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# DIVERS FOR THE ENVIRONMENT

WWW.EMIRATESDIVING.COM | MAGAZINE | JUNE 2026 | VOLUME 22 | ISSUE 2

# DIGITAL ONLINE

## THE UNDERWATER PHOTOGRAPHY & FILM COMPETITION

## 2026 RESULTS ARE IN

• **BRUVS ON PREDATORS** • CETACEANS IN WARTIME • **THE HISTORY OF DIVING** • ACCESSIBLE OCEAN TOURISM • **LIVABOARD SAFETY** • DIVING DESTINATIONS • **UPCOMING EVENTS**

# FOR THE OCEAN

## OCEAN STORIES | CONSERVATION | DIVE TRAVEL


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EDA
جمعية الإمارات للغوص
Emirates Diving Association

**Tel:** +971 4 393 9390 | **Email:** projects@emiratesdiving.com | **Website:** www.emiratesdiving.com

EDA is a non-profit NGO registered with the Ministry of Community Development and CDA, and accredited by UNEP as an International Environmental Organisation.

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EDA
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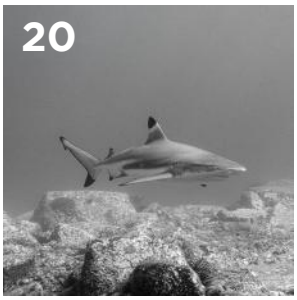
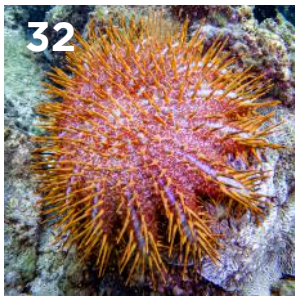





## REGULARS



## NEWS



## REEF CHECK



## YOUTHS CORNER



## FEATURES




**DIVERS FOR THE ENVIRONMENT**
Please note that EDA's magazine, 'Divers for the Environment' includes articles written by individuals whose opinions', whilst valid, may or may not represent that of EDA's. The magazine is a platform for individuals to voice their opinion on marine and diving related issues. You are welcome to suggest an article for the next issue to be released in September 2026. Send your articles, feedback or comments to: **magazine@emiratesdiving.com**


**COVER**
PHOTO BY TANER ATILGAN
The Digital Online 2026 Competition Results Are In

## UNDERWATER PHOTOGRAPHY

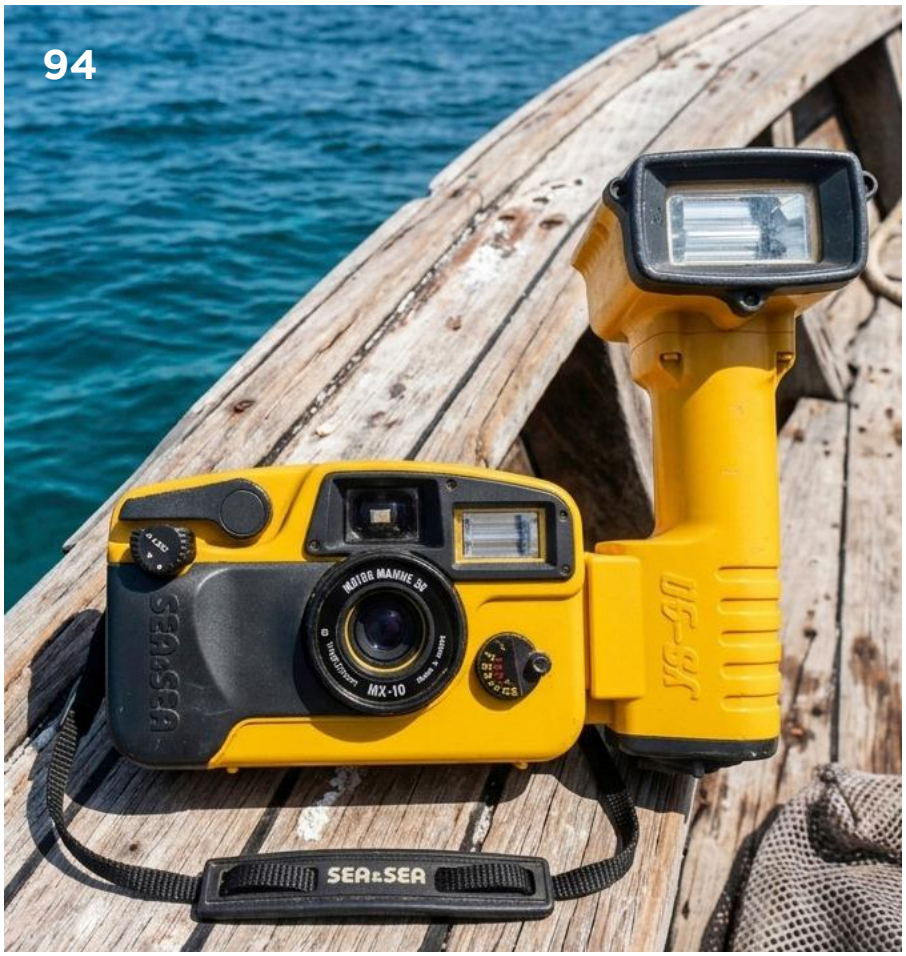


## DIVING DESTINATIONS



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

JON LAPEYRA MARTIN
Dr Jon Lapeyra Martin is a marine scientist and tec-diver who blends ocean exploration with cutting-edge research. As an Assistant Professor in the UAE, he combines eDNA, ROV surveys, AI image analysis, and technical diving to study plankton, coral reefs, and sea turtles. Passionate about immersive fieldwork, he champions hands-on marine science through freediving, scuba, and visual storytelling underwater.
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JESPER KJØLLER
Professionally involved in the diving industry since the early nineties, Jesper has logged over 6,000 dives across more than 35 countries — as a dive journalist, underwater photographer, technical diver, and instructor trainer. He spent many years running a successful Scandinavian diving magazine, with his articles and photography appearing in books, magazines, and websites worldwide. Today he serves as Marketing Manager for Deep Dive Dubai, a role he has held for over a decade, bringing a lifetime of firsthand underwater experience to everything he does.
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PATRICK VAN HOESERLANDE
Diving opens up a whole new world. Being a writer-diver and co-editor of the Flemish divers magazine, Hippocampus, Patrick personally explores our underwater world and shares his experiences through his articles. You'll find a collection of them on **www.webdiver.be**.

SAMER HALWANY
Born in Lebanon, Samer grew up with a great passion for nature. After photography studies at the New York Film Academy, his lens became the perfect medium for him to document the interaction of the natural world. Underwater photography was a perfect fit for Samer since he's passionate about both photography and the ocean, being a scuba diver himself. As a CMAS visual committee member, he uses his images to present wonders of the sea to the world.
**www.samerhalwany.com**
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# EDA CELEBRATES 31 YEARS!

IBRAHIM AL-ZU'BI
Co-Founder

The underwater world continues to inspire explorers, conservationists, and marine enthusiasts alike, revealing new wonders beneath the surface with every dive. Across oceans and coastlines, advancements in marine research, sustainable diving practices, underwater photography, and ocean conservation are shaping a deeper understanding of our blue planet. In this issue of 'Divers for the Environment', we celebrate the beauty, mystery, and innovation thriving beneath the waves.

Our June 2026 edition brings together a vibrant collection of stories and features that capture the spirit of the marine world. Among the highlights is our Digital Online Underwater Photography & Film Competition, showcasing breathtaking images of coral reefs, marine life, shipwrecks, and underwater adventures from talented photographers around the globe. The competition not only highlighted artistic creativity, but also reminded us of the fragile ecosystems and extraordinary biodiversity hidden beneath the sea.

This issue also dives into emerging developments in marine conservation, scuba technology, underwater exploration, and sustainable ocean tourism, alongside exclusive interviews with divers, marine biologists, and ocean advocates. From encounters with majestic manta rays and sea turtles to innovations in reef restoration and deep-sea discovery, the stories featured in these pages reflect humanity's growing connection to the ocean and commitment to protecting it for future generations.

The EDA magazine remains committed to creating a platform that informs, connects, and inspires readers who share a passion for the underwater world. As marine exploration evolves, so too does the importance of sharing knowledge, celebrating discoveries, and encouraging responsible stewardship of our oceans.

We thank our contributors, partners, photographers, and readers for their continued support and enthusiasm. We hope this edition offers inspiration, insight, and a renewed appreciation for the incredible life that exists beneath the surface.

Happy reading, and safe diving.

Ibrahim Al-Zu'bi

Ibrahim Al-Zu'bi

EDA members supported John Henrik Stahl (Sharjah Marine Science Research Centre, College of Marine Science and Aquatic Biology, & University of Khorfakkan) and Paolo Galli (University of Milan-Bicocca, Italy, & Marine Research and Higher Education Center, Maldives) in gathering data and samples during the crown-of-thorns sea star outbreak back in May 2024. Check out the article adapted from the latest scientific report for the results of the data gathered from the project on pages 32-39.

# AN EDA FIELD TRIP

## TO THE SHARJAH MARINE SCIENCE RESEARCH CENTRE (SMSRC)

PHOTOGRAPHY BY **ALLY LANDES**

We want to thank Henrik Stahl and Jon Martin Lapeyra from the Sharjah Marine Science Research Centre (SMSRC) – University of Khorfakkan who hosted 20 EDA members in their brand new facility on the 3rd of May, presenting all the projects and research their team have going on in the 4.6km$^2$ of the Al Qalqali Marine Protected Area (MPA).

**Henrik's presentation walked us through:**

- The SMSRC's priorities to safeguard human well-being and the marine ecosystems through Marine Biology, Ecology and Conservation, which constitutes animal observations, species ID, lab and field experiments, and population modelling.
- The Marine Genomics, Molecular and Microbial which consists of DNA/RNA sequencing, bioinformatics, microbial ecology, eDNA, and population genetics.
- The Marine Chemistry and Biogeochemistry which is the chemical measurement, toxic chemicals, nutrients, CO2/pH, and water quality.

**Jon's presentation explained:**

- The link between habitat, biodiversity and individuals through Habitat Ecology, where they map the physical biological structure of the MPA's rocky reefs, soft coral beds, sandy habitat, seagrass meadows, and hard coral areas, with the use of an ROV (Remotely Operated Vehicle).
- The Community Ecology where they quantify fish, sharks, rays, predators, and mobile species across habitats to include the species richness, fish assemblages, sharks and rays, groupers and predators, with the use of BRUVS (Baited Autonomous Underwater Camera Systems).
- The Population Ecology with Sea Turtle Photo-ID to track individuals through time to understand the residency, re-sighting, and habitat use.

A new project is being introduced this summer which will identify the critical habitats for threatened sharks and rays in the Gulf of Oman with the collaboration of divers, fishers and all ocean lovers to map the most recent shark and ray sightings. Underwater photographers will be able to share their sightings in order to facilitate the project.

If you've got anything to share, let us know and we'll put you in touch.

After the presentations, we were given a tour of the centre and all its facilities before heading to the dive centre to kit up for a snorkelling session of the SMSRC wave-breaker to see the resident green turtles. One lucky member got to see a blacktip reef shark before it darted out of sight.

Thank you for the lunch SMSRC, and for this very insightful experience. Everyone loved it!


**BECOME AN EDA MEMBER**

If you would like to join EDA and get involved in our upcoming events and activities, please Subscribe to our Newsletter to receive all our news and updates straight to your inbox:
**www.emiratesdiving.com**

Membership is just AED100/year and you are able to register to all our activities that interest you:
**www.emiratesdiving.com/membership**

Check out all the membership benefits/ discounts available to you here:
**www.emiratesdiving.com/membership-benefits**

# A CLEAN-UP MISSION

## 3FILS CALLS ON THE DVDT FOR THE SECOND TIME

PHOTOGRAPHY BY **ALLY LANDES**

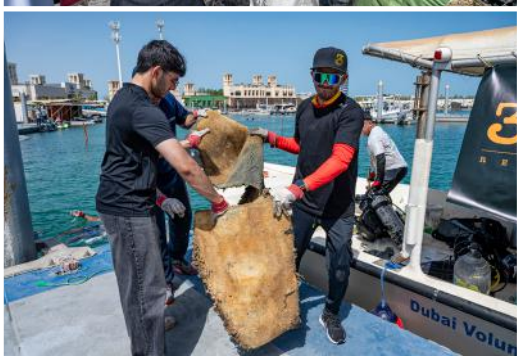

The Dubai Voluntary Diving Team (DVDT) organised a second underwater clean-up with Emirates NBD (ENBD) in collaboration with 3Fils and the Dubai Ports, Customs and Free Zone Corporation (PCFC) at Jumeirah Fishing Harbour 1 on the 23rd of May. At 9am, 13 DVDT divers with 6 surface volunteers, and 13 ENBD divers with 5 surface volunteers (the majority of both teams are also EDA members) cleared the designated section of the harbour in their one-hour dive. 3Fils' team also actively volunteered throughout the event and helped count and pack up all the rubbish.

Divers Down, a strong supporter of local underwater clean-ups, were there to provide the dive equipment logistics. EDA brought the Ocean Conservancy's International Coastal Cleanup (ICC) forms to collect all the data needed. In the end, a total of 190kg of marine debris was recorded and removed from the underwater environment.

Imdaad LLC arrived on site to safely remove all the items at the end of the event. Amongst everything that had been listed and counted, the most stand out items were 35 e-cigarettes/vapes, 5 pairs of sunglasses, 2 mobile phones, a pump, and a kids scooter.

Thank you to 3Fils who catered a wholesome breakfast, and to ENBD who had lunch packs delivered for everyone at the end. EDA supplied the mesh bags, gloves and sacks, the shade, scale and shower rack. DVDT provided their dive boat with winch, lift bags, kayaks, and the underwater scooter.

It was a very successful event pulled together with everyone involved. Team work at its best!




| DIVE CLEAN-UP \| DUBAI | |
|---|---|
| Jumeirah 1<br>30 Divers \| 16 Surface Support Volunteers | |
| **MOST LIKELY TO FIND ITEMS** | **TOTAL** |
| Grocery Bags (plastic) | 26 |
| Beverage Bottles (glass) | 49 |
| Beverage Bottles (plastic) | 63 |
| Beverage Cans | 57 |
| Bottle Caps (metal) | 15 |
| Bottle Caps (plastic) | 7 |
| Cups, Plates (foam) | 2 |
| Cups, Plates (paper) | 2 |
| Cups, Plates (plastic) | 127 |
| Food Containers (plastic) | 13 |
| Food Wrappers(Candy, Chips, etc) | 23 |
| Lids (plastic) | 13 |
| Straws/Stirrers (plastic) | 30 |
| Utensils (plastic) | 15 |
| **FISHING & BOATING** | |
| Line, Nets, Traps, Rope, etc | 61 |
| Foam Dock Pieces | 2 |
| **PACKAGING MATERIAL** | |
| Other Plastic Bottles (oil, bleach, etc) | 2 |
| **ILLEGAL DUMPING** | |
| Construction Materials | 44 |
| Tyres | 1 |
| **OTHER ITEMS/DEBRIS** | |
| Clothing | 20 |
| E-cigarettes | 35 |
| Electronic Waste (phones, batteries) | 11 |
| Tobacco Products (lighters, wrap) | 1 |
| Other Plastic Waste | 45 |
| Other Waste (metal, paper, etc) | 39 |
| **OTHER ITEMS NOT LISTED** | |
| Carpet | 1 |
| Boat Cover | 1 |
| Anchor | 1 |
| Kids Scooter | 1 |
| Boat Windscreen | 1 |
| **GRAND TOTAL OF ITEMS** | **698** |
| **TOTAL BAGS COLLECTED** | **15** |
| **TOTAL WEIGHT (KG)** | **190** |

# AL-FAJR INTERNATIONAL MARINE SPORTS CLUB AND THE EMIRATES DIVING ASSOCIATION SIGN A MEMORANDUM OF UNDERSTANDING TO ENHANCE STRATEGIC COOPERATION


Al-Fajr International Marine Sports Club and the Emirates Diving Association (EDA) announced the signing of a Memorandum of Understanding to launch a strategic partnership aimed at enhancing cooperation and coordination.

This announcement was made during a press conference on the 4th of May, where the launch of one of the most prominent cooperation initiatives in the field of marine sports in the country was revealed.

The agreement was signed during a press conference held on this occasion. His Excellency Juma bin Thalith, Chairman of the Emirates Diving Association, affirmed that the association operates in the United Arab Emirates and works to regulate the diving sector according to best practices and is registered and recognised in environmental practices. This includes supporting and developing diving activities by coordinating the efforts of the diving community and enhancing safety standards in rural diving. He also highlighted the association's role in this sector, the quality of professional practices, and the licensing of diving training centres, thus ensuring the safety of divers.

His Excellency Ahmed Ibrahim Al Baloursh, the Executive Director of Al Fujairah International Marine Sports Club, explained that the club strives to promote and develop marine sports in the Emirate of Al Fujairah, creating a safe and healthy environment for all segments of society and encouraging individuals to participate in marine activities, especially rural diving. He emphasised the importance of establishing clear regulatory mechanisms to ensure the safety of divers, noting that diving is witnessing widespread growth.

Cooperation with EDA, as the competent authority, represents a fundamental step towards achieving these goals.

Mr Mohamed Faraj Jaber, a member of the Association's Board of Directors and the EDA Inspector General, stated that the Association's role constitutes a vital aspect of the diving centres' operations in the diving sector. He emphasised that safety and security are paramount, adhering to the standards of safety and security.

This is a fundamental principle, as is compliance with approved laws and regulations, ensuring the readiness and safety of equipment used, in addition to the Association's accreditation of instructors to legally practice training.

This partnership aims to unify efforts between the two parties to promote safe diving practices, develop frameworks for marine environmental protection, coral reef cultivation, regulatory frameworks, and support environmental initiatives, including those within the country, and enable clean-up campaigns. It also seeks to ensure the sustainability of the diving sector and that the institutions operating within it conduct their activities according to the highest standards of safety and quality.

Signed on behalf of the association by His Excellency Juma bin Thalith and on behalf of the club by Ahmed Ibrahim, Executive Director.

# EAD AND TAQA JOIN FORCES UNDER THE ABU DHABI MANGROVE INITIATIVE

## TO ADVANCE INNOVATIVE BIODIVERSITY RESEARCH & CONSERVATION IN THE UAE

The Environment Agency – Abu Dhabi (EAD) has named TAQA, the Abu Dhabi National Energy Company, as Official Partner of the Abu Dhabi Mangrove Initiative (ADMI) partnership programme. Under the two-year agreement, TAQA will serve as the Lead and Exclusive Sponsor for two flagship environmental initiatives.

The first initiative will see TAQA support the launch and implementation of the Mangrove Biodiversity Automated Monitoring programme – an innovative research initiative launched under ADMI. Supporting the development of the Mangrove Nature Tracking Assistant, MANTA – the first-of-its kind in the Arabian Gulf, leveraging artificial intelligence, technology, advanced ecological monitoring and community-driven science to study biodiversity in natural and restored mangrove ecosystems.

It aims to study and analyse the biodiversity within the natural ecosystems of mangrove habitats, with a particular focus on key species such as fish and crabs that serve as important indicators of ecosystem health and stability and help measure the success of habitat restoration efforts. Providing accurate and real-time data that enhance the effectiveness of conservation efforts and environmental planning, MANTA supports informed decision-making to ensure the sustainability of Abu Dhabi's coastal ecosystems.

TAQA also sponsored the 2025 Marine Turtle Festival, organised by the Environment Agency – Abu Dhabi. As one of the UAE's key environmental events, it aims to highlight the importance of marine species conservation by releasing rescued and rehabilitated sea turtles back into their natural habitats. The festival also showcases the efforts of the Agency and its partners in protecting marine biodiversity.

Maitha Mohamed Al Hameli, Director of Marine Biodiversity Division at EAD said, "This partnership between the Environment Agency – Abu Dhabi and TAQA marks a significant step forward in how we protect our mangrove ecosystems. Through the Abu Dhabi Mangrove Initiative, we are pioneering the use of advanced technologies and ecological research to monitor key species and assess habitat health in real time. Collaborations like this not only strengthen our scientific capabilities, but also create opportunities for global knowledge exchange, citizen science and long-term conservation impact. Together, we are shaping a new era of environmental innovation rooted in evidence and collaboration."

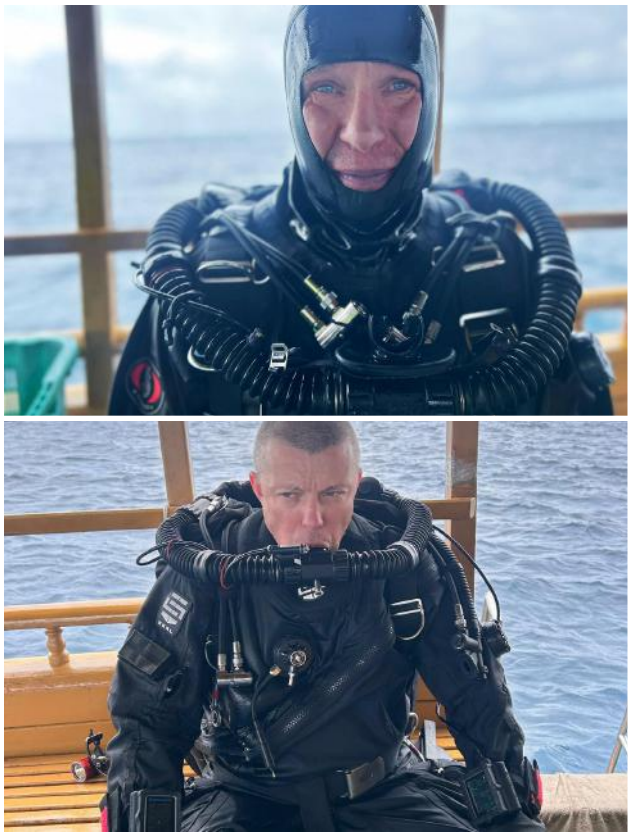
Noel Aoun, Group Chief Strategy Officer at TAQA said, "TAQA is proud to support the Abu Dhabi Mangrove Initiative as part of our ongoing commitment to sustainability and environmental stewardship. This collaboration highlights the vital role of science, technology, and community engagement in protecting and understanding our natural ecosystems. We look forward to advancing this important work alongside the Environment Agency – Abu Dhabi (EAD) and its partners."

The Abu Dhabi Mangrove Initiative was launched in 2022 during His Royal Highness Prince William, the Prince of Wales and Duke of Cambridge's, landmark visit to the UAE where he met His Highness Sheikh Khaled bin Mohamed bin Zayed Al Nahyan, Crown Prince of Abu Dhabi and Chairman of Abu Dhabi Executive Office, at Jubail Mangrove Park.

The initiative aims to position Abu Dhabi as a global hub for mangrove conservation, research, and innovation. It brings together all projects and efforts focused on the protection of coastal ecosystems and nature-based solutions in the emirate. It also serves as a platform for regional and international collaboration, while encouraging the establishment of public-private partnerships. Since its launch, the Abu Dhabi Mangrove Initiative has brought together 8 international and 15 local partners.

# DAN-LED MISSION

## COMPLETES VICTIM RECOVERY IN THE MALDIVES AS MISSION CONTINUES



The Finnish rescue Team L-R: Patrik Grönqvist, Sami Paakkarinen and Jenni Westerlund.

Malé, Maldives, 20 May 2026 – DAN Europe confirms that the international search & recovery mission coordinated in support of Maldivian and Italian authorities has successfully completed the recovery of all victims involved in the Dhekunu Kandu diving tragedy.

Today's operation marked the completion of the main recovery phase following another tech dive in the cave, carried out by the Finnish recovery team, in close collaboration with the Maldives National Defence Force, local police forces, and in constant contact with the Italian authorities in Malé.

Favourable sea conditions during the morning allowed the team to execute the planned dive efficiently and without complications. As in previous days, all three divers entered the cave system with clearly defined roles, including victim recovery, operational safety support, and underwater documentation of both the intervention and the dive site itself.

The operation lasted approximately three hours and was conducted using advanced technical diving systems including closed-circuit rebreathers (CCR), DPVs, and redundant configurations designed for deep overhead environments.

The primary objective assigned to two of the team members was the careful transport of the remaining victims through narrow passages inside the cave system while preserving both rescuer safety and the integrity of the victims. Challenges included potential entanglement hazards and visibility reduction caused by disturbed sediment, all of which were successfully managed by the team throughout the dive. A third diver provided operational safety support and documented the intervention in depth, in line with established cave diving team procedures and best practices commonly adopted in recovery operations.

"First of all, we would like to express our deepest condolences to the families of the divers who lost their lives. The reason we responded to the request for help was our desire to assist in this heartbreaking situation. After three days of operations, all of the missing divers have now been recovered and are on their way home.

A huge thank you to DAN Europe, the Italian Embassy, the Maldivian Defence Forces, the police, and all the other volunteers: without you, this would not have been possible.

We would also like to give a big thank you to everyone for the many encouraging messages we have received". – The Finnish rescue team

Although the main recovery phase has now been completed, the mission itself is not yet over. Tomorrow, the team is expected to conduct what will likely be the final operational dive of the mission. In accordance with best practices, the divers will return to the site to remove guide lines and operational equipment placed inside the cave system during the recovery efforts, restoring the environment and removing traces of human intervention wherever possible. Given the ongoing investigation, this phase also carries additional importance.

The team will also attempt to further document and map sections of the cave system in order to share additional information with the Maldivian authorities.

DAN Europe wishes to reiterate that throughout the entire mission, both operational choices and communications have been guided by two priorities: the safety of the recovery team and the utmost respect for the victims and their families.

Our thoughts remain with the families and loved ones affected by this tragedy.

# DIVING TALKS 2026

## RETURNS TO LISBON WITH ITS MOST AMBITIOUS EDITION YET!



Lisbon, Portugal – 23-25 October 2026 – Diving Talks, the international diving show often described as the "TED Talks of diving," returns to Lisbon for its fifth edition, taking place once again at Cordoaria Nacional. Building on its unique concept and growing global recognition, the 2026 edition is set to deliver its most comprehensive and impactful programme to date.

Over the past editions, Diving Talks has established itself as more than a traditional trade show. It is a dynamic platform where exploration, science, art, and industry converge, bringing together some of the most influential voices in the underwater world. In 2026, the event continues to expand into a broader ecosystem that goes far beyond the three days in Lisbon.

This year's edition will once again be complemented by exclusive experiences, including a pre-show FAM trip to the Azores, specifically to the island of Graciosa, and a post-show FAM trip to the Lisbon region. In addition, the Diving Talks Naval Base side event – hosted by the Portuguese Navy divers – will offer a unique, invitation-only experience.

The programme will feature a diverse and engaging lineup, including the second edition of Ocean Tales, two full days of talks covering the most relevant topics in diving, the highly anticipated Lightning Talks, discussion panels bringing together leading experts, and the renowned Diving Talks Official Dinner, known for fostering meaningful connections and behind-the-scenes conversations within the industry.

A key highlight of the event will be the inauguration of the Diving Talks | Underwater Photography Collection exhibition, the largest underwater photography collection in the world, further reinforcing the event's commitment to showcasing the artistic dimension of the underwater realm. The exhibition will also host school visits, contributing to education and outreach by inspiring younger generations.

Following an audience-driven challenge from the previous edition, the Future Diver Initiative (FDI) was created to address critical questions about the future of diving. The initiative is currently working across several areas, including defining the "why" of diving, identifying industry quick wins, conducting surveys among young divers, and organising focus groups. The first conclusions of this work will be presented during Diving Talks 2026.

Panel discussions have already been confirmed around key themes such as exploration, conservation, innovation, training, diving physiology, and the next generation of divers, ensuring a forward-looking and thought-provoking programme.

Diving Talks also continues to open its stage to the community through its Lightning Talks format, inviting anyone with a meaningful underwater project, story, or idea to apply and share their work with a global audience.

Brands from across the diving industry are already confirming their support for the 2026 edition, reinforcing Diving Talks as a key platform for visibility, connection, and thought leadership within the sector.

Early Bird tickets are now available for a limited time.

As the speaker lineup continues to be announced, Diving Talks invites the global diving community to stay tuned for upcoming updates and to join what promises to be an unmissable gathering in Lisbon.

### ABOUT DIVING TALKS

Diving Talks is an international diving show held annually in Lisbon, Portugal, since 2021. Combining a conference and a trade show, it brings together explorers, scientists, industry leaders, photographers, and divers from around the world to share ideas, experiences, and innovations shaping the future of diving.

**www.divingtalks.com**

# THE 2025 REEF CHECK MALAYSIA SURVEY RESULTS AND WHAT THEY MEAN FOR OUR CORAL REEFS

BY **JULIAN HYDE, CHIEF EXECUTIVE OFFICER OF REEF CHECK MALAYSIA**


I'm not sure I know how to do this anymore, to make it effective and impactful. It feels like every year I talk about the results of the annual surveys… but nothing seems to change.

But here we go…

## OVERVIEW OF THE 2025 REEF CHECK SURVEY RESULTS

Our 2025 survey report has been published. The data from surveys at over 300 sites around Malaysia last year show a continuing decline in reef health.

Live coral cover (the national average) reduced from about 45% in 2024 to 40% in 2025. That's a loss of 5 percentage points, or 10% of coral cover in one year.

Back in 2022, live coral cover was about 50%. Looked at one way, you could say we lost 10 percentage points, or 20% of coral reefs since 2022.

20%

Imagine if someone told you that one fifth of Malaysia's forests were cut down in a few years. Or, to use a different measure, that's about 47,250 football fields gone. Would that mean anything to you, would it have any effect on you? Or is it just too big a number for people to comprehend?

Nonetheless, that's what the data are telling us. We lost 47,250 football fields worth of corals last year.

## WHY ARE WE LOSING OUR CORAL REEFS?

Bleaching is a big part of it.

2024 is now acknowledged by marine scientists as the 4th global bleaching event. In Malaysia, over 90% of corals bleached during the peak of the bleaching season in April to June 2024. The 2025 data reveal just how much coral survived… and how much died.

Add to that, growing impacts from tourism. In September last year, Johor closed six islands to tourism. Redang is seeing an increase in day trips from the mainland. Seri Buat similar. And Semporna has seen a huge increase in tourism numbers over the last few years.

And pollution from inadequate sewage treatment. And over-fishing. And… so on. Many impacts… though most of these problems can be fixed relatively easily.

## WHY IS THE LOSS OF CORAL REEFS A PROBLEM?

I'm sure most people are already aware… but let's do this one more time.

We lost 47,250 football fields worth of corals last year.

Coral reefs support food security for coastal communities, as they are part of the nursery system (along with mangroves and seagrass) that produces the fish targeted by those small-scale fishers.

According to one source there are over 140,000 small-scale fishers in Malaysia. That's basically 140,000 households that rely on coastal fisheries for food and incomes. Which in turn rely on those ecosystems being healthy.

Coral reefs are also an important tourism product. According to some sources, tourism accounts for 15% of GDP and 25% of employment in Malaysia. No coral reefs… diminished tourism?

Don't get me wrong. We are not anti-tourism; but we are pro-sustainable tourism.

## WHY SHOULD I CARE ABOUT CORAL REEFS?

This is not a nature conservation issue. This is a food security and jobs issue.

This affects every one of us.

- FAO statistics show that Malaysians are one of the largest per capita consumers of seafood – around 57kg per person, per year. Imagine that gone because we didn't look after the ecosystems?
- Say coral reef decline continues. Some sources suggest that might have an impact on tourism, leading to a reduction in numbers. So, all those people working in tourism on the islands, and the East Coast… they are going to migrate to where there are other jobs, putting pressure on housing, medical care, schools… you do the math.

## FOCUS ON THE RESILIENCE OF OUR REEFS

There's not much we can do about bleaching… actually, quite honestly there's nothing we can do about bleaching at a local level.

That's why I keep banging on about resilience – basically eliminating or reducing all the local impacts so reefs are as healthy as possible to withstand the big external impact – whether you call it ocean warming, climate change, global warming… the outcome is the same: diminished marine ecosystems.

We have solid data showing a decline in coral reefs. We know the implications of this for food security and jobs. We need action now to address these challenges. Resilience provides a science-based approach.

## WHAT CAN YOU DO TO SUPPORT OUR REEFS?

We get asked this a lot. Usually, we talk about minimising your own consumption, being a good citizen… recycling, that sort of thing.

I don't think that's enough anymore.

We need more people to support efforts to lobby the government, MPs, ADUNs, EXCOs – basically the decision makers who can actually change things.

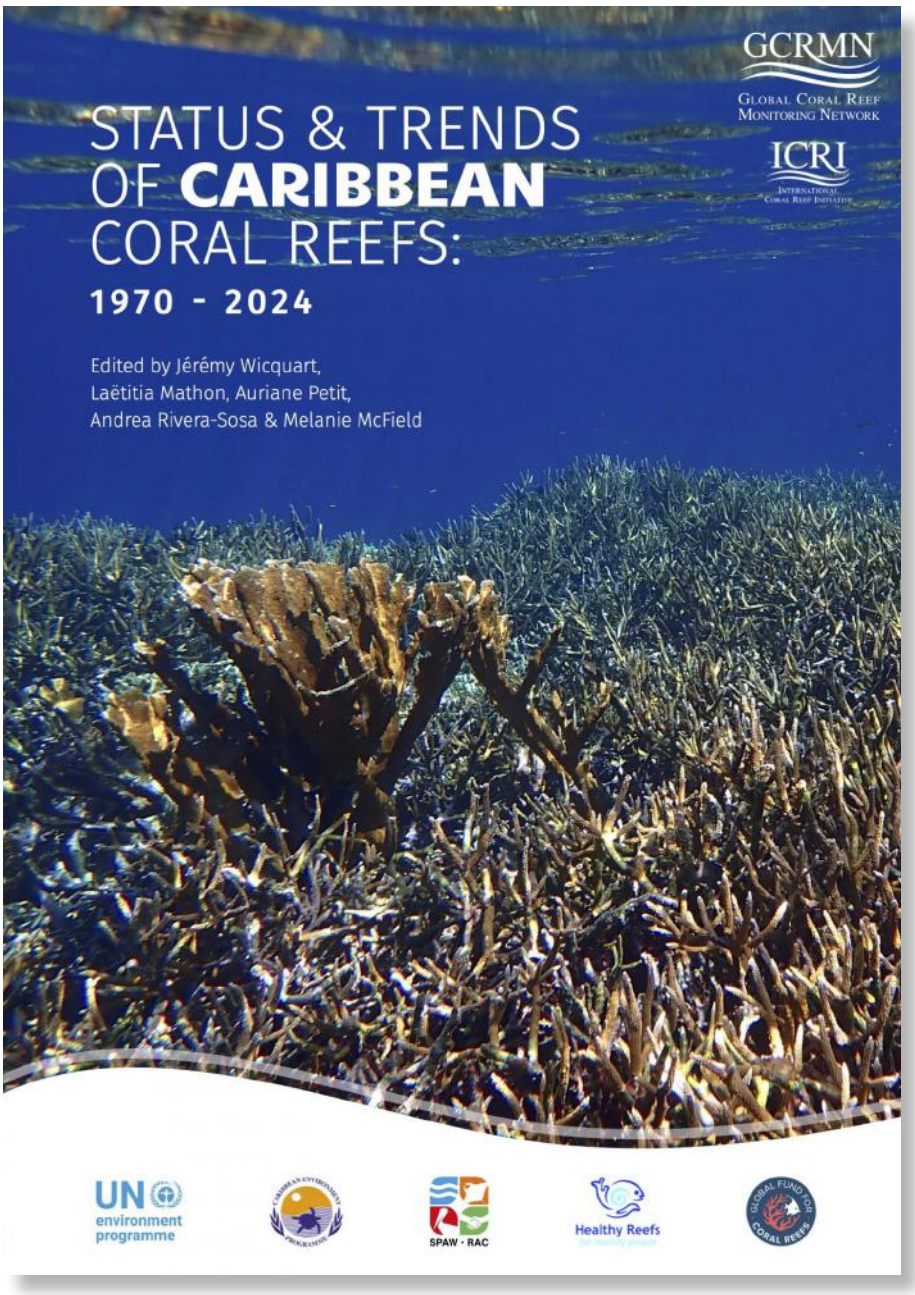
We met some recently and I was pleasantly surprised by the positive reaction we received. We need their support to make the changes we need if we are to conserve these critical ecosystems.

# REEF CHECK CORAL DATA
## FEATURED IN TWO RECENT PUBLICATIONS

Earlier this month, Nature Communications published the article, "Severe and widespread coral reef damage during the 2014-2017 Global Coral Bleaching Event". The paper relied on Reef Check's coral reef data and warns that "the impacts of ocean warming on coral reefs are accelerating, with the near certainty that ongoing warming will cause large-scale, possibly irreversible, degradation of these essential ecosystems."

During 2014-2017, marine heatwaves caused the Third Global Coral Bleaching Event. The paper analyses data from 15,066 reef surveys globally during 2014-2017. Across all surveyed reefs, 80% experienced bleaching of more than 10% of corals on the reef and 35% experienced coral mortality. Based on these survey data, models predict that about 50% of the world's coral reefs suffered from bleaching and 15% had coral mortality during one or multiple years. This finding marks this as the most severe bleaching event, surpassing damage from any prior global coral bleaching event and suggests that impacts of ocean warming are accelerating.

Another alarming report was published by the Global Coral Reef Monitoring Network (GCRMN) in December. The "Status and Trends of Caribbean Coral Reefs: 1970-2024" report is the latest scientific assessment of the region's coral reef health, revealing both declines driven by climate change and local environmental pressures, but also detecting encouraging signs of recovery where effective management and protection measures are in place. The report shows that coral cover in the Caribbean has declined by 48% since 1980, while macroalgae cover has risen 85% in the same time. This report was compiled by more than 300 scientists across 44 countries and territories; it draws on over 23,000 surveys – including more than 2,700 Reef Check surveys – from nearly 14,000 sites collected between 1970 and 2024.

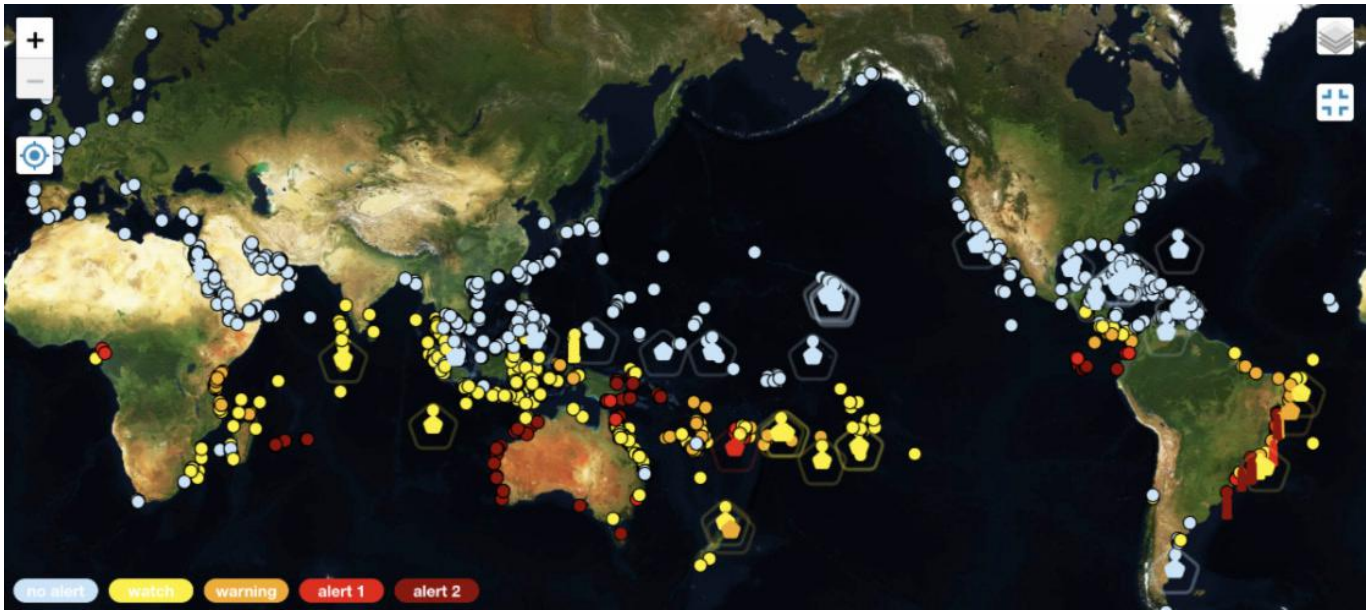



**These two major scientific assessments underscore both the accelerating crisis facing coral reefs and the critical importance of long-term, global monitoring efforts like Reef Check's surveys. Together, they demonstrate that Reef Check's global dataset is not only vital for documenting large-scale change, but also indispensable for informing management and policy worldwide. Importantly, the Caribbean assessment also identified areas where strong local protection and management have supported coral recovery – offering clear evidence that when action is taken, reefs can rebound and hope remains for their future.**

**READ THE NATURE COMMUNICATIONS ARTICLE HERE:**
https://www.nature.com/articles/s41467-025-67506-w

**READ THE GCRMN REPORT HERE:**
https://gcrmn.net/caribbean-2025/

# LATEST REEF CHECK CORAL REEF DATA AVAILABLE ON AQUALINK




The latest coral reef data from Reef Check has been uploaded to Aqualink! A year ago, Reef Check announced Aqualink as an official Global Reef Tracker partner for Reef Check's coral reef data. Aqualink, a groundbreaking nonprofit offers an open source tool for people on the front lines of ocean conservation and showcases Reef Check's worldwide coral reef database of over 17,700 surveys, alongside Aqualink's collection of data from sensors, models, satellite observations, community member surveys, images, and video to give an instant view of real-time reef conditions. Check it out!

**With just a few clicks, users can:**

- View Reef Check survey data going back to 1997
- Access ocean temperature data from satellites or smart buoys
- Track heat stress and bleaching events
- Compare reef images over time

Completely free, Reef Check and Aqualink are making high-tech reef monitoring accessible and collaborative – because ocean conservation should be a team effort.

### HOW DO I EXPLORE REEF CHECK DATA FROM THE MAP?

1. Click on a site and press "EXPLORE".
2. Scroll down to "Survey History" to find all the Reef Check survey data for the site.
3. Click on "VIEW DETAILS" to access the full table with all of the data.

**Go to the Map:** https://aqualink.org/map?siteOptions=reefCheckSites

# NEW ECOEXPEDITION AVAILABLE IN MADAGASCAR

BY **REEF CHECK ECODIVER TRAINER CHRISTIAN SOLTERER**

Mora Mora Conservation with the University of Marche will organise two sessions of 14-day field courses on coral reefs that will take you to the island of Sakatia in the northwest of Madagascar. These reefs are world renowned for having more than 400 coral species and fish species from all over the Indian Ocean. This expedition gives divers a superb opportunity to become EcoDiver certified. All guests will be provided with the materials needed. Lectures and presentations on reef survey techniques will be given.

Biologist Christian Solterer, who is leading the workshop, has been involved in Reef Check surveys in lemur country since 2003. He is also a NAUI Course Director CMAS*** Instructor.

**This workshop taught in English, French or German aims to:**

- Provide basic knowledge for the identification of fish, hard corals and invertebrates.
- Find at least 2 new sites to install permanent transects.
- Teach different survey methods underwater, including Reef Check and Coral Watch protocols.
- Contribute to the monitoring and conservation of coral reefs.

Participants will obtain the international tropical EcoDiver certification issued by the Reef Check Foundation as well as three marine ecology specialities issued by SSI.

For more information about this EcoExpedition, contact **biodiversity@moramora.ch** or visit **www.moramora.ch/reefchecksakatia**.

# EXPANDING THE COMMUNITY OF KELP FOREST MONITORS:

## THE INTEGRATION OF FISHING COMMUNITIES INTO REEF CHECK BAJA CALIFORNIA

BY **JESSICA PANTOJA, JULIO LORDA, RODRIGO BEAS, ARTURO HERNÁNDEZ-VELASCO, ALFONSO ROMERO CASTRO, ALESA FLORES**

Our family of monitor divers is growing. In March, two more fishing cooperatives were trained to monitor kelp forests. This was made possible by the collaboration between COBI (Comunidad y Biodiversidad, A.C.) and Reef Check Baja. Reef Check was invited by COBI to teach local fishers how to monitor kelp forests in Bahía Asunción and Bahía Tortugas, remote coastal communities in Baja California Sur. The fishing cooperatives, Emancipación Cooperative (Bahía Tortugas) and California de San Ignacio Cooperative (Bahía Asunción), are key stewards of their ecosystems, holding exclusive fishing rights in their territories. Established over 40 years ago, California de San Ignacio is one of the earliest examples of community-based fisheries management in the region. COBI and Reef Check joined for this opportunity to promote capacity building and foster monitoring initiatives by bringing these cooperatives together to enhance their collaborative efforts. Reef Check is proud to once again be partnering with COBI. Since 2007, Reef Check and COBI have worked on projects in Loreto, Isla Natividad, Bahia Magdalena, and El Rosario.

Throughout the training, we engaged with 30 participants. We had 15 divers (3 women and 12 men) and 15 snorkellers (2 women and 13 men). A significant number of these individuals belong to a younger generation of fishers from 14-25 years old. This group is starting to incorporate diving into their professional activities, thereby upholding and advancing a rich local tradition that has been passed down through their families.

Together, we trained in Reef Check methodologies, including species identification, size measurements, density estimation for surveys of fish, algae, and invertebrates, as well as habitat characterisation. On the final day, we also focused on monitoring key commercial species such as abalone, following COBI protocols. Additionally, participants received safety training focused on underwater monitoring, including the proper use of emergency oxygen for diving accidents.

Snorkellers actively participated in the theory lessons and supported fieldwork from the surface. Their curiosity, commitment, and motivation reflects an important step toward future diving certification and continued involvement in monitoring efforts.

This work was made possible through strong collaboration. COBI provided transportation and essential scuba equipment and materials, while the cooperatives contributed boats, tanks, compressors, and invaluable local knowledge. Reef Check Baja's participation brought significant support from its consortium with UABC (Autonomous University of Baja California) and ECOCIMATI, A.C. (Ecology, Sky, Sea & Land), enhancing the initiative.

This initiative represents a step toward strengthening community-based monitoring networks. By collaborating with fishers who have strong ties to their environment, often from multi-generational fishing families, we are fostering a long-term monitoring network that combines scientific research with local knowledge. This effort aims to enhance local skills and promote the future of Baja California's kelp forest ecosystems.

These training sessions in underwater monitoring techniques are more than just a tool for sharing knowledge with local partners, they empower them to actively generate data. By contributing to citizen science, they join an existing network of divers in the North Pacific region, where FEDECOOP (Regional Federation of Fishing Cooperative Societies of Baja California) cooperatives are now committed to understanding their fishery resources to make decisions based on data and science generated by the community itself. "Knowledge is invaluable, and we must learn to appreciate it. Today we are here, and tomorrow we will be able to take all this knowledge back to our community. We will be able to value, grow, and improve the ecosystems we have. Today, we took a very big step." – Alexis Bojorquez

We extend our heartfelt gratitude to our collaborators COBI, ECOCIMATI and MEXCAL (Managing Ecosystems Across the Californias), whose generous financial support for the Reef Check Baja programme was instrumental in making this work possible.

# 100 YEARS OF PROTECTING OUR PLANET

# HAPPY BIRTHDAY SIR DAVID ATTENBOROUGH

BY **ISAAC AL-ZU'BI – A CERTIFIED PADI JUNIOR OPEN WATER DIVER**


**Top Row Left-Right:** Butterfly Conservation President Sir David Attenborough with a south east Asian Great Mormon Butterfly on his nose, as he launched the Big Butterfly count at the London Zoo in Regent's Park, London. (Photo by John Stillwell/PA Images via Getty Images); and Isaac enjoying reading 'Life Stories' by David Attenborough.
**Bottom Row Left-Right:** Photos of Sir David Attenborough distributed by PBS via Wikimedia Commons.

This week, as we celebrate Sir David Attenborough turning 100 years old, I want to dedicate my May article to him and look back at his incredible life. I also want to thank him on behalf of young divers and budding environmentalists like me for inspiring generations of people to love, respect and protect our oceans, wildlife and natural world.

When David Attenborough was a child, like me, he loved exploring outside and learning about nature. He collected fossils, rocks and animal specimens and became fascinated by how wildlife lived and survived. Even at a young age, he cared deeply about the environment. He didn't just enjoy nature; he genuinely wanted to understand it. That curiosity eventually grew into a lifelong mission to teach the world about protecting wildlife and led him to become one of the most famous natural historians of all time – and my personal hero.

David Attenborough has spent decades showing people the incredible beauty of marine life. As a diver, I think the ocean is one of the most amazing places on Earth. When you are underwater, you realise how full of life it is and how everything in nature is connected. Coral reefs are like underwater cities for marine animals. Through his documentaries, we have seen giant whales, sea turtles, glowing jellyfish, colourful coral reefs and creatures from the deep ocean that look almost like aliens.

He also showed us the darker side of what humans are doing to the oceans, including plastic pollution, overfishing and coral reef destruction. Through his work, he made people realise that the oceans are not endless and that marine life needs protecting. He famously said, "If we save the seas, we save our world", and I think that explains why ocean conservation matters so much. Throughout his life, he has taught us that healthy oceans are essential for life on Earth and that without them, our planet faces serious danger. Sir David wants young people to understand this so we can help change the future.

For my generation, we must understand that we matter when it comes to the preservation of our planet. We must get outside, learn about the natural world and care enough to protect it, no matter how small our actions may seem. He told us, "If children don't grow up knowing about nature and appreciating it, they will not understand it. And if they don't

**Top Row Left-Right:** Isaac getting ready for a dive; and his Planet Earth wall.
**Bottom Row Left-Right:** Isaac attending a Turtle Release in Abu Dhabi with his brother, Idris; Finding gobies in the rock pools; Crabbing in the UK with his grandfather, Teddy; and finding fossil treasures.

understand it, they won't protect it. And if they don't protect it, who will?" His message to us is clear: if we learn about nature, care about it and speak up for it, we really can help protect the future of our planet.

There are 89 years and one week between me and David Attenborough, yet we both share the same curiosity, the same love for the ocean and the same hope that my generation and future generations will protect the amazing marine life living beneath the waves. As Sir David looks back at his childhood, I am living mine now. From summers with my grandfather, Teddy pointing out a gentle *Bombus terrestris*, the buff-tailed bumblebee visiting my grandmother's lavender garden in Wales, to finding 80 million year old fossils in the deserts of the United Arab Emirates with my brother, I too have been lucky enough in my short life to experience the beauty of our planet. I keep photographs from my travels with my father on my living room wall to remind me every day how extraordinary Earth really is.

I hope that when I am 100 years old, I will still see Helix Pomatia leaving silvery trails, deserts still revealing their fossil treasures and oceans still full of the same incredible marine life that existed during Sir David's childhood and that exist during mine now.

I think David Attenborough's greatest achievement is not simply making documentaries, but inspiring millions of children like me to love and protect the natural world. He believes young people can create real change because children today are learning more about climate change, conservation and animal protection than ever before. He taught us that our voices and opinions matter and that our actions count.

He has dedicated his entire life to helping the world appreciate animals, the environment, and most importantly for me – Our Blue Planet.

Thank you Sir David, and Happy Centenary.

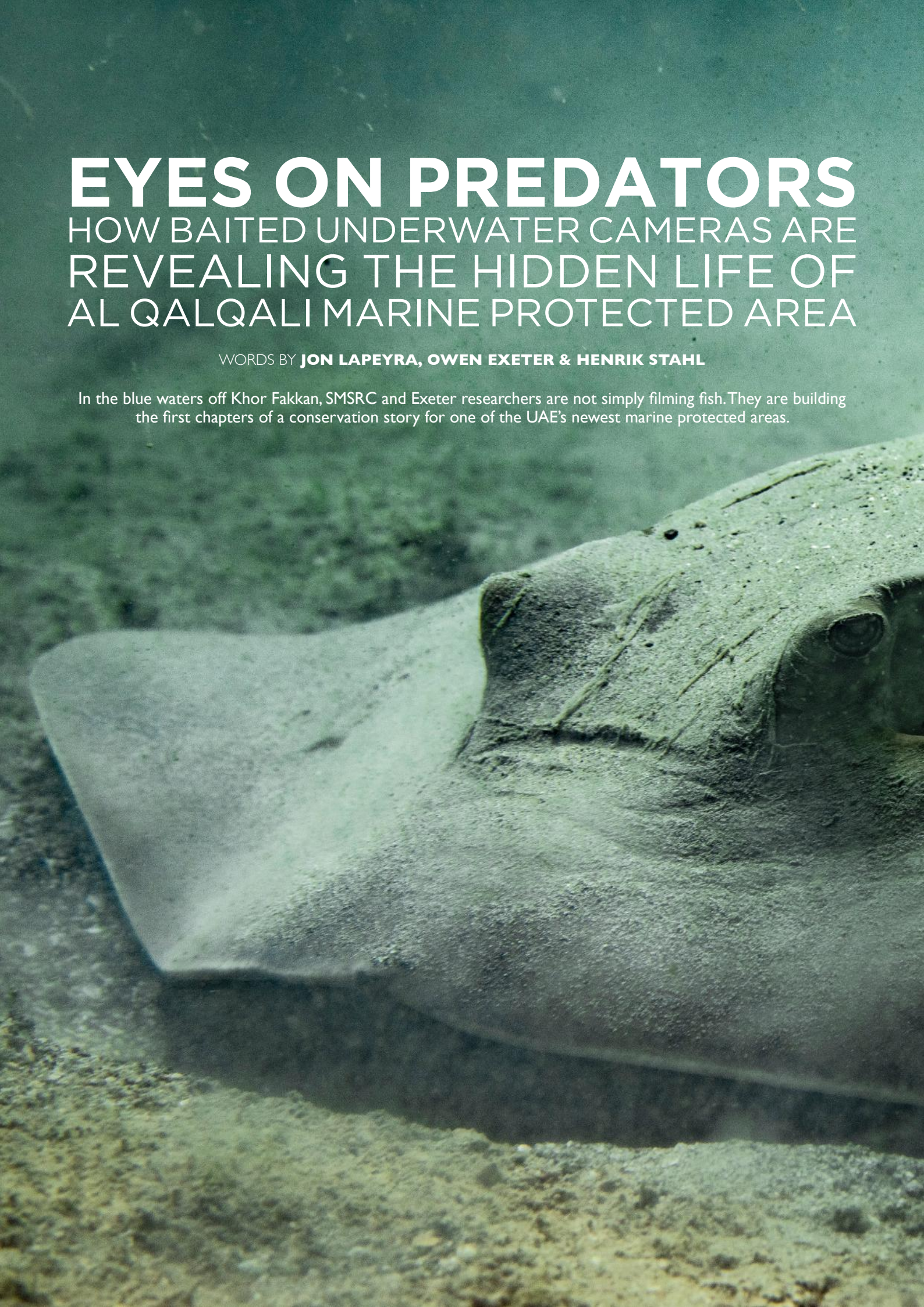
"After living for nearly 100 years on this planet, I now understand the most important place on earth is not on land, but at sea. For once you've truly seen the sea, you'll never look at earth in the same way again." – Sir David Attenborough

# EYES ON PREDATORS

## HOW BAITED UNDERWATER CAMERAS ARE REVEALING THE HIDDEN LIFE OF AL QALQALI MARINE PROTECTED AREA

WORDS BY **JON LAPEYRA, OWEN EXETER & HENRIK STAHL**

In the blue waters off Khor Fakkan, SMSRC and Exeter researchers are not simply filming fish. They are building the first chapters of a conservation story for one of the UAE's newest marine protected areas.



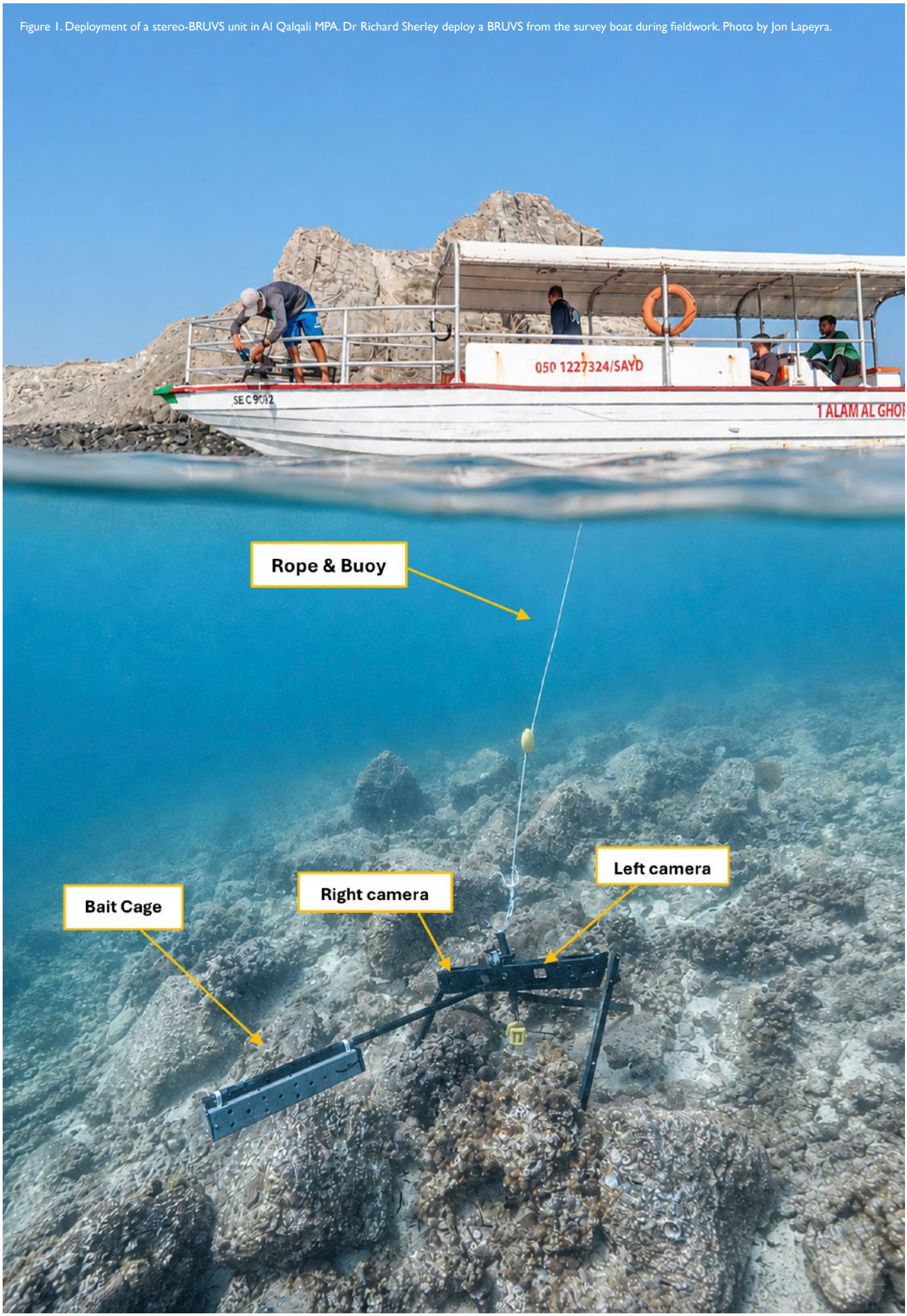



Figure 1. Deployment of a stereo-BRUVS unit in Al Qalqali MPA. Dr Richard Sherley deploy a BRUVS from the survey boat during fieldwork. Photo by Jon Lapeyra.

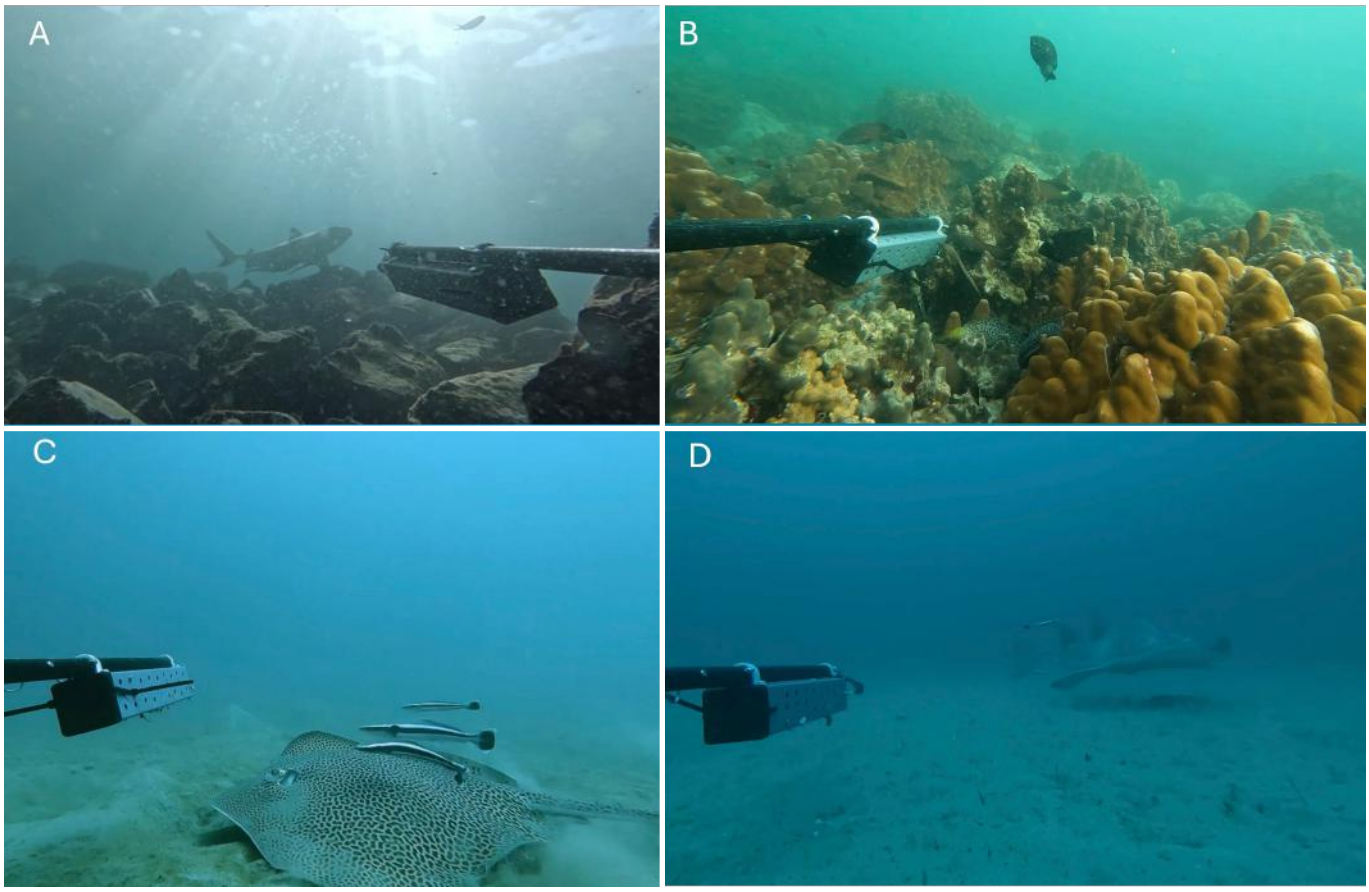



Figure 2. Representative species recorded using BRUVS in Al Qalqali MPA. (A) blacktip shark passing through a rocky reef habitat (*Carcharhinus melanopterus*); (B) reef-associated fishes over coral habitat, including a grouper (*Epinephelus sp.*), (C) leopard whipray (*Himantura sp.*) accompanied by remoras; and (D) a critically endangered bowmouth guitarfish (*Rhina ancylostoma*) swimming on a sandy habitat near the BRUVS unit. The observations highlight the value of BRUVS for detecting predators, rays, groupers and other mobile fishes as part of the biodiversity baseline for Al Qalqali MPA.

| | | | |
|---|---|---|---|
| 4.6 km² **MPA size** | 42 **BRUVS sites** | 129 species **October 2025 baseline** | 49 **Families recorded** |

At Al Qalqali Marine Protected Area (MPA), "BRUVS" are now becoming one of the core tools used by the Sharjah Marine Science Research Centre (SMSRC), University of Khor Fakkan, in close partnership with researchers from the University of Exeter. The aim is ambitious but essential: to build a biodiversity baseline for a newly protected coastline and help track the benefits of protection now and into the future.

Al Qalqali MPA was established in November 2025 and covers approximately 4.6km² of coastal waters off Khor Fakkan. Its protection rules are simple and powerful: no hunting, transporting, killing or harming marine organisms; no pollution of soil, water or air; and no action that disrupts the natural balance of the reserve. For the SMSRC marine scientists, this creates a precious starting point. Rather than documenting loss after it has occurred, we now have the opportunity to follow the evolution of an ecosystem from the earliest stages of formal protection into the future.

## WHAT ARE BRUVS?

Baited Remote Underwater Video Systems, or BRUVS, are underwater camera systems used to observe marine life without catching, handling or disturbing animals. The BRUVS unit is usually placed on the seafloor or suspended in the water column, with a camera facing a bait cage (see Figure 1). As the scent of the bait spreads through the water, fishes and other mobile species, especially predatory sharks and rays[1], are attracted into view, allowing researchers to record which species are present and how they behave.

BRUVS deployments are typically set to record for one hour. A frame is lowered gently onto the seabed (Figure 1), carrying a bait cage that releases a faint scent trail into the current. Nothing is chased, handled or extracted. The scientists obtain the video recordings back to the computers, and the analysis starts. Importantly, the BRUVS being deployed by SMSRC represent the latest in cutting-edge marine monitoring technology[2]. These systems allow researchers to measure individual sharks, rays and fish, and to track how protection benefits not only the number of animals present, but also their size, age structure and maturity, all key indicators of a healthy marine ecosystem. Since BRUVS, are indeed, an internationally standardised technique used for estimating biodiversity of mobile marine fauna.

At first, the video analysis can be deceptively quiet. The frame shows only water movement, reef structure, sand, and the slow drift of particles in the current. Then, suddenly, they arrive. Small fishes flicker across the screen. Groupers hold at the edge of visibility. Moray eels emerge to inspect the bait cage. Rays pass like shadows over the sand. If conditions are right, a shark (Figure 2A), or even the exceptionally rare and critically endangered bowmouth guitarfish (Figure 2D) may emerge briefly, circle the cameras once, and then disappear again into the depths. This is the power of BRUVS: they transform patience into data for marine scientist to be analysed. Across the first 40 sites surveyed in October last year alone, the team recorded and identified 129 species of marine organisms inhabiting the vibrant coral reef and sediment habitats in the Al Qalqali MPA. These included six shark and ray species, three species of grouper, and two species of marine turtle, highlighting the remarkable biodiversity occurring within the Al Qalqali MPA.

BRUVS also have a unique power to reveal the hidden world beneath the waves from colourful reef fish and turtles resting among the rocks to sharks patrolling the reef edge.

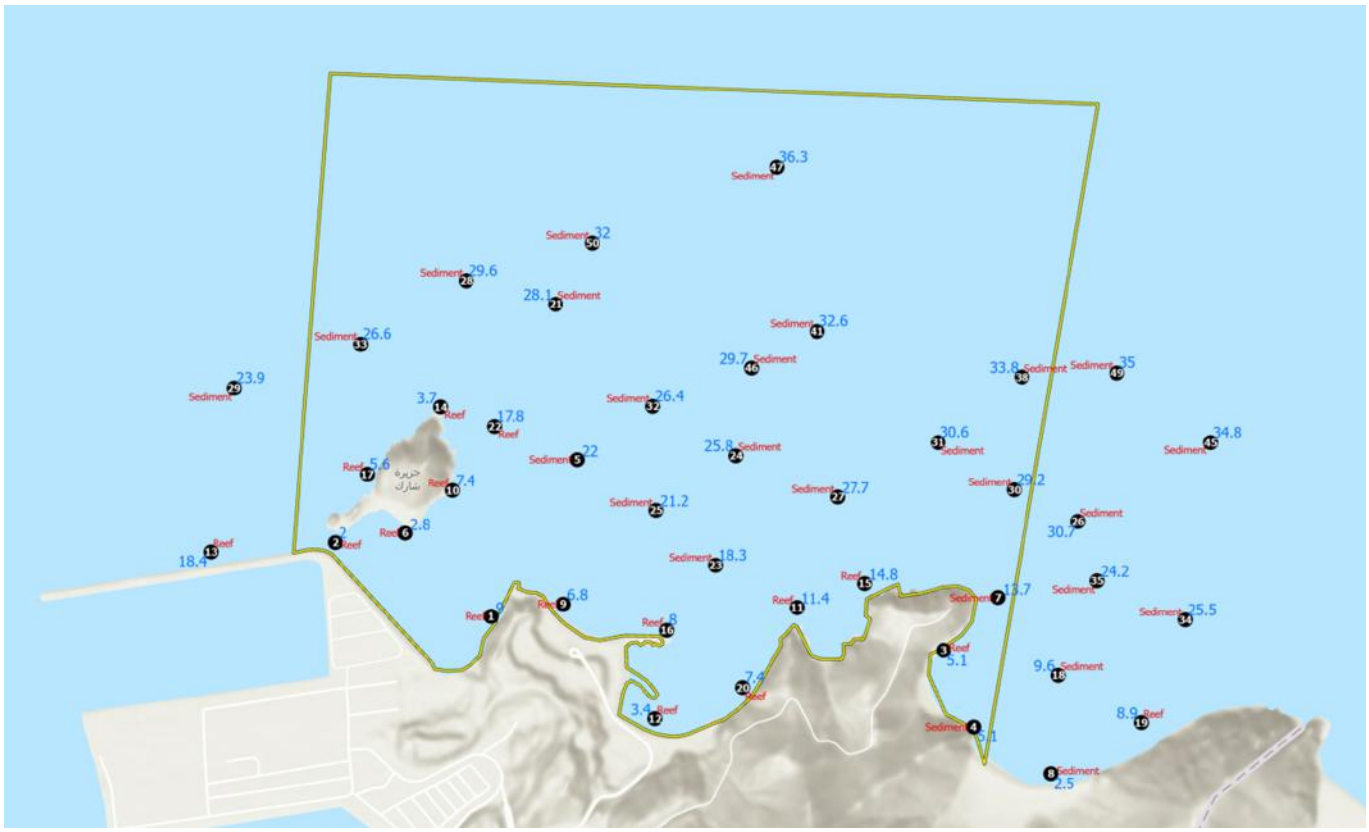



Figure 3. Spatial layout of the Al Qalqali MPA biodiversity survey design. Black numbered points indicate BRUVS deployment stations. White lines represent planned ROV transects used for benthic habitat mapping.

For divers, this sense of anticipation is familiar. Every dive begins with the same hope: that the reef will reveal something new and unexpected. BRUVS bring that same feeling into a scientific framework, the excitement of never knowing what you will discover at a new site. The difference is that every appearance becomes a record, every record becomes a dataset, and every dataset helps shape the future protection of Al Qalqali MPA.

The footage captured by these systems not only provides critical scientific data, but also brings people closer to these underwater ecosystems, inspiring a deeper connection and desire to protect our oceans.

## PART OF A BIGGER MONITORING SYSTEM

BRUVS are powerful because they are not working alone. At SMSRC, they are being integrated into a wider monitoring framework that includes habitat mapping using Remotely Operated Vehicles (ROV) and geolocated imagery. Surveys have already produced more than 7km of high-resolution seafloor videos, and artificial intelligence is helping classify the habitats that species are using. Together, these methods link the seafloor and the animals moving above it, building a holistic understanding of this important biodiversity site and how it is responding to protection.

This multi-method approach is where the science becomes especially strong. A BRUVS camera may show a ray crossing over a sandy seabed. An ROV transect can describe the surrounding habitat. Different geolocated layers can place these observations on a map (Figure 3). Repeated seasonal surveys can show whether the pattern persists. Over time, the Qalqali MPA becomes not just a boundary on a map; but a living and measurable marine ecosystem.

The partnership with the University of Exeter strengthens this work by connecting local field capacity with international expertise in marine ecology, threatened species research and conservation monitoring. It also reflects a wider truth: the Gulf of Oman is a global hotspot for coastal sharks and rays, yet many species remain poorly documented locally[3]. Local knowledge from divers, fishers and ocean users will be essential for filling those gaps.

**In a newly established MPA on the UAE's east coast, SMSRC and the University of Exeter's researchers are using BRUVS to turn hours of blue water into a baseline for conservation: which species are present, where they occur, how they use reefs, sands and seagrass, and how this young marine protected area changes through time.**

## FILMING THE FUTURE

Al Qalqali MPA is young as a protected area, but that is precisely why this work is so important. The cameras being lowered into Khor Fakkan waters today will help scientists, decision makers and communities understand what marine protection and conservation can achieve. The data will reveal how species assemblages change over time – identifying newly arriving species, the return of previously absent species, species that disappear, and those that have depended on these habitats all along.

In the blue waters off Khor Fakkan, SMSRC and Exeter researchers are not simply filming fish. They are building the first chapters of a conservation story for one of the UAE's newest marine protected areas. And sometimes, all it takes to begin that story is a camera, a bait cage, and the patience to let the reef come to you.

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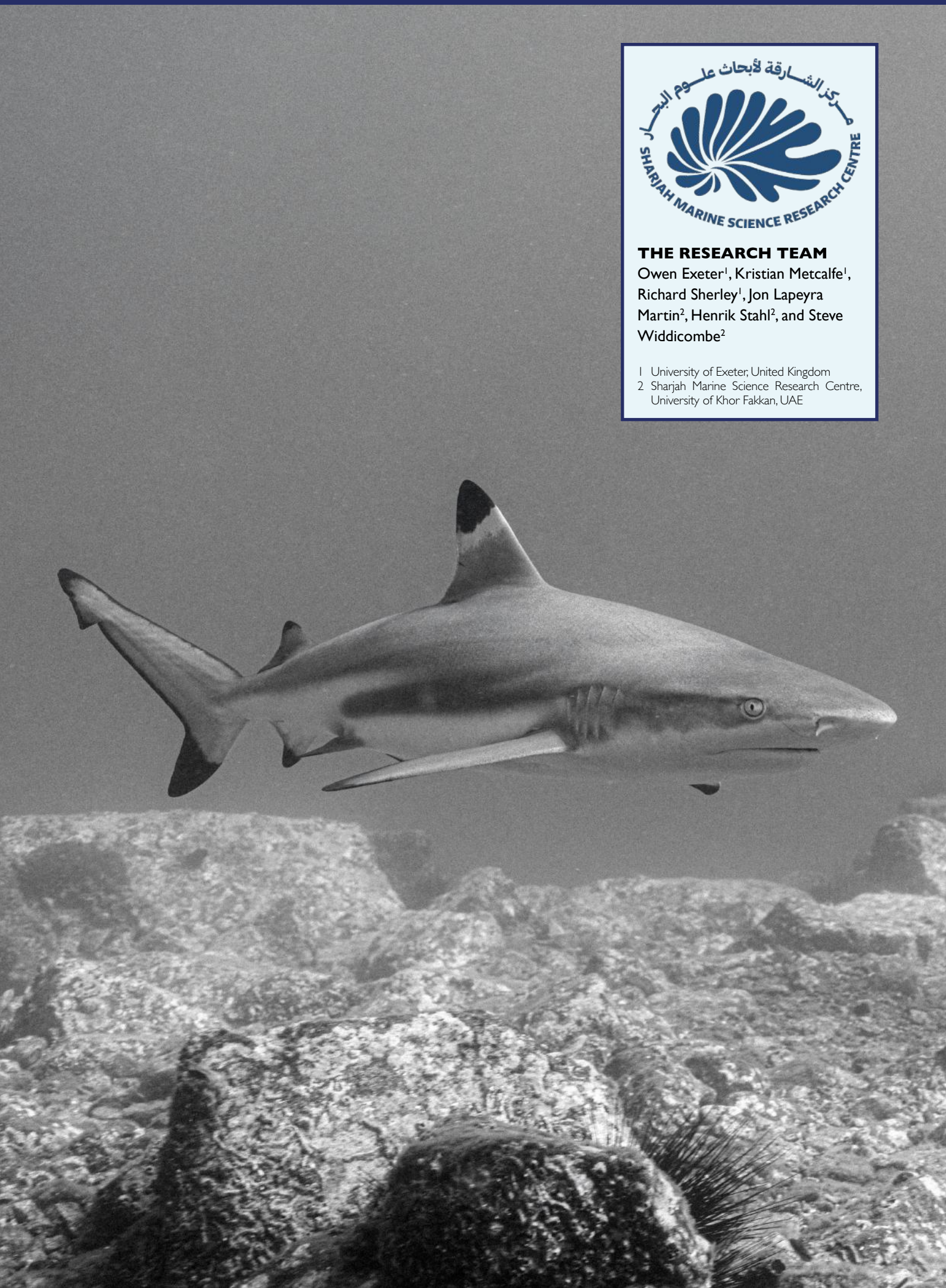
3. Notarbartolo di Sciara, Giuseppe, and Rima W. Jabado. "Sharks and rays of the Arabian Sea and adjacent waters." The Arabian Seas: Biodiversity, environmental challenges and conservation measures. Cham: Springer International Publishing, 2021. 443-477.



**THE RESEARCH TEAM**
Owen Exeter[1], Kristian Metcalfe[1], Richard Sherley[1], Jon Lapeyra Martin[2], Henrik Stahl[2], and Steve Widdicombe[2]

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# SILENT LOSSES
## BENEATH THE SURFACE:
## HOW WARTIME ACTIVITIES AFFECT CETACEANS

WORDS BY **SONJA LAVRENCIC** EDITED BY **ADA NATOLI** AND **BRYANA COPE**
ZAYED UNIVERSITY – UAE DOLPHIN PROJECT

The full extent of the damage inflicted on the Black Sea and the Arabian Gulf marine wildlife will only become clear after the wars have ended. For now, it is simply too dangerous for scientists to conduct research: unexploded ordnance continues to pose a danger and deployed naval mines at sea could take decades to locate and clear, precluding field research even after the end of the war.

A ship floats amongst a sea of spilled oil in the Gulf of Mexico after the BP Deepwater Horizon oil-spill disaster.
Flickr: Deepwater Horizon Oil Spill – Gulf of Mexico, Author Kris Krüg.

Whales and dolphins often die offshore and never reach the shore. This dolphin was documented by the UAE Dolphin Project in 2016. Unless such cases are identified and recorded, these deaths remain unrecorded and unaccounted for. Photo by the UAE Dolphin Project.

War is always a deeply traumatic event, and attention to, as well as accounting for, war-related damage is rightly focused primarily on humans. However, war also results in millions of silent, non-human victims who too often remain overlooked and unaccounted for. The recent conflict in the Gulf is no exception, and its marine victims, specifically among cetaceans (whales, dolphins and porpoises) will probably remain unknown, as the full extent of damage is often difficult to determine. Scientific surveys are nearly impossible during wartime, and many dead animals sink rather than wash ashore, limiting opportunities for examination postmortem. As a result, assessments typically occur only after the fact, relying on population studies and indirect evidence rather than clear cause-and-effect links.

One of the first scientific proofs of the stressful effects of war on whales comes from World War II, when research demonstrated higher levels of the stress hormone cortisol in whales directly linked to war exposure. Research analysing levels of cortisol (a hormone usually produced in higher quantities when under stress) in whale earplugs showed that, although whale harvesting was reduced at the onset of World War II, cortisol levels still remained slightly higher than expected (Tumble et al. 2018). Scientists attributed this otherwise unexplained increase to wartime. Increased vessel traffic, underwater explosions, and naval battles involving ships, planes, and submarines created an underwater cacophony. Since baleen whales migrate thousands of kilometres, they would easily have been exposed to high levels of noise, causing their stress levels to rise (Forbes 2019).

## WAR IMPACT ON ECOSYSTEMS

The impact of war on marine ecosystems can be divided into two types: direct and indirect. Direct impacts include the effects of weapons and ammunition explosions, such as shock waves and explosive noise, as well as the use of powerful sonar systems, naval mines, surface and underwater explosions.

Indirect impacts are caused by oil spills resulting from the flooding and damage of warships and other military equipment, water pollution by toxic components of ammunition (heavy metals, polychlorinated biphenyls, etc.), pathogens (used as bacteriological weapons or released due to damage to city sewage systems or agricultural complexes), and possible radioactive contamination (Kharchenko, 2023).

## THE NOISE

Cetaceans rely heavily on sound for navigation, communication, socialisation, hunting, and feeding, compensating for limited underwater visibility. Through whistles, clicks, and echolocation, they can identify the distance, size, shape, and texture of objects, while also maintaining complex social bonds through vocal communication, including individual "signature whistles." In noise-polluted waters, their ability to hunt and communicate can be severely compromised. This may lead to disorientation, separation from their pods, or even stranding events.

Numerous reports of mass cetacean strandings have been linked to military sonar activities (Parsons, E.C.M. 2017). International concern intensified after the highly publicised mass stranding of Cuvier's beaked whales (*Ziphius cavirostris*), Blainville's beaked whales (*Mesoplodon densirostris*), and northern minke whales (*Balaenoptera acutorostrata*) in the Bahamas in 2000. This was the first time the US Government determined that a stranding event resulted from the use of mid-frequency active sonar. Similar conclusions were drawn following the 2008 Falmouth Bay stranding in Cornwall, where at least 26 short-beaked common

dolphins died shortly after nearby naval exercises involving sonar (Jjepson et al., 2013).

Establishing direct causality remains difficult due to military secrecy and the challenges of conducting postmortem analyses. Damage to the inner ear can only be reliably detected within 24 hours after death, after which degradation of sensory hair cells obscures evidence. Sonar exposure may therefore contribute indirectly to mortality by impairing orientation and feeding rather than causing immediate fatal injury.

## UKRAINIAN WAR AND BLACK SEA LEARNINGS

Scientists investigating the most recent strandings in the Black Sea are now pointing to increased naval activity related to the war in Ukraine, and estimate a tenfold increase in strandings, up to an estimated 50,000 individuals (Węgrzyn et al. 2023). In particular, strandings with no visible injuries have led to the conclusion that acoustic trauma from the increased use of sonar may be responsible. The pattern of increased mass strandings following Russian attacks supports the hypothesis of acoustic trauma, which is being further researched by the Schmalhausen Institute for Zoology in Kyiv (BBC.com).

On a positive note, at least two animals with inner-ear damage were rescued in the Black Sea during the Ukrainian war, and they recovered, proving that the animals can survive if helped during recovery. In contrast, when strandings are caused by disease or infection, the cetaceans usually die (Mooney et al. 2009).

## DISPLACEMENT

Missiles falling into the sea can displace cetaceans and create population imbalances and overcrowding in certain areas, which in turn can lead to food shortages and greater spread of disease.

During the Ukrainian war, for example, the normal distribution patterns of cetaceans were disrupted, and the highest density and abundance of cetaceans off the Bulgarian coast in six years was recorded (Romulus-Marian Paiu et al. 2019, BBC.com).

## OIL SPILLS

War usually increases the incidence of oil spills in seas and other bodies of water. The effects of oil on dolphins and whales have been studied to some extent following past spills. To date, the most comprehensive source of information comes from the 2010 Deepwater Horizon oil spill in the northern Gulf of Mexico. Evidence from both historical research and findings from that event shows that cetaceans face a high risk of harm from oil exposure, with consequences at both individual and population levels.

Like most animals, cetaceans can be affected by oil pollution through respiratory, dermal, and oral pathways. Oil spills may have both direct and indirect impacts, ranging from inhalation of toxic vapours to declines in prey availability. Damage from diesel fuel or fuel oil entering the water can be just as severe as damage caused by crude oil spills.

Young Dionysus is transforming Tyrrhenian pirates into dolphins. In the myth the pirates attempted to capture the god to sell him into slavery. A Mosaic from a Roman Villa, 3rd Century, Dougga, Museum in Bardo, Tunisia. By Dennis G. Jarvis – Flickr Tunisia-4727 – Ulysses, CC BY-SA 2.0, Wikimedia Commons.

One tonne of oil can cover an area of up to 12km² with a 1mm-thick layer (Al Bayaty, 2020). Oil first spreads across the water's surface, preventing sunlight and oxygen from reaching lower water layers. As a result, phytoplankton (tiny algae) receive insufficient light for photosynthesis and oxygen production. Plankton forms the foundation of the sea's biotic system, and destruction of this foundation leads to catastrophic consequences for marine ecosystems. (Kharchenko 2023, Céline A.J. Godard-Codding et al. 2018, CNN Science)

Very little information is available on the abundance and distribution of marine mammals in the Gulf, but the Gulf War oil spill likely had an impact on them. Between late February and mid-April 1991, at least 93 marine mammals died in the western Gulf, including 14 dugongs, 57 bottlenose dolphins, 13 humpback dolphins, one finless porpoise, and eight unidentified cetaceans (Preen 1991). Since these carcasses were found south of the main spill area, other causes cannot be ruled out. However, recent years have shown a consistent correlation between marine mammal die-offs and oil pollution in the Gulf (Greenpeace 1992). Humpback dolphins and finless porpoises appear particularly vulnerable to oil pollution and are listed under CITES Appendix I as endangered species (Klinowska 1991). Gulf populations may also be geographically isolated, making them even more susceptible to environmental impacts (Greenpeace 1992) (Poonian 2003).

## CHEMICAL POLLUTION – TOXIC CHEMICAL COMPOUNDS

During the explosions of bombs, missiles, military shells, naval mines, and torpedoes, vast amounts of dangerous substances are released into the environment. Some munitions contain highly toxic chemical compounds. For example, white phosphorus releases poisonous gas and causes severe burns when ignited, while also contaminating water if released into the environment.

Phosphorus is practically insoluble and can remain stored for decades in salty seawater under oxygen-deficient conditions. Many compounds developed as chemical warfare agents are highly toxic to humans and equally harmful to other vertebrates. These compounds can accumulate and persist in the natural environment for decades, affecting aquatic organisms (Hubareva, 2022). Toxic substances may also enter the sea through the destruction of industrial facilities and infrastructure on land (Kharchenko 2023).

Recent toxicological analyses conducted on whale samples collected in the UAE in the past decades, a collaborative study between EPAA Sharjah, UAE Dolphin Project, Zayed University and American University of Sharjah, showed very low levels of contaminants in these animals compared to populations in other parts of the world (Yagmour et al., 2023). Having this baseline could be useful to test any increase in contaminant levels on post war collected samples.

## DETONATING REMAINING WAR BOMBS

The danger to cetaceans can continue long after wartime activities have ceased.

For example, the seas around the UK are estimated to contain 100,000 tonnes of mines and bombs. These are relics of the Second

A pod of bottlenose dolphins swimming offshore in the UAE, 2023. Photos by the UAE Dolphin Project.

World War, as well as explosives accidentally lost or discarded during training exercises. They are routinely disposed of using counter-charges placed next to the bombs to detonate them, and there are an estimated 50 such detonations each year. A 2015 study found that each explosion in Dutch waters deafened 15 porpoises, and possibly as many as 60 (M. von Benda-Beckmann et al. 2015, The Guardian).

## DOLPHIN SOLDIERS: MILITARY-TRAINED CETACEANS

War does not affect cetaceans exclusively through environmental damage. These intelligent, social creatures are also at risk of being recruited as active participants in war.

Both the US and Russia have a history of using cetaceans for military purposes. The US Navy's Marine Mammal Program began in 1960, with the initial aim of studying the sonar abilities and speed of bottlenose dolphins (*Tursiops truncatus*) and beluga whales (*Delphinapterus leucas*) in order to design more efficient submarines and methods for detecting underwater objects.

The use of marine animals peaked during the Cold War and in the 1980s, when the US supposedly had 100 dolphins, beluga whales (and sea lions) trained to perform various underwater tasks, such as guarding boats, submarines, and harbours, as well as conducting surveillance using cameras. Cetaceans, with their sophisticated natural "sonars," were also useful for identifying underwater mines.

The US programme became declassified in 1992 when various allegations of animal abuse surfaced, including reports of confinement and the use of anti-foraging muzzles, which prevented dolphins from hunting naturally and made them food-dependent on their captors. Food was routinely used as a reward during training.

Despite opposition, such US programmes continue today.

Less is known about Soviet programmes. Whale and dolphin pens were spotted in satellite images near Russian military bases, and in 2022 the Russian military was reportedly using specially trained dolphins to defend Sevastopol harbour (Source: submarine analyst H. I. Sutton for the US Naval Institute News). Russians remain quiet on the topic.

Worldwide awareness of such military programmes increased because of Hvaldimir, a supposedly escaped beluga whale who, in 2019, "contacted" Norwegian fishermen while wearing a harness labelled "St Petersburg Equipment." Hvaldimir also became a case study illustrating how difficult, if not impossible, it is to readapt such captive animals to their natural environment and life in the wild. (Source: Dive Magazine, BBC)

Recent discussions on social media have accused Iran of using "kamikaze dolphins" in the Strait of Hormuz. While the truth is difficult to verify, the fact remains that militarily trained dolphins have previously been used in the Arabian Gulf (eg at Umm Qasr port in 2003). (Source: Gulf News, Dubai Eye)

## LEGISLATION

There have been some scattered attempts to limit, regulate, and punish war-related damage to marine life, but these efforts remain fragmented and have limited enforcement power. Ecocide, unfortunately, is still not formally criminalised under international law.

However, environmental destruction during armed conflict is addressed indirectly through several international legal frameworks. The Geneva Conventions and their Additional Protocols prohibit widespread, long-term, and severe damage to the natural environment during warfare. The United Nations Convention on the Law of the Sea (UNCLOS) also obliges states to protect and preserve the marine environment. In addition, conventions such as the Convention on Biological Diversity (CBD), the Convention on Migratory Species (CMS), and regional agreements such as ACCOBAMS and ASCOBANS, seek to protect cetaceans and other marine species, although their effectiveness during active military conflict is limited.

In the case of the Black Sea and the war in Ukraine, the Odessa Regional Prosecutor's Office launched an initiative aimed at holding Russia accountable for ecocide under Ukrainian law. Ecocide was legally defined in 2021 by an international panel of 12 lawyers as: "unlawful or wanton acts committed with knowledge that there is a substantial likelihood of severe and either widespread or long-term damage to the environment" (Fitt, 2022).

Although there is growing international discussion about recognising ecocide as a fifth international crime under the jurisdiction of the International Criminal Court, alongside genocide, crimes against humanity, war crimes, and the crime of aggression, no binding international mechanism currently exists to prosecute wartime environmental destruction on a global scale.

## IMMAS AND MPAS ARE IGNORED IN WARTIME

Important Marine Mammal Areas (IMMAs) and Marine Protected Areas (MPAs) are important conservation tools, but their effectiveness during wartime is highly questionable.

Marine mammals are highly mobile species, often migrating across entire seas and

oceans. Because of this mobility, size-limited MPAs frequently cannot provide sufficient protection for cetaceans exposed to military sonar, underwater explosions, pollution, or displacement caused by conflict. Even if protected zones exist on paper, they offer little practical protection during active warfare, especially in international waters or contested regions.

Additionally, military operations are generally exempt from many environmental protections under national security exceptions. Enforcement mechanisms are weak, monitoring becomes nearly impossible during conflict, and scientific surveys are often suspended for safety reasons.

This raises broader questions about whether current marine conservation strategies are adequate for protecting cetaceans during periods of war. Some scientists and conservationists have proposed stronger international agreements specifically addressing military impacts on marine ecosystems, including:

- restrictions on military sonar use in known cetacean habitats;
- mandatory environmental risk assessments for naval exercises;
- international monitoring systems for wartime marine pollution;
- emergency response frameworks for marine wildlife during conflicts;
- expansion of transboundary marine protected corridors rather than isolated MPAs;
- and formal recognition of ecocide under international criminal law.

At present, however, such protections remain largely aspirational.

## CONCLUSION

The full extent of the damage inflicted on the Black Sea and the Arabian Gulf marine wildlife will only become clear after the wars have ended. For now, it is simply too dangerous for scientists to conduct research: unexploded ordnance continues to pose a danger and deployed naval mines at sea could take decades to locate and clear, precluding field research even after the end of the war.

Cetaceans are often described as sentinels of the marine environment. Their suffering during wartime may therefore reflect not only the destruction of individual species, but also the broader collapse of marine ecosystems under the pressures of modern conflict. While human casualties understandably remain the primary focus during war, the silent losses beneath the surface should not remain invisible or forgotten.

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U.A.E. DOLPHIN PROJECT

**REPORT YOUR SIGHTINGS!**

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

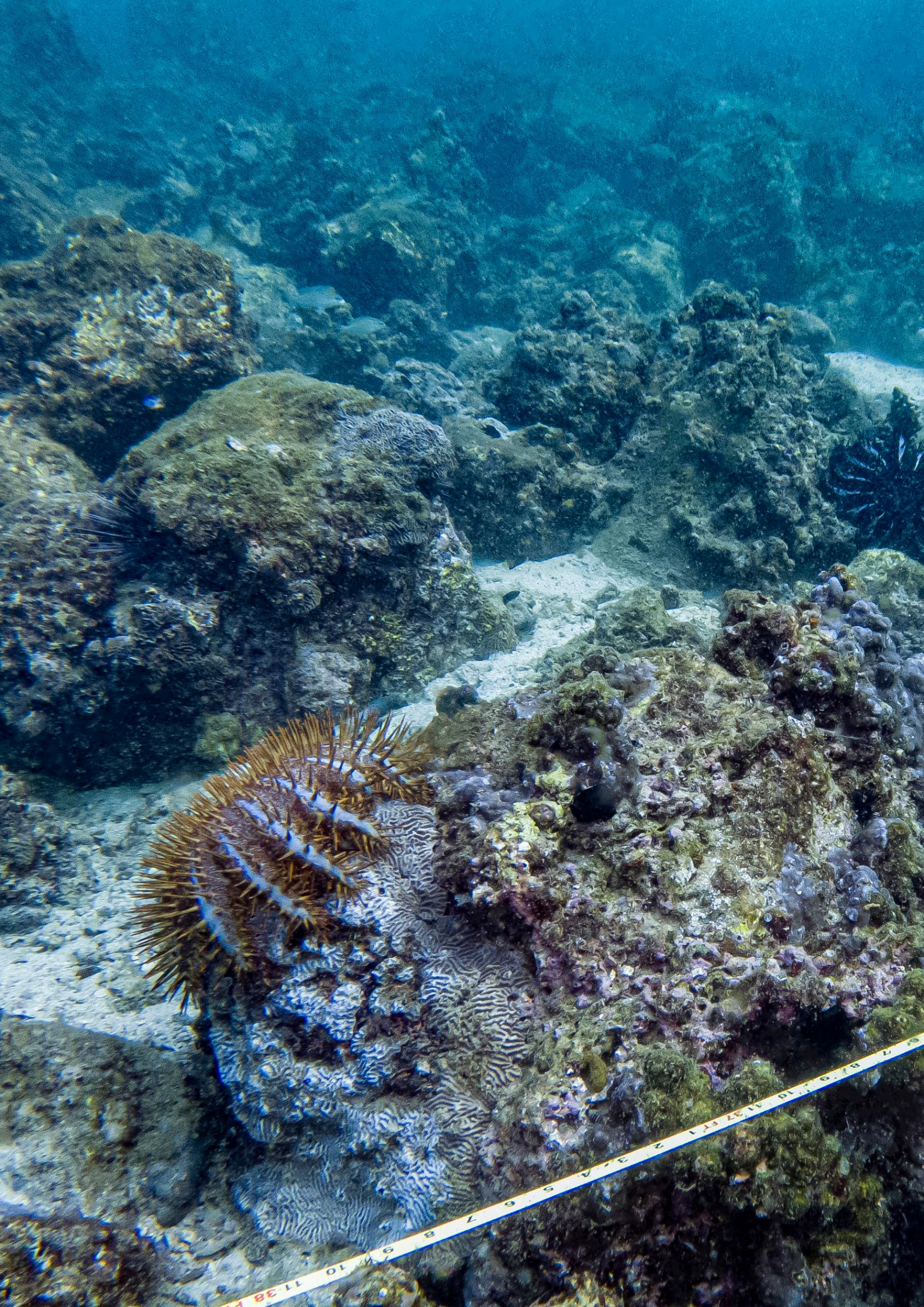
1. Take videos or photos (if you can). You are there in that moment so you become the scientist. Every image of any quality is better than nothing and will help experts to confirm the species. If you can take photographs and videos when you are on the side of whales or dolphins when fins are clearly 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**



# INTEGRATED ECOLOGICAL AND MOLECULAR ASSESSMENT OF A CROWN-OF-THORNS SEASTAR (*ACANTHASTER PLANCI*) OUTBREAK IN THE GULF OF OMAN (UAE)

WORDS BY **ELEONORA CONCARI [1,2], ENRICO MONTALBETTI [1,2,3], DAVIDE MAGGIONI [2,3,4], ALISON LANDES [5], PAOLO GALLI [1,2,3], DAVIDE SEVESO [1,2,3], AND JOHN HENRIK STAHL [6]**

Outbreaks of crown-of-thorns sea stars (CoTS) threaten coral reef integrity and biodiversity, yet local dynamics and short-term responses to control remain insufficiently described. This study characterised an outbreaking Acanthaster population in two specific sites of the coast of Khorfakkan (Gulf of Oman, UAE) to resolve species identity, population composition, prey selection and the effects of targeted removals.

Blue, variegated and white morphotypes of CoTS in one area. Photo by Ally Landes.

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**In the June 2024 issue of Divers for the Environment, we published an article about a crown-of-thorns sea star (CoTS) outbreak in Khor Fakkan in January 2024, in which volunteers from the Emirates Diving Association supported scientific researchers in gathering data and samples during multiple survey dives.**

**Thanks to the citizen science project, the researchers managed to both confirm the outbreak and undertake culling activities to help with conservation of our corals, while also learning more about their ecological role and function on the reefs in the Gulf of Oman.**

**The following article is adapted from the scientific report produced as a result of the data gathered from the project.**

ABSTRACT
Outbreaks of crown-of-thorns sea stars (CoTS) threaten coral reef integrity and biodiversity, yet local dynamics and short-term responses to control remain insufficiently described. This study characterised an outbreaking Acanthaster population in two specific sites of the coast of Khor Fakkan (Gulf of Oman, United Arab Emirates) to resolve species identity, population composition, prey selection and the effects of targeted removals.

All sequenced individuals clustered in two related haplotypes belonging to the species *Acanthaster planci*. Benthic surveys showed moderate live-coral cover, dominated by massive *Porites sp.* colonies. Moreover, the observations of 139 preyed colonies revealed pronounced genus-level selectivity, with branching and complex morphologies suffering disproportionately and massive forms largely avoided.

However, the selection of massive Plesiastrea and Favites genera as preferred coral prey might suggest a shift towards less preferred coral in the CoTS diet, posing a severe threat to coral reefs' integrity. Intensive removal reduced the local density, up to 86%, and provided substantial short-term relief, but continued monitoring is required to secure long-term reef resilience.


Map of the study area showing the two investigated sites, Martini Bay and Hole in the Wall Bay, off the coast of Khorfakkan (UAE).

## INTRODUCTION

Coral reefs are biodiversity hotspots increasingly threatened by multiple local and global stressors, including climate change, ocean acidification, and marine pollution. Among biotic pressures, corallivory (consumption of coral by marine animals) poses a major threat to coral health.

Crown-of-thorns sea stars (*Acanthaster spp.*, CoTS) are among the most impactful corallivores, as their mass feeding activity and population density fluctuations can lead to severe losses of coral cover and structural reef complexity, amplifying the effects of other disturbances. CoTS populations naturally fluctuate between low-density states and episodic outbreaks characterised by unsustainably high densities. These events are generally classified as primary or secondary outbreaks.

Primary outbreaks arise from prolonged, repeated recruitment events, resulting in populations with a broad, evenly represented range of size classes. In contrast, secondary outbreaks are typically driven by a single, intense recruitment pulse that produces high and spatially concentrated densities, with size-frequency distributions dominated by a few size classes and often approximating a normal distribution.

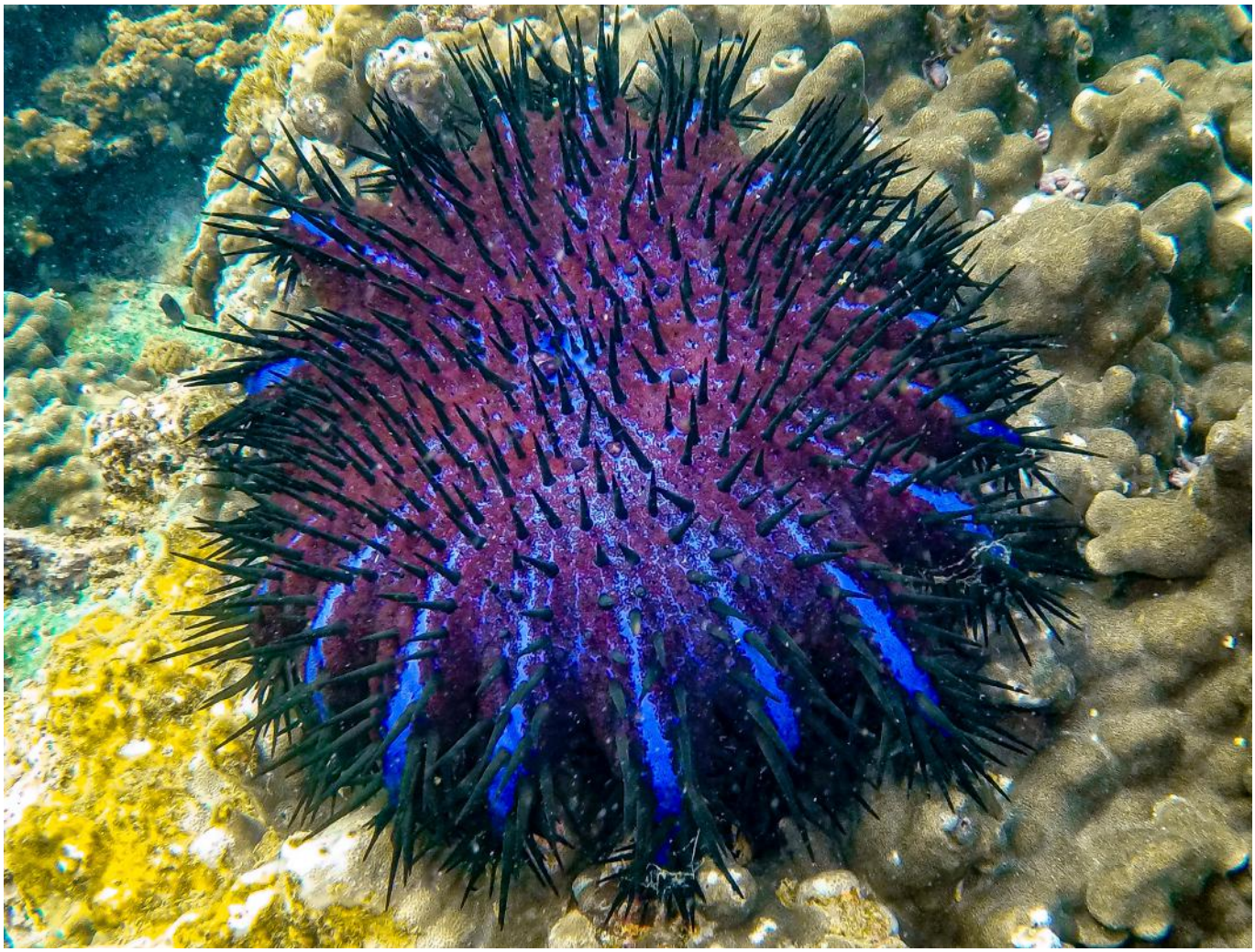
Both outbreak types can result in a substantial decline of coral cover and reef-associated biomass, potentially leading to phase shifts in the benthic community structure. Although historically rare, occurring approximately every 50-80 years. CoTS outbreaks appear to be increasing in frequency under contemporary anthropogenic and climatic pressures, including nutrient enrichment, habitat degradation, and ocean warming, hypothesised to enhance larval survival and contribute to outbreak formation.

During outbreaks, CoTS exert a strong impact on reef ecosystems through intense feeding activity. While feeding, individuals evert their stomachs and release extracellular digestive enzymes that macerate coral tissue, leaving characteristic feeding scars and exposed skeletons on consumed colonies. Numerous studies have documented a marked preference for branching coral taxa, particularly within the families *Acroporidae* and *Pocilloporidae*, and a general avoidance of massive corals such as those belonging to the genus *Porites*. However, CoTS feeding behaviour is flexible, and dietary shifts have been observed when preferred taxa are scarce.

Under such conditions, individuals may consume higher proportions of less-preferred coral genera, consistent with density-dependent predation dynamics driven by prey availability. Feeding selectivity is further influenced by coral morphology and spatial accessibility, which affect encounter rates and handling efficiency. As a result, predation by *Acanthaster spp.* is widely regarded as a major biotic threat to coral reefs worldwide, contributing substantially to ecosystem degradation.

The ecological interpretation of CoTS outbreaks is further complicated by taxonomic uncertainty within the genus *Acanthaster*. Currently, five species are recognised: *Acanthaster* cf. *solaris* from the Pacific, *Acanthaster brevispinus* from the Indo-Pacific, *Acanthaster benziei* from the Red Sea, *Acanthaster mauritiensis* from the Southern Indian Ocean, and *Acanthaster planci* from the Northern Indian Ocean.

Pronounced morphological intraspecific variation, particularly in colouration, can obscure species identification and complicate outbreak assessments. Such variation may



**BLUE:** Electric blue with black spines. Different morphotypes of CoTS feeding on corals detected at both study areas. The colour label, a brief description, and a picture are provided for each one of them. Photo by Ally Landes.

reflect intraspecific plasticity or the coexistence of multiple species within the same habitat, with important implications for understanding outbreak dynamics.

Although crown-of-thorns sea stars have been reported in the Gulf of Oman for several decades, surveys indicated generally low population densities and limited ecological impact. However, localised infestations and increases in abundance have been documented since the late 1990s, with evidence of coral community shifts associated with CoTS predation. In addition, recurrent outbreaks have been reported in nearby Oman reefs, occasionally reaching high population densities.

Despite this, information on long-term trends and baseline population dynamics in the United Arab Emirates remains scarce, and no major outbreak had been formally documented in the region before 2024.

The impacts of CoTS outbreaks have been widely documented across the Indo-Pacific, including the Indian Ocean, Southeast Asia, and the Pacific. This broad geographic distribution highlights the potential vulnerability of diverse reef systems, including those in the Gulf of Oman. In the United Arab Emirates, the most recent confirmed CoTS outbreak was reported by Seveso et al.

In January 2024, two sites off Khor Fakkan (Sharjah, UAE), Martini Bay and Hole in the Wall Bay, exhibited sea star densities exceeding commonly accepted outbreak thresholds (more than 15 individuals per hectare). Although additional nearby sites were surveyed, these two locations were the most severely affected. The observed presence of distinct colour morphotypes suggested the possible co-occurrence of two species, namely *A. planci* and *A. mauritiensis*. While CoTS outbreaks have previously been reported from reefs near Oman, this event represents the first documented outbreak of comparable intensity in the UAE.

The present study aims to give further insights and analyse the first documented large-scale outbreak of *Acanthaster planci* in the Gulf of Oman. Specifically, it aims to (i) clarify the species composition of the CoTS community, (ii) describe population size structure and outbreak dynamics, (iii) evaluate feeding preferences in relation to coral community composition, and (iv) assess the short-term effectiveness of targeted culling. Through this integrated approach, the study aims to improve understanding of the population dynamics and ecological impacts associated with CoTS outbreaks in the Gulf of Oman, with direct relevance for reef management and mitigation strategies.

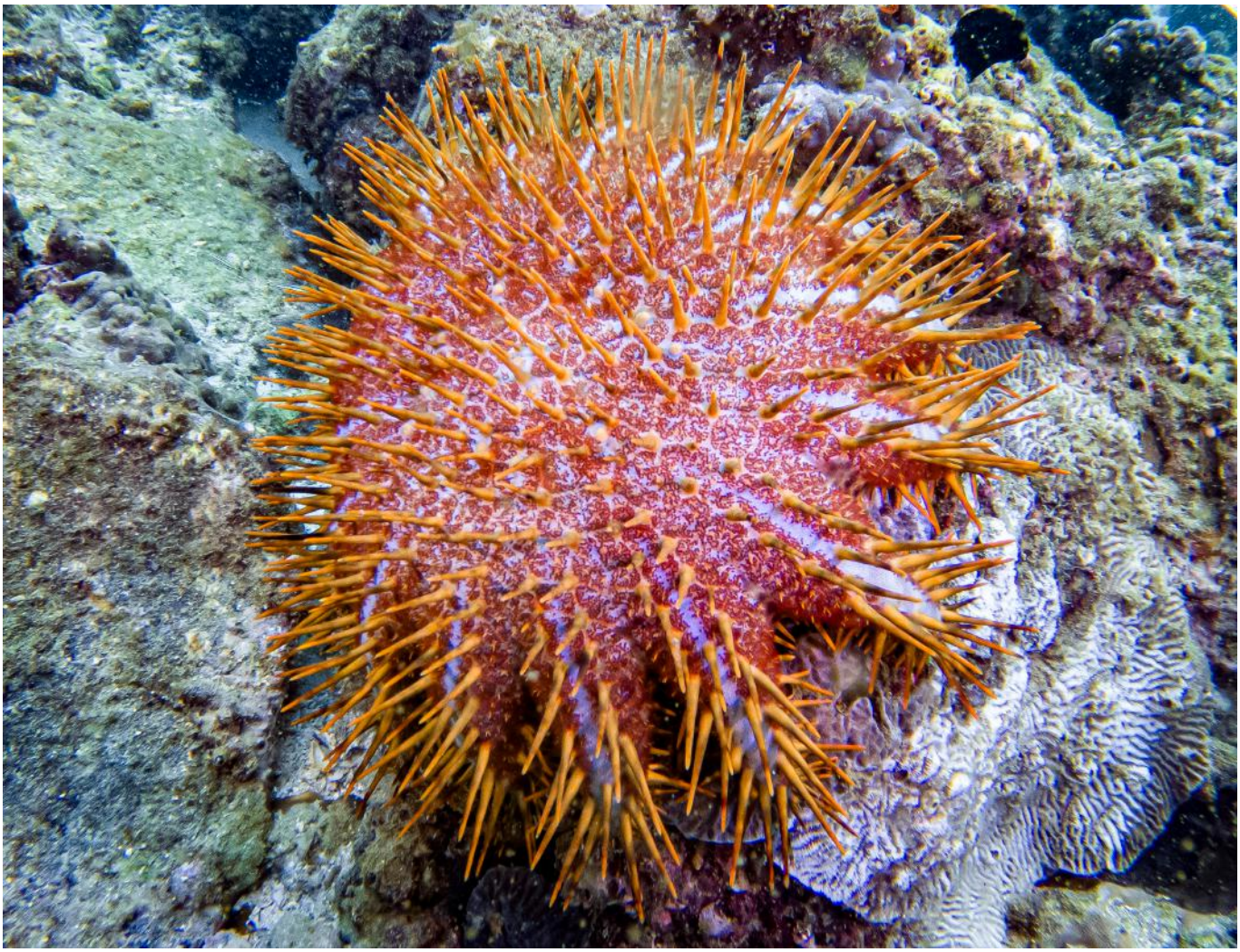
## MATERIALS AND METHODS

### STUDY SITE

This study focused on the ecological characterisation of the crown-of-thorns sea star (CoTS) outbreak previously reported by Seveso et al. in January 2024. Field surveys and sampling were conducted between April and June 2024 at the same two affected sites: Martini Bay and Hole in the Wall Bay, located off the coast of Khor Fakkan in the Gulf of Oman (Figure 1). All activities were carried out by SCUBA diving at depths ranging from 2 to 8m during daylight hours. These sites were specifically selected for further investigation of the outbreak dynamics and are the only reef sites affected by the outbreak in the area.

### MOLECULAR IDENTIFICATION OF COTS MORPHOTYPES

To determine whether the observed colour morphotypes corresponded to different species, molecular analyses were conducted on a subset of individuals. A total of 24 CoTS specimens were sampled, and genomic DNA



**BROWN:** Purple-brown with brown spines. Photo by Ally Landes.

was extracted from 1 to 2 podia per individual.

### BENTHIC COMMUNITY CHARACTERISATION

The benthic community structure and coral assemblage composition were assessed using a photoquadrat approach. At each site, at depths ranging from 2 to 8m, twenty-five 1×1m$^2$ PVC quadrats were randomly deployed with an interquadrat spacing of 10-20m to capture overall variability within the reef. Photographs were collected using a Nikon D300 DSLR equipped with a Tokina 10-17mm wide-angle lens in a Sea&Sea housing with dual strobes.

Substrate coverage was quantified for the following benthic categories: live coral, dead coral with algae, sand/pavement, rock, turf algae, soft corals, sponges, and coral rubble. A total of 50 quadrats were analysed, and as no clear differences in benthic composition and coral genera were observed between the two sites, data were pooled for subsequent analyses.

### COTS POPULATION STRUCTURE AND PREDATION ASSESSMENT

Crown-of-thorns sea star (CoTS) abundance, size structure, colour morphotype composition, and feeding activity were assessed using roving SCUBA surveys. Surveys were conducted for one hour at each site within the 2-8m depth range, for a total of six surveys per site. Upon encountering a sea star, colour morphotype was recorded, and maximum diameter (arm tip to opposite arm tip) was measured to the nearest centimetre using a ruler. Individuals were subsequently assigned to predefined size classes (20-25cm, 26-30cm, 31-35cm, 36-40cm, 41-45cm, and >45cm).

To quantify predation pressure, feeding activity was assessed during the same surveys upon each encounter with CoTS. Following Montalbetti et al., all coral colonies within a 2m radius of a sea star were examined. Colonies exhibiting clear signs of active or recent predation, such as tissue loss, visible mucus, and fresh white skeletal scars, were classified as preyed. Older scars showing algal overgrowth or partial recolonisation were not taken into consideration. This integrated approach allowed simultaneous characterisation of CoTS population structure and associated impacts on coral assemblages.

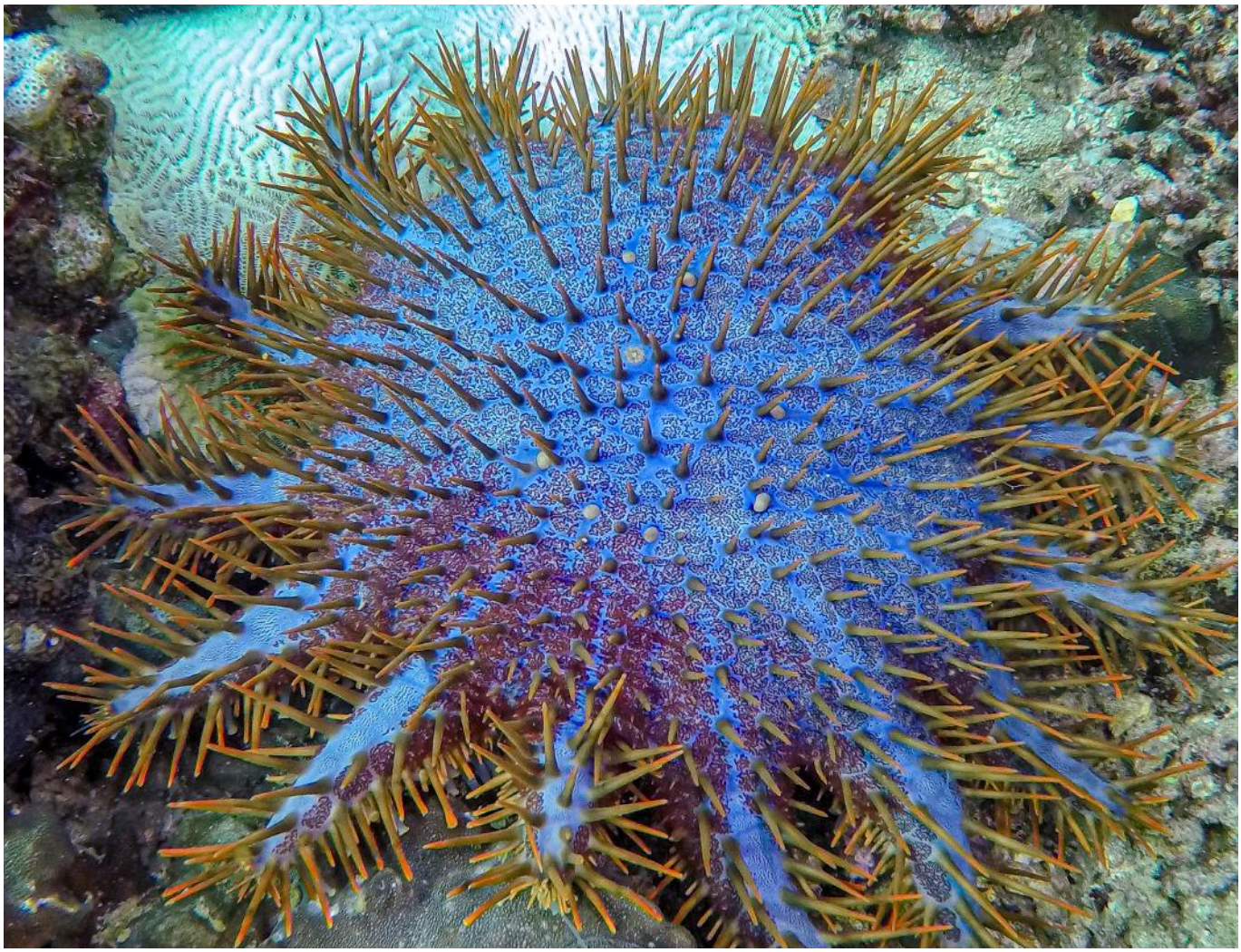
### COTS REMOVAL AND EVALUATION OF CULLING EFFECTIVENESS

Targeted culling operations were conducted in late April 2024 as a management intervention to reduce local densities of crown-of-thorns sea stars (CoTS) and mitigate their potential impact on reef communities. To evaluate the effectiveness of this intervention, CoTS abundance was quantified both immediately before and after the removal operations using standardised belt-transect surveys.

Baseline CoTS densities were assessed in late April before culling by laying consecutive 25m belt transects along the reef at each site. During each transect, divers visually surveyed an area extending approximately 3m on either side of the transect line, for a total surveyed area of 150m$^2$ per transect (25m x 6m) and recorded all encountered CoTS individuals. These pre-culling surveys provided a reference for comparison with post-removal densities.

Following baseline surveys, culling was performed by SCUBA divers who collected all encountered CoTS individuals and placed them into secured plastic bags. After removal, a small arm tip was collected from selected individuals representing different colour morphotypes and preserved in 99% ethanol for molecular analyses. Collected sea stars were subsequently euthanised using a 5% household vinegar solution.

To assess the success of the culling operation,



**VARIEGATED:** Electric blue with orange spines. Photo by Ally Landes.

post-removal CoTS densities were quantified in June 2024, approximately six weeks after removal, using the same belt-transect methodology. A total of 16 transects were conducted, seven in Martini Bay and nine in Hole in the Wall Bay, each covering 150m$^2$. This approach followed the methodology previously applied by Seveso et al., allowing direct comparison of CoTS densities before and after culling. CoTS abundance was standardised and expressed as individuals per hectare.

## RESULTS

### MOLECULAR IDENTIFICATION OF COTS MORPHOTYPES

DNA extraction, amplification, and sequencing were successful for all samples. The obtained sequences were highly similar, differing by a single substitution in one individual, yielding two closely related haplotypes. Comparisons with sequences deposited in GenBank showed a 99.15-100% match with *Acanthaster planci*, with the highest similarity (100%) observed for sequences from the United Arab Emirates and the Maldives. Similarly, comparison with the BoLD database resulted in 99.15-100% matches with *A. planci*.

The haplotype network reconstructed for 80 *A. planci* sequences revealed limited genetic diversity, with six haplotypes identified overall. Samples from the United Arab Emirates were represented by two haplotypes: one exclusive to the UAE and one shared with specimens from the UAE, Oman, and the Maldives. Samples from the north-western Indian Ocean (UAE, Oman) were genetically separated from those from the eastern Indian Ocean (Thailand, Indonesia, Christmas Island), while samples from the central Indian Ocean (Maldives) shared haplotypes with both regions.

### COTS POPULATION STRUCTURE AND CORAL PREDATION

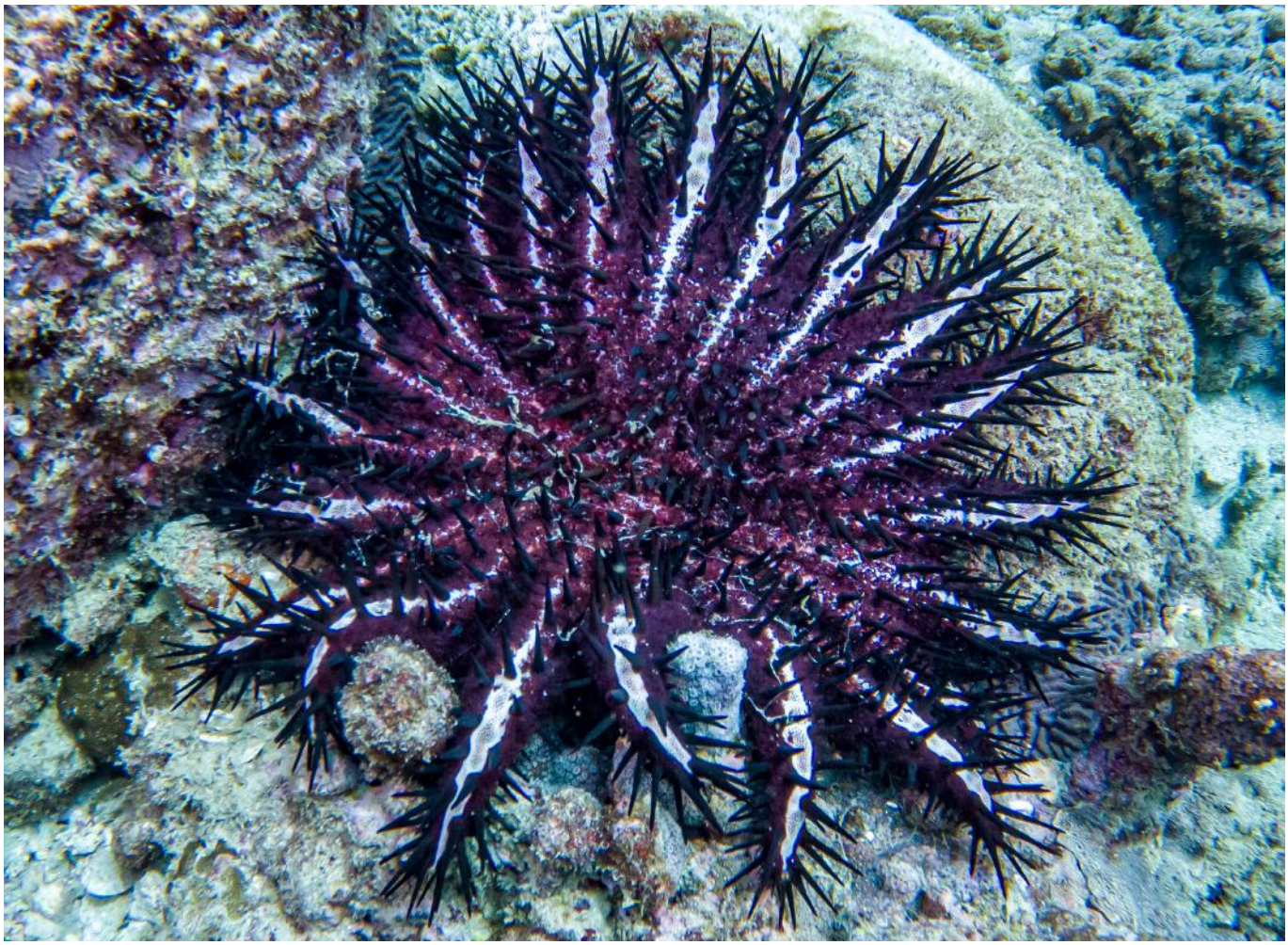
A total of 157 crown-of-thorns sea stars were recorded across the two study sites. Four colour morphotypes were identified: blue (127), brown (16), white (13), and variegated (1). The blue morphotype was the most abundant, accounting for 80.9% of all individuals, followed by the brown (10.2%), white (8.3%), and variegated (0.6%) morphotypes.

Measured body diameters ranged from 20 to 47cm, with a mean size of 34.7 ± 4.19cm. The 31-35cm size class was the most represented (45%), followed by the 36-40cm (32%) and 26-30cm (15%) classes, while other size classes occurred at lower frequencies. Similar size-frequency patterns were observed for the blue and brown morphotypes, with both dominated by individuals in the 31-35cm size class. In contrast, the white morphotype showed a peak in the 36-40cm size class (54%), followed by the 31-35cm class (31%), significantly different compared with the brown morphotype. Conversely, no significant differences in body diameter were detected between Martini Bay and Hole in the Wall Bay.

During surveys, 139 coral colonies were recorded as preyed upon by *A. planci*, either directly beneath feeding individuals or within a 2m radius, showing clear feeding scars. Feeding preferences varied among coral genera, with *Plesiastrea* showing the highest selectivity value, followed by *Favites, Platygyra*, and *Acropora*. In contrast, *Porites* was the most strongly avoided genus, followed by *Goniopora, Montipora*, and *Leptoseris*.

### COTS REMOVAL AND EVALUATION OF CULLING EFFECTIVENESS

*Acanthaster planci* densities declined markedly following the culling intervention. During the outbreak peak in January 2024, population density was estimated at 179 ± 39 individuals per hectare. Following removal operations conducted in late April 2024, *A. planci* density



**WHITE:** White with brown spines. Photo by Ally Landes.

decreased to 25 ± 15 individuals per hectare by June 2024, corresponding to an overall reduction of approximately 86%. The reported reduction in CoTS density represents averaged values across the surveyed sites. Both locations showed a consistent decline in sea star abundance following culling, with a stronger decline observed at Hole in the Wall Bay.

## DISCUSSION

Crown-of-thorns sea stars (CoTS) are among the most important biotic stressors driving coral reef degradation through intense feeding activity and high reproductive output. Despite their broad distribution across the Indo-Pacific, information on CoTS outbreaks in the United Arab Emirates and, more generally, in the Gulf of Oman remains limited. In this context, the present study provides the first detailed genetic and ecological characterisation of a severe CoTS outbreak in this region.

Molecular analyses demonstrated that all sequenced individuals belonged to *Acanthaster planci*, confirming that the outbreak was driven by a single species rather than by the co-occurrence of multiple taxa.

Phylogenetic reconstructions revealed that all the newly generated sequences clustered in two haplotypes placed within a well-supported Northern Indian Ocean clade, characterised by low genetic diversity. One haplotype was shared with samples from the United Arab Emirates, Oman, and the Maldives, while the second appeared to be currently detected only in the UAE. This pattern is consistent with previous studies reporting limited mitochondrial diversity in *A. planci* populations across the Indo-Pacific.

The presence of distinct colour morphotypes within a genetically homogeneous population supports the interpretation that external colouration is an unreliable indicator of species identity in *Acanthaster* species. This finding aligns with extensive evidence that colour variation largely reflects intraspecific morphological plasticity rather than taxonomic differentiation.

However, such polymorphism may reflect phenotypic variations or environmental acclimation, but dedicated genomic, physiological, and behavioural studies will be necessary to determine any biological implications. The geographic position of the Gulf of Oman at the interface between the Northern Indian Ocean (*A. planci*) and Southern Indian Ocean (*A. mauritiensis*) lineages warrants caution. The presence of shared haplotypes between nearby regions, such as the Maldives and Oman, suggests that the outbreak population may reflect an established population with regional connectivity. Similar patterns were also reported by Vogler et al., indicating possible connectivity across the Western Indian Ocean.

Nevertheless, the occurrence of haplotypes currently detected only in the UAE may reflect local processes. Taken together, these factors are more consistent with a locally established population with some degree of connectivity with surrounding areas and undergoing rapid expansion. However, further genomic analyses and sampling efforts are required to disentangle the origin and population genetics of *A. planci* in the UAE.

CoTS densities recorded at the study sites exceeded commonly accepted outbreak thresholds (>15 individuals per hectare), confirming the exceptional magnitude of the event. The mean density of 179 ± 39 individuals per hectare reported in January 2024 by Seveso et al. places this outbreak among the most severe documented in the region. Moreover, the greater number of individuals recorded during the present surveys than during the January assessment suggests that the population continued to expand before management intervention, thereby increasing the potential for coral loss.

Size-frequency analyses provided insights into the outbreak's demographic structure. The

dominance of large individuals, particularly within the 31-35cm size class, indicates that the population was primarily composed of mature adults rather than newly recruited juveniles. The overall normal distribution of body sizes is consistent with an established population structure. These characteristics are more typical of a secondary outbreak, driven by the rapid expansion of an existing population, rather than a primary outbreak dominated by recent recruitment pulses.

Analysis of feeding patterns revealed that adult *A. planci* individuals exhibited strong selectivity towards certain coral genera, despite the dominance of massive taxa in the benthic community. *Plesiastrea, Favites, Platygyra*, and *Acropora* coral genera were preferentially consumed, whereas *Porites* and *Goniopora* were consistently avoided. This pattern is broadly consistent with previous studies demonstrating a preference for structurally complex or energetically rewarding corals, particularly branching, foliose, or tabular forms.

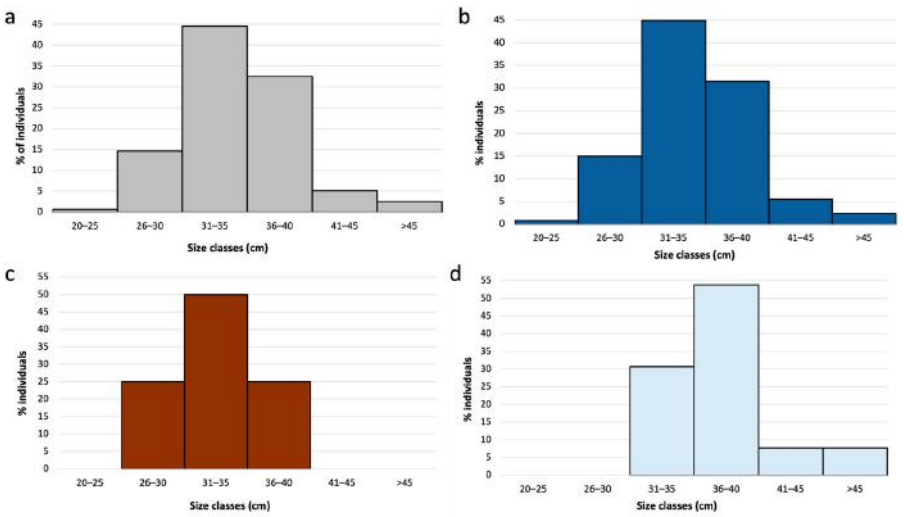
Species of massive Porites are generally considered among the least favoured prey items for CoTS, and individuals feeding predominantly on these corals exhibit very limited growth rates. On the other hand, CoTS have often shown strong feeding preferences for corals from the *Acroporidae* and *Pocilloporidae* families.

The mechanisms underlying the feeding selectivity of CoTS toward specific coral taxa remain poorly understood. Several explanations have been proposed, including variation in the nutritional value of different coral species, differences in tissue accessibility related to coral morphology (e.g., tabular versus branching forms), digestibility, and the presence of mutualistic symbionts that may deter predation.

Recently, coral defensive mechanisms involving nematocysts and venom and toxins production may also potentially play a role as a possible driver underlying CoTS feeding. The preferential consumption of less abundant but more accessible or nutritionally favourable taxa highlights CoTS's capacity to disproportionately affect coral diversity, even on reefs dominated by massive corals.

Structurally complex colonies provide greater access to tissue and polyps and offer increased stability against hydrodynamic forces during feeding, making them particularly vulnerable to predation. As preferred taxa become depleted, density-dependent predation may expand to include less-preferred massive corals, accelerating structural degradation and potentially driving shifts in benthic community composition.

The relatively high selectivity observed for *Plesiastrea* and *Favites* may reflect a combination of prey accessibility, energetic profitability, and local resource constraints rather than simple opportunistic consumption. Although CoTS are generally considered to consume branching, tabular, or structurally complex corals preferentially, feeding preferences are influenced by multiple interacting factors, including prey morphology, tissue accessibility, and nutritional value.




(a) Histogram showing the variation in body sizes (cm) of *A. planci* individuals at the study site (n = 157). (b) Histogram showing the variation in body sizes (cm) of *A. planci* of the blue morphotype (n = 127). (c) Histogram showing the variation in body sizes (cm) of *A. planci* of the brown morphotype (n = 16). (d) Histogram showing the variation in body sizes (cm) of *A. planci* of the white morphotype (n = 13). (Concari et al. 2026)

Massive or submassive colonies can provide broad and stable feeding surfaces that facilitate attachment and may increase feeding efficiency and tissue intake per feeding event. Moreover, different tissue characteristics and nutritional quality may influence palatability.

During outbreak conditions and limited availability of preferred taxa, these characteristics may enhance a broadening of dietary preferences towards coral genera that are not usually preyed. This pattern is consistent with recent evidence showing that CoTS feeding behaviour can shift according to local prey availability, with reduced access to highly preferred corals leading to broader use of alternative taxa. In such cases, repeated predation on locally vulnerable genera such as *Plesiastrea* and *Favites* may contribute not only to declines in coral cover but also to local depletion of these taxa and, if prolonged and unmanaged, possible extirpation from the affected reef sectors.

Such flexibility may substantially amplify the ecological consequences of outbreaks by extending predation pressure beyond the most preferred coral genera. Even when overall coral cover remains moderate, targeted predation on key structural or fast growing genera can substantially reduce reef resilience and recovery potential.

Given the predominance of large, actively feeding adults and evidence of selective predation on vulnerable coral taxa, targeted removal represented the most immediate management option to reduce local predation pressure. The substantial decline in CoTS density following culling, an 86% reduction from January to June 2024, demonstrates that active removal can be highly effective in rapidly lowering local population densities.

These findings are consistent with previous studies showing that culling is the most efficient short-term strategy to mitigate coral loss during CoTS outbreaks. However, the success of culling depends on sustained effort and follow-up monitoring. Without continued intervention, residual individuals or recruits may allow populations to rebuild, undermining initial management gains. Furthermore, this intervention represents, to our knowledge, the first documented targeted CoTS culling in the UAE, providing a valuable regional baseline for future management actions.

## CONCLUSIONS

Overall, this study provides the first integrated ecological and genetic assessment of a severe *Acanthaster spp*. outbreak in the Gulf of Oman. The results demonstrate that the outbreak was driven by a single species, Acanthaster planci, supporting the presence of intraspecific colour variation across the study area.

Feeding analyses revealed clear selectivity towards specific coral genera, specifically *Plesiastrea, Platygyra*, and *Acropora*, characterised by structural complexity and energetically favourable, alongside evidence of dietary flexibility towards and potential expansion towards less-preferred massive corals, such as *Favites*.

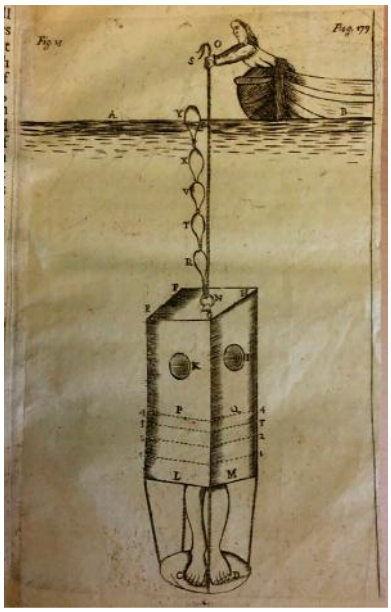
Furthermore, targeted culling operations proved effective in reducing local sea star densities over a short time frame, highlighting the potential of rapid management interventions in mitigating outbreak impacts. Sustained monitoring, long-term effects evaluation, and adaptive management will be essential to prevent future outbreaks and to support the long-term resilience of coral reefs in the region.

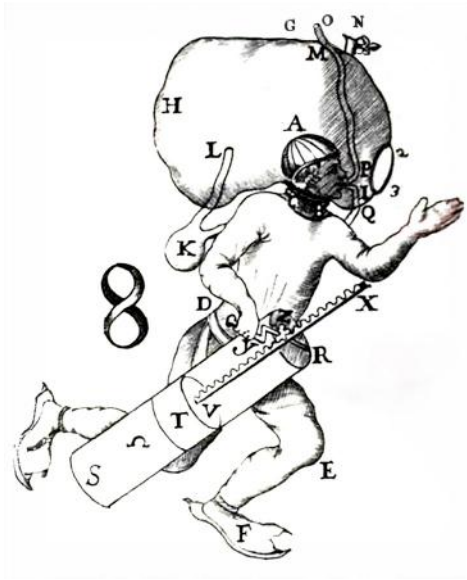
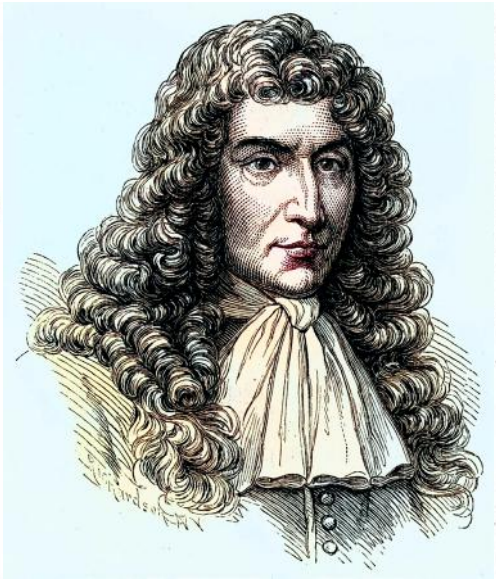
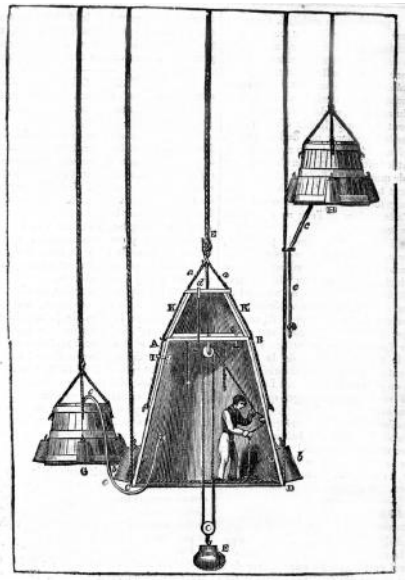
# PART 4
# THE HISTORY OF DIVING

WORDS BY **PATRICK VAN HOESERLANDE**

After three parts on the history of diving, scientists and inventors have become wiser. Knowledge about pressure and volume may not yet be widespread, but it does exist. Medical knowledge about diving is still in its infancy and we are still a long way from the diving equipment we use today. Time for some more history.

A reproduction of John Lethbridge's "barrel" diving equipment (1715) in the "History of Diving Museum" in Islamorada, Florida. Photo by Divingenthusiast2005.



**TOP ROW L-R:** George Sinclair described this wooden ark for diving in his book, 'Hydrostaticks', published in Edinburgh in 1672; engraving of William Phips loading treasure found in a shipwreck in 1687; and Giovanni Alfonso Borelli (1608-1679). **BOTTOM ROW L-R:** One of the first rebreather designs, conceived in 1680 by Giovanni Alfonso Borelli; Denis Papin (1647-1713); and the "Spalding Bell" could make small upward movements with ballast E, and the small side bells provided a supply of fresh air – unknown designer. Drawing: archive from meisterdrucke.nl.

After three parts on the history of diving, scientists and inventors have become wiser. Knowledge about pressure and volume may not yet be widespread, but it does exist. Medical knowledge about diving is still in its infancy and we are still a long way from the diving equipment we use today. Time for some more history.

Robert Boyle (1627-1691) is no stranger to us, as we already met this Anglo-Irish natural philosopher, chemist, physicist and inventor in the previous part. Every diver knows Boyle's Law, which was distilled from, among other things, the results of Boyle's experiments with pressure and volume. This scientist deserves a second mention in our story about diving.

## THE FIRST WRITTEN OBSERVATION OF A DECOMPRESSION ACCIDENT OR 'BENDS'

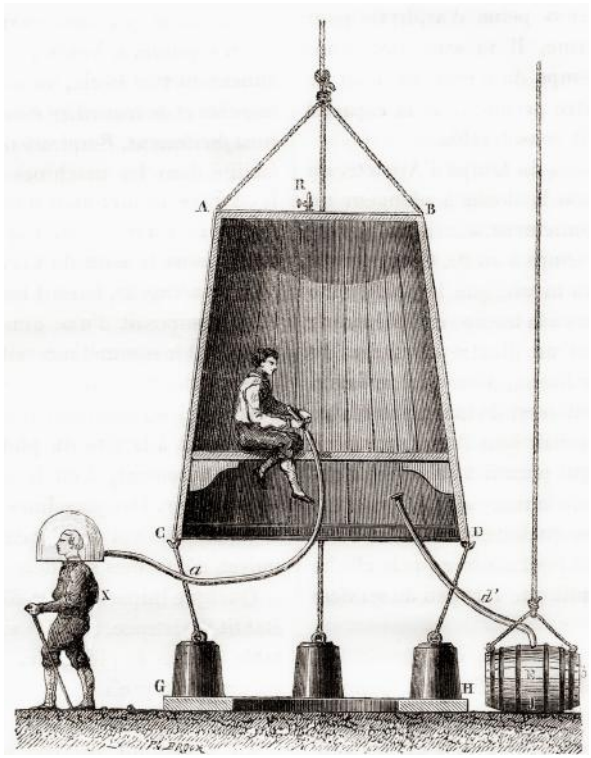
During one of his experiments with air pressure, Boyle noticed a gas bubble in the eye of a viper that had first been pressurised and then decompressed. In 1667, he noted that he clearly saw a bubble moving from left to right in the viper's eye. At the time of this observation, the snake appeared to be in severe pain and was in a low-pressure chamber. Upon further investigation, he discovered that small bubbles were blocking some arterial passages and impeding normal blood circulation. Boyle thus proved that a reduction in ambient pressure could lead to bubble formation in blood and tissue. A finding and conclusion that would only be appreciated 200 years later by hyperbaric medicine and divers.

## THE FIRST THEORY ABOUT DIVING BELLS

In the 17th century, there was hardly any specialisation, and people combined very unusual occupations. For example, the Scottish natural philosopher George Sinclair (1630-1696) was the first professor of mathematics at the University of Glasgow and an engineer, even though that profession did not yet exist at the time. He was also a demonologist and known among specialists for his 1685 work on witchcraft, 'Satan's Invisible World Discovered'. However, this latter work did not earn him a place in this history series. Like Blaise Pascal, he wrote a book on hydrostatics in 1672, but that did not earn him any prizes either. His 1669 treatise on the theory and techniques for the use of diving bells does, however. Based on this theory, Sir William Phips built a "bell" in 1685, which he used in 1687 to salvage nearly a million dollars' worth of treasure from the wreck of the Spanish galleon, 'La Nuestra Senora de Almiranta' in the West Indies. His success, underpinned by a theoretical basis, led to the rise of diving bells.

## FIRST DESIGN OF A CCR, FIRST FREE-SWIMMING DIVER AND FIRST SCUBA(?)

Giovanni Alfonso Borelli (1608-1679) was an Italian mathematician and physicist, and very inventive. He is often remembered by rebreather divers for his drawings of a CCR (Closed Circuit Rebreather). His illustrations




**LEFT-RIGHT:** Engraving of a diving bell built by Halley in 1691, from "Les Merveilles de la Science", published around 1870. Drawing: archive from meisterdrucke.nl; the "Wanha Herra", the oldest diving suit; and the replica of the first helmet diving suit worn by pioneer Chevalier de Beauve and used in Patrice Leconte's film Ridicule – on display at the historic Musée Frédéric Dumas in Sanary-sur-Mer, France. Photo by Ripley's Believe It or Not!

show a giant bag that was supposed to enable the diver to breathe air underwater (without headaches, as was the case with the Assyrians). The helmet was made of brass with a glass window and had a diameter of 0.6 metres. The diving apparatus most likely never left the drawing board. This designer was not familiar with Boyle's law, otherwise Giovanni would have realised that his invention could not work. There is uncertainty about how the designer approached the recycling of exhaled air. Based on our current knowledge, some believe that the large bag held chemicals that removed carbon dioxide from the air. This does not really correspond with what was known, or rather not known, about air at the time. The existence of oxygen and carbon dioxide was not yet known. The accepted theory at the time was that the hot, exhaled air could be rejuvenated by cooling and condensation. It is therefore more likely that Borelli thought of passing the exhaled gas through copper pipes to cool it with cold water. A later experiment confirmed this hypothesis.

His design is interesting for two other reasons. The diver has fins on his feet, making it the first design of a diving apparatus for a free-swimming diver. Because of the fins, this diver could not walk on the seabed and must be able to control his buoyancy. After all, keeping your feet on the ground is a matter of carrying enough weight, but free swimming is more delicate. How did the designer tackle this problem?

If you look closely at the drawing, you will see a one-metre-long piston-like device that the diver is holding in his hands. This device is a 'Buoyancy Control Device' (BCD or trim vest) with a rigid body. Unlike the "soft" version we use, the volume does not vary with depth, but only with the diver's adjustment of the piston position. I do wonder what the maximum depth was at which the diver still had enough strength to adjust the volume using the rotary handle. The Boyle-Mariotte duo would also throw a spanner in the works with this design.

## THE FIRST EXPLANATION AS TO WHY LONG SNORKELS DO NOT WORK

The use of a long breathing tube to dive deeper and longer is a logical extension of the success of the snorkel. Many have probably tried and failed without knowing why. For an explanation on this, we have to wait for the French priest and physicist Jean de Hautefeuille (1647-1724). In 1681, he wrote the book, 'L'art de respirer sous l'eau' (The Art of Breathing Underwater), in which he explained for the first time why, "it is not possible for humans to breathe air at normal atmospheric pressure when they are underwater at depths". His ideas culminated in the more advanced designs of the famous English astronomer Sir Edmond Halley and the enterprising Englishman John Lethbridge.

The inventors of diving equipment did not limit themselves to diving. Perhaps the reason they were so successful was that they integrated ideas from other disciplines into this new field. Until then, the air in a diving bell was refreshed with surface air that was brought down in barrels. The temporary occupant of the bell had to transfer this air to the bell, causing the excess air to leave the diving bell. This method was not very effective because the warmer, exhaled air remained at the top of the diving bell. The Flemish Florencio Valangren may have proposed a solution to this problem to the Spanish Court in 1631, but his idea disappeared into the archives along with the rest of the proposals.

To revive this idea, we need Denis Papin (1647-1713). This French physicist and mathematician was the inventor of the pressure cooker and suggested the first piston steam engine. In 1689, Papin proposed using a bellows or pump to maintain the pressure in a diving bell and supply fresh air. This concept was important because it allowed the diving bell to descend deeper, remain underwater longer, and the fresh air to displace the warm air saturated with carbon dioxide. The problem, however, was that the power of the contemporary pumps only allowed a working depth of 25 metres, which, despite the increasing complexity, did not yield any real gains.

## LONG OPERATIONS WITH DIVING BELLS

Not many people are capable of combining space and diving, but the English astronomer, physicist, mathematician and meteorologist, Sir Edmund Halley (1656-1742) was one of them. The name probably sounds familiar to you because of Halley's Comet. In 1690, Edmund patented a modern wooden diving bell in the shape of a truncated cone. The larger end (at the bottom) was open, while the smaller end was closed. The top had a valve to allow the used 'warm breathing air' to escape. Fresh air was supplied by two weighted barrels connected by a pipe and refilled at the surface. Each barrel held 36 gallons (approximately 150 litres) of air. Dives of more than 20 metres for 90 minutes have been recorded. This diving bell proved to be very suitable for carrying out

**LEFT-RIGHT:** Divers wearing Andrew Becker's diving suit in 1754 – illustration London News, 6 February 1873; Benjamin Franklin, inventor and co-founder of the United States, designed the precursors to modern swimming fins at the age of 11; and Filipino Bajau divers still hunt using handmade wooden fins.

underwater work. It is supposed that Halley's choice of a barrel system instead of forced air exchange was due to his concern that Papin would accuse him of stealing his idea. After all, the two were no strangers to each other and probably communicated with each other about this.

Later, in 1716, he improved his design and, at the age of 65, proved its safety by staying underwater for 4 hours. Air was still supplied using barrels, but now the occupant of the diving bell no longer remained alone on the riverbed. Outside, a diver walked around with a small diving bell on his head. This diver was supplied with fresh air from the diving bell. This method must have been a risky feat, because the principle of communicating vessels meant that the diver had to keep a close eye on his position in relation to the diving bell (and that in poor visibility). One misstep could be fatal, although I suspect that for divers of that era, a 20-metre swim ascent was routine.

## OLDEST DIVING ARTEFACT

The oldest known diving artefact is the oldest diving suit in the world and is displayed in a special glass case in the Pakkahuone museum (better known as the Raahe museum) in the Finnish port town of Raahe on the Baltic Sea. Raahe has always been a seafaring town and most of the objects in the small museum, which was founded in 1862, were donated by ship owners.

The suit, "Wanha Herra" (which means "Old Gentleman" in the old Finnish language) was also donated to the museum in the 1860s by Captain Johan Leufstadius. No one knows who made the suit. It is possible that a sea captain saw a similar suit in use somewhere and brought the idea back to Finland. Wherever the idea came from, the suit was made in Finland, because the gloves and boots resemble what people there used to make and wear. The suit is estimated to be about 300 years old.

What was the "Old Man" used for? No one knows for sure, but because of its location, many wooden ships came to Raahe to be repaired. It was not uncommon for wooden sailing ships to leak, and often those leaks could only be repaired if the ship was lifted out of the water. Lifting a sailing ship out of the water to repair small leaks was expensive and time-consuming. It is therefore possible that the diving suit was an easier and cheaper way to inspect the hull or carry out minor repairs while the ship was anchored in the harbour.

The diving suit is made of cowhide with seams stitched with pitch thread and sealed with pitch. The diving suit was made waterproof with a mixture of sheep fat, tar and pitch. The top of the suit, the hood, is reinforced on the inside with wooden strips. Air was probably pumped to the diver using bellows via wooden pipes connected to flexible leather tubes. The top of the hood probably had a valve where the air entered and exited via a pipe at the back. The brave diver squeezed into the diving suit through a hole in the belly of the suit. Afterwards, the suit was closed by twisting the long leather strip with the hole around the belt and fastening it around the diver's waist.

## VALSALVA TECHNIQUE

As divers, we learn the Valsalva manoeuvre as a technique to equalise the pressure in the middle ear cavity. This technique is described as an exhalation while pinching the nostrils closed. The air then flows from the lungs through the oral cavity to the Eustachian tube and then to the middle ear cavity. The increased pressure on the inner eardrum should restore the balance of the surrounding water pressure. However, this manoeuvre is incorrectly named after Valsalva. The Italian physician Antonio Maria Valsalva (1666-1723) described a manoeuvre in his 1704 work, "De Aure Humana" as a forceful exhalation against a closed opening between the vocal cords, similar to sneezing. This technique was a means of removing fluid or foreign objects from the middle ear and, of course, does not ensure balanced pressure in the ears.

It is more likely that our "diving manoeuvre" with a gradual build-up of pressure was first described by the English physician Joseph Toynbee (1815-1866) and became known among divers from then on. The era of peculiar techniques for equalising pressure within the ears slowly came to an end.

The use of the original Vasalva manoeuvre increased significantly when physiologists such as Ernst Heinrich Weber documented its profound cardiovascular effects, leading to its modern application in the diagnosis of heart disease.

Valsalva's main interest was in investigating the complex structure of the human ear, to which

he devoted a specific treatise. He understood the problems inherent in the imbalance of pressure between the outer and inner ear and found ways to use this to remove purulent fluid by deliberately increasing the pressure inside with his manoeuvre. Although the name Valsalva is usually associated with his manoeuvre, his contributions to the history of medicine were much broader: he discovered various anatomical parts (eg the sinuses of Valsalva), laid the foundations for the development of pathological anatomy, introduced improvements in surgery and promoted compassionate care for patients with mental illness.

## THE FIRST HELMET DIVING EQUIPMENT

Most diving suits were probably unique pieces. They may have been inspired by other designs, such as the "Old Gentleman" above, but they were nevertheless exceptional in their kind. Chevalier Pierre Rémy de Beauve (Chevalier de Beauve), a French aristocrat and sea guard, referred to the use of a diving suit in a letter to Chevalier de Borda in 1660, in which air was supplied to the diver from the surface. Later, he described how he himself dived to a depth of 8 metres in a similar suit at Dugay-Trorien in Rio de Janeiro in 1711. He provided detailed illustrations of the equipment. He later designed a diving suit himself, which may have been brought to the attention of King Louis XIV of France before it was successfully (?) tested. The only evidence of this is a letter to de Beauve in which the king encourages him to continue working on the design and explains that, under the current circumstances, the king would not allow the costs necessary for further development to be incurred.

Preserved drawings show that the equipment consisted of a metal helmet and a breastplate or cuirass, covered from the neck down by a leather diving suit that was fastened at the front with clips. The front of the helmet was moulded in the shape of a face, including "eyes", which were probably made of glass. The helmet also had two breathing tubes; one tube for air supply, and the other to allow exhaled air to escape. Copper rods closed the back of the suit. The suit was simply pulled on at the wrists. The diver wore sandals with lead soles and walked vertically across the seabed. The helmet fit over the collar of a corset that blocked the pressure of the water. It is not known whether further tests were carried out and whether it was actually used, but thanks to the drawings, his design would be copied many times in the following years.

The principle behind Chevalier de Beauve's diving suit was revolutionary. Unlike Halley's design, his diver not only had a "helmet" on his head but was also equipped with a real suit. It is rightly referred to as the first diving suit with a helmet. The helmet diver was now able to compete with the diving bell.

While some sought refuge in designing clocks and diving suits, Englishman John Lethbridge designed his "diving engine" in 1715. The concept is difficult to translate because it was a kind of combination of a submarine and a diving suit. The diver was enclosed in an oak cylinder – a "barrel" – which was supplied with compressed air at the surface. A diver could dive to a depth of 20 metres for 30 minutes, while sticking his arms in the water for salvage work. Water was kept out of the cylinder by greased leather cuffs that closed very tightly around the diver's arms.

After testing this diving machine – for lack of a better word – in his garden pond (dug especially for this purpose), Lethbridge dived on a number of wrecks and became very rich from these salvages. One of his famous salvages was that of the Dutch ship, 'Slot ter Hooge', which sank off Madeira with more than three tonnes of silver on board. It is claimed that this device was used successfully for years.

Over time, divers realised that it was impossible to use breathing apparatus designed for working below the surface for deeper expeditions. As scientists had already discovered the water pressure below the shallow layer of water was too high for the human lungs to function normally, because the water pressed down on the body. Solutions, such as those designed by Lethbridge, were half torture for the divers. After all, the seals at the transitions between the rigid structure, in which quasi-atmospheric pressure prevailed, and the aquatic environment, with its higher pressure, had to be perfectly watertight, otherwise the divers would drown. The deeper they dived, the stronger the seal had to be and the greater the risk of fatal leaks.

In 1715, the Englishman Andrew Becker gave a demonstration of a "new" invention in the River Thames. The novelty consisted of a full leather diving suit and a large spherical metal helmet with a window. Three tubes led from the helmet to the surface, one for the exhaust of exhaled air and the other two for fresh air pumped down by large bellows. During the demonstration, the diver was able to remain underwater for an hour, but the depth he reached was not mentioned.

We know that the invention was put into practice from a report by the Irish bishop Richard Pococke, who visited England in 1754 and saw divers wearing Becker's equipment at work salvaging a warship. During this work, the air was supplied by a pump instead of the more primitive bellows.

John Smeaton (1724-1792) was a British engineer responsible for the design of bridges, canals, harbours and lighthouses. Smeaton was the first self-proclaimed "civil engineer" (as opposed to engineers who were all military personnel) and is often considered the "father of civil engineering". He was a skilled mechanical engineer and an eminent physicist. In 1771, he developed an improved air pump, and his invention opened up new possibilities for the diving world in the 18th century. Smeaton's invention paved the way for pressurised suits and the development of the first SCUBA system. Soon, divers were exploring areas that were previously inaccessible.

## THE FIRST SWIMMING FINS

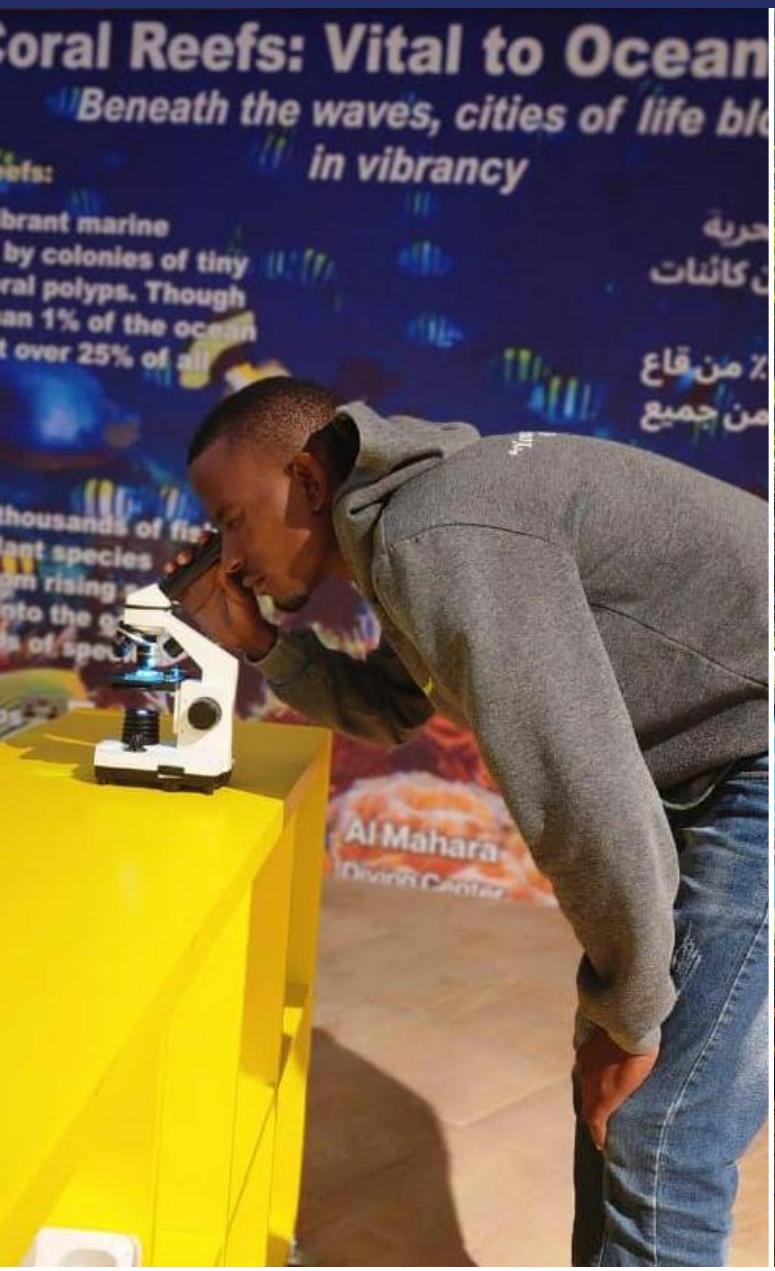
Giovanni Borelli may have been the first to draw a design of a free-swimming diver with fins, but he was certainly not the first to think of fins, let alone use them. While his design remained on the drawing board, others used this tool almost daily. In indigenous coastal communities around the world, people developed their own techniques and tools to aid in free diving for fishing, gathering food or practising cultural customs. Probably the best known are the Ama, "women of the sea". These traditional Japanese freedivers have been diving for centuries for pearls, seaweed and other riches from the sea. They sometimes use wooden or bamboo "sugiita" fins to increase their diving efficiency. Until the 1960s, the Ama dived naked, wearing only a loincloth. Today, they traditionally wear white, as this colour stands for purity and possibly also to ward off sharks. But they still dive without diving equipment or air tanks. One of the reasons the Ama are mainly female, is that they have a thicker layer of fat than their male counterparts, making them more resistant to the cold water. Another reason is the self-sufficient nature of the profession, which allows women to live independently and form strong communities. Like the Ama divers, the Haenyeo divers of Jeju Island in South Korea are women. They use traditional handmade wooden fins, called "daljip taewak", during their diving activities. The men of the Philippine's Bajau tribe use a wooden fin as an aid, but divers active in various countries around the Mediterranean, such as Greece and Italy, also used traditional freedivers' rudimentary wooden or metal fins to improve their diving skills and increase the distance they could cover underwater. Fins were therefore no exception, but they were not really known in the diving world at that time.

The first recorded use of this type of equipment did not occur until 1717, when an 11-year-old boy decided to use a pair of oval paddles as kind of swimming gloves. When his wrists became too tired, he adapted the design for use on his feet and tied them on like sandals. The boy, Benjamin Franklin (1706-1790), would become the great inventor and co-founder of the United States. His precursors to modern swimming fins earned him a place in the International Swimming Hall of Fame some 240 years later. Despite his fame, we had to wait about as long for the emergence of a modern, practical fin. Strange for a piece of equipment that had been in use for centuries.

# CONNECTING YOUTHS TO CORAL REEF RESTORATION BETWEEN THE UAE AND MALDIVES

WORDS & PHOTOGRAPHY BY **KATHLEEN RUSSELL, PADI COURSE DIRECTOR**
ADDITIONAL PHOTOGRAPHY BY **SIVA SAGAR**

Whether youths are exploring the waters off Sir Bani Yas Island or snorkelling and restoring the coral reefs off Fenfushi Island, these experiences are impactful. They start to understand that the ocean connects all of us globally. We are the torch bearers passing it to future generations.





The ocean has always had a way of connecting people, cultures, and communities across borders. It has no geopolitical realm. Through youth coral reef restoration programmes developed between Sir Bani Yas Island in the UAE and Fenfushi Island in the Maldives, Al Mahara Diving Center and Mountain Quests have been creating hands-on educational experiences that bring together marine conservation, cultural exchange, and experiential learning for youths.

For many youths, this is their first hands-on experience connecting with the ocean and learning about the marine ecosystems away from the four walls of the classroom. They are immersed in real-time, real-life ecosystems. Especially for locations like the heritage island of Sir Bani Yas and the local Maldivian Island of Fenfushi located in south Ari Atoll. This is where they begin their journey to understand the importance of coral reefs, marine biodiversity, and the role healthy oceans play in supporting coastal communities and marine life.

"Hands-on coral reef restoration is more than saving an ecosystem – it is reconnecting a generation to the living planet. When young people restore reefs with their own hands, they don't just learn about climate change; they experience the power of protecting biodiversity, rebuilding resilience, and becoming active stewards of our ocean future," explains Matt Farr, Founder of Mountain Quests.

In the UAE, students camping on Sir Bani Yas Island quickly connect with nature. Camping outdoors, spending time by the sea, and exploring the coastline allow students to experience the marine environment in a way many never have before. While snorkelling off the north beach near Desert Islands Resort, students encounter local marine life and begin to understand the importance of coral reefs and their connection to the health of the Arabian Gulf waters.

During the residential trip, students are also introduced to the large-scale coral conservation work now taking place across the country. In Abu Dhabi, the Abu Dhabi Coral Garden initiative is working towards deploying more than 40,000 artificial reef structures across a 1,200 square kilometre area, together with plans to plant more than four million coral colonies across the emirate. Dubai has also launched the Dubai Reef project, which includes the deployment of 20,000 artificial reefs across 600 square kilometres of coastal waters. Other emirates including Fujairah, Umm Al Quwain, Ajman, and Ras Al Khaimah are also developing important coral restoration projects and marine conservation initiatives.

For most youths, this is the first time they learn about large-scale ecological restoration efforts happening across the UAE. They get to see real restoration efforts and understand how marine ecosystems can support long-term recovery when conservation efforts are done well. Seeing these projects firsthand gives students hope and helps them understand that positive environmental change is possible and that they are part of the solution for the future of ecological recovery.

Both Sir Bani Yas Island and Fenfushi Island offer very different but equally important learning outcomes.

In the Maldives, students experience thriving reef systems within the Indian Ocean and witness firsthand both the beauty and resilience of coral reef ecosystems and their connectivity with the local communities. For many centuries, local inhabitants have relied on fisheries as an important food source. For many years, these islands supported local fisheries across the Maldivian archipelago long before island tourism became the primary industry. The international trip experiences were designed to connect conservation awareness with local culture and heritage. Students participate in coral reef education sessions, guided snorkelling activities, reef and beach clean-ups with local youth communities, marine species identification, sustainability and traditional bushcraft workshops, and discussions about the relationship island communities have with the ocean. The students and teachers stay in locally owned guest houses such as Whale Shark Boutique. During their visit, they also take part in the Fenfushi Coral Restoration mission operated by Dive Club Maldives.

Students also learn that this region is the whale shark capital of the Maldives. Whale sharks and manta ray sightings happen daily. The students are taken to the coral restoration site and are taught how to plant the coral colonies onto the dedicated frames to support the degraded coral reef area. This encourages marine life aggregation and helps to incubate more fish stock back to these once-thriving reefs. A long-term monitoring plan is also part of this mission to track the successful survival rates of the coral restoration efforts of these local islands.

One of the most rewarding aspects of these experiences is seeing how students discover themselves during these journeys. Many come with little knowledge about coral reefs or marine conservation, but leave with a greater appreciation for the ocean and a better understanding of why restoration and conservation efforts are so important for the future.

As Jacques Cousteau once said, "People protect what they love." And this is one of my favourite quotes too. This philosophy continues to guide how we develop these programmes. It's a way for us to pass the torch to future generations. Young people are deeply impacted when they spend time living alongside local communities and develop a more personal connection to the environment and island way of life. Conservation becomes more real and meaningful rather than simply a subject taught in a classroom or a checklist activity. The depth of their experience becomes more profound than they imagine.

Whether youths are exploring the waters off Sir Bani Yas Island or snorkelling and restoring the coral reefs off Fenfushi Island, these experiences are impactful. They start to understand that the ocean connects all of us globally. We are the torch bearers passing it to future generations.

# OPENING THE BLUE FRONTIER: WHY ACCESSIBLE OCEAN TOURISM IS THE DIVE INDUSTRY'S DEFINING MOMENT

WORDS BY **ELSIE GABRIEL**

For decades, the underwater world has been framed as a frontier for the physically elite: strong swimmers, able-bodied adventurers, and those who fit a narrow definition of "diver." Yet beyond that frame lies a global population that has largely been left at the shoreline.

There is a quiet exclusion that has long existed in ocean spaces.

Not by intent – but by design.

For decades, the underwater world has been framed as a frontier for the physically elite: strong swimmers, able-bodied adventurers, and those who fit a narrow definition of "diver." Yet beyond that frame lies a global population that has largely been left at the shoreline.

According to the World Health Organisation (WHO), over 1.3 billion people – approximately 16% of the world's population – live with some form of disability. Crucially, this is not a marginal demographic; it is one of the largest minority groups on the planet.

And they do not travel alone.

Studies cited across accessible tourism frameworks consistently show that travellers with disabilities often move in multi-person groups – family members, caregivers, and companions – multiplying their economic footprint significantly. The implication for the dive industry is stark: accessibility is not a niche – it is an untapped market force.

## A RIGHT, NOT A PRIVILEGE

The argument for accessible ocean tourism is not only economic – it is fundamentally rooted in human rights.

The United Nations, through the UN Convention on the Rights of Persons with Disabilities, explicitly recognises access to recreation, leisure, and sport – including marine environments – as a basic right. Article 30 of the Convention calls for equal access to tourism, cultural life, and recreational activities.

This reframes the conversation.

Ocean access is no longer a specialised offering. It is an obligation – one that the dive industry is uniquely positioned to fulfil.

## THE ECONOMICS OF INCLUSION BENEATH THE SURFACE

Dive tourism is already a powerful economic engine. Research published via Science Direct highlights that scuba diving contributes billions annually to coastal economies, while also supporting conservation funding.

Now consider layering accessibility onto that model.

A single adaptive diver may represent:

- A group booking of 3-6 people.
- Longer stays due to planning requirements.
- Higher loyalty and repeat visits.
- Off-peak travel patterns.

For resorts and water sports operators, this translates into revenue stability and market differentiation.

Accessibility is not philanthropy. It is strategy.

## DEFINING ACCESSIBLE OCEAN TOURISM

Accessible ocean tourism extends beyond ramps and railings. It is a multi-dimensional framework built on five core pillars:

1. **Physical Access**
   Barrier-free entry points, adaptive dive equipment, lift-assisted boat access.
2. **Instructional Inclusion**
   Modified teaching techniques, visual dive briefings, flexible pacing.
3. **Cognitive Accessibility**
   Structured environments & communication tailored for neurodiverse individuals.


4. **Digital Transparency**
   Clear online communication of facilities, certifications, and real experiences.
5. **Community Integration**
   Local employment, volunteer engagement, and inclusive participation.

These pillars redefine the dive centre – not as a service provider, but as an access enabler.

## TRAINING THE INDUSTRY: ADAPTIVE DIVING AS A DISCIPLINE

Adaptive diving is not improvised – it is trained, certified, and structured.

Organisations such as the Handicapped Scuba Association have long established methodologies for training divers with physical and sensory disabilities. These include:

- One-to-one & three-to-one buddy systems.
- Task loading adjustments.
- Customised buoyancy and propulsion techniques.
- Pre-dive skill conditioning and confined water adaptation.

Similarly, PADI has expanded its adaptive teaching framework, encouraging instructors to modify techniques based on individual ability rather than rigid standards.

This marks a critical shift in dive education – from standardisation to personalisation.

## ZERO GRAVITY, REAL IMPACT: THE SCIENCE OF DIVING AS THERAPY

What happens underwater is not just recreational – it is physiological & psychological.

Neutral buoyancy creates a sensation often described as "weightlessness," reducing pressure on joints and allowing freedom of movement that is difficult – or impossible – on land. For individuals with mobility impairments, this can be profoundly liberating.

Research published in Healthcare (MDPI, 2022) indicates that scuba diving can:

- Improve motor coordination and muscle control.
- Enhance mental wellbeing and confidence.
- Reduce anxiety and social isolation.

In effect, diving becomes a form of blue therapy – a convergence of rehabilitation, mindfulness, and adventure.


## ABOUT THE AUTHOR

Elsie Gabriel is a leading researcher in Accessible Ocean Tourism and Ocean Literacy, and a doctoral candidate whose interdisciplinary work bridges marine conservation, inclusive travel, and community engagement. She is an author of several books, with a strong commitment to making the oceans accessible to all. She advocates for sustainable and inclusive tourism practices that empower diverse communities and promotes environmental stewardship with commercial benefits for dive centres and resort water sports segments.

She serves as the International Director of the Handicapped Scuba Association (HSA), where she champions adaptive diving and works to break barriers for individuals with disabilities in marine exploration. She has launched the HSA training in Maldives, Philippines, Kerala, Goa, Lakshadweep Islands, Havelock Islands, Sri Lanka Islands among many others. Elsie is also the founder of Ocean School and the Young Environmentalists Programme Trust, initiatives dedicated to nurturing environmental awareness, ocean literacy, and youth leadership in conservation.

A recognised global voice in climate advocacy, she is a UNESCO Green Citizens Ocean Literacy project lead and the National Coordinator for Oceans for the Climate Reality Project - India and Asia. Her work spans education, policy advocacy, and grassroots mobilisation, creating meaningful impact at both local and international levels.

Elsie is a PADI Adaptive Scuba certified and HSA-certified diver, and an active member of leading global bodies including the IUCN, the Global Sustainable Tourism Council, and the Accessibility Association of Professionals. As a TEDx global speaker at G20, DRT, Oztec, UN Ocean Conference and ADeX, she has shared powerful insights on ocean conservation, accessibility, and the role of communities in protecting our planet, inspiring audiences worldwide.

# LAUNCHING THE PADI SHARK TANK DIVER SPECIALITY

## IN COLLABORATION WITH DIVE CLUB MALDIVES

WORDS BY **KATHLEEN RUSSELL, PADI COURSE DIRECTOR, OWNER OF AL MAHARA DIVING CENTER** PHOTOGRAPHY BY **DIVE CLUB MALDIVES**

As a dive professional and long-time visitor to the Maldives, I have always believed that one of the country's greatest natural treasures is its healthy pelagic species population found throughout the Maldivian archipelago. Encounters with a variety of sharks, eagle rays, and other pelagic species are not only unforgettable experiences for divers, but also an important reminder of the ecological balance required to maintain a healthy ocean.

A Wedgefish, more commonly known as the White-spotted Giant Guitar Shark (*Rhynchobatus djiddensis*).

A round ribbontail ray (*Taeniurops meyeni*).

Excited divers are gearing up for their first dive on a modernised Maldivian dhoni and it's a warm humid day in June. The dive crew is walking around doing their final checks and making sure everyone is analysing their enriched air cylinders which should be around 29% oxygen. PADI instructor Hussain, a Maldivian PADI dive pro and experienced shark guide from Dive Club Maldives gathers all the divers together and starts his well-rehearsed shark briefing about the famous Hulhumale Shark Tank dive which he is passionate about.

Over the last three years, he has seen it all. He has trepidation because he knows how divers react when they see the pelagic around this special dive site. He's seen divers trying to chase, touch, put a strobe flash in front of them and even feed the cruising sharks. He's seen sharks turn quickly and move erratically around divers who have swarmed together, blocking the shark's exit strategy. This has caused some incidents where divers were hurt and had to be rescued; luckily the sharks were not harmed.

Hussain, in his gentle and calm voice, explains to the divers why this dive site is so important as at any one time, five pelagic species of sharks can be encountered on a single dive. He continues to explain that divers must be vigilant and keep their eyes on these predators. Divers need to avoid all the invasive movements to appreciate the special nature of this in-water experience. His briefing is finished and the divers are now buzzing with excitement and anticipation of meeting the big 5 on this dive. They start to discuss their awaited encounters; the great hammerhead shark, tiger shark, bull shark, spinner sharks, lemon shark and lots of pink whip rays. Hussain prepares by entering first to check the current to ensure the water is safe from any curious tiger shark swimming to the surface. He gives the all-clear signal to the crew, it's time to descend into Shark Tank.

In 2025, Al Mahara Diving Center and Dive Club Maldives collaborated to develop and launch the PADI Shark Tank Diver Speciality – a programme designed to inspire greater awareness, understanding, and appreciation for sharks and their critical role in marine ecosystem balance. It's also important to understand that we as divers are visitors and sharks are the apex predators of the ocean. They evolved in the ocean, we did not. Through education, awareness, and responsible diving practices, we hope this speciality helps create divers who become ambassadors for shark conservation wherever they dive in the world.

"The economic impact that shark diving tourism has brought to the Maldives is immense. Every diver must become a guardian of these vulnerable animals and take responsibility for protecting their future," explains Hatthu, founder of Dive Club Maldives.

As a dive professional and long-time visitor to the Maldives, I have always believed that one of the country's greatest natural treasures is its healthy pelagic species population found throughout the Maldivian archipelago. Encounters with a variety of sharks, eagle rays, and other pelagic species are not only unforgettable experiences for divers, but also an important reminder of the ecological balance required to maintain a healthy ocean. This was just one of the reasons we were compelled to develop this course for the Shark Tank Dive site in Hulhumale.

Hatthu and I wanted divers to learn to appreciate their presence and to dive and


**TOP ROW:** Tiger shark (*Galeocerdo cuvier*); Bull shark (*Carcharhinus leucas*). **BOTTOM ROW:** Hammerhead shark (*Sphyrnidae*), Spinner shark (*Carcharhinus brevipinna*).

respect their boundaries. The PADI Shark Tank Diver programme was developed to give divers a deeper understanding of sharks beyond just the excitement of the encounter. The course explores the evolution and history of sharks, their role in maintaining healthy marine ecosystems, shark anatomy and behaviour, and the importance of the Maldives as a habitat for several pelagic species. Divers also learn about the significance of the Shark Tank dive site, safe and passive shark interaction techniques, responsible diving practices around pelagic species, and the importance of global shark conservation and monitoring during dives.

The divers surface as the dive ends and they climb back onto the dhoni, exhausted and energised. They are now regaling their shark adventure and recounting the sharks they actually saw. Divers eagerly start recounting the sudden appearance of a tiger shark from the blue, moments later to see the hammerhead shark charge through the school of giant trevallies. A fever of whip rays come swimming past the divers at speed for a brief moment; then they are gone. A slow-moving wedgefish, more commonly known as the white-spotted giant guitar shark, glides effortlessly along the sandy bottom. A shiver of spinner sharks suddenly rushes between the divers. The adrenaline is pumping now; divers lose their fear momentarily. They start to realise sharks are not something to fear, but something to appreciate and protect.

For many divers, Shark Tank is more than just another dive site to check off a list. It becomes an experience that changes the way they perceive sharks and understand the vital role they play in the ocean. They begin to understand that sharks are the gatekeepers of the ocean.

The Maldivian dhoni slowly heads back to the popular public jetty. The divers bring back more than just photographs and videos; they return with a deeper appreciation for the ocean, respect for the pelagic species and the feverish desire to protect these beautiful and awe-inspiring marine life. This time, the divers are filled with gratitude to have just been in the water with one of the ocean's most misunderstood predators.

The PADI Shark Tank Diver programme consists of knowledge development covering shark evolution and history, shark morphology, their ecological importance, shark species found in the Maldives, the significance of the Shark Tank dive site, shark safety, passive and responsible encounters, and the importance of global shark conservation and monitoring.

Hussain Rasheed, Maldivian shark diver and PADI Instructor, tells us, "the aim through the Shark Tank Speciality Course is to educate divers, change their mindset, and inspire them to become guardians of sharks and protectors of the ocean."


EDA
Emirates Diving Association
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Canon
DIVE
GARAGE
GrandStores
Dive
Campus
DIVERS
DOWN
Al Boom Diving
GOBLIN

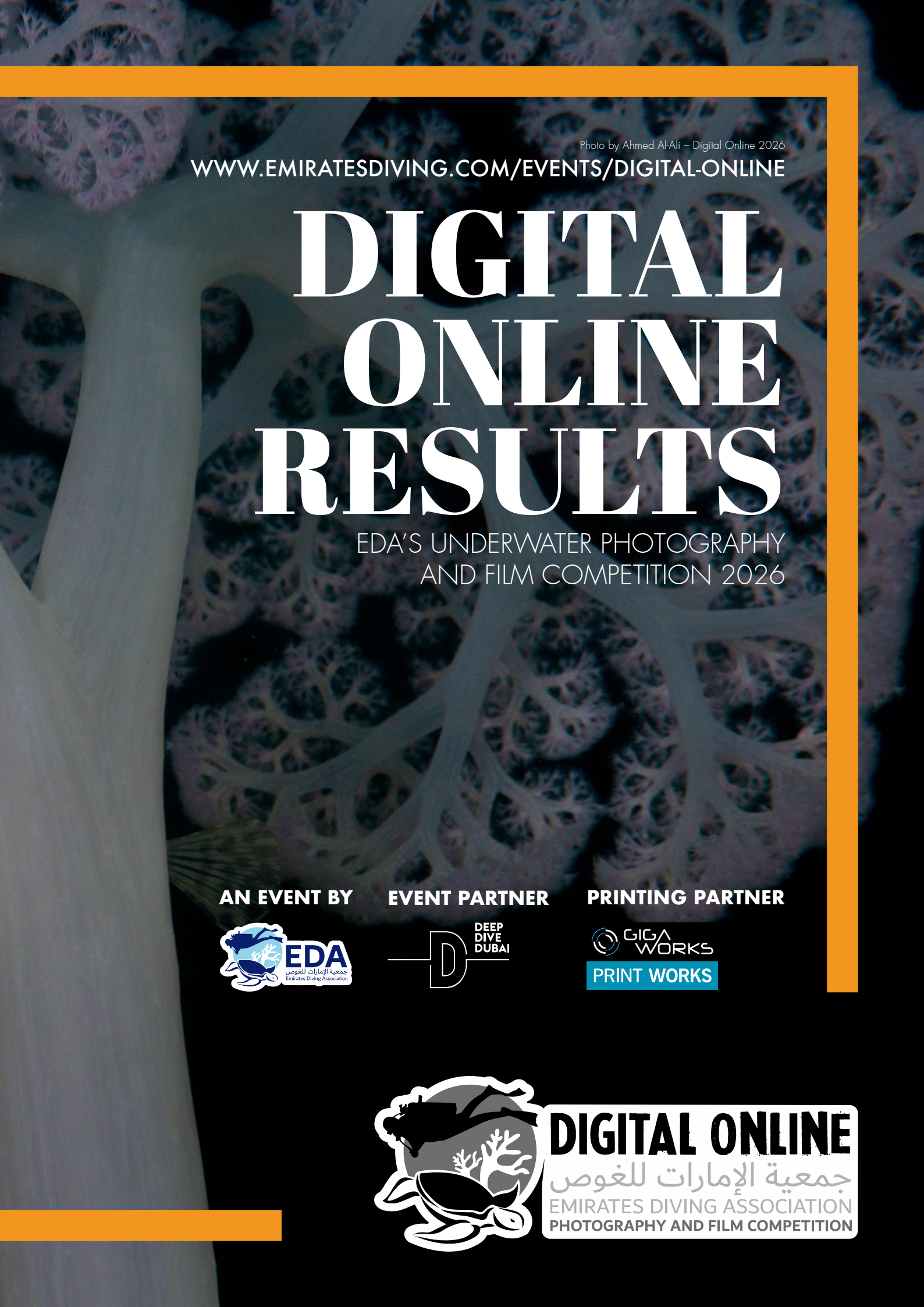

Photo by Ahmed Al-Ali – Digital Online 2026

WWW.EMIRATESDIVING.COM/EVENTS/DIGITAL-ONLINE

# DIGITAL ONLINE RESULTS

## EDA'S UNDERWATER PHOTOGRAPHY AND FILM COMPETITION 2026

**AN EVENT BY**

EDA
جمعية الإمارات للغوص
Emirates Diving Association

**EVENT PARTNER**

DEEP DIVE DUBAI

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


# BEST OF UAE'S PHOTOGRAPHY TALENT AWARDED AT EDA'S 17th ANNUAL DIGITAL ONLINE UNDERWATER PHOTOGRAPHY & FILM COMPETITION

Celebrating its 17th year, the annual Digital Online Underwater Photography & Film Competition recognised the best of the UAE's underwater photography talent across multiple image and video categories at the awards ceremony at Deep Dive Dubai on the 14th of May.

Open to EDA members, the competition was launched by the Emirates Diving Association (EDA) in 2009 with a mission to capture the beauty of the underwater world and reveal it to non-divers and those unfamiliar with the marine environment. Through the event, EDA seeks to develop a deeper relationship between the general public and the world's oceans to encourage conservation practices for this vital ecosystem.

Prizes were awarded to the winners by Juma Khalifa bin Thalith, EDA's Chairman and celebrated author, Ali Khalifa bin Thalith, renowned photographer and filmmaker and Secretary General of the Hamdan bin Mohammed bin Rashid Al Maktoum International Photography Award, and Mohamed Faraj Abdulla Jaber, EDA's Health, Safety and Technical Inspector.

Guests were also treated to a short presentation by Munther Ayache, Corporate Communication Manager at Canon Middle East, alongside Darryl Owen, Founder of Project REEFrame and Freestyle Divers, who discussed the powerful role of underwater photography and videography in driving ocean awareness and conservation. Reflecting on initiatives such as Canon's World Unseen campaign and Project REEFrame, the session highlighted the important role photographers and filmmakers play as ocean advocates, bringing the unseen beauty and challenges of the underwater world to wider audiences through visual storytelling.

Commenting on the 2026 awards ceremony, Juma Khalifa bin Thalith, Chairman of the Emirates Diving Association said, "I would like to wish a warm congratulations to all the winners tonight. The imagery and videography submitted this year by these talented individuals was fantastic, and I'm grateful to our judges from across the world who gave their valuable time to assess the best in each category. It's heartwarming to see so many ocean enthusiasts supporting our mission to reveal the underwater world to audiences across the United Arab Emirates and the world. I'm also deeply grateful to our sponsors for the event, who provided all the excellent prizes to reward the winners for their exceptional work. The competition could not succeed without you."

During the awards ceremony hosted at Deep Dive Dubai, the world's deepest diving pool, the 1st, 2nd and 3rd place prizes were presented


to winners across seven categories, with over 14 different nationalities represented in the list of winners, including three Emirati nationals.

Deciding on the winners is the panel of judges comprising world-renowned photographers: ocean explorer, underwater photographer and storyteller Kate Jonker from Cape Town, South Africa; marine biologist and underwater photographer Ollie Clarke from the UK based in Western Australia; and expedition leader and underwater photographer Simone Caprodossi from Italy, based in Byron Bay, Australia. Underwater filmmaker, cinematographer, and digital colourist David Diley from the UK; and the UAE's very own researcher, Mohamed Abdulla Almusallami, an award-winning underwater photographer and marine biologist, affiliate at Mohammed bin Rashid Academy of Scientists, Head of Fisheries Management at the Environment Agency – Abu Dhabi, and a Board Member at the Emirates Zoos and Aquariums Association.

Categories in the competition included Macro, Wide Angle, Best of the UAE, Black & White, Behaviour, Creative Underwater Photography, and the Video category, for which this year's theme was 'An Ocean Story'.

Ahmed Al-Ali, Ali bin Thalith, Issac Al-Zu'bi, Ahmed Alkaabi, Khalid Alrazooqi, Ibrahim Al-Zu'bi, Juma bin Thalith, Mohamed Faraj, Abdullah Salem Al Ruwaihy, and Dr Ahmed Al Bastaki.


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2026
THE AWARDS & EXHIBITION NIGHT


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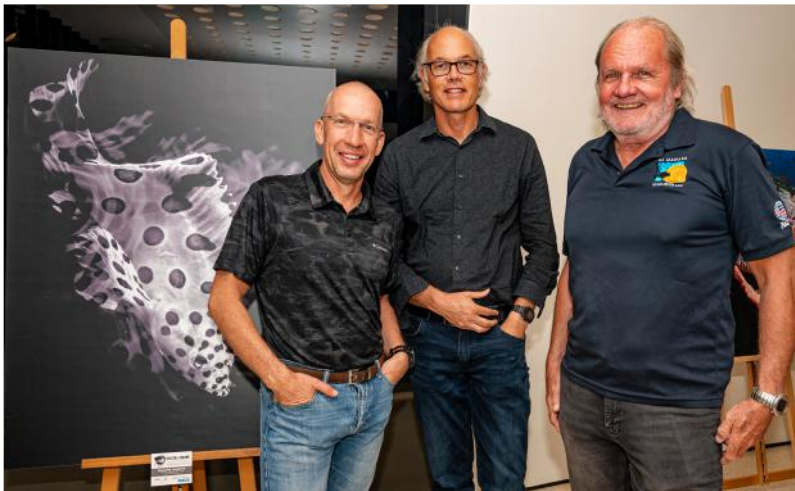

# THE WINNERS
## THE SPONSORS AND THE PRIZES

**1.** Mohamed Azmey | 1st Place Video: An Ocean Story (474 pts)
**PRIZE SPONSOR:** EMIRATES DIVING ASSOCIATION
Cash Prize: AED2,000

**2.** Taner Atilgan | 1st Place Macro (534 pts)
**PRIZE SPONSOR:** EMIRATES DIVING ASSOCIATION
Cash Prize: AED1,500

**3.** Ahmed Al-Ali | 1st Place Best of the UAE (498 pts)
**PRIZE SPONSOR:** XR HUB
Akuana Single Tank Regulator Package with 1st Stage, 2nd Stage, and SPG.

**4.** Philippe Lecomte | 1st Place Black & White (485 pts)
**PRIZE SPONSOR:** EMIRATES DIVING ASSOCIATION
Cash Prize: AED1,000

**5.** Sundeep Rao | 1st Place Wide-Angle (482 pts)
**PRIZE SPONSOR:** CANON
Canon PIXMA PRO-200S A3 Plus Colour Photo Wireless Printer.

**6.** Ilaria Mariagiulia Rizzuto | 1st Place Behaviour (478 pts)
**PRIZE SPONSOR:** MONSTER MIDDLE EAST
GoPro HERO13 + LARQ Bottle Swig Top + Monster Blaster Micro Bluetooth Speaker Bundle.

**7.** Hesma Fivaz | 1st Place Creative Photography (470 pts)
**PRIZE SPONSOR:** MONSTER MIDDLE EAST
GoPro HERO13 + LARQ Bottle Swig Top + Monster Blaster Micro Bluetooth Speaker Bundle.

**8.** Mohamed Mohsen | 2nd Place Video: An Ocean Story (432 pts)
**PRIZE SPONSOR:** DESERT ISLANDS RESORTS & SPA BY ANANTARA and AL MAHARA DIVING CENTRE
Complimentary one night stay in a Deluxe Sea View Room inclusive of breakfast for two adults and a 2-tank dive trip and a mangrove kayak trip at Anantara on Sir Bani Yas Island.

**9.** Mohamed Mohsen | 2nd Place Macro (487 pts)
**PRIZE SPONSOR:** MONSTER MIDDLE EAST
GoPro HERO13 + LARQ Bottle Swig Top + Monster Blaster Micro Bluetooth Speaker Bundle.

**10.** Ola Khalaf | 2nd Place Best of the UAE (468 pts)
**PRIZE SPONSOR:** DIVE GARAGE
DiveVolk Ocean Kit (Seatouch 4 Max).
A must-have accessory bundle for underwater photography enthusiasts.

**11.** Anthony Leydet | 2nd Place Wide-Angle (454 pts)
**PRIZE SPONSOR:** CANON
Canon SELPHY CP1500 Colour Portable Photo Printer.

**12.** Samer Halwany | 2nd Place Black & White (451 pts)
**PRIZE SPONSOR:** SHEESA BEACH DHOW CRUISES
A 2 Nights Sharing Musandam Liveaboard Dive Trip.
- Includes all meals, up to 6 dives, and full kit.
- An extra person accompanying the winner on this trip will be offered a 25% discount.

**13.** Paul John Mamiit | 2nd Place Creative Photography (438 pts)
**PRIZE SPONSOR:** DIVE GARAGE
DiveVolk SL20 Video Light for Underwater Photography.

**14.** Aadel Alzaabi | 2nd Place Behaviour (436 pts)
**PRIZE SPONSOR:** GRAND STORES
AED 500 Gift Voucher.
Redeemable at all UAE Grand Stores Showrooms.

**15.** Yevheniia Rehush | 3rd Place Video: An Ocean Story (404 pts)
**PRIZE SPONSOR:** GRAND STORES
AED 300 Gift Voucher.
Redeemable at all UAE Grand Stores Showrooms.

**16.** Yanni Smith | 3rd Place Macro (480 pts)
**PRIZE SPONSOR:** DIVERS DOWN
3 Pleasure Dives with Divers Down Fujairah.
Includes full equipment.

**17.** William Gausch | 3rd Place Best of the UAE (447 pts)
**PRIZE SPONSOR:** DIVE CAMPUS
2 East Coast Dive Trips with Dive Campus (4 dives). Includes full equipment.

**18.** Naima Amari | 3rd Place Behaviour (431 pts)
**PRIZE SPONSOR:** AL BOOM DIVING
2 Pleasure Dives with Al Boom Diving on East Coast. Includes full equipment.

**19.** Felipe Morales | 3rd Place Black & White (428 pts)
**PRIZE SPONSOR:** GOBLIN DIVING CENTER
Two Tank Boat Dive with tank and weights.

**20.** Hamid Al Ali | 3rd Place Wide-Angle (413 pts)
**PRIZE SPONSOR:** GOBLIN DIVING CENTER
Two Tank Boat Dive with tank and weights.

**21.** Jon Lapeyra | 3rd Place Creative Photography (403 pts)
**PRIZE SPONSOR:** EMIRATES DIVING ASSOCIATION
The Best of Digital Online Book – First Volume (2011-2017); and an EDA Spinal T-shirt in the design, colour, and size of choice.

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### HIGHLY COMMENDED

Photographers who have won multiple photo entries, win a prize for their highest score only. They receive an honourable mention for their other award-winning images which are also printed and displayed in the exhibition.

**FIRST PLACE**
1. Taner Atilgan | 1st Place Wide-Angle (520 pts)
2. Taner Atilgan | 1st Place Behaviour (509 pts)

**SECOND PLACE**
1. Philippe Lecomte | 2nd Place Macro (492 pts)
2. Taner Atilgan | 2nd Place Black & White (481 pts)
3. Ilaria Mariagiulia Rizzuto | 2nd Place Creative Photography (465 pts)

**THIRD PLACE**
1. Mohamed Mohsen | 3rd Place Best of the UAE (463 pts)
2. Mohamed Mohsen | 3rd Place Wide-Angle (463 pts)
3. Taner Atilgan | 3rd Place Creative Photography (459 pts)
4. Ola Khalaf | 3rd Place Behaviour (441 pts)

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

### COMPETITION CLAUSE

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

## HOW PRIZES ARE AWARDED

The Judges award a 3-way point system to each photograph/video consisting of Technique, Composition, and Impact which is combined to give the image or video's total grand score.

Scoring is on a basis of 100 points: 30 for technical merit, 30 for composition, and 40 for the impact.

Once the judging is complete, the winners choose their own prize from those available on the list they receive via email prior to the Awards Night. They know they have won, but they don't know which image has.

The best of show with the highest points gets first choice. First place winners with the highest score choose a prize before all other winners, and second place winners before third place winners.

A photographer can only win one prize. If photographers get multiple wins, their highest scoring image wins the prize and the other winning images are marked 'Highly Commended' and displayed in the exhibition as these are also award-winning images.

| | PHOTOGRAPHY | BEHAVIOUR | UAE | BW | CREATIVE | MACRO | WA | TOTAL |
|---|---|---|---|---|---|---|---|---|
| 1 | Mohamed Mohsen | 428 | 463 | 413 | 395 | 487 | 463 | 2649 |
| 2 | Ahmed Al-Ali | 426 | 498 | 418 | 414 | 447 | 348 | 2551 |
| 3 | Samer Halwany | 420 | 445 | 451 | 348 | 446 | 441 | 2551 |
| 4 | Taner Atilgan | 509 | | 481 | 459 | 534 | 520 | 2503 |
| 5 | Hesma Fivaz | 392 | 409 | 405 | 470 | 448 | 344 | 2468 |
| 6 | Naïma Amari | 431 | 379 | 377 | 445 | 392 | 363 | 2387 |
| 7 | Jon Lapeyra | 379 | 405 | 410 | 403 | 361 | 412 | 2370 |
| 8 | Felipe Morales | 392 | 419 | 428 | 407 | 346 | 360 | 2352 |
| 9 | Ilaria Mariagiulia Rizzuto | 478 | | 429 | 465 | 454 | 462 | 2288 |
| 10 | Sarah Kelly | 414 | 365 | 386 | 313 | 407 | 380 | 2265 |
| 11 | Philippe Lecomte | 429 | 414 | 485 | | 492 | 432 | 2252 |
| 12 | William Guasch | 389 | 447 | 422 | | 453 | 414 | 2125 |
| 13 | Anthony Leydet | 422 | | 365 | 395 | 472 | 454 | 2108 |
| 14 | Gordon Smith | 418 | 379 | 283 | 303 | 382 | 322 | 2087 |
| 15 | John Kennedy | 348 | 356 | 359 | 301 | 375 | 338 | 2077 |
| 16 | Nathalie Fouquet | 315 | 369 | 341 | 291 | 368 | 372 | 2056 |
| 17 | Hamid Al Ali | 386 | 352 | 413 | | 478 | 413 | 2042 |
| 18 | Chris Combes | 373 | 368 | 411 | | 395 | 379 | 1926 |
| 19 | Kimia Shad | 408 | 387 | 348 | 372 | | 404 | 1919 |
| 20 | Fakhruddin Husein | 368 | 375 | 339 | 385 | 411 | | 1878 |
| 21 | Khalid Alrazooqi | 340 | 369 | | 373 | 412 | 372 | 1866 |
| 22 | Henry Fernando | 297 | | 330 | 395 | 421 | 356 | 1799 |
| 23 | Sundeep Rao | | 436 | 408 | | 441 | 482 | 1767 |
| 24 | Yevheniia Rehush | 311 | 303 | 405 | 369 | | 378 | 1766 |
| 25 | Aadel Alzaabi | 436 | 398 | 380 | | 387 | | 1601 |
| 26 | Yanni Smith | 369 | 360 | 370 | | 480 | | 1579 |
| 27 | Ola Khalaf | 441 | 468 | | | 438 | | 1347 |
| 28 | Ahmed Alkaabi | | | | | 369 | 379 | 748 |
| 29 | Paul John Mamiit | 296 | | | 438 | | | 734 |
| 30 | Nasser Bakkar | | | 348 | | 339 | | 687 |
| 31 | Emil Duffey | | | | | 326 | 353 | 679 |

| | VIDEO: AN OCEAN STORY | |
|---|---|---|
| 32 | Mohamed Azmey | 474 |
| 33 | Mohamed Mohsen | 432 |
| 34 | Yevheniia Rehush | 404 |
| 35 | Ola Khalaf | 322 |

## OVERALL PHOTO & VIDEO WINNERS 2026

This year's overall winners for Digital Online's Photographer 2026 is Mohamed Mohsen with 2,649 pts, and Digital Online's Videographer 2026 is Mohamed Azmey with 474 pts who have both received this year's trophies. Congratulations to all our participants for taking part and sharing their work with us, and thank you to all our guests who came to support the event.

Ibrahim Al Zu'bi

Juma bin Thalith

Ali bin Thalith

Canon's World Unseen campaign and Project REEFrame Presentation.

Munther Ayache, Canon Middle East

Munther Ayache, Canon Middle East & Darryl Owen, Founder of Project REEFrame and Freestyle Divers

Jon Lapeyra 3rd Place Creative Photography – 403 pts
Prize Sponsor: Emirates Diving Association

Hamed Al Ali 3rd Place Wide-Angle – 413 pts
Prize Sponsor: Goblin Diving Center

Jonathan Laperdrix 3rd Place Black & White 428 pts
Prize Sponsor: Goblin Diving Center

Naima Amari 3rd Place Behaviour 431 pts
Prize Sponsor: Al Boom Diving

William Gausch 3rd Place Best of the UAE 447 pts
Prize Sponsor: DiveCampus

Yanni Smith 3rd Place Macro 480 pts
Prize Sponsor: Divers Down

Jenny Rehush 3rd Place Video 404 pts
Prize Sponsor: Grand Stores

Aadel Alzaabi 2nd Place Behaviour 436 pts
Prize Sponsor: Grand Stores

Paul John Mamiit 2nd Place Creative Photography 438 pts
Prize Sponsor: Dive Garage


Samer Halwany 2nd Place Black & White 451 pts
Prize Sponsor: Sheesa Beach Dhow Cruises


Anthony Leydet 2nd Place Wide-Angle 454 pts
Prize Sponsors: Canon


Ola Khalaf 2nd Place Best of the UAE 468 pts
Prize Sponsor: Dive Garage


Mohamed Mohsen 2nd Place Macro 487 pts
Prize Sponsor: Monster Middle East, GoPro & LARQ


Mohamed Mohsen 2nd Place Video 432 pts
Prize Sponsor: Desert Islands Resorts & Spa By Anantara and Al Mahara Diving Center


Hesma Fivaz 1st Place Creative Photography 470 pts
Prize Sponsor: Monster Middle East, GoPro & LARQ


Ilaria Mariagiulia Rizzuto 1st Place Behaviour 478 pts
Prize Sponsor: Monster Middle East, GoPro & LARQ


Sundeep Rao 1st Place Wide-Angle 482 pts
Prize Sponsor: Canon


Philippe Lecomte 1st Place Black & White 485 pts
Prize Sponsor: Emirates Diving Association


Ahmed Al-Ali 1st Place Best of the UAE 498 pts
Prize Sponsor: XR Hub Diving Center


Taner Atilgan 1st Place Macro 534 pts
Prize Sponsor: Emirates Diving Association


Mohamed Azmey 1st Place Video 474 pts
Prize Sponsor: Emirates Diving Association


Mohamed Mohsen Overall Digital Online Winning Photographer 2026 – 2,649 pts


Mohamed Azmey Overall Digital Online Winning Videographer 2026 – 474 pts

# DIGITAL ONLINE PANEL OF JUDGES

## OLIVER CLARKE
Marine Biologist and Award Winning Underwater Photographer

Growing up on the South Coast of England I developed a love for the ocean, which lead me to pursue a career in Marine Biology. After completing my studies in the UK, I spent almost 8 years travelling the world and working in marine conservation, the dive industry and photography. I now reside in Exmouth, Western Australia, with amazing access to the Ningaloo Reef and its iconic megafauna, its hard to find a better place to be an underwater photographer. In 2023 I was named British Underwater Photographer of the Year and have since gained a few more international awards.

www.OllieClarkePhotography.com
www.instagram.com/OllieClarkePhoto
www.facebook.com/OllieUnderwater

## DAVID DILEY | SCARLET VIEW MEDIA
Filmmaker, Underwater Cinematographer and Digital Colourist

David is a multi-award winning Film-maker, Underwater Cinematographer and Digital Colourist from the UK best known for his work with sharks and large marine megafauna as well as his multi-award winning feature documentary, "Of Shark and Man".

His profile has increased rapidly thanks to his work on a wide variety of projects for film and television, alongside his commercial work for a number of household brands.

David is the owner of Scarlet View Media, a high end boutique Production House in the north of England, and is a Panasonic Professional Ambassador and Angelbird Media Creative.

www.ScarletViewMedia.com
www.instagram.com/ScarletViewMedia

## KATE JONKER
Award Winning Underwater Photographer and Writer

Kate Jonker is a renowned ocean explorer, underwater photographer, and storyteller from Cape Town, South Africa. With a deep passion for the sea, Kate has earned national and international recognition for her captivating underwater photography. As an advocate for ocean conservation, she uses her platform to raise awareness about protecting marine ecosystems. Kate's work goes beyond photography – she is a respected writer, speaker, and educator, sharing her expertise through workshops, dive expeditions, and numerous publications.

As co-owner of Indigo Scuba Diving Centre and Underwater Photo Company, Kate leads unforgettable dive experiences and offers personalised photography coaching. Her role as a Marelux ambassador allows her to contribute to the underwater photography community, where she continues to inspire others to explore, appreciate, and protect the ocean's remarkable beauty.

www.KateJonker.com
www.instagram.com/KateJonkerPhotography
www.facebook.com/KateAJonker

## MOHAMED ALMUSALLAMI
Marine Biologist and Award Winning Underwater Photographer

Mohamed is a son of the Arabian Gulf. Coming from a long line of legendary pearl divers and fishermen, a strong bond ties him to the deep blue. He started his passion as a freediver and a spear-fisherman at an early age and naturally fell in love with the beauty of the underwater world.

He took up underwater photography in 2008, and has won several awards and been published internationally since. His eye-catching and distinctive style pushes the limits to how photographers represent life below the waves. Mohamed has dedicated himself to conservation and to the Art of Underwater Photography, putting forth the message, "The Ocean has given our ancestors everything, now it is our turn to give back".

As a marine scientist with a masters degree in Environmental Science, he works closely with sea turtles, dugongs, dolphins, and sharks, where he is also responsible for many rare scientific discoveries in the Arabian Gulf region. Mohamed is also a PADI Instructor, an affiliate at Mohammed bin Rashid Academy of Scientists (MBRAS), the Head of Fisheries Management at the Environment Agency – Abu Dhabi, and a Board Member at the Emirates Zoos and Aquariums Association.

www.instagram.com/b47r

## SIMONE CAPRODOSSI | SUNDIVE BYRON BAY
Award Winning Underwater Photographer

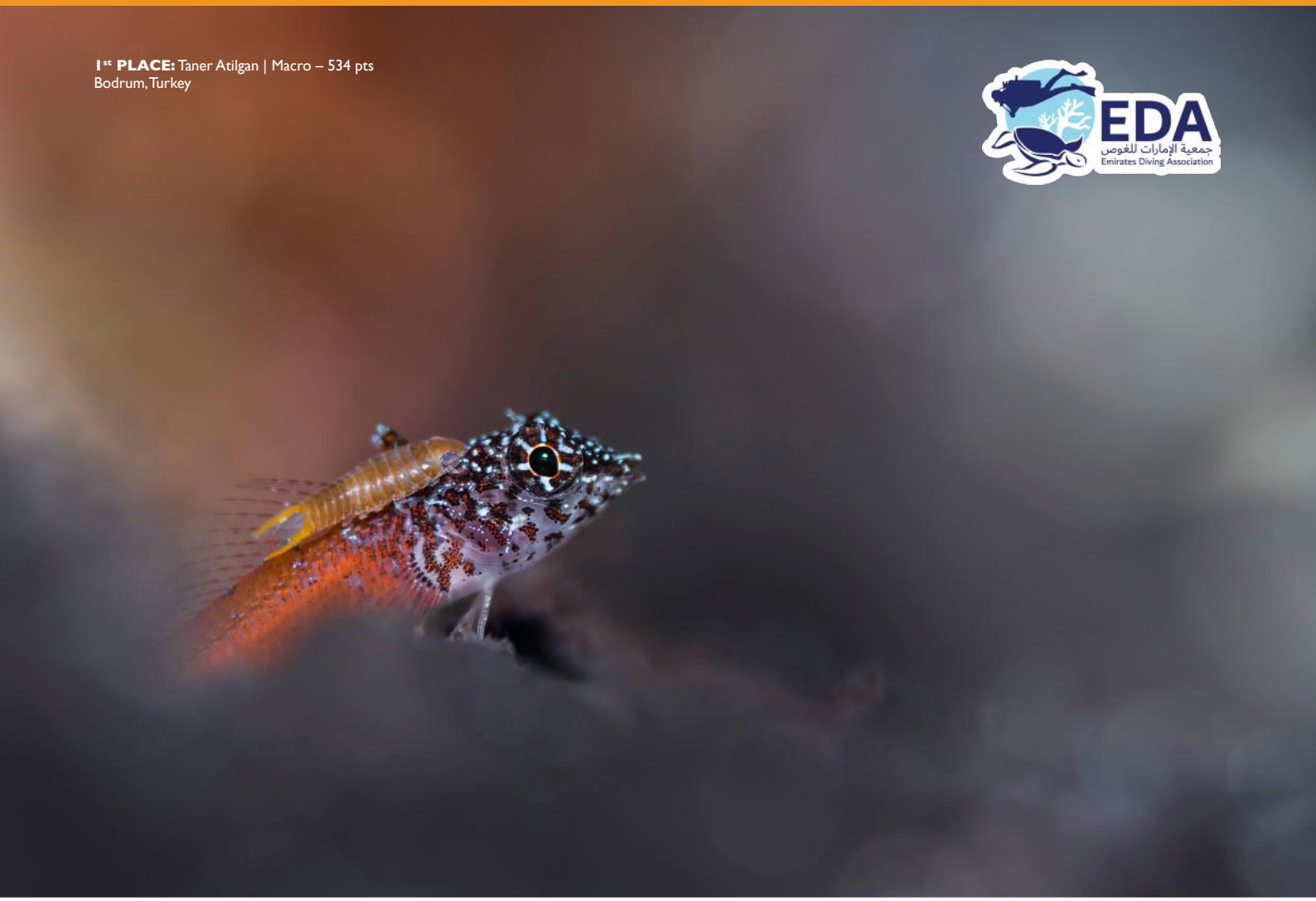
Simone is an Italian underwater photographer, who has been awarded in several prestigious competitions and published internationally. After over 10 years of corporate life in Dubai, he moved to Australia where he co-owns and manages Sundive Byron Bay, a PADI 5 Star Dive Centre offering dives at the amazing Julian Rocks in Byron Bay. After travelling to and photographing many unique diving destinations worldwide, he also runs expeditions with Sundive to help others experience and photograph his favourite ones such as the Sardine Run and Djibouti. Simone was the Overall Winner of Digital Online for two consecutive years until he became a judge for the competition and has been a main feature contributor to the EDA magazine, 'Divers for the Environment'.

www.instagram.com/SCaprodossi
www.facebook.com/SimoneCaprodossiPhotography

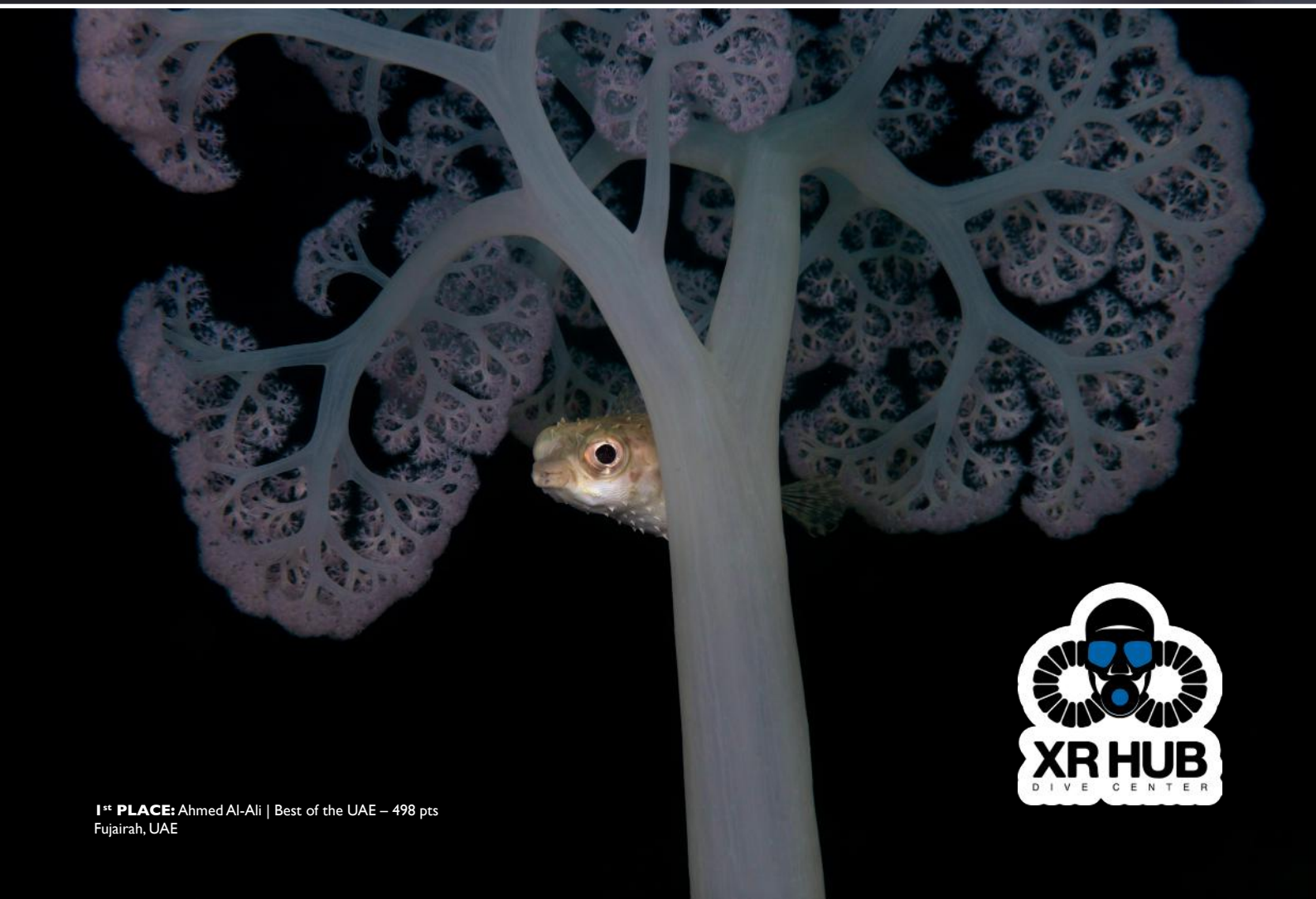
## ALLY LANDES | EMIRATES DIVING ASSOCIATION
Project Director, Editor, Graphic Designer, and Photographer

Ally joined EDA in December 2004 when she created and introduced the organisation's quarterly magazine, "Divers for the Environment". She played a central role in the development of Digital Online – EDA's Underwater Photography and Film Competition from its launch in 2009, as well as introducing the film category as an extension in 2012 to share our underwater world through motion pictures, and has managed the event since inception. Today, Ally continues to oversee the EDA team and develop the brand, manages design and production of the magazine, handles photography and videography, and runs the organisation's events and social media, all in the name of ocean conservation.

www.EmiratesDiving.com
www.instagram.com/EmiratesDivingAssociation
www.instagram.com/EDA_UAE



**1st PLACE:** Taner Atilgan | Macro – 534 pts
Bodrum, Turkey



**1st PLACE:** Ahmed Al-Ali | Best of the UAE – 498 pts
Fujairah, UAE

**1st PLACE:** Philippe Lecomte | Black & White – 485 pts
Lembeh Strait, Indonesia

**1st PLACE:** Sundeep Rao | Wide-Angle – 482 pts
Havelock, Andaman Islands, India





**1st PLACE:** Ilaria Mariagiulia Rizzuto | Behaviour – 478 pts
La Paz, Mexico

**1st PLACE:** Hesma Fivaz | Creative Underwater Photography – 470 pts
Dive Garage, Dubai



**HIGHLY COMMENDED**
**1st PLACE:** Taner Atilgan | Behaviour – 509 pts
Tenerife, Spain

**HIGHLY COMMENDED**
**1st PLACE:** Taner Atilgan | Wide-Angle – 520 pts
Raja Ampat, Indonesia

**2nd PLACE:** Mohamed Mohsen | Macro – 487 pts
Fujairah, UAE

**2nd PLACE:** Ola Khalaf | Best of the UAE – 468 pts
Khorfakkan, UAE

**2nd PLACE:** Anthony Leydet | Wide-Angle – 454 pts
Dhuni Kolhu, Baa Atoll, Maldives




**2nd PLACE:** Samer Halwany | Black & White – 451 pts
Maldives

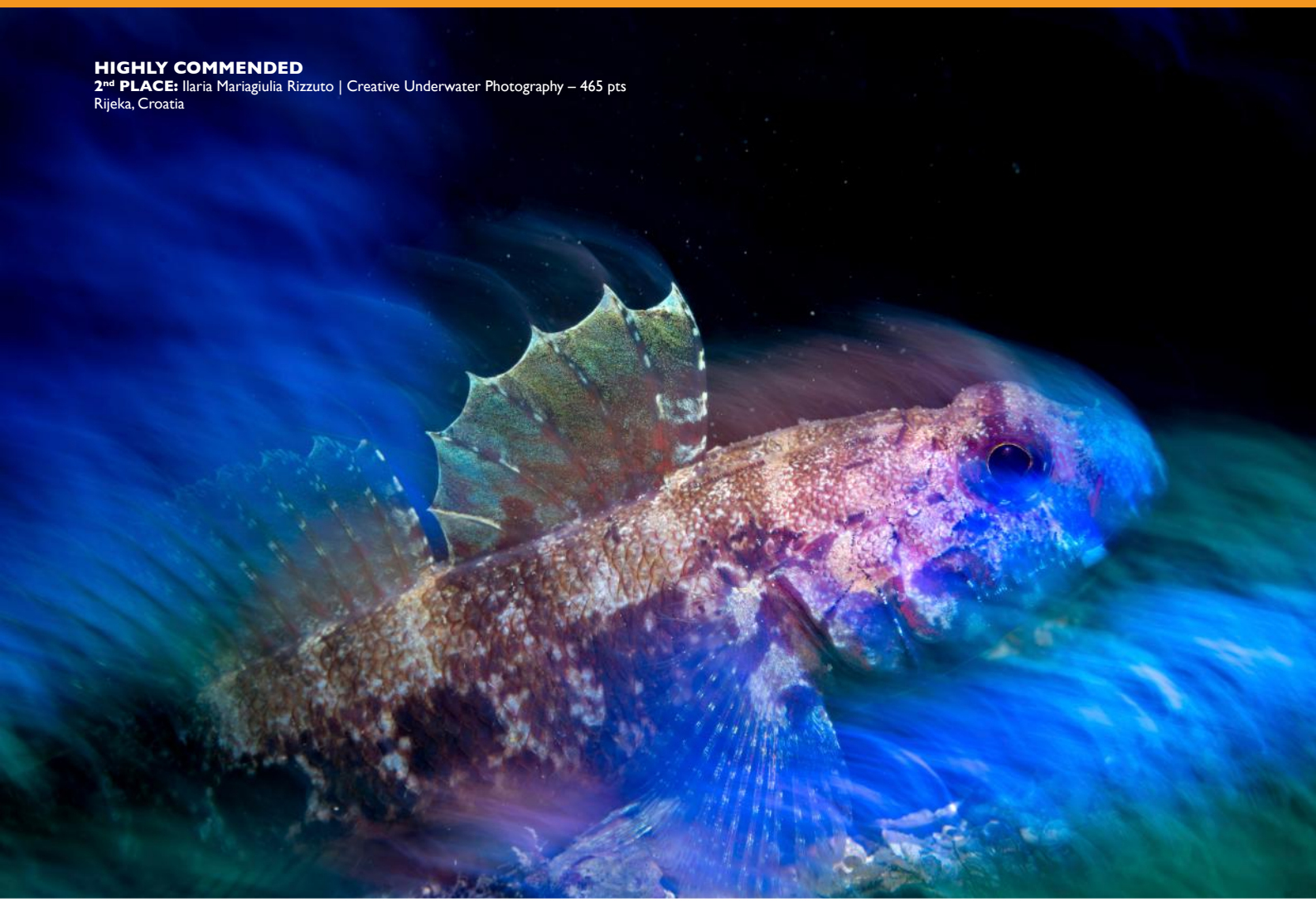

**2nd PLACE:** Paul John Mamiit | Creative Underwater Photography – 438 pts
Dibba Rock, Fujairah, UAE


**2nd PLACE:** Aadel Alzaabi | Behaviour – 436 pts
Khorfakkan, UAE

**HIGHLY COMMENDED**
**2nd PLACE:** Philippe Lecomte | Macro – 492 pts
Lembeh Strait, Indonesia

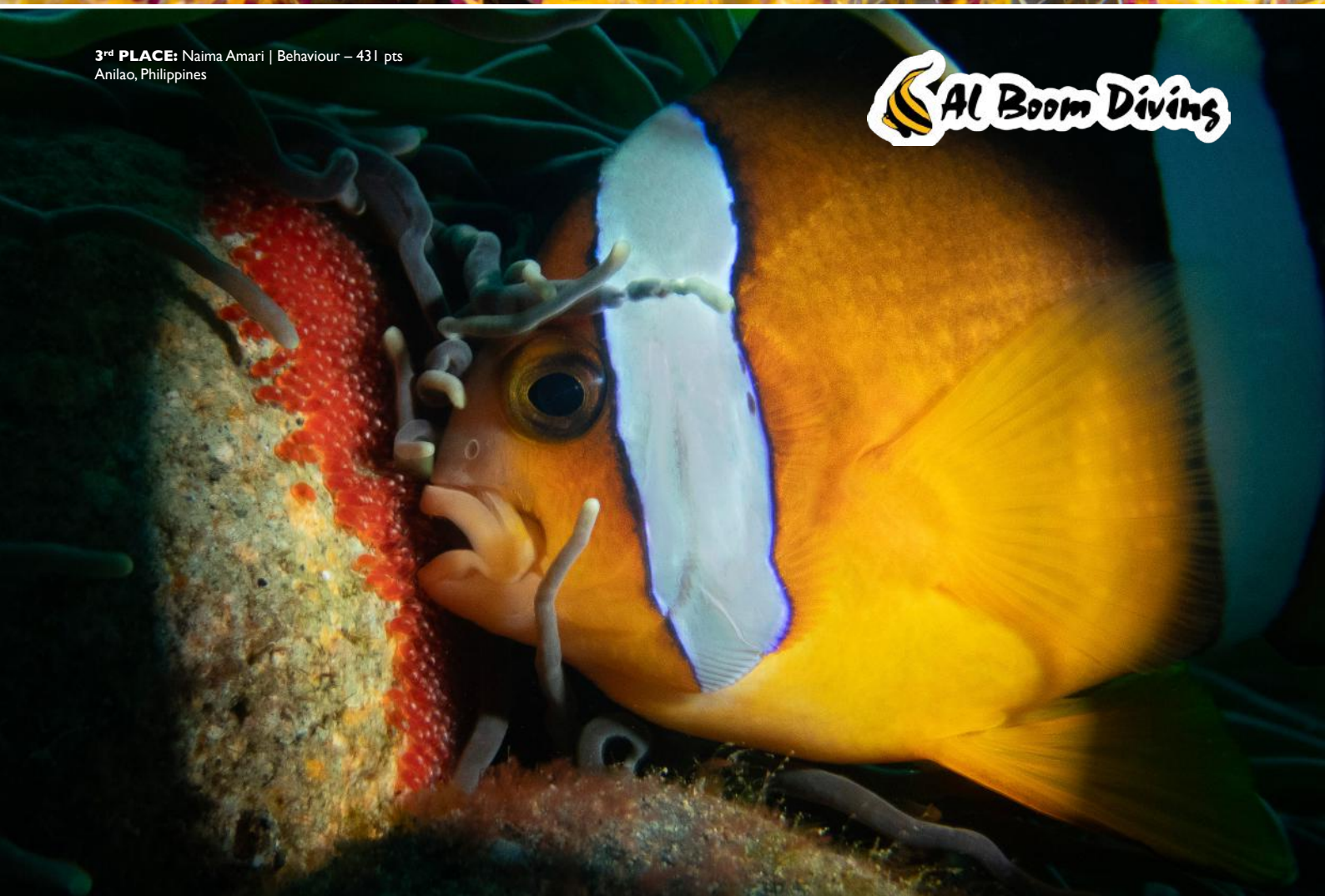
**HIGHLY COMMENDED**
**2nd PLACE:** Taner Atilgan | Black & White – 481 pts
Fethiye, Turkey

**HIGHLY COMMENDED**
**2nd PLACE:** Ilaria Mariagiulia Rizzuto | Creative Underwater Photography – 465 pts
Rijeka, Croatia

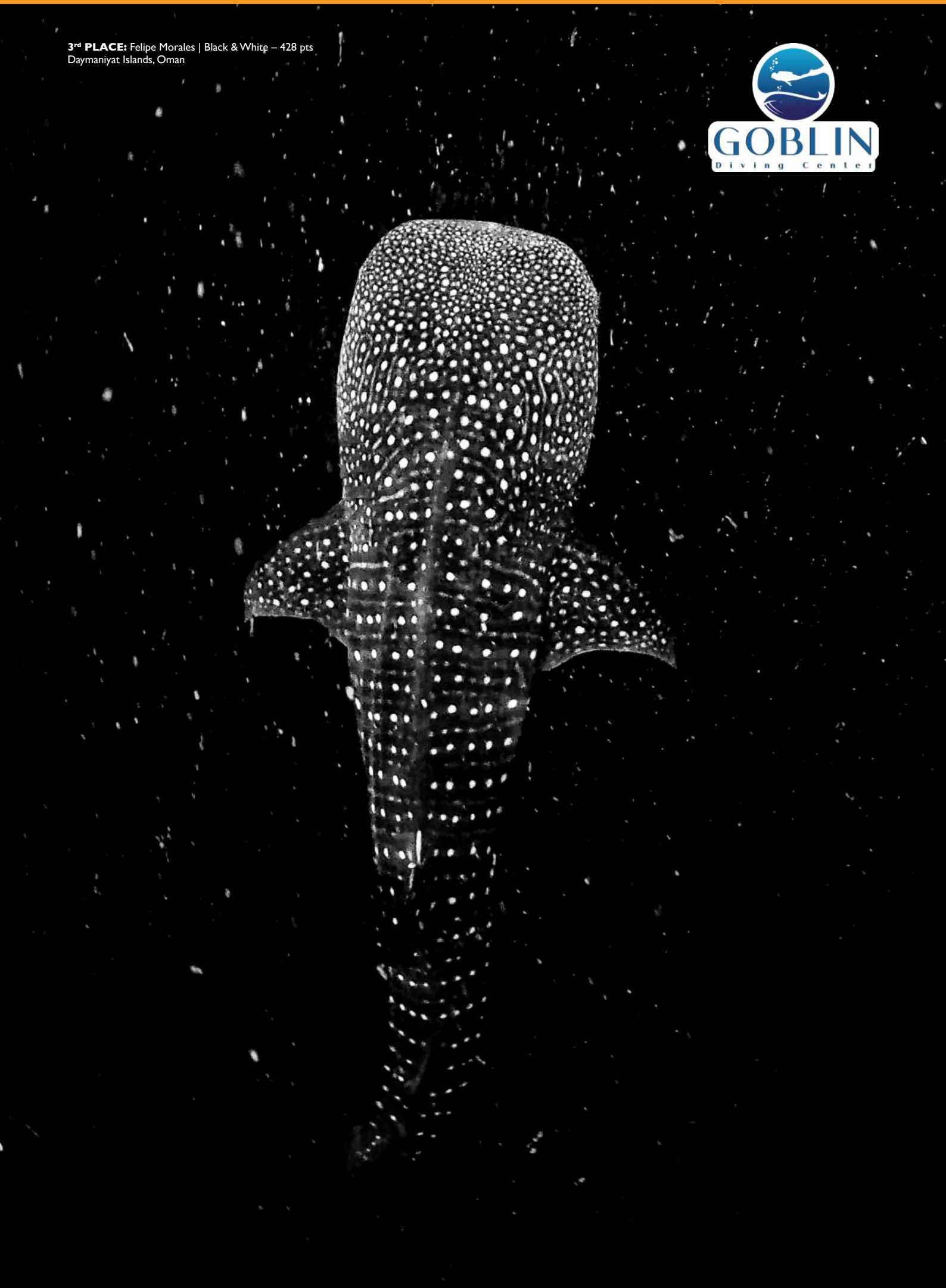


**3rd PLACE:** Yanni Smith | Macro – 480 pts
Tulamben, Bali, Indonesia

**3rd PLACE:** William Gausch | Best of the UAE – 447 pts
Inchscape 10, Fujairah, UAE



**3rd PLACE:** Naima Amari | Behaviour – 431 pts
Anilao, Philippines

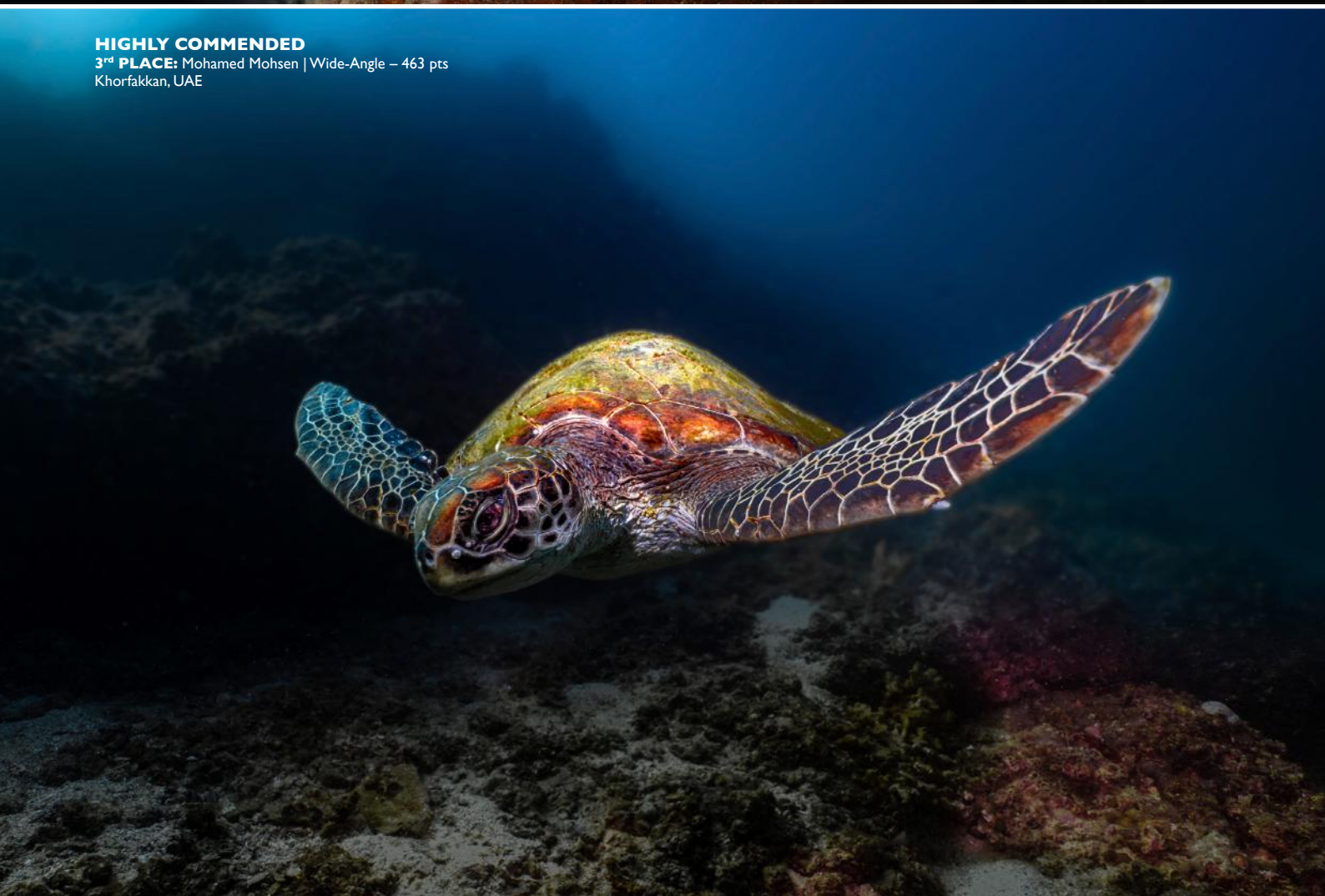


**3rd PLACE:** Felipe Morales | Black & White – 428 pts
Daymaniyat Islands, Oman


**3rd PLACE:** Hamid Al Ali | Wide-Angle – 413 pts
Okinawa, Japan

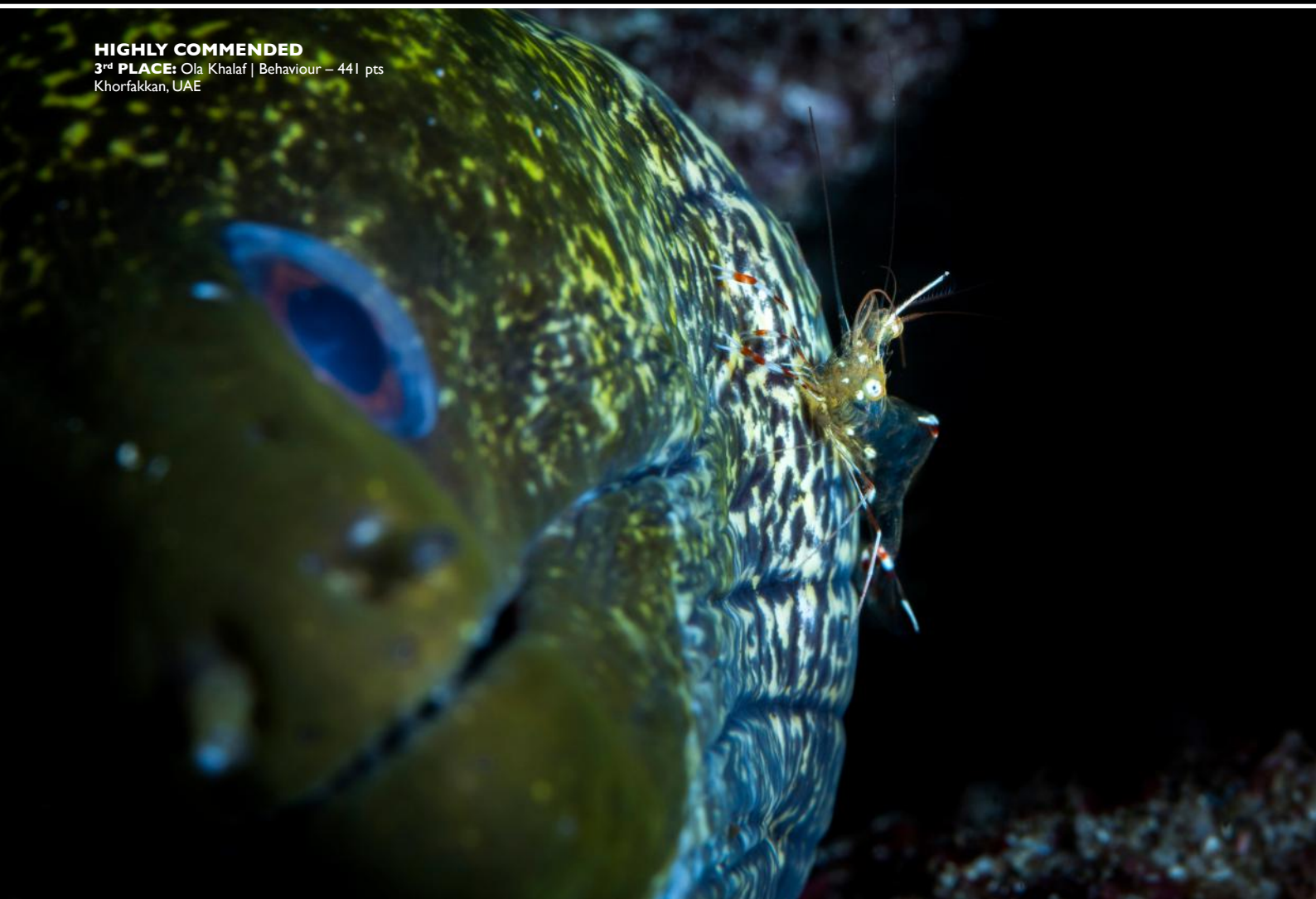

**3rd PLACE:** Jon Lapeyra | Creative Underwater Photography – 403 pts
Aqaba, Jordan

**HIGHLY COMMENDED**
**3rd PLACE:** Mohamed Mohsen | Best of the UAE – 463 pts
Dibba, Fujairah, UAE



**HIGHLY COMMENDED**
**3rd PLACE:** Mohamed Mohsen | Wide-Angle – 463 pts
Khorfakkan, UAE

**HIGHLY COMMENDED**
**3rd PLACE:** Taner Atilgan | Creative Underwater Photography – 459 pts
Manado, Indonesia



**HIGHLY COMMENDED**
**3rd PLACE:** Ola Khalaf | Behaviour – 441 pts
Khorfakkan, UAE

# 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

# NOT A HOLIDAY

## THE MALDIVES HAD NO IDEA WHAT WAS COMING

WORDS & PHOTOGRAPHY BY **JESPER KJØLLER**

Over 6,000 frames across six days. Videos, reels, stories, high-resolution stills, cinematic clips. Above water and below it, in wetsuits and silk skirts and mermaid tails. That is the scope of what a skilled, self-sufficient content team can deliver when the conditions – and the collaboration – are right.

**Underwater content creation at a professional level is not about pointing a camera at someone who looks good in a wetsuit. It requires trained divers, experienced performers, and a photographer who has spent decades learning where the light falls and when to fire. The Underwater Dream Team – three Dubai-based specialists with backgrounds in dive journalism, competitive freediving and professional contortion – recently spent six days at Pullman Maldives Maamutaa putting that proposition to the test. The results speak for themselves. The story behind them is worth telling.**

I am standing inside a darkened room, camera raised, watching through a floor-to-ceiling panel of glass. I am staring into the endless water column. Suddenly two mermaids spiral past each other in iridescent tails, their hair fanning out in slow motion. Outside, the Indian Ocean does what it always does – indifferent, luminous, extraordinary. This is not a holiday.

This is work. Specifically, it is the kind of work that only a very particular combination of people can do – and after six days at Pullman Maldives Maamutaa on Gaafu Alifu Atoll, I am more convinced of that than ever. The three of us – Jessica Whalen, Irina Kazakova and I – are invited to this resort not as guests, not as influencers passing through, but as a professional content production team with a specific brief, a serious haul of professional camera gear, and over 6,000 frames and terabytes of video to show for it.

We call ourselves the Underwater Dream Team. It sounds grand. But spend a morning coordinating a mermaid tail shoot with two breath-hold models, no masks, communicating through a glass panel with hand signals – and you will understand that the name is less about ego than about accuracy.

## THE TEAM

The three of us share a common base in the world of Deep Dive Dubai – the world's deepest pool and one of the most extraordinary aquatic facilities on the planet. That connection is important. By the time we land in the Maldives, we are not a bunch of strangers hoping to find a rhythm. We are a well-oiled production crew with years of working chemistry, built through hundreds of hours in the water together.

My role is the technical backbone of the operation. I bring more than 25 years of underwater photography behind me – published across international dive magazines, books and websites around the world – alongside a career as a dive journalist and magazine editor that has taken me from the editor's chair at DYK, Scandinavia's leading dive publication, to founding my own international title and eventually to my current role as Editor-in-Chief of Quest, GUE's member journal. Add to that my work as a GUE instructor, PADI Course Director, and more than ten years as head of marketing at Deep Dive Dubai, and you begin to understand why very little surprises me underwater – and why I know exactly what a strong image needs to look like before I even get under the surface.

But all this experience is worthless without having something worth pointing a camera at – and that is where Jessica and Irina are simply without equal.

Jessica Grace Whalen is a cabin crew member who has built a remarkable parallel life underwater. A strong freediver with a personal best of 60 metres, she is also a GUE Fundamentals scuba diver with a Tech Pass – certifications she earned training with me at Deep Dive Dubai, where she also completed her PADI Advanced Open Water. Alongside her flying career she enjoys content creation, and with a marketing degree backing her instinct for what works on camera – and specifically what is trending on TikTok this week – she shapes every shot we plan

Irina Kazakova is a contortionist, aerialist and


underwater performer with a background in national-team rhythmic gymnastics. Based in Miami but a frequent presence in Dubai, she is deeply embedded in the global dive community – a certified technical diver, freediver and scuba instructor who recently passed her GUE Tech 1. She has performed for Madonna and Snoop Dogg. Underwater, her movement is unlike anything else in content creation.

The division of labour is clear but complementary. I handle the technical. The girls handle the creative – the concepts, the styling, the awareness of what is trending across platforms, the fashion sensibility that transforms a good underwater shot into something that stops a scroll. Neither half works without the other. And critically, this is not a team assembled for a single trip. I have trained both Jessica and Irina as divers over the years. They are not just performers who happened to agree to dive. They are accomplished divers who happen to be extraordinary performers – and in the water, that distinction matters enormously.

## THE ASSIGNMENT

Six days. Every environment the resort offers: on the dive sites, at the surface, below it, in the pool, on the beach, on the overwater boardwalks, and – most memorably – in the remarkable Aqua Villa. Early mornings waiting for the light to shift. Long afternoons managing multiple setups in and out of the water. Getting from one location to the next means walking, cycling, jumping on an electric buggy or transferring between sites by boat — all with a full load of camera gear in tow. We are shooting simultaneously for social media, high-resolution stills for web and print, and cinematic video clips for the resort.

The Aqua Villa is one of two unique rooms at the resort featuring an underwater bedroom with a full viewing window that looks directly onto the house reef. For a content team with freedivers and an underwater performer, the moment we see it, we know exactly what we want to do with it.

## UNDERWATER – THE SPINE OF THE WORK

The reef around Maamutaa is healthy and abundant. On our diving days we encounter several turtles, rays and sharks. The hawksbill and green turtles rest on coral heads or cruise the walls, occasionally gliding so close that I have to pull back on my wide angle to keep them in frame. The kind of encounters that remind you why people fall in love with this ocean.

The scuba diving gives us our classic dive-magazine shots – both girls neutrally buoyant over staghorn coral, a turtle in the foreground filling the frame, the deep blue of the Indian Ocean rising behind them. Beautiful images – almost too easy when you have subjects with this level of water confidence and buoyancy control. Situational awareness is the key, and the girls instinctively swim into position when a Kodak moment occurs – a turtle on a coral block, a curious batfish passing by, a ray buried in the sand. We work efficiently, relying on the almost telepathic communication built over years of working together.

Both Jess and Irina are accomplished freedivers, and in the water they share a quality that no amount of coaching can manufacture: presence. Over the reefs, both of them – independently and together – produce moments of real beauty. Gliding effortlessly above the coral, long freediving fins trailing behind them, and as a photographer who has worked with both of them long enough to anticipate the moment before it arrives, I am able to capture everything.

What most people do not appreciate is how much is happening beneath the surface of what looks effortless. Underwater modelling is a discipline in its own right. It demands constant situational awareness – where is the light falling, what is the current doing, how is the surge affecting the fabric of a dress, is the marine life moving into or out of frame. Hair




and clothing behave differently underwater and have to be actively managed on every breath hold. The model has to simultaneously read the photographer, read the environment, and perform – all while managing the physical and psychological demands of being underwater without a mask, on a single breath, in open water. That requires composure, experience, and a particular kind of courage that does not show up on a follower count.

Jess and Irina bring all of it. That is not a compliment. It is a job description.

The Suvadiva Dive Center offers mermaid experiences in the resort pool – a concept that resonates strongly with the resort's many guests from South East Asia, where mermaid culture has a devoted following. When we spot the mermaid tails in the dive centre, we look at each other and immediately see a different opportunity.

Swimming in a mermaid tail in open water is considerably more demanding than it looks. There is no independent leg movement – propulsion comes entirely from a fluid, full-body dolphin kick – but Jess and Irina make it look effortless.

Shooting through the villa's underwater window, I position myself inside the room while Irina performs in her signature pink dress in the water outside. We want Jessica to play the role of a surprised guest in the villa, so she stays inside, pressed against the glass. Two worlds separated by a pane of glass: the quiet luxury of the room on one side, and something altogether more extraordinary on the other.

But we want to milk the location for everything it has. We try different combinations, swapping roles, adding the mermaid tails, and eventually end up with both mermaids performing outside simultaneously. We also return after dark, shooting with the reef lights on – a surrealistic scene that neither a conventional photographer nor a conventional model could pull off alone.

Throughout, Suvadiva Dive Center manager Mathis Denevault stays at the surface with a float, providing both safety cover and a rest point between dives. On a shoot like this, that support is not optional – it is the foundation that makes everything else possible.

## WHEN THE PLAN GOES OUT THE WINDOW

One of our scheduled diving days is cancelled due to weather. The sea is running too rough for safe boat operations, and the dive centre makes the right call. We do not write the day off. We read the light.

The storm delivers something unexpected: dramatic skies. Thick, rolling cloud banks build over the atoll, creating backdrops with far more depth and detail than a clear blue sky ever offers. We move to shoot fashion pieces – beach wear, freediving suits, evening wear – with the Indian Ocean as a backdrop. Moody, cinematic, genuinely arresting.

Nature does not care about your shot list. But if you know how to adapt to what is handed to you on any particular day, it will occasionally yield something better than what you planned. The cancelled dive day gives us some of the strongest frames of the trip.

## ABOVE THE SURFACE

Not every frame comes from reef dives – and that breadth is itself part of the point. We shoot yoga and stretching sequences in the late afternoon. We jump on a white sand bank in flowing dresses as the tide comes in. Lifestyle shots on the beach, around the resort pools, and on the transfer boats. A modern content production assignment covers all of it.

These images are important and we take them seriously. But they are also images that any competent photographer and a willing subject could produce. What sets this team apart is what happens when we get in the water.

The dive centre also wants content to promote their Discover Scuba Diving programme – an experience that begins in the pool and transitions to the open water after a short walk on the beach. The girls volunteer to play first-time divers, and we spend an afternoon shooting in and around the pool, including some split-level over/under shots that show off both the resort's lush surroundings above and the clear water below.

### THE BIGGER PICTURE

When I reflect on six days at Pullman Maldives Maamutaa, what strikes me most is not any single image. It is the efficiency of what we produce as a unit. Three people who have trained together, dived together, and built a shared visual language over years. There is almost no briefing required between shots. A look, a gesture, a positioning of the body in the water – and everyone knows what is needed. That kind of shorthand does not come from a first meeting.

The Maldives delivers everything it is supposed to deliver. Warm water, visibility that makes you feel like you are floating in glass, marine life that shows up without being chased. Pullman Maamutaa adds something that few resorts can offer: an underwater room, a well-run dive operation, and the space to work without interference. The resort also has their own photography and drone team on the ground, and the collaboration between both crews makes for a productive and efficient operation all round.

Over 6,000 frames across six days. Videos, reels, stories, high-resolution stills, cinematic clips. Above water and below it, in wetsuits and silk skirts and mermaid tails. That is the scope of what a skilled, self-sufficient content team can deliver when the conditions – and the collaboration – are right.

The only question now is: where next?

## THE UNDERWATER DREAM TEAM

JESPER KJØLLER:

- Head of Marketing, Deep Dive Dubai.
- GUE Instructor.
- PADI Course Director.
- Editor-in-Chief, Quest (GUE Member Journal).
- 25+ years published underwater journalist and photographer.
- Danish, based in Dubai.

**www.instagram.com/jesperkjoller**

JESSICA WHALEN:

- Cabin Crew, freediver, personal best 60m.
- GUE Fundamentals/Tech Pass.
- PADI Advanced Open Water.
- Starred in the world's first underwater bullet time sequence.
- 59M+ campaign views.
- 250K TikTok ·
- 33K Instagram.
- Australian, based in Dubai.

**www.instagram.com/jessicagracewhalen**

IRINA KAZAKOVA:

- Contortionist, aerialist, underwater performer.
- National-team rhythmic gymnastics background.
- GUE Tech 1.
- Certified technical diver, freediver, scuba instructor.
- Performed for Madonna and Snoop Dogg.
- 148K Instagram.
- Russian, based in Miami.

**www.instagram.com/sunallure**

## WEBSITE

**www.uwdreamteam.com**

## CAMERA EQUIPMENT

UNDERWATER SYSTEMS

- Nikon Z8 in Nauticam Housing
- Sony A1 in Nauticam Housing
- Nikon Lenses: Nikon 14-30mm f/4, Nikon 24-70mm f/2.8, Nikon 16-35mm f/4
- Sony Lens: Sony 12-24mm f/2.8
- Inon Strobes
- Atomos Ninja Monitor in Nauticam Housing

TOPSIDE

- Nikon D850

VIDEO & 360°

- 2 × Insta360 X5
- DJI Action 6
- iPhones

## PULLMAN MALDIVES MAAMUTAA

LOCATION

Gaafu Alifu Atoll, southern Maldives. 45-min seaplane from Malé.

ACCOMMODATION

Beach and overwater villas including the signature Aqua Villas – two rooms featuring a bedroom with an underwater viewing window onto the house reef.

DIVING

Suvadiva Dive Center & Watersports on-site. PADI 5-Star. Nitrox available.

WATER ACTIVITIES

Scuba, freediving, snorkelling, jet ski, wakeboard, flyboard, dolphin cruises, sunset fishing.

**pullmanmaldivesmaamutaa.com**
**www.instagram.com/pullmanmaldivesmaamutaa**

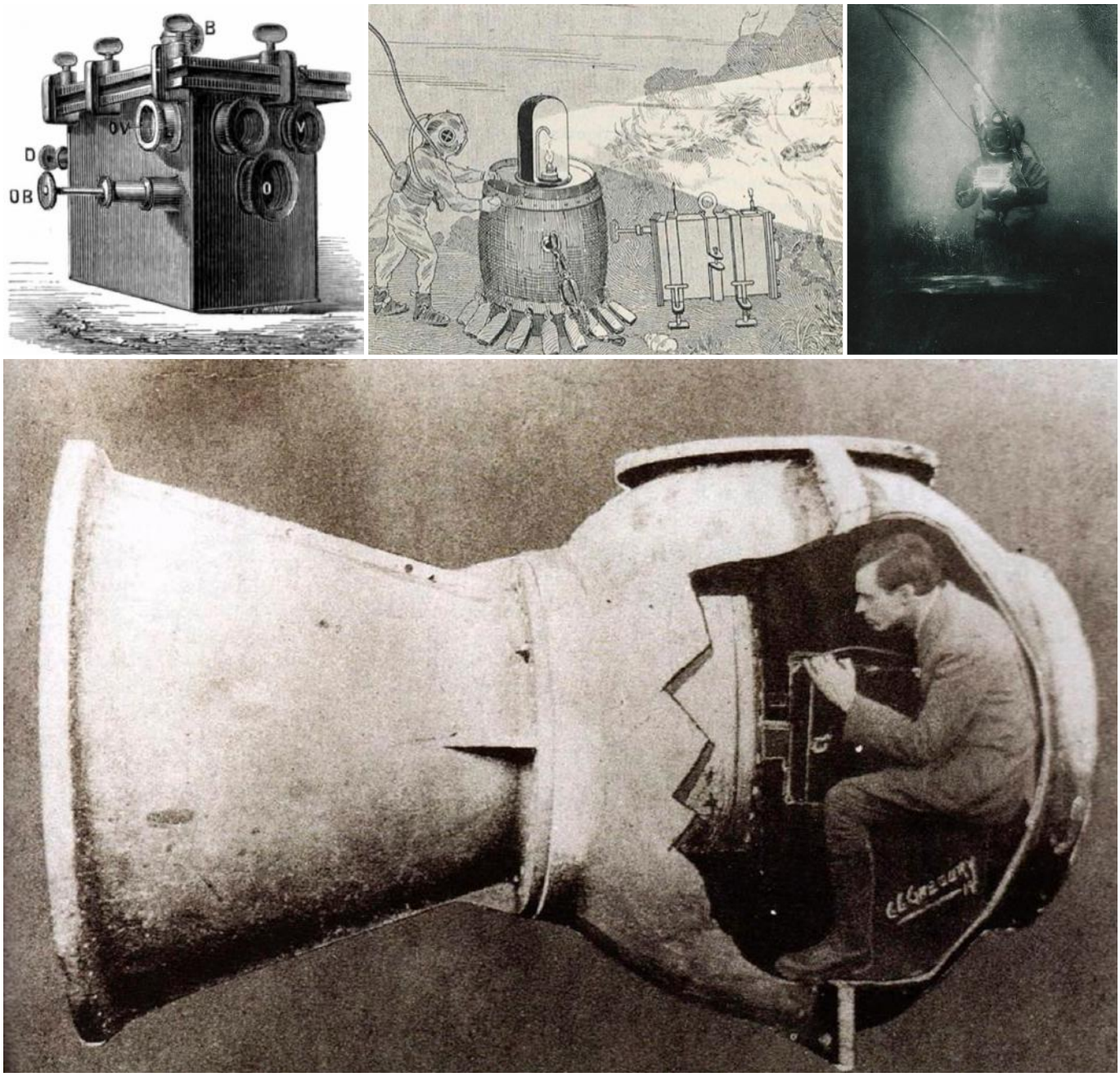
# BENEATH THE SURFACE:
## A TIMELINE OF OCEAN PHOTOGRAPHY

WORDS & PHOTOGRAPHY BY **SAMER HALWANY**

From William Thompson's first experimental shot to the mass-market success of the GoPro and todays mirrorless cameras, the journey of underwater photography has been one of incredible grit and innovation. These pioneers transformed a scientific challenge into a creative art form, making the ocean's depths accessible to us all.


The Nikonos 5 (1984).


105




**ABOVE LEFT-RIGHT:** Boutan's first underwater camera (1893); First flash system used by Boutan in 1899; Raco-Boutang first underwater Portrait 1899; and the Photosphere capturing the first motion footage.

## THE EARLY START: AN UNDERWATER CAMERA WITHOUT A DIVER

It all started in 1856 in Dorset, UK when William Thompson, driven by a scientific curiosity and an artistic desire, was a able to produce the first underwater photograph. His technique involved coating a plate with light-sensitive collodion, exposing it in the camera, and then immediately developing it while it was still wet. That day Thompson and his friend Kenyon, rowed out a sufficient distance from the beach and lowered the camera box into 18 feet of water. When he was sure that the apparatus was standing upright on the bottom, he pulled the string that raised the hinged shutter. Thompson gave two attempts that day, with two different shutter speeds. One with 5 seconds that came out totally dark, and one with a doubled shutter speed of ten seconds which brought the birth of the first underwater image: a fainted shot of seaweed.

## THE FIRST MAN TO DIVE WITH AN UNDERWATER CAMERA

It was only 37 years later in 1893 that Louis Boutan, a French marine biologist, developed the first official underwater housing to be able to take photographs while diving. For his first attempt, he used a small detective camera box and built a wooden underwater housing for it. He later moved to a more developed and well sealed system, with an iron box housing. Cameras and photographic processes of that time were not exactly user-friendly, especially not in a marine environment. The camera Boutan used was a big, bulky, and complicated affair. It was a wooden box camera, heavy enough to counteract the buoyancy of the water. Boutan had to work with a slow photographic emulsion, which required him to remain still for exposure times that could last several minutes. A considerable challenge when trying to hold his breath!

Boutan was also a pioneer in creating artificial lighting for underwater photography. The lack of natural light underwater meant that Boutan had to experiment with different methods of artificial illumination. One of his most successful inventions was an underwater flash bulb, which involved a pan of magnesium powder that was ignited by electricity. He took his first self portrait in 1893 using natural Light, and in 1899 he was able to photograph his dive buddy with a flash.

## FROM STILL TO MOTION (THE WILLIAMSON PHOTOSPHERE)

The first underwater motion picture was captured in 1914 by John Ernest Williamson,


The Calypso Nikonos II (1960).

a British-born photographer and filmmaker. He achieved this using his invention, the Williamson Photosphere, which served as a pressurised observation chamber for filming. The photosphere was a windowed chamber attached to an iron tube that allowed Williamson to film beneath the surface from a dry, safe environment.

Williamson filmed the first ever recorded film titled 'The Terrors of the Deep'. In 1914, the film featured the first footage of a shark fight. This technology paved the way for the 1916 film adaptation of 20,000 Leagues Under the Sea, the first commercial film to feature extensive underwater cinematography.

## FROM MONOCHROME TO COLOUR PHOTOGRAPHY

Colour underwater photography began in 1926, when Dr William Longley and National Geographic photographer Charles Martin captured the first colour images of Hog fish and coral in the Florida Keys. They utilised early autochrome plates, which were complex and required hypersensitizing to work, taking pictures in about 1/20$^{th}$ of a second.

Lighting was achieved using a custom-made underwater camera housing and a raft on the surface that detonated magnesium flash powder to illuminate the scenes.

## THE OCEAN EYE PIONEERS

From 1930 up to 1950, underwater photography shifted from a high-stakes scientific experiment, into a professional creative medium. While it wasn't yet accessible to the public, this era saw the birth of modern diving technology and the first professional underwater celebrities.

This period was dominated by individual explorers who had to build their own equipment because commercial gear didn't yet exist.

- **Hans Hass (The "Huntsman"):** In 1937, Austrian Hans Hass began diving with a custom-built housing for his Zeiss Movikon 16mm camera. He published the first popular book of underwater photos, 'Diving to Adventure' (1939), and released the first underwater hunting film, 'Stalking Under Water' (1940).
- **Bruce Mozert (The Publicity Visionary):** Starting in the late 1930s, Bruce Mozert transformed Silver Springs, Florida, into an underwater studio. He built waterproof housings and perfected lighting to capture surreal scenes of models doing "land" activities such as barbecuing or reading newspapers underwater.
- **Jacques Cousteau:** While Cousteau is more famous for the 1950s, his foundational work happened in 1943. He and Émile Gagnan co-invented the Aqua-Lung diving system, which finally freed photographers from heavy surface-supplied hoses.

## A CAMERA FOR EVERY DIVER

Underwater photography began its commercial journey in 1950 with the release of the Beuchat Tarzan, the first commercial waterproof housing. It was available in two models designed to fit either the French Foca or the Leica II 35mm cameras. By 1954, professional underwater photography reached a new milestone when Hans Hass launched the Rolleimarin housing. Specifically engineered for the Rolleiflex twin-lens camera, it allowed divers to capture high-quality images on 120mm medium-format film, though the housing itself remained bulky and heavy.

A major shift occurred in 1961 with the birth of the first truly amphibious camera: the Calypso. Conceived by Jacques Cousteau


The Minolta Weathermatic A (1980).

The Nemrod Siluro with Flash Arm & Magnesium Bulb (1960s).

and designed by Jean de Wouters, it was the world's first purpose-built 35mm waterproof camera. Recognising its potential, Nikon purchased the design and released it in 1962 as the Nikonos. With its compact size, 60-metre depth rating, and interchangeable Nikkor optics, the Nikonos series democratised underwater photography. It eventually became the most successful series in history, spanning five generations until 2001.

Following the success of the Nikonos, several other brands emerged to mark the movement:

- **Nemrod Siluro (Early '60s):** A Spanish 120mm camera (6x6) featuring a sports finder and a depth rate of 40 metres.
- **Minolta Weather Matic (1980):** A 110-format amphibious camera with a built-in flash.
- **Canon Aqua Snappy (1987):** A user-friendly 35mm camera with a 10-metre depth rating and an attachable sports finder.
- **Sea & Sea MX10 (1990):** A distinctive yellow 35mm camera with a dedicated flash unit capable of reaching depths of 45 metres.

## EVOLUTION & EDUCATION

In 1961 Ernie Brooks II began teaching at Brooks Institute in Santa Barbara, California, where underwater imaging became a focus. Future students included David Doubilet, Cathy Church and Bob Hollis.

In 1965, Ikelite introduced the first consumer housing. Before Ikelite, most housings were custom-built, heavy aluminium boxes.

In 1970, legend David Doubilet introduced the world to split images, captured with a DSLR, a fisheye or super-wide-angle lens, and a dome port.

In 1984, the Nikonos V marked the world of underwater photography as the first manual-focus amphibious camera to offer Through-The-Lens (TTL) flash metering. This allowed the camera to automatically control the power of external strobes. The Nikonos V remained the industry standard for recreational and professional divers for nearly 20 years until the rise of digital photography.

## DIGITALISING THE OCEAN

While digital technology appeared in the 90s, it took over a decade to surpass the quality and accessibility of traditional film systems such as the iconic Nikonos. Underwater photography began its major shift from film to digital in the mid-to-late 1990s, with the transition largely completed for most photographers by 2007.

**Late 1990s:** The first consumer digital cameras appeared with rudimentary housings. Early models were often marketed as "filmless" until the term "digital" became standard.

**2001:** Digital imaging was still in its infancy and many professionals believed it would never match the quality of film. However, Nikon officially discontinued its famous Nikonos film series, signalling the end of the film era.

**2006-2007:** This period marked the "tipping point." In 2006, international contests still saw an even split between film and digital entries. By 2007, virtually all participants had switched to digital.

**2010-Present:** The introduction of high-definition action cameras such as the GoPro, fully democratised underwater photography, making it accessible to hobbyists rather than just specialists.

## FROM BOMBS TO STROBES: THE FLASH EVOLUTION

The history of underwater lighting has evolved from dangerous chemical reactions to precision digital tools:

- **Primitive Era (1893-1920s):** Photographers used volatile magnesium "bombs" and powder to create enough light for early film.
- **Flash Bulb Era (1940s-1960s):** The rise of scuba diving introduced waterproof, single-use bulbs that required manual replacement after every shot.
- **Electronic Revolution (1970s-1980s):** Reusable xenon strobes and TTL (Through-The-Lens) metering automated exposure, making photography more efficient.
- **Modern Digital Era (Present):** Current tech uses fibre optics to prevent flooding and LED hybrids to support both high-speed stills and video.

From William Thompson's first experimental shot to the mass-market success of the GoPro and todays mirrorless cameras, the journey of underwater photography has been one of incredible grit and innovation. These pioneers transformed a scientific challenge into a creative art form, making the ocean's depths accessible to us all.

# THE SECRET WORLD OF LIZARDFISH

WORDS & PHOTOGRAPHY BY **MOHAMED MOHSEN**

We're always learning something new about each species we photograph on our dives.

During one of my dives with my son Yehya, we noticed something so special, a group of lizardfish laying on the sandy bottom. I tried to point them out to Yehya, but they were so well camouflaged in their environment, it was so hard for him to see them.

After our dive, he asked me about them and we started to research and explore more about lizardfish. I'm here to share what we found out with you.

Through our time researching, we learned that lizardfish are very clever hunters. They don't chase their food like other fish. Instead, they remain very still on the sand and patiently wait until a small fish or shrimp comes close, then they strike very quickly and swallow them whole.

They usually eat small fish, shrimp, crabs, and other tiny sea creatures. Because they hide so well, their prey often doesn't even notice them until it's too late.

Lizardfish usually live around 3 to 5 years, depending on the species and the environment they live in.

Even though they look a little scary with their very sharp and pointy teeth, they are not a threat to divers. They won't attack humans and prefer to stay hidden and calm.

For divers, it's important to be respectful and careful around them. Avoid touching or disturbing them as they can get stressed and they could try to defend themselves. Also, be careful with your fins so you don't accidentally kick sand on them or harm their habitat.

It was interesting to discover how such a simple-looking fish can be so smart and well adapted to its environment.

It made our dive even more special and we're always learning something new!

### TECHNICAL NOTES

**Camera Setup:** Sony A7 III + Sony 90 mm f/2.8 Macro G OSS + INON UCL 165 M67 wet lens.
**Depths:** 15-20m
**Dive Buddy:** Yehya Ibrahim

### ABOUT THE PHOTOGRAPHER

Mohamed Mohsen is an architect, diver, and underwater photographer based in the UAE and Oman.

His macro work reveals the quiet beauty and behaviour of marine life that often escapes the casual eye – from the vigilant guardianship of clownfish to the ethereal drift of nudibranchs.

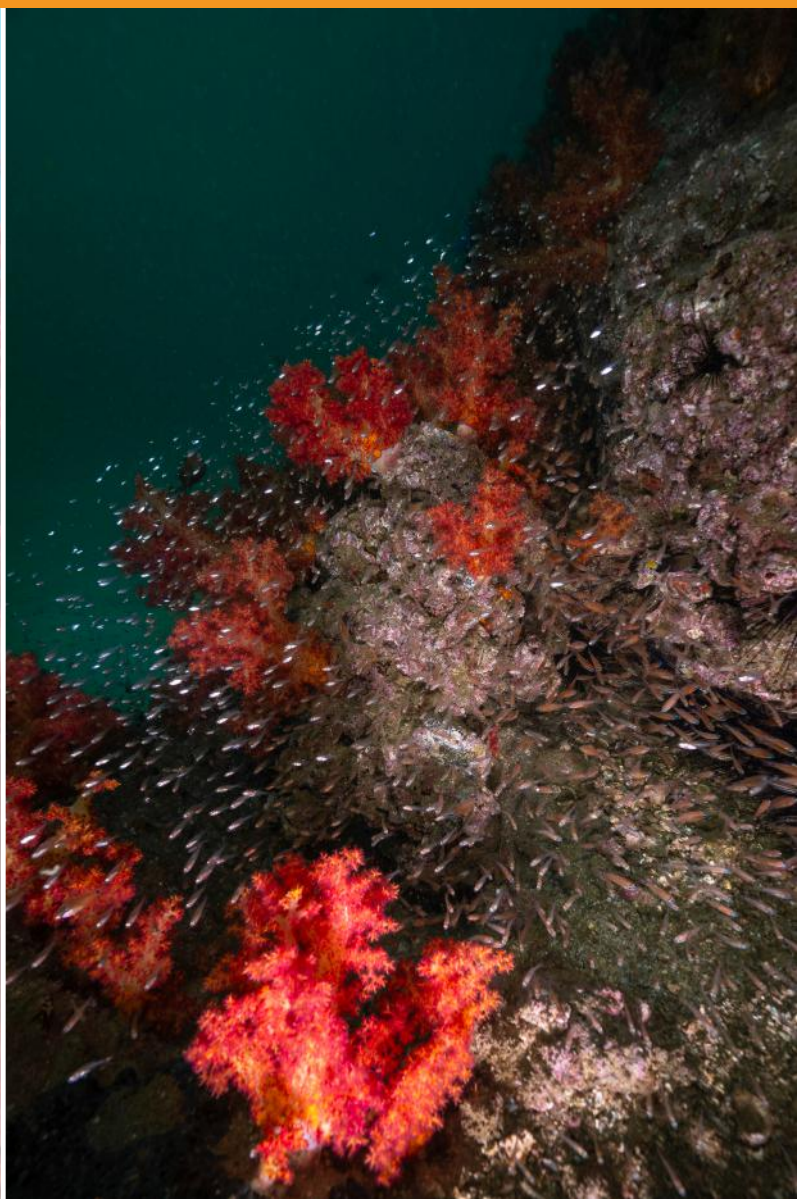
**www.instagram.com/m.mohsen.uwp**

# MY UNDERWATER DISNEYLAND:

## AMONG THE SOFT CORALS OF MARTINI ROCK

WORDS & PHOTOGRAPHY BY **KIMIA SHAD**

For me, Martini Rock is a living reminder that this "Underwater Disneyland" I fell in love with isn't just a dream – it's a reality that we are successfully protecting for the future.



In the heart of the vibrant waters of Khorfakkan, lies one of the most iconic dive sites in the UAE: Martini Rock. For years, it has been a favourite for its unique topography, but lately, something remarkable is happening. Every time I roll off the boat and descend, I am greeted by a more explosive display of life than the last. The schools are thicker, the species more diverse, and the soft corals are more brilliant than ever.

The first time I descended onto Martini Rock, I didn't just see a dive site; I found a world that felt entirely separate from our own. I remember the immediate sense of wonder – staring at those soft, colourful branches as they swayed in the current like a living, breathing "underwater Disneyland." It wasn't long before my curiosity turned into a ritual. I found myself joining every weekly boat trip headed to this specific site. Between those floating, colourful stalks, I found my peace. For me, Martini Rock isn't just a place to dive – it is a place where the world at the surface fades away into an explosion of vivid colours of oranges and neon pinks that sway in the current. It's a living reminder that true wonder isn't found in a dream – it's alive, it's breathing, and it's right here, finally protected within the Al Qalqali Marine Reserve.

On the 19th of November 2025, everything changed. With the signing of the Emiri Decree by HH Sheikh Dr Sultan bin Muhammad Al Qasimi, Martini Rock officially became part of the Al Qalqali Marine Reserve. We are no longer just visiting a dive site; we are witnesses to the birth of a sanctuary. What we see today is the result of persistent national effort; when you protect a core area, life flourishes so intensely that it begins to repopulate the entire surrounding region.

## THE JEWEL OF THE REEF: DENDRONEPHTHYA

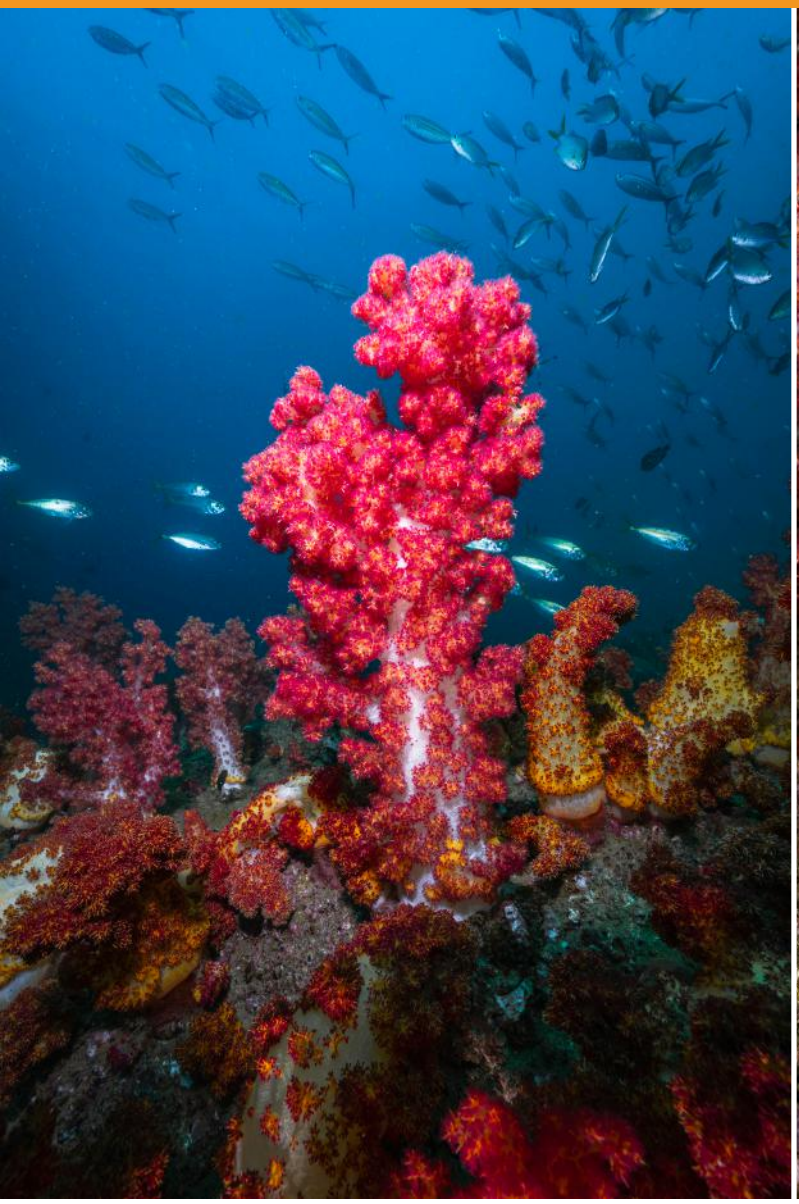
The stars of my recent gallery are the soft corals, specifically the Carnation Coral (scientific name: *Dendronephthya*). These are the vibrant "fireworks" of the UAE's East Coast reefs. Unlike hard corals, they are azooxanthellate, meaning they do not rely on sunlight for food. Instead, they are active filter feeders, pumping themselves up with seawater – a process called hydrostatic skeletal support – to extend their feathery polyps into the current to catch plankton.

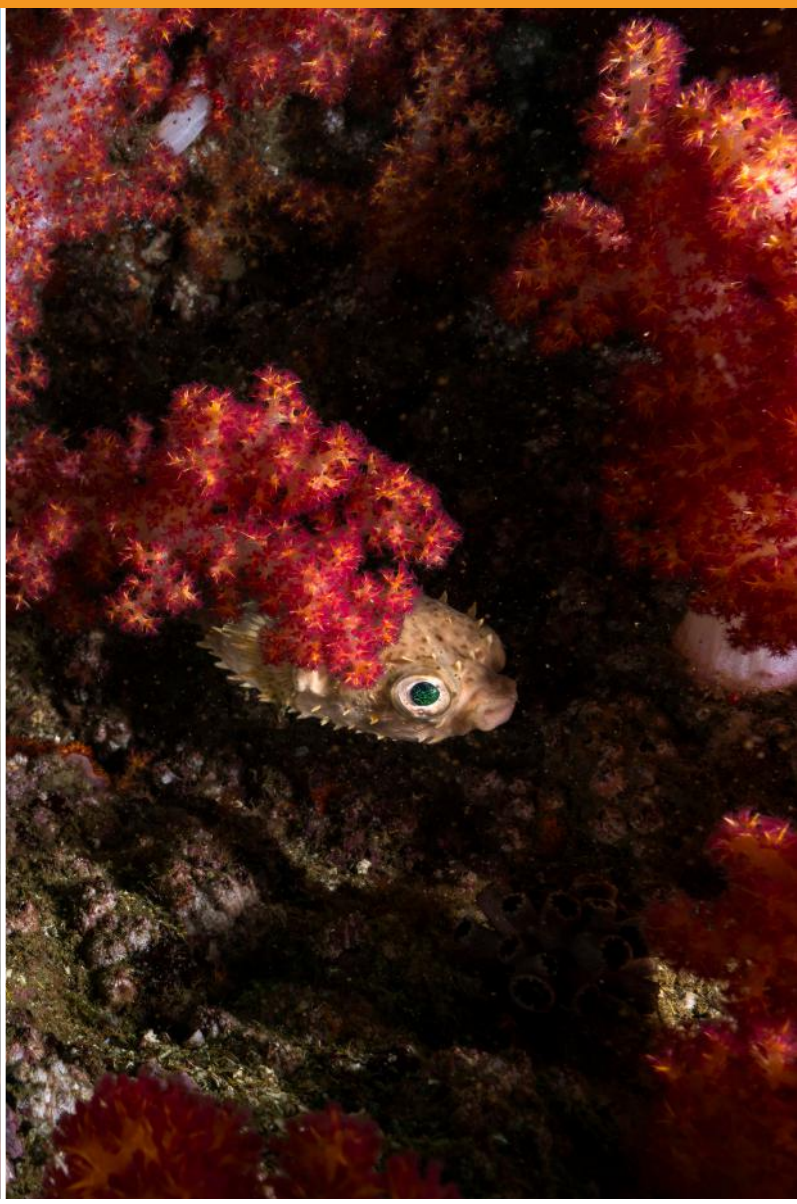
If you look closely at the macro details of these colonies, you can see tiny, needle-like structures called sclerites. These are made of calcium carbonate and act like a flexible skeleton, giving the coral its shape and providing a defence against predators.

## BEYOND BEAUTY: WHY HEALTHY CORALS MATTER

A healthy reef is the heartbeat of our coast. These corals aren't just "underwater decorations", they are a high-functioning infrastructure that supports the UAE's marine life.

- A Natural Nursery: The complex, branching structures of soft corals provide a three-dimensional safe place. Unlike the rigid tunnels of hard corals, the flexible stalks of *Dendronephthya* create a dense, swaying forest that breaks up the silhouettes of small fish, making them nearly invisible to predators.
- Biodiversity Hub from macro to apex: Their presence signals a stable, nutrient-rich ecosystem. Because soft corals are filter feeders, they thrive where currents are strong, bringing a constant stream of plankton that kickstarts the entire food chain. While nudibranchs graze on the base, tiny blennies and gobies use the coral as





a lookout tower to spot passing food. The health of these soft corals is the reason we see apex predators like Blacktip Reef Sharks and large Honeycomb Moray Eels circling the pinnacle; they are there because the coral provides a "grocery store" that keeps their prey thriving.

## DOCUMENTING THE FUTURE

I dive here every week because I want to show the world that you don't need to fly to the Pacific to see a thriving reef. We have one right here in Khorfakkan. We often look at famous reefs halfway across the world and marvel at their beauty, but we have something world-class right here in our own backyard. The resilient, glowing corals of Martini Rock are a part of the UAE's natural identity.

For me, Martini Rock is a living reminder that this "Underwater Disneyland" I fell in love with isn't just a dream – it's a reality that we are successfully protecting for the future.

When I am down there, I often find myself imagining the next generations diving these same waters. Will they face an even more vibrant "Disneyland," seeing these reefs grow even larger and more colourful than they are today? Or will they look at my photographs with a sense of loss, wishing they could see a world that no longer exists?

The outcome isn't left to chance. It is on us, and it is defined by the choices we make today. We are not just documenting the present; we are deciding the legacy of our oceans.

# ANILAO: THE TINY, HIDDEN WORLD OF THE PHILIPPINES

WORDS & PHOTOGRAPHY BY **HAMID OBAID AL ALI**

For photographers willing to slow down, focus, and appreciate the tiny details often overlooked by others, Anilao is not simply a diving destination – it is an underwater universe comprised of the smallest corners of the reef.

For underwater photographers, there are destinations that impress, and then there are destinations that completely consume your imagination. Anilao, in the Philippines, belongs firmly in the second category. Long regarded as the "World Capital of Macro Photography," this small coastal region south of Manila has earned legendary status among underwater photographers for one simple reason: nowhere else seems to offer such an astonishing concentration of strange, rare, and beautifully bizarre marine life in such accessible conditions.

Reaching Anilao from the UAE turned out to be remarkably easy. A direct flight from Dubai to Manila, followed by approximately a two-and-a-half-hour road transfer south toward Batangas Province, was all it took to arrive at one of the richest macro diving destinations on the planet. Despite the relatively short journey from the capital, Anilao feels worlds away from the busy streets of Manila. The atmosphere quickly changes into something quieter and more focused – a place built around diving, underwater photography, and a deep appreciation for marine life.

What makes Anilao truly special is not only the abundance of marine creatures, but also the entire ecosystem that has developed around underwater photography itself. Many of the dive resorts are specifically designed for photographers, complete with spacious camera rooms, rinse tanks dedicated to camera equipment, charging stations, editing areas, and flexible dive schedules built around photographers rather than recreational tourists. The region has become a gathering point for underwater image-makers from around the world, from beginners carrying compact cameras to award-winning professionals armed with full-frame systems and super macro setups.

Equally impressive are the local dive guides and spotters. Their ability to locate creatures that seem nearly invisible against the reef is nothing short of extraordinary. During many dives, I found myself staring at what appeared to be an empty patch of sand, only for the guide to point toward a tiny pygmy seahorse, a perfectly camouflaged frogfish, or a shrimp no larger than a grain of rice. Their knowledge of marine behaviour, habitats, and seasonal sightings transforms every dive into a carefully curated treasure hunt beneath the surface.

Anilao's marine biodiversity is simply staggering. Almost every dive revealed something unusual or completely unexpected. Rhinopias, hairy frogfish, ghost pipefish, flamboyant cuttlefish, nudibranchs in endless colours and patterns, blue-ringed octopus, mimic octopus, wonderpus, coleman shrimp, bobbit worms, pygmy seahorses, and juvenile reef species could all be found in the area. Even the shallowest dives often turned into extended hunts for tiny

subjects hidden among coral rubble, volcanic sand slopes, and reef walls bursting with life. For macro photographers, Anilao feels less like a dive destination and more like an endless living catalogue of underwater oddities.

One of the most fascinating experiences during the trip was blackwater diving. Unlike traditional reef dives, blackwater dives take place offshore over deep water at night, suspended in complete darkness beneath a lit downline. At first, the experience feels surreal – floating in the black void with no visible reef or seabed, surrounded only by darkness and drifting particles illuminated by dive lights. But as your eyes adjust, an entirely different world begins to emerge.

Blackwater diving in Anilao offers a glimpse into one of the ocean's greatest nightly migrations. As darkness falls, larval fish, juvenile pelagic species, tiny squid, jellyfish, shrimp, and countless microscopic organisms rise from the deep toward the surface under the cover of night. Many of these creatures are seen only during these brief stages of their lives, making every dive unpredictable and unique. For underwater photographers, it becomes both exhilarating and technically demanding. Subjects drift quickly, lighting must constantly be adjusted, and focus becomes a challenge in the darkness – but the reward is the opportunity to photograph alien-like creatures rarely seen by human eyes.

Some nights produced encounters with transparent larval fish, paper-thin juvenile squid, tiny octopus no larger than a fingernail, and strange gelatinous organisms that looked more extraterrestrial than marine. Every descent into the darkness carried the feeling that absolutely anything could appear from below. It is easy to understand why blackwater diving has become almost addictive among underwater photographers.

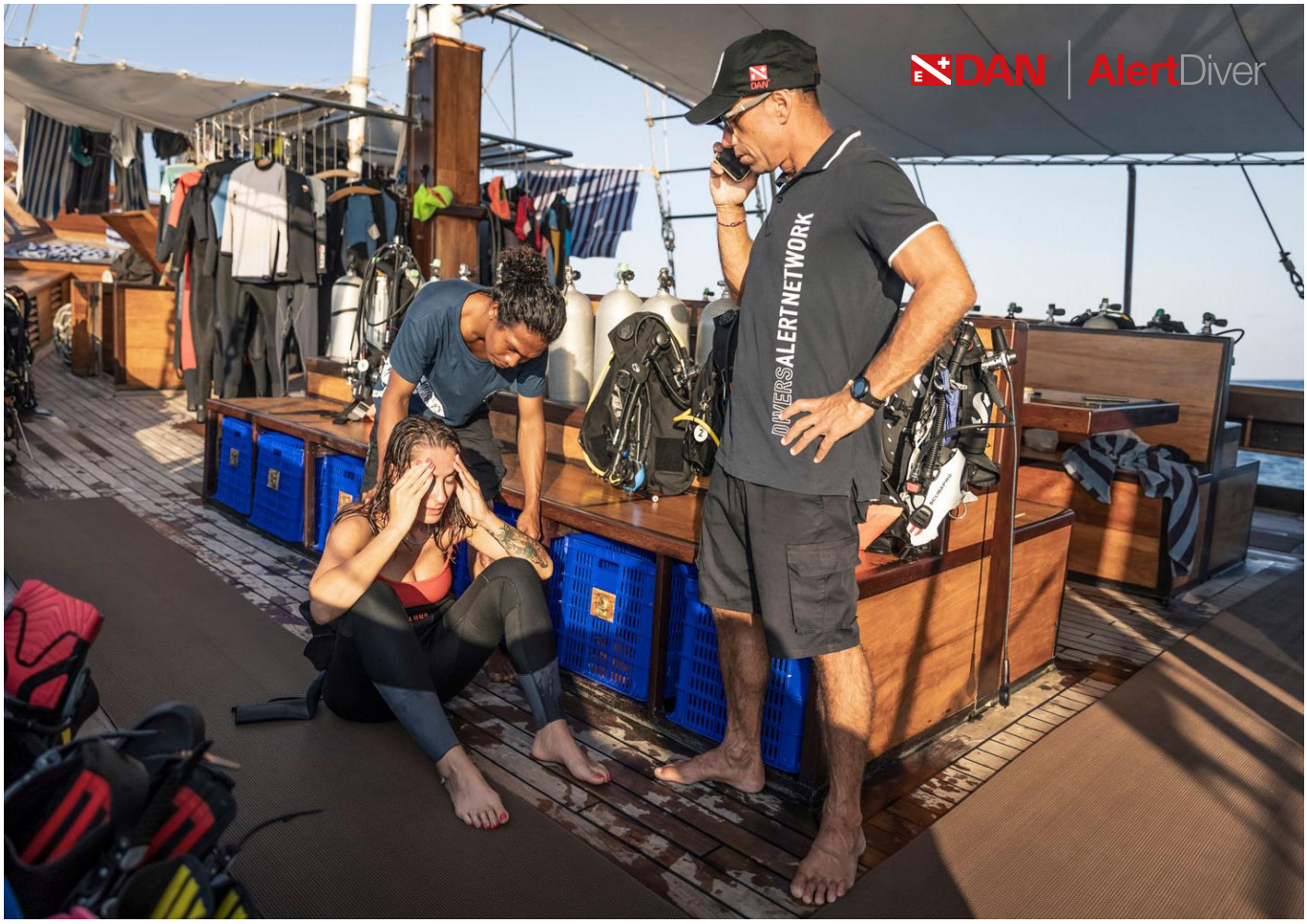
What ultimately makes Anilao unforgettable is the combination of accessibility, biodiversity, expert local knowledge, and the culture of underwater photography that exists throughout the region. Few places in the world cater so naturally to photographers while still maintaining the raw excitement of discovery on every dive. Whether searching for rare macro critters hidden among volcanic sand slopes or drifting in the darkness during a blackwater dive waiting for mysterious larval creatures to emerge from the deep, Anilao constantly reminds you that some of the ocean's greatest wonders are also its smallest.

For photographers willing to slow down, focus, and appreciate the tiny details often overlooked by others, Anilao is not simply a diving destination – it is an underwater universe comprised of the smallest corners of the reef.

# SHOULD I CALL DAN OR EMS FIRST?

## UNDERSTANDING WHO TO CONTACT FIRST IN A DIVING EMERGENCY – AND WHY CONTEXT MATTERS.

WORDS BY **LARA LAMBIASE**




**Please Note:** though this information is generally applicable internationally, it is specifically addressed to DAN Europe members. As some aspects may differ in case management among the various DAN organisations, we advise divers to get in touch with the relevant DAN organisation in their region.

"In the event of a diving accident, where decompression illness is suspected, is it better to call 112 (EMS) or DAN Europe first?" This is a question frequently heard among divers, and one that often creates confusion.

First, let's define what a diving accident is in this case: it's an event that results in a potential risk of illness or death due to inadequate decompression.

**Decompression Illness (DCI) includes two main conditions:**

- **Decompression Sickness (DCS):** caused essentially by the persistence of inert gas in bubble form (not dissolved) in tissues or blood.
- **AGE, or Arterial Gas Embolism:** for example, caused by venous gas bubbles crossing to the arterial side or by pulmonary barotrauma.

The risk of DCI during recreational or technical diving, and even during work in pressurised environments, is closely related to the conditions and physical exertion involved in the dive. The estimated frequency is approximately 1 in 10,000 dives for recreational divers, and 9.5 in 10,000 dives for technical and professional divers (Mitchell 2022).

Unfortunately, a number of cases are under reported because divers sometimes self-treat or do not report symptoms, do not seek care in medical facilities, or the care provided is not properly recorded.

Diagnosing DCI is often challenging due to several possible symptoms, and it requires a clinical evaluation that considers the nature of the dive(s) and the diver's personal health history. Any new sign or symptom after a dive should be considered as "suspect DCI" until proven otherwise.

Mild symptoms may include unusual fatigue or skin itching.

**More serious symptoms include:**

- Skin rashes or mottling
- Tingling
- Numbness
- Pain
- Difficulty moving or urinating
- Muscle weakness
- Impaired consciousness, breathing, vision, hearing, speech
- Nausea
- Dizziness
- Reappearance or persistence of mild symptoms after 30 minutes of initial oxygen therapy

So, who should be contacted first in the event of a suspect diving accident?

Answer: It depends on the diver's symptoms and location.

Having DCS in Europe, where numerous hospitals with hyperbaric units are available, is one thing. Experiencing it in remote locations or regions without a 24/7 operational hyperbaric chamber for emergencies, is another story.

In case of MILD SYMPTOMS, do not underestimate them. In this situation, there's usually a little more time for action. EMS can be activated, if transport to a health facility is preferable for diagnosis. At the same time the DAN Europe hotline should be contacted for 3 reasons:

1. Reporting the accident: If the diver is an active DAN member, the Alarm Centre, case management and DAN medical staff can open a case and provide remote support, which can be invaluable. The Centre will put local medical or paramedical personnel who arrive at the scene of accident and are typically not familiar with diving medicine, in communication with DAN doctors who specialise in diving and hyperbaric medicine, to share information, strategies, recommendations.

2. In the event of accidents in remote locations, the diving centre or boat staff are put in touch with medical personnel to receive immediate assistance on what is best to do/not to do following a diving accident. This is how the DAN Alarm Centre implements assistance mechanisms locally.

3. The DAN Alarm Centre is available 24/7 for telephone conversations with everyone, both active (insured) DAN Members and non-Members, as well as with lay and healthcare personnel for discussion and advice.

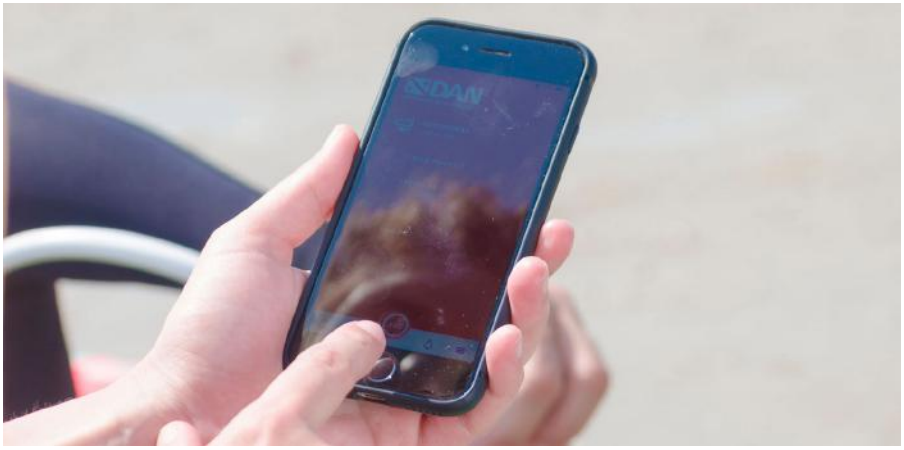
DCI should be suspected if the symptomatic individual has been scuba diving (open or closed circuit, recreational or technical) or freediving, especially if they have been repeatedly diving to deep depths.

Usually the first rescue manoeuvres are carried out by the diving buddies, instructor, diving guide, or surface assistants. The ideal conditions for a correct management of an accident are: adequate training of all divers, the presence of secure means of communication and emergency management material (Oxygen Unit, First Aid Kit); the planning of an accident protocol in case of particularly demanding dives, including phone numbers of the closest facilities equipped with a Hyperbaric Chamber.

Summing up: What should you do in case of mild symptoms?

One person should contact the DAN Europe Hotline for advice, while others should:

1. Perform a 5-Minute Neurological Check:
   - Ask the diver how they feel, where they are, the day and time.
   - Check eye tracking with a finger.
   - Ask the diver to whistle, show teeth, or stick out the tongue symmetrically.
   - Test balance and motor coordination.



2. Administer 100% normobaric oxygen for at least 30 minutes, at the highest available concentration (15L/min), regardless of the gas mixture used, and ideally using a demand valve or non-rebreather mask if the diver is conscious. Although administration may start before contacting DAN, we remind you that oxygen is a drug and, in this case, its use should be supervised by a physician.*

3. Hydrate the diver: at least 1 litre of water in an hour, monitoring urination and/or other symptoms.

4. If vomiting or loss of consciousness occurs, place in the recovery position.

In case of DCS with SEVERE SYMPTOMS, immediately alert EMS (112 in Europe). EMS manages the emergency by sending an ambulance on site, providing cardiopulmonary resuscitation (CPR) and/or other life-saving measures as needed. The DAN team is then activated and liaises with the local rescue team, to ensure that the diagnostic and therapeutic procedure is correct. DAN follows the case and remains available throughout the period of necessary treatment – also for all those aspects linked to reimbursements.

From personal experience I can guarantee that the DAN Medical team often provides helpful assistance, even in serious cases, through telephone support, mediation, and education – eg supporting colleagues who may not be familiar with underwater medicine, and would not diagnose a diving pathology correctly.

In case of serious symptoms, while someone calls EMS and clearly states a "diving accident", others should:

- Perform CPR if needed.
- Administer 100% oxygen at 15L/min using bag-mask ventilation. As previously mentioned, oxygen is a drug and should be used under medical supervision.*
- Call the DAN Europe hotline.

DAN cannot in any way replace an equipped First Aid centre or a clinic nearby where we would like everything to work 100% in the best case scenario.

So, "DAN or EMS – who's better?"

In the best-case scenario, the two entities will work together synergistically. Sometimes only EMS will be alerted, possibly resulting in a successful intervention. Other times, DAN will be contacted by NHS personnel for specialised guidance on how to proceed, or even directly by the injured diver after calling EMS first. It's not about choosing "who is better" – it's about understanding the context and adapting the response to the specific situation.

*When a doctor – ideally specialised in underwater and hyperbaric medicine – is not available on site, assistance can also be provided remotely, under supervision. Our approach is that first responders, who are not doctors but have been properly trained and certified through DAN first-aid courses, can intervene promptly to administer oxygen to divers in difficulty. In such cases, our team of experienced doctors provides remote support to ensure effective and safe assistance.

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**ABOUT THE AUTHOR**

Lara Lambiase is a Medical Doctor specialised in Infectious Diseases and in Diving & Hyperbaric Medicine. Passionate about scuba diving and freediving since 2016, she transformed an ancestral fear of the sea into a true passion. During a vacation in the Maldives, she decided to overcome the fear that had prevented her for years from even swimming offshore. Since then, the sea has become an essential part of her life.

# LIVEABOARD SAFETY:
## AN ANALYSIS OF RECENT ACCIDENT TRENDS

WORDS BY **FLORINE QUIRION**


We review recent accident data and address critical maintenance and training gaps to empower divers in making informed choices.

2019 remains the most dramatic year in diving liveaboard history. With thirty-four casualties, the disaster of the MV Conception in California remains to this day the deadliest maritime disaster in the diving industry. The legal case closed at the end of 2023, and the jury's conclusions shed light on fire risks, limited evacuation routes, and insufficient safety protocols in general onboard – all of which led to the captain's conviction. This horrific accident should have been a wake-up call for the entire industry. But as travel reawakened in 2022 after two years of closed borders during the COVID pandemic, the opposite happened.

Reports of fires, groundings, and sinkings have surged; the worst year was 2024, with ten incidents. And, while some might assume budget liveaboards are the primary culprits of cutting corners and neglecting safety protocols, luxury vessels were the subject of the majority of incidents. So, unfortunately, this is not always a matter of getting what you pay for. The situation seems to be far more complex and it continued in 2025.

I visited the floating dockyards of Labuan Bajo, Indonesia and saw firsthand how some liveaboards are built – not from blueprints or naval engineering standards, but from the sound experience of captains and boat builders. While this craftsmanship carries generations of maritime knowledge, it also means that vessels often lack the safety features found on Australian or French Polynesian-built ships. Without standardised oversight, even high-end liveaboards can hide critical safety flaws beneath their polished exteriors.

### A SYSTEMIC ISSUE?

A review of liveaboard accidents from 2017-2019 versus 2022-2024 highlights a troubling pattern: While only five incidents were reported between 2017 and 2019, twenty incidents occurred from 2022 to 2024 (a staggering increase of 300%).

The dates raise concerns about whether the pandemic and the subsequent travel explosion could offer a statistical explanation.

Marta Marrocco, Senior Case Manager at DAN Europe, suggests that the increase in incidents could be linked to the aftermath of COVID-19, "I believe that the increase in liveaboard incidents over the past few years could be attributed to a combination of two factors, both tied to the COVID period. The first," she says, "is about scale. On the one hand, since 2022-2023, people have resumed travelling on a larger scale than before COVID – perhaps seeing this as a way to reclaim freedom after the restrictions we all experienced."

For the 2022-2024 period, 55% of accidents happened in Egypt (11) and 20% in Indonesia (4). The remaining incidents are shared between Thailand (2), the Maldives (1), Mexico (1), and the Philippines (1). While tourism has more than recovered in the Middle East since the pandemic – especially in Egypt, with 17.5 million international visitor arrivals in 2024, an increase of 34.3% compared to 2019 – it has yet to recover in Southeast Asia. In 2024, Indonesia received 13.9 million international visitor arrivals (-13.7% compared to 2019), and Thailand received 35.1 million international visitor arrivals (-12% compared to 2019).

However, these figures must be compared with the distributions of diving liveaboards worldwide. While it is challenging to find the exact number of ships operating from the Red Sea to the Pacific Ocean, one of the most popular online booking platforms, Liveaboard.com, currently offers 80 liveaboards in Indonesia (26% of the total), 68 in Egypt (22%), 44 in the Maldives (15%), and 31 in Thailand (10%) for a total of 223 liveaboards out of a global fleet of 316, which run approximately 23,000 trips per year. When we do the math, if there is a worrying trend, it is the one happening in Egypt.

Marta Marrocco says that the second contributing factor to the rise of liveaboard accidents could be financial: "Many liveaboard operators, whose businesses were halted during the pandemic, may not have had sufficient income to properly maintain their vessels during that lean period. The subsequent surge in demand for cruises, coupled with the use of boats that perhaps didn't receive adequate upkeep, might likely be the cause of the higher number of incidents."

This perspective is echoed by Pete Mesley of Lust4Rust Diving Expeditions, "I think the world shutting down during COVID made a massive impact on things. Shortly after the borders reopened, everyone was scrambling to earn money. I am sure that maintenance and upkeep on the vessels during that global shutdown wasn't as good as it should've been. There is no proof to corroborate this, but it seems an educated guess about the influx of liveaboard sinkings."

Additionally, Craig Stephen, Managing Director of Mike Ball Dive Expeditions in Australia, believes shifting ownership structures are influencing safety standards: "Many once-owner-operated dive companies (with passion, drive, and care factor) have changed hands or been sold to companies where they are now just part of the parent company's portfolio. As such, the annual bottom line in dollars is far more important than safety."

## CONSEQUENCES FOR SCUBA DIVERS

Luckily, most liveaboard incidents ended with no casualties (75% in 2022-2024), and rescue operations were managed swiftly. On the other hand, one of the accidents in Egypt had a significant death toll last November. After the Sea Story capsized, among the forty-four passengers and crew, four bodies were recovered while seven are still missing. While Indonesia ranks second for the number of incidents, there has not been a single casualty since 2012. Of the five liveaboard accidents with casualties between 2022 and 2024, three were due to stability issues (leading to the ship capsizing) and two to fire disasters. In all cases, a lack of alternative evacuation routes was the cause of the fatalities; divers were blocked from exiting either by the water or the flames.

Director of Safety Programmes at DAN Europe, Guy Thomas, points out that one major issue contributing to these accidents is the lack of proper crew training and emergency preparedness: "A well-trained crew can make the difference between a contained incident and a full-scale disaster." He adds, "Poor maintenance of electrical systems and fuel lines has been a recurring factor in many of these accidents."

Looking at all twenty incidents, half of them were due to a fire starting in the engine room, 30% were due to the ship running aground often at night due to a discontinued night watch, and, finally, four (20%) are linked to stability issues with a boat capsizing during storms. Unfortunately, despite representing only a few cases, the latter has been the deadliest over the last three years.

Beyond the immediate danger to life, these accidents have left many divers stranded with nothing but the clothes on their backs. Marta Marrocco notes that DAN Europe has assisted multiple divers who lost everything in these liveaboard incidents:

"During the past two years, divers have contacted DAN Europe's emergency department, notifying they had been victims of shipwrecks during their liveaboard cruise. Fortunately, most of the time, the divers on board these vessels managed to escape these wrecks unharmed, but almost always, they lost all their personal belongings and valuable diving equipment. In fact, their most common request to our hotline was the reimbursement of lost property."

However, she clarifies that insurance coverage has limits: "The insurance that DAN Europe members can choose to purchase covers the acute phase of medical emergencies only. The diving equipment falls within the insurance cover only if it is damaged or lost during a rescue operation of an injured diver following a diving accident, but not if it is lost at sea after a shipwreck." While it would be fair to ask the operator's insurance to cover the lost equipment, divers we managed to contact and who were on the MY Pacific Vortex in Mexico in 2022 said they got less than 30% of the value of what they lost after battling for it.

This is why, following the tragic accident of the Sea Story, last November, DAN Europe decided to bring some relief to the affected divers with additional financial and psychological support.

## SAFETY PROTOCOLS: WHAT SHOULD DIVERS LOOK FOR?

In light of these unsettling figures, what should divers do to protect themselves? Pete Mesley offers a few ideas for scuba divers looking to actively prioritise their safety on diving liveaboards: "Demand actual fire and evacuation drills, muster stations, location and donning of lifejackets – these must be practised and not just talked about." He also recommends "having a waterproof 'Go Bag' by your bed with essential things like your phone, money, credit cards, glasses, and passport."

Guy Thomas mentions the safety measures divers can check onboard: "In multiple cases, we've seen fire detection and suppression systems that were either inadequate or completely non-functional." To learn more, he published fire safety guidelines with Francois Burman, VP of Dive Safety Services, as early as 2020, in the wake of the MV Conception fire disaster.

Craig Stephen advises divers to inspect certain aspects well before boarding: "Before travelling to a foreign destination, do your homework. Does the country have high standards? Are you far from help? Does the company promote Safety First? The post-welcome should be a safety briefing for fire, collision, abandon ship, etc. Is there more than one escape route from all areas? Is the accommodation below deck (not recommended)?"

He also points out a specific risk related to charging batteries: "It [battery charging] should not be permitted inside [ie. passenger's cabin] and unattended." Guy Thomas supports the same idea: "Fires can start in the engine room, but this does not mean the actual engine was involved. This can be caused by overloading the system or faulty wiring on the ship. Fires caused by charging batteries are not to be overlooked."

Indeed, since the fire disaster of the MV Conception in 2019, it has been long thought that the cause was charging batteries that could have caused an overload on the electric circuit, or the batteries themselves could have caught fire. That potential scenario had some professionals in the diving liveaboard industry taking drastic measures in recent years.

While the conclusions of the MV Conception case finally showed the fire started from a bin on the main deck, looking at the figures from civil aviation gives a non-debatable outlook about this specific risk. "Incidents rose 28% over the past five years, from 2019-2023," claims UL Standards & Engagement. Scuba divers immediately think of dive light batteries,

as well as cameras and phones; however, it's interesting to note that e-cigarettes and power banks have been the main culprits on commercial flights. Luckily, in 85% of cases, the incidents were handled before becoming serious, thanks to devices being within reach of passengers. So, while there is no report, so far, that confirms lithium batteries to be the source of any diving liveaboard fire disaster, their use must be taken extremely seriously.

## HOLDING OPERATORS ACCOUNTABLE

Pete Mesley emphasises that travel agents and operators must take greater responsibility: "Tour operators and travel agents carry a large responsibility. Someone has to do due diligence and, to be honest, the customers don't really want to do that; they want to rely on tour operators and travel agents to do the vetting for them. Some parts of the world have no regulations whatsoever, so pressure must be put on these liveaboard operators to come up with operational plans, show proof of safety records, proof of captain qualifications, and staff competency and training."

Indeed, not all countries are equal regarding regulations[1] that apply to passengers carrying commercial vessels. Craig Stephen shares his experience operating in Australia, a country that has not seen a single incident among diving liveaboards in the last decade. Still, some consider it overregulated. "We have very strict regulation and governance for scuba diving and vessel management, and the relevant authorities monitor us with annual inspections and surveys (including night watch protocol). Saying Australia is over regulated for diving is simply nonsense. Whilst tragedy can occur to the most vigilant operators, the authorities help keep otherwise unscrupulous businesses honest."

Expedition companies such as The Dirty Dozen have taken steps to ensure that their safety standards remain high. Gill Flaherty, their Expedition Manager, details their rigorous vetting process: "Prior to booking a charter on a new boat, we ensure due diligence and discuss the following with the operator: fire extinguisher types, engine room fire suppression systems, life raft testing, emergency lighting circuits, night watch procedures, crew fire and first aid training, as well as emergency action plans. We also require a copy of the boat's EAP and a mutually agreed RACI Matrix for our records."

Pete Mesley has also changed his operational processes after a liveaboard incident in Socorro, Mexico, in 2022, one which he was personally on: "Since the grounding of the Pacific Vortex liveaboard, I have completely changed my operational processes. I now request to see the qualifications of captains, vessel survey documentation, safety equipment maintenance sheets, and so on. If a diving liveaboard operator cannot supply these documents, then it tells me that these guys should not be in business."

## A WAKE-UP CALL FOR THE INDUSTRY

As the number of liveaboard accidents continues to rise, experts agree that the industry must take a more proactive approach to safety. Inadequate maintenance, crew training deficiencies, and regulatory gaps contribute to a growing problem that cannot be ignored.

While divers have a role to play in ensuring their own safety, questioning operators and making informed decisions about which companies they trust and decide to buy from, the current crisis is a wake-up call that the dive industry cannot afford to ignore.

Guy Thomas explains, "The best way forward is probably to raise awareness among divers and liveaboard operators. Many liveaboard operators want to work as safely as possible, but some have safety issues they might not even be aware of. Therefore, increasing awareness is going to be important in the future. Same for the divers: We need to educate them on what they should expect onboard, safety-wise."

Finally, if there is an odd takeaway we learned by reviewing every report of each liveaboard incident, it's "never skip a dive."

A version of this article was also published in InDepth magazine The version published here in Alert Diver places a stronger emphasis on diver safety, in line with the magazine's mission and editorial focus.

## DIVE DEEPER

- Undercurrent: A Decade of Liveaboard Losses
- Institut für Schiffbau und Maritime Technik: Investigation of a series of accidents involving yachts for diving vacations (Bachelor-thesis) by Justus Schiszler
- Int'l Maritime Organisation: International Convention for the Safety of Life at Sea (SOLAS), 1974
- Organisation Scuba Diving: The Ultimate Liveaboard Packing Guide By Candice Landau


### ABOUT THE AUTHOR

Florine Quirion is a writer, underwater photographer, and dive travel blogger at World Adventure Divers. She trained as a mechanical engineer and worked in product regulation and certification before embracing a career dedicated to the ocean. She's a regular contributor to Alert Diver and In-Depth magazines and has published a book about scuba diving travels with Lonely Planet.

For any questions, you can reach her on:
www.instagram.com/WorldAdventureDivers

## EDA MOVIE NIGHT

### AWARD-WINNING DOCUMENTARIES BUNDLE

Thursday 11th June 2026 | 6:30pm | Deep Dive Dubai


It has been a while since our last EDA Movie Screening!

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(We will have discussions between each one.)

We look forward to seeing you at this unique EDA Movie Screening.

**Email Kacy to book your seat:** projects@emiratesdiving.com

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Project REEFrame's mission is to create high-impact, scalable environmental initiatives that help restore the UAE's coastline and it is built around three core values:

- Community building;
- Education; and
- Science-based methods.

The Project REEFrame education system includes courses for each project role. The training combines online learning with practical work, both in and out of the water. The three main education streams are designed for:

- Reef Restoration Divers;
- Environmental Monitoring Divers; and
- Coral Analysts (land based).

As a related learning opportunity for divers who are interested in learning underwater photography or videography, Freestyle Divers will be hosting the Canon Academy, who will deliver one free course per quarter to pre-selected divers during 2026 and 2027. Places will be limited to 15 divers per session, and candidates will be selected according to their availability and commitment to help document Project REEFrame after completing their course.

Project REEFRAME

**FOR MORE INFO, GO TO:**
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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.

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