snoot light for capturing videos and still images. It became evident that the glow was only visible with the video lights on. When I returned to the same spot with different lighting equipment, the reflections did not reappear at all.

This prompted me to explore the visual mechanisms of shrimp. Many shrimp possess specialised structures in their eyes that enhance their ability to see in low-light conditions. These structures include reflective materials that act like mirrors, reflecting light that passes through the eye back toward the retina, thereby improving their vision in dim environments. The effectiveness of this reflection depends on the angle of incidence and the wavelength of the light.

During one dive, I encountered three species of shrimp – cleaner shrimps, tiger shrimps, and Caribbean velvet shrimps – at a depth of 6 metres in Jumeirah. In the past four years of diving, I was able to spot only five shrimps, all of which were large adults, making them hard to miss. During my 50+ night dives, I had never encountered three species of shrimp in various sizes, including both juveniles and adults all in one dive.

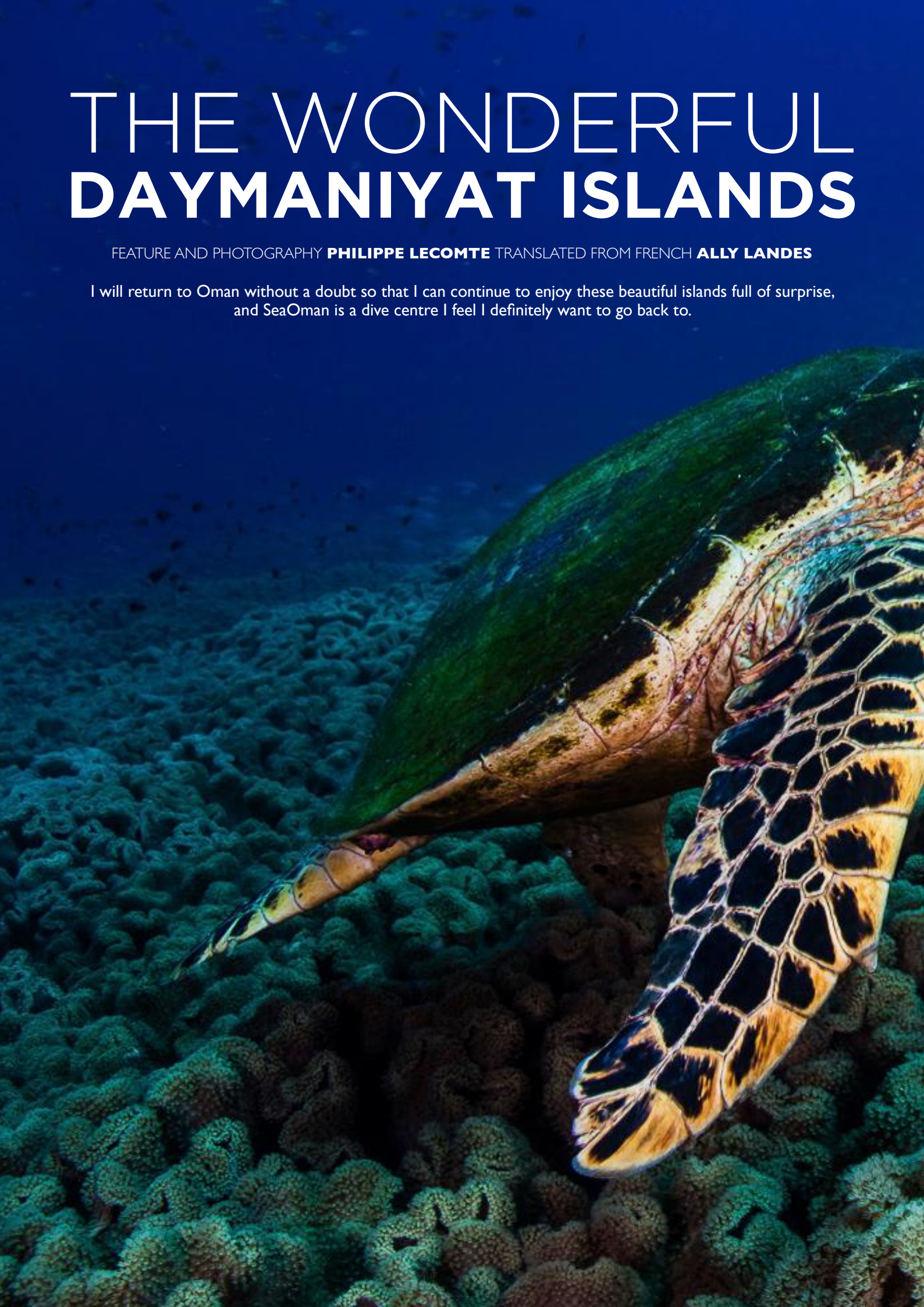
While professional equipment is undoubtedly valuable, sometimes affordable gadgets can reveal opportunities that high-end tools might miss. In my experience, a cost-effective light provided hidden benefits that a $1,000 professional light could not offer. This underscores the importance of keeping an open mind and exploring all options, as you may uncover hidden features and advantages that you otherwise might have overlooked.

If you're in Dubai in the UAE and would like to experience this extraordinary phenomenon, follow me on **www.instagram.com/xphotodxb** and send me a direct message.
Let's arrange a night dive together to explore this remarkable sight.

THE WONDERFUL **DAYMANIYAT ISLANDS**

FEATURE AND PHOTOGRAPHY **PHILIPPE LECOMTE** TRANSLATED FROM FRENCH **ALLY LANDES**

I will return to Oman without a doubt so that I can continue to enjoy these beautiful islands full of surprise, and SeaOman is a dive centre I feel I definitely want to go back to.



A trip to Oman had been on my mind for a long time. After going through a difficult summer in the UAE and combatting some medical issues, I decided to take a long weekend for myself to finally go back and dive the Daymaniyat Islands. I had not been back to dive there for 7 years, so it was well overdue.

I got in touch with a friend whom I had met at EDA's Digital Online Awards Night 2024 back in May who had recommended to dive with SeaOman located at the Al Mouj Marina, conveniently close-by to Muscat Airport.

I first got in touch with them by phone and spoke with Maha on reception who was very professional and helpful. My 3 day trip for the first weekend of November was officially booked and I was looking forward to it!

The drive to Muscat takes around 4.5 hours, not including the border crossings. After passing the administrative procedures, all I had to do was drive directly to Muscat. This is now much easier thanks to the Batinah Expressway which leads straight to the Muscat Expressway. Being further away from the coast the expressways act as relief roads, making the journey much smoother.

SeaOman is located in the Al Mouj Marina, and check-in time in the mornings is at 8am. The 42 foot boat is well equipped and berthed 50m along the jetty making it a short walk over. The dive centre also has lockers available to store belongings you don't want to take on the boat.

The day consists of 2 dives with a surface interval during which you can enjoy a club sandwich included in the price. The

comfortable boat journey to the Daymaniyat Islands takes around 30 minutes one way, and you are normally back in the marina around 1:30pm-2pm dependant on the sea conditions.

The Daymaniyat Islands consist of 7 main islands including a few small islets. Some of the beautiful beaches are accessible during the open seasons.

There are numerous dive sites available from easy to moderate levels, making this destination the perfect choice for all skill levels. Snorkelling can be done during the surface intervals in the bays on the south side. The water is always crystal clear on this side as it is protected from the wind and the prevailing currents. A variety of tropical fish can be seen here without forgetting the turtles which are present all around the islands.

About 4-5 months ago, the Ministry of Environment, with the help of SeaOman, sank several wrecks in one of the passes. There is now a plane and 2 truck wrecks settled on the sand bed at approximately 10-12 metre depths. The boat crew will bring you just above the wrecks so you can snorkel as another option for one of your surface intervals. The wrecks are also visible from the boat. They will eventually become a dive site location, but for that, we must wait for the underwater life to slowly settle on these structures and transform them into part of the ecosystem.

I dived Hayut, Garden of Eden and 3 Sisters on my trip, and I encountered several octopuses. They are quite common and it's always exciting to observe these very intelligent creatures.

The numerous caves and crevices are often occupied by rays. Don't hesitate to look in all the cracks and other dark places with your torch, you will find several hidden lionfish. The latter wait patiently for night to arrive in order to go hunting on the reef. Parrotfish of all sizes, arabian butterflyfish and other angelfish swim in from all directions. Life around these islands has never disappointed me. At certain sites and in Hayut, the northern most site, it is not uncommon to encounter one of the most sought-after residents of the Daymaniyats, the leopard shark.

They are often found on the sand facing the open blue, where they rest peacefully after having spent the night hunting for crabs, shellfish and other cephalopods. The leopard shark does not have a large mouth dotted with razor sharp teeth. They have overlapping ridges between different tooth rows which result in a large flattened and ridged surface on the upper and lower jaws, often referred to as "pavement-toothed".

Leopard moray eels are also very present and you are sure to encounter them during your dives. These large moray eels appear aggressive due to their sheer size, but they are actually very peaceful when divers approach them. Cleaner fish are very often their companions during the day. These wrasses turn, twirl and even tuck into the mouth of their imposing client in order to clean-up all the remains of fish from the morays last meal.

Our two guides, Suleiman and Said were very professional and they had a great sense of humour. This trip also allowed me to meet new underwater photo and video enthusiasts. It was an interesting weekend. I will return to Oman without a doubt so that I can continue to enjoy these beautiful islands full of surprise, and SeaOman is a dive centre I feel I definitely want to go back to.

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THE UNDERWATER WORLD OF THE MALDIVES

FEATURE **NAIRIKA BHARUCHA** PHOTOGRAPHY **MILAIDHOO MALDIVES**

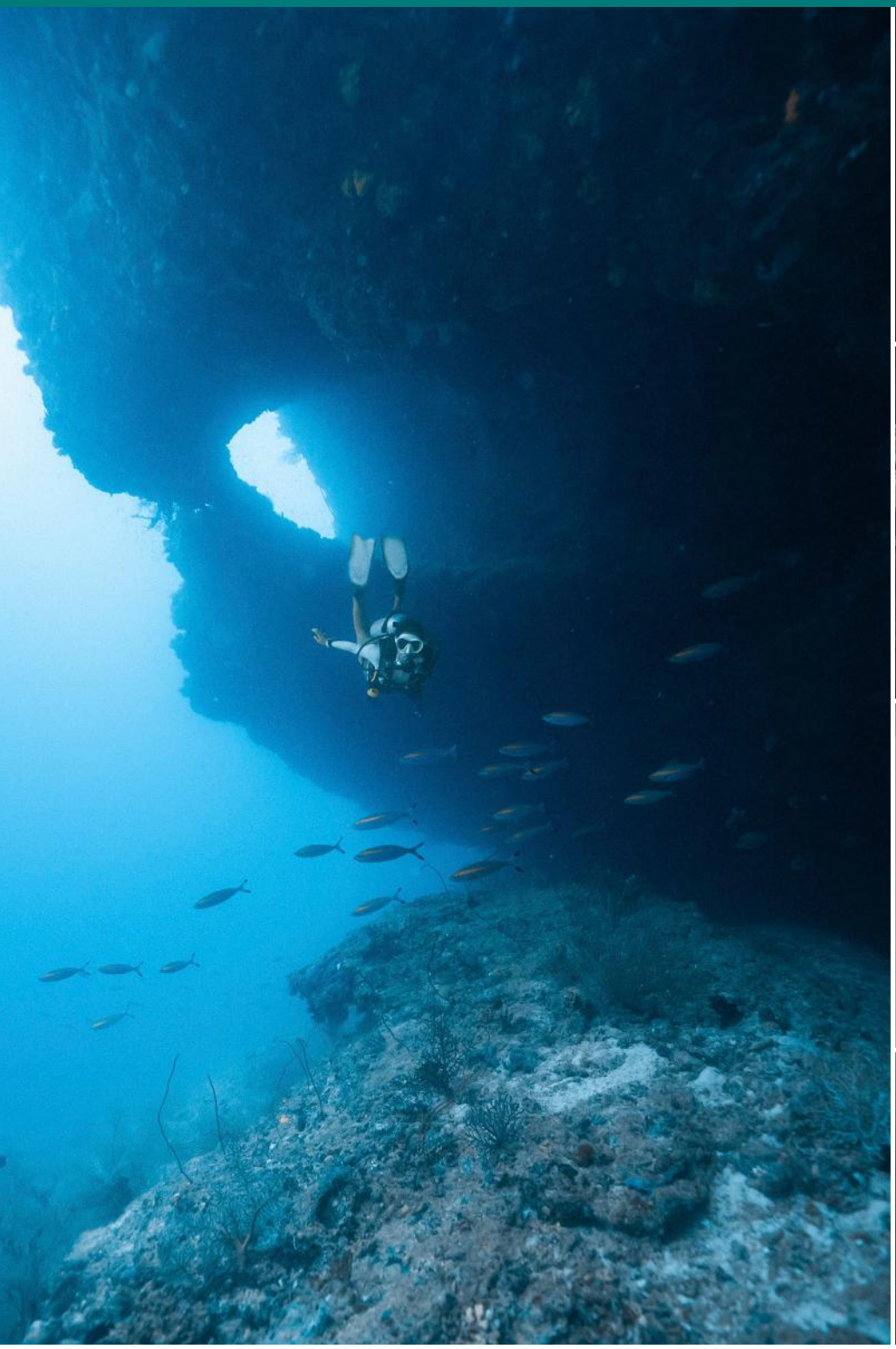
The Maldives is much more than a paradise above water – beneath the ocean lies an extraordinary world teeming with life, and at Milaidhoo, we are priviledged to explore, protect and share it with those who are curious enough to dive in.

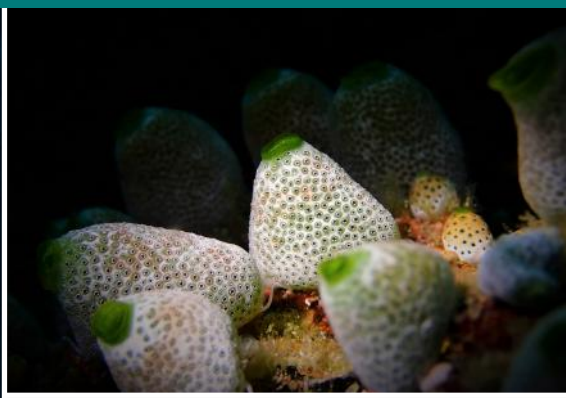
The Maldives is much more than a paradise above water – beneath the ocean lies an extraordinary world teeming with life, and at Milaidhoo, we are privileged to explore, protect and share it with those who are curious enough to dive in. As a marine biologist, I have the honour of working in one of the planet's most diverse ecosystems, and few places compare to what I have seen in these waters. The Baa Atoll UNESCO Biosphere Reserve, home to Milaidhoo, harbours over 2,000 species of fish alone, and the density and richness of marine life here is mesmerising.

Every dive reveals a tapestry of colourful coral gardens with fish weaving in and out, flashing neon blues and electric yellows. Closer to the coral, schools of fusiliers move in synchrony while parrotfish nibble away, keeping the reef in balance. Just off Milaidhoo's shore lies the house reef, bustling with life, a gateway to the wild underwater realm for both snorkellers and seasoned divers alike. In the Maldives, the ocean is a timeless cinema that can even be watched from the shore.

Milaidhoo is deeply committed to conserving this fragile ecosystem. We regularly conduct coral frame planting projects, placing each frame with meticulous care on the reef to promote coral growth and biodiversity. So far, over 175 frames have been planted, each one a hope for future generations who will swim among these coral forests long after we are gone. Through our non-motorised water sports programme, guests can paddle out into the lagoon without disturbing the natural balance – whether they are kayaking, paddle boarding, or joining us in reef-cleaning sessions.

The diversity here extends far beyond corals and fish. The Baa Atoll is the heart of the world's largest manta population. Since June 2024, over 6,000 individual mantas have been identified across the Maldives, and more than 2,000 of those gather seasonally in Hanifaru Bay. A short boat ride from Milaidhoo, Hanifaru Bay offers one of nature's grandest





spectacles: hundreds of mantas gather in a feeding frenzy, sweeping through the plankton-rich waters. It is a rare privilege to witness, and each sighting reminds us of our responsibility to protect them.

Our whale sharks are equally impressive. Unlike those found in other parts of the world, Maldivian whale sharks exhibit strong territorial loyalty. With over 750 identified individuals, none have been seen outside Maldivian waters, marking them as a uniquely Maldivian phenomenon. They glide with gentle power, and encountering one of these giants brings awe and a deeper awareness of the delicate balance they help maintain in the ecosystem.

Milaidhoo's dive sites offer even more treasures for those eager to explore. Our famed Milaidhoo Caves, for example, provide a stunning setting for experienced divers. It is a place of tunnels, swim-throughs, and caverns teeming with life – sharks resting on the sandy floor, rays gliding effortlessly through beams of sunlight, and turtles that seem to almost welcome our presence. The caves are also perfect for night dives, where the reef lights up in bioluminescent displays, a surreal vision of glowing coral and dancing plankton under the moonlit water.

Our work is not limited to what guests see. Behind the scenes, we contribute crucial data to local and international NGOs to support marine conservation efforts. We monitor turtle nesting, track manta sightings and conduct fish counts, all to ensure that this ecosystem remains healthy and vibrant.

It's an honour to be part of Milaidhoo's commitment to both conservation and education. Every dive is an adventure, every encounter a reminder of nature's vastness. For our guests, each underwater journey brings not only a deeper appreciation of the sea but an invitation to join us in protecting it for generations to come.

www.milaidhoo.com

CYLINDER VALVES AND ACCIDENTS IN SCUBA DIVING

FEATURE **GUY THOMAS**

One would expect diving cylinder valve connections to be the same all over the world. However, this is not the case and there are some fundamental differences that have led to confusion, dangerous situations, and even fatal accidents.

VALVE OUTLET CONNECTIONS

Most divers are aware that cylinder valves have either an INT (aka Yoke or A-Clamp) or a DIN outlet connection to their first stage. Unfortunately, there are different DIN outlet connections depending on the cylinder pressure and gas used, and this needs some explanation.

We commonly refer to DIN Air when we talk about the DIN valves on an air cylinder. However, there are two different configurations, namely the 232 bar connection (generally referred to as a 200 bar connection), and a 300 bar connection. DIN is actually an old term and was referred to as DIN 477 #13 for up to 300 bar, and then #56 for 300 bar and above. Today the correct specification is ISO 12209, but we still call these DIN connections. Both of these DIN fittings have a G5/8 inch internal thread. However, the 200 bar version has a thread with five turns while the 300 bar version uses a thread with 7 turns and is thus slightly longer. A 300 bar first stage will fit on both 200 and 300 bar valves, but a 200 bar first stage will not seal in a 300 bar cylinder valve. This is for safety, to prevent inadvertently overpressurising a 200 bar first stage regulator.

In Europe, you also have the larger diameter M26 valve for cylinders containing a breathable nitrox gas with an oxygen content greater than 22%. This valve, introduced in European standard EN 144-3, is intended to prevent filling of cylinders with the wrong gas as well as the use of air-only regulators with a cylinder containing a higher concentration oxygen mix, as in both cases this could lead to a fire hazard. This means that if you dive with nitrox, both your cylinder valve and your first stage regulator should have the M26 connection. The problem however is that the M26 valves are rare outside the European Union. In most other countries, normal DIN (or INT) valves are used, which means that you would need an adapter to have your M26 regulator inlet fit onto a standard DIN cylinder valve. This of course is exactly what one wanted to avoid with the EU directive. The M26 valve is also available in 200 and 300 bar configurations.

The INT (Yoke or A-clamp) valve is only used on 200/232 bar cylinders. Most 200 bar DIN valves can be converted into an INT valve, using a DIN to Yoke insert.

VALVE INLET THREADS

The cylinder to valve connection refers to cylinder neck thread. This is where we have the biggest safety concern.

Most commonly used threads are the British Imperial BSP (British Standard Pipe) G3/4-14 and the metric M25x2 thread. These threads are very similar, which unfortunately makes it possible to insert the M25x2 valve into a G3/4 cylinder neck. When this happens, the first turns will feel loose, and about halfway in one will experience some resistance. With a bit of extra force the valve can however be screwed further down into the cylinder neck. This will damage the thread and the connection becomes unstable. While filling the cylinder, the force exerted at the connection will become so high that the valve will be

blown off the cylinder. When this happens, the sudden release of pressure will create an enormous shock wave and can do extensive damage. Additionally, the valve will become like a projectile and the cylinder will fly around resulting also in possible damage to the area and persons in the vicinity. If the valve is not blown off during filling, it will just be a matter of time before it will happen: in the car, at home, in the pool, at the dive site… This has led more than once to fatalities and serious, permanent injury.

You can also find other threads, such as M18x1.5, used on cylinders where the neck is not large enough to fit, for example, an M25x2 thread. Here the thread is so different that you will immediately notice the fitting is not correct.

As a general safety tip, only certified and competent persons should fit valves to cylinders and only after checking the threads, making sure they match. Both the valve and the cylinder should also have the type of thread stamped on the valve/cylinder, but this is not always the case or might no longer be visible.

In the US the 3/4" National Pipe Straight Mechanical (NPSM) connection is used. Similar but not equivalent to the BSP 3/4" valve, this valve poses the same safety concern as described in this article.

To add to the confusion, many people think M25 and M26 both refer to the valve outlet connection and do not realise that there are different inlet connections on the market. As written above, making this mistake can lead to severe consequences. However, they can easily be avoided with proper caution.

The following are some of the incidents on the subject reported in the media:

- Diver injury during air cylinder recharging – IMCA (imca-int.com)
- HSE – Mismatching valve threads
- Dive instructor dies after tank explosion (divernet.com)
- Zwaargewonde door ontploffing van duikfles in Brugge – DuikeninBeeld
- Zij kan het nog navertellen – DuikeninBeeld
- Duikinstructeur komt om in zwembad – DuikeninBeeld
- Kraan schiet van fles – Arbeidsinspectie waarschuwt – DuikeninBeeld
- Het gebeurt nog steeds – gevaarlijke combi van fles en kraan – DuikeninBeeld
- Esplode bombola da sub: morto un cinquantaquattrenne | Sicilia Oggi Notizie
- Dive Instructor Killed In Diving Cylinder Explosion – DIVERS24.COM
- Une Polonaise se tue en plongée (lefigaro.fr)
- Tauchlehrer nach Explosion im Schwimmbad von Amstelveen gestorben, 16.10. – Forenbeitrag auf Taucher.Net

ABOUT THE AUTHOR

Guy Thomas is an expert Diving and First Aid Instructor Trainer and works full-time as Director of Safety Programs at DAN Europe, where he is responsible for the development and implementation of the DAN Europe Safety Initiatives. He also is a member of the Special Rescue Team of the Italian Red Cross and operates as a Helicopter Rescue Swimmer/Diver Medic, onboard a SAR helicopter of the Italian State Police.

HRV AND DECOMPRESSION INDUCED PHYSIOLOGICAL STRESS

BY **REILLY FOGARTY**

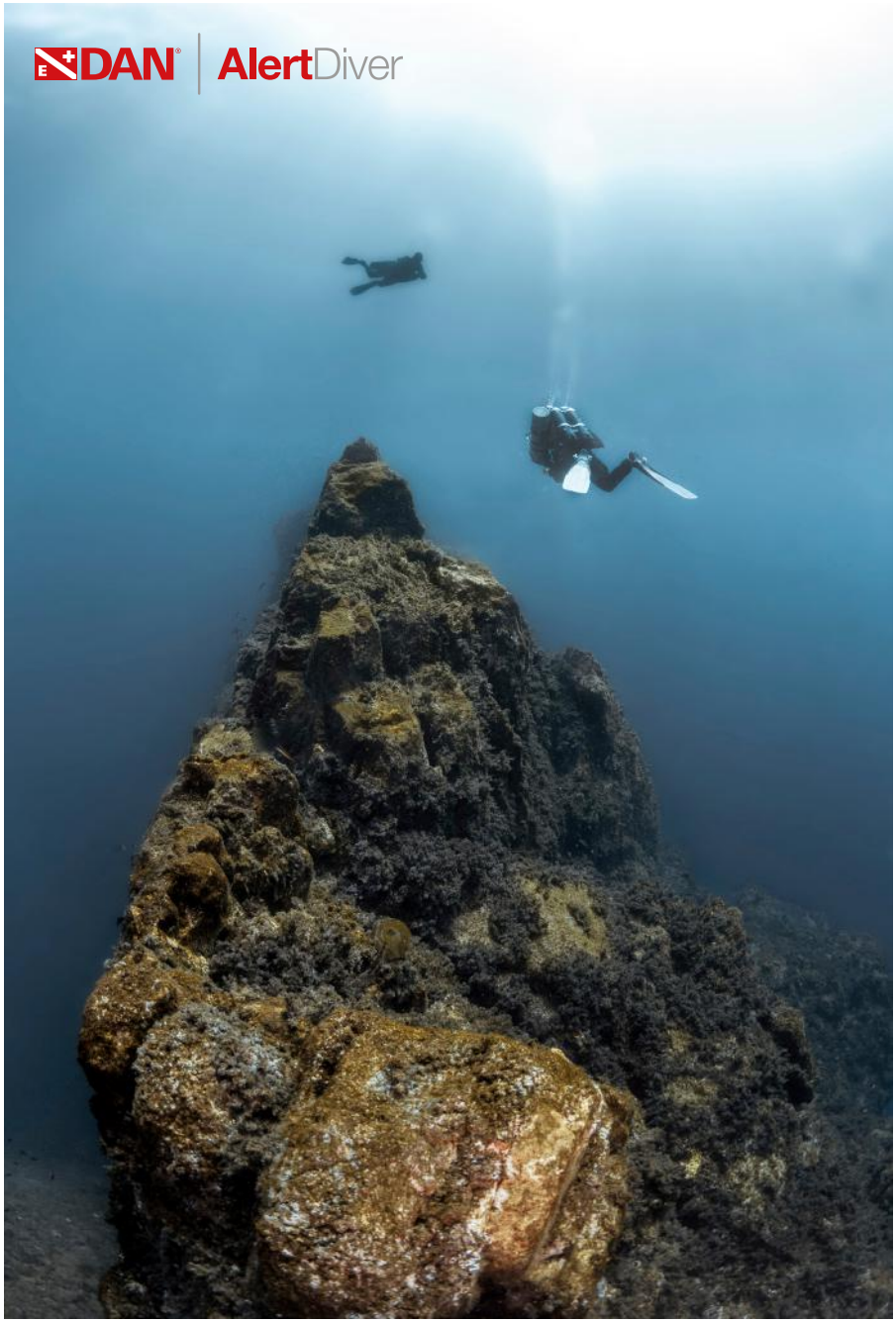
We present here a contributor's analysis on a recent and vastly debated topic, shedding light on a study in which DAN Europe researchers are also involved. The article explores the intricate link between Heart Rate Variability (HRV) and decompression stress.

There's nothing divers love more than finding a way to shave five minutes off their decompression, whether the justification is a particularly tasty surface snack waiting on the surface or some serious research data.

Thanks to recent work by a team of Brazilian and Italian researchers, and a quickly expanding understanding of decompression illness, you may soon be able to change the way you plan your decompression dives in a serious way. Working to develop a tool to better quantify decompression stress in divers, the team managed to correlate a metric historically used in cardiovascular medicine with known markers of decompression stress. Using this metric, the approach has been to look at decompression illness not as a disease caused by a few rogue bubbles, but as a multifaceted illness triggered by the factors we're familiar with and driven by the physiological responses to those triggers.

It's not that decompression illness isn't about bubbles anymore, but that it's not just about bubbles. In the past decade a host of new research has illustrated a model for decompression sickness that relies on a constantly growing number of physiological responses and increasingly complex biochemical mechanisms. The catalyst for this shift in understanding has primarily been the involvement of endothelial dysfunction research in decompression sickness. Signalling and response processes from endothelial cells have been linked to numerous disease processes and interest in these processes and the contributions of inflammatory processes to known diseases have exploded. Endothelial dysfunction is complex and our understanding of it is still evolving. But what's important to understand is that modern research has shown that even diseases that we thought were well understood may not be the product of a single offensive agent but a combination of a trigger and the body's own responses – in some cases the disease may be entirely caused by the body's own response to that trigger.

Unfortunately, this means that we can no longer think of decompression illness as a simple disease caused by bubbles in the bloodstream.



In reality it's been shown that venous gas emboli (actual bubbles in the blood) are a poor indicator of DCS, and hugely variable between divers. Instead endothelial dysfunction has been correlated with hyperbaric exposure, and with it researchers have had to take a deep dive into inflammatory processes and what lies between the actual dives we do, and the decompression sickness that may follow.

THE ROLE OF HEART RATE VARIABILITY

Enter heart rate variability (HRV) – used as a potential shorthand for a measure of specific inflammatory responses, it's been correlated with a range of conditions from diabetes to cardiovascular disease, and shown to change with diving. That's where this most recent study enters the fray. It's been shown that microparticles in the blood have been correlated to inflammation, HRV has been shown to change with diving and correlated with inflammation, and microparticles have been shown to increase with exposure to inert hyperbaric gases, so it's possible that

	SDNN		LF		HF	
	Estimate	*p*-value	Estimate	*p*-value	Estimate	*p*-value
CD16 +	−22.89	0.09	−5.11	0.24	−0.94	0.25
MPO (%)	−2.68	0.91	1.08	0.89	−1.66	0.25
MPO (MFI)	0.44	0.01	0.07	0.23	0.01	0.28
Annexin +	−125.37	0.03	−25.45	0.16	−7.70	0.02
CD66b +	195.27	0.74	376.92	0.04	34.12	0.33
CD31 +	78.87	0.72	122.34	0.08	2.00	0.88
CD41 +	3.14	0.52	1.83	0.23	0.09	0.74

Post-modelling relationships between HRV indicators, MPO and MP – Association Between Heart Rate Variability and Decompression – Induced Physiological Stress.

NOTE: LF and HF are low- and high- frequency band filters used during ECG studies – both represent different facets of electrocardiographic HRV analysis. The differences are not critical to the overall understanding of this study but more information is available for those interested.

HRV could be used as a convenient tool to measure the inflammatory responses in divers and potentially estimate risk of decompression illness. If this sounds ambitious, that's because it is, but if the correlation between heart rate variability and decompression-induced physiological stress could be validated it would prove enormously powerful both as a tool for understanding how and why divers get injured, what the physiological responses to decompression stress are, and provide a method to estimate decompression risk in the field. We're not there yet but this is an exciting first step, and the kind of thing that bubble nerds dream about.

The foundational research is a bit complex but the crux of this study is the idea that HRV can be correlated with inflammatory markers associated with decompression illness, and directly used as a measure of decompression illness risk. Specifically, the Brazilian and Italian researchers looked at markers taken from blood samples and ECG results to begin to correlate HRV with these inflammatory markers. Twenty-eight volunteers were each put through two separate dive profiles at one of three facilities where subjects used either closed circuit rebreathers, hyperbaric chamber supplied breathing gas or open-circuit Scuba equipment. The dive profiles all had the same total decompression time and gas supersaturation, though they varied in decompression stop depths in order to include some variation. Intervals between dives and data collection intervals were the same.

Researchers consolidated the data between the two profiles so they could be analysed as a single data set. Pre- and post- dive ECG and blood samples were obtained with a 30 minute buffer before and after each dive, and a minimum of 48 hour interval was required between dives to prevent skewing of data due to lingering effects from prior exposure.

Significant accumulated results were analysed in a way best described by the authors themselves, then used to create a theoretical model to extrapolate the results taken from the relatively small sample group and model them on a dataset including approximately 1,000 dives. There are a number of interesting avenues to pursue among the post-analysis data points but the focus on the relationship between HRV and the inflammatory markers showed a statistically significant change that could show serious promise.

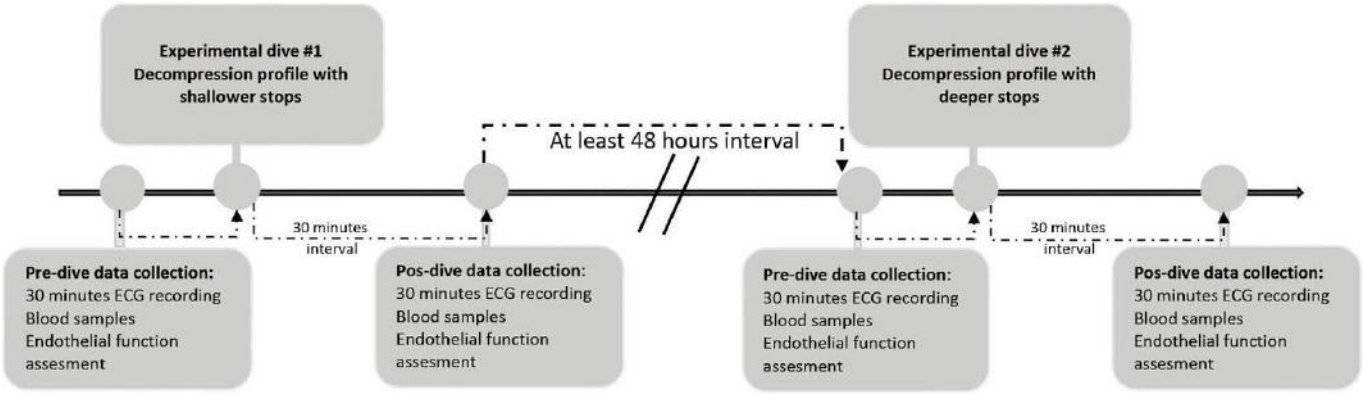
The data can be intimidating but the key trends can be seen in the relationship between HF and SDNN, Annexin and MP, and the positive association between LF and CD66b+ and CD31+ MPs. For those lost in the wash of acronyms (see definitions that follow), all of that essentially means that multiple data correlations seem to converge in a way that provides statistically valid evidence for the researchers' hypotheses.

IN CONCLUSION

If all of this strikes you as a bit dense for a casual afternoon read, that's because it is. The number of variables that affect inflammatory processes, decompression illness, and even day to day HRV data in the same subject are almost immeasurable, and accounting for as many as possible takes an enormous amount of foundational research and experimental planning. Understand the models enough to validate the research, then focus on the results – which in this case primarily seem to indicate a correlation between HRV after decompression, and the indicators of physiological inflammation and stress chosen by the investigators. This is by no means a reason to buy a heart rate monitor and cut your decompression as short as you can, but it is a promising result and an exciting potential for the future. It's worth noting that data from animal models didn't correspond to the human trials but didn't provide anything to directly contradict the conclusions from the human studies. In addition, results may vary in cases of subjects experiencing decompression sickness, but the possibilities for future research are enormous.

If this relationship between HRV and decompression stress can be validated further it is possible that decompression models could be qualitatively validated by divers in real time, and a real understanding of the unknowns between tissue supersaturation and decompression illness could finally be possible. If this model is validated, we could be looking at fundamental changes in the way decompression is planned, and decompression illness is understood and treated.

With the ability of popular consumer technology to identify cardiac arrhythmias through a wrist watch, it's not impossible that we could eventually see something like this HRV modelling incorporated in dive computers in the future. This isn't something that should change the way you dive



ABOVE: Procedure flow chart – Association Between Heart Rate Variability and Decompression – Induced Physiological Stress.

now, but this study and research into new models of multi-faceted understandings of decompression illness should absolutely excite you for the future.

DEFINITIONS

HF: High Frequency band of heart rate
LF: Low frequency band of heart rate
SDNN: Standard deviation of the (internet) IBI intervals measured in ms

Annexin: Annexin is a common name for a group of cellular proteins mostly found in animal, plant and fungi.

MP: Microparticles
MPO: Myeloperoxidase-positive microparticles
CD66b+: CD66b is an activation marker for human granulocytes; however, its biological functions are largely unknown in eosinophils.
CD31+: Is known as platelet endothelial cell adhesion molecule

WORKS CITED:

1. Brubakk, A. O., Duplancic, D., Valic, Z., Palada, I., Obad, A., Bakovic, D., et al. (2005). A single air dive reduces arterial endothelial function in man. J. Physiol. 566, 901–906. doi: 10.1113/jphysiol.089862
2. Papadopoulou, V., Germonpré, P., Cosgrove, D., Eckersley, R. J., Dayton, P. A., Obeid, G., et al. (2018). Variability in circulating gas emboli after a same scuba diving exposure. Eur. J. Appl. Physiol. 118, 1255–1264. doi: 10.1007/s00421-018-3854-7
3. Doolette, D. J. (2016). Venous gas emboli detected by two-dimensional echocardiography are an imperfect surrogate endpoint for decompression sickness. Diving Hyperb. Med. 46, 4–10.
4. Cognasse, F., Hamzeh-Cognasse, H., Laradi, S., Chou, M.-L., Seghatchian, J., Burnouf, T., et al. (2015). The role of microparticles in inflammation and transfusion: a concise review. Transfus. Apher. Sci. 53, 159–167. doi: 10.1016/j.transci.2015.10.013
5. Noh, Y., Posada-Quintero, H. F., Bai, Y., White, J., Florian, J. P., Brink, P. R., et al. (2018). Effect of shallow and deep SCUBA dives on heart rate variability. Front. Physiol. 9:110. doi: 10.3389/fphys.00110
6. Appel, M. L., Berger, R. D., Saul, J. P., Smith, J. M., and Cohen, R. J. (1989). Beat to beat variability in cardiovascular variables: noise or music? J. Am. Coll. Cardiol. 14, 1139–1148. doi: 10.1016/0735-1097(89)90408-7
7. von Känel, R., Nelesen, R. A., Mills, P. J., Ziegler, M. G., and Dimsdale, J. E. (2008). Relationship between heart rate variability, interleukin-6, and soluble tissue factor in healthy subjects. Bone 23, 1–7. doi: 10.1038/jid.2014.371
8. Schirato SR, El-Dash I, El-Dash V, Bizzarro B, Marroni A, Pieri M, Cialoni D and Chaui-Berlinck JG (2020) Association Between Heart Rate Variability and Decompression-Induced Physiological Stress. Front. Physiol. 11:743. doi: 10.3389/fphys.2020.00743

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Reilly Fogarty is a New England based rebreather instructor and USCG licensed captain. His professional background includes surgical and wilderness emergency medicine, Hyperbaric research and large-scale diving risk mitigation and first aid program design and management. He has previously worked on human trials in extreme exposure physiology for the Duke Centre for Hyperbaric Medicine and Environmental Physiology and as the Risk Mitigation Team Lead for Divers Alert Network.

UPCOMING EVENTS

CLEANUP ARABIA EVENT

DIVE CLEAN-UP | D-MARIN MARINA MARSA AL ARAB

Saturday 11th January 2025 | 9am | EDA Members & Partners Only

For the first dive clean-up of 2025, we are joining forces with our partner D-Marin for members to register for a dive clean-up at Marina Marsa Al Arab.

Nestled at the tip of the peninsula in the heart of Dubai's largest private beach, Marsa Al Arab is an ultra-luxury destination featuring a world-class marina that accommodates yachts up to 61 metres in length, all boasting spectacular views of the renowned Burj Al Arab Jumeirah.

Lunch will be provided to the participants courtesy of D-Marin. Spaces are limited.

A PRESENTATION BY EMIRATES NATURE – WWF

USING CUTTING-EDGE TECHNOLOGY TO SUPPORT MARINE MEGAFAUNA CONSERVATION EFFORTS

Thursday 6th February 2025 | 6:30pm | Deep Dive Dubai

Emirates Nature – WWF has been a prominent and active partner in environmental conservation in the region for over two decades. They are part of the global WWF network which has a 60+ year legacy and is supported by more than five million people worldwide. They are rooted in a country renowned for achieving the impossible.

Register to this one-off social event with Q&A and learn what cutting edge technology Emirates Nature – WWF use to support their marine megafauna conversation efforts.

DIVE MENA EXPO

CO-LOCATED AT THE DUBAI INTERNATIONAL BOAT SHOW

19-23 February 2025 | 3-8pm | Dubai Harbour

Join the 31st edition of the Dubai International Boat Show, the regions premier yacht and marine lifestyle show.

Discover a world of underwater wonders. Dive into the latest diving gear, innovative techniques and expert insights. Connect with other diving enthusiasts, experience new destinations, and experience the adventure and thrill of the open water.

EDA Members and Certified Divers get free entry by showing their membership and/or certification!

AN EDA MOVIE SCREENING

FIGHTING FOR FLORIDA

Thursday 6th March 2025 | 6:30pm | 97 mins | Deep Dive Dubai

Fighting for Florida is an eye-opening, environmental film that celebrates the natural beauty of Florida while promoting shark conservation and exposing the abuse of Florida's natural habitats and precious resources.

Growing up in a coastal gem like Sarasota, allowed Florida native and documentarian Wilson McCourtney to witness the ebb and flow of the tides on a molecular level. Issues that have plagued the gulf coast are completely unknown to people living in other seaside regions of the United States, proving to be hyper local issues that only affect the residents. Now that Florida has become the top growth state in America with approximately 1,000 people moving there per day, the numbers are unsustainable and with the population continuing to boom, so do the environmental issues. There is a great opportunity to create change and make Florida a shining model of conservation for the rest of the world. With such lush wetlands teaming with birds and reptiles, immense biodiversity, and an abundance of marine life, Florida attracts adventure seekers and animal enthusiasts from all corners of the globe. However, on the flip side of that coin, it is also plagued by corporate exploitation, widespread pollution, algal blooms, irresponsible fishermen, trophy hunters, shark finning, and wildlife abuse.

McCourtney illuminates the need for conservation and illustrates small changes that every Floridian family can make in order to keep Florida beautiful with thriving ecosystems that act as safe havens for the breathtaking wildlife.

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MISSION STATEMENT

Our mission is to conserve, protect and restore the UAE's marine resources by emphasising and promoting the underwater environment and environmental diving.

LEGISLATION

EDA is a non-profit NGO registered with the Ministry of Community Development as per the Ministerial Decree No. 149.

The Decree stipulates the following responsibilities for EDA:
- Ensure environmentally respectful diving practices in all EDA members.
- Support the diving industry within the UAE by coordinating the efforts of the diving community.
- Promote safety in the commercial and recreational diving fields through standardisation of practices.
- Preserve historical aspects of diving within the gulf region and enhance environmental education to diving and non-diving communities through EDA projects and events.

PUBLISHED BY

Emirates Diving Association
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