Inspiring People to Care About our Oceans Since 1995

DIVERS FOR THE ENVIRONMENT

WWW.EMIRATESDIVING[illegible]GAZINE | DECEMBER 2016 | VOLUME 12 | ISSUE 4

JAWSOME GUADALUPE

CLOSE ENCOUNTERS WITH GREAT WHITES

EDA MOVIE NIGHTS • REEF CHECK NEWS • **CLEAN UP ARABIA** • MARS THE MAGNIFICENT
DIGITAL ONLINE 2017 • MARSA SHAGRA VILLAGE, EGYPT • **DAN EUROPE & ALERT DIVER**

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

EVENT BY EDA:
EDA
جمعية الإمارات للغوص
Emirates Diving Association

DIGITAL ONLINE 2017

EDA'S 9th ANNUAL UNDERWATER PHOTOGRAPHY AND FILM COMPETITION

COMPETITION OPENS:
Sunday, 8th January 2017

SUBMISSION ENTRIES CLOSE:
Sunday, 23rd April 2017 @ 11:59 PM (GST)

AWARDS & EXHIBITION NIGHT:
May 2017 | Date and Venue TBC

PRIZE SPONSORS

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WWW.EMIRATESDIVING.COM | PHOTO BY © LEVENTE ROZSAHEGYI (Black and White Category: Humpback Whale, Pacific Ocean Ha'apai, Tonga)
EDA is a non-profit voluntary federal organization and is accredited by UNEP as an International Environmental Organization.

EDA
جمعية الإمارات للغوص
Emirates Diving Association

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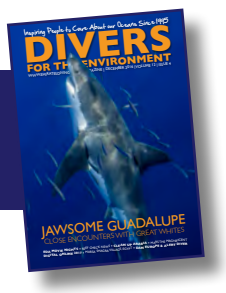
DIVERS FOR THE ENVIRONMENT

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

COVER

PHOTO BY SIMONE CAPRODOSSI
Great White Shark (*Carcharodon carcharias*) in Guadalupe



REDUCE REUSE RECYCLE

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

THE QUARTERLY CONTRIBUTORS

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

Want to contribute? Email: **magazine@emiratesdiving.com**

DR. ADA NATOLI
Ada is a specialist in population genetics applied to conservation of species. Having been involved in whale and dolphin research since 1992, she is a member of the IUCN Cetacean Specialist List and founder of the UAE Dolphin Project. **www.uaedolphinproject.org**

SIMONE CAPRODOSSI
Simone is an Italian underwater and travel photographer with a passion for diving and the sea. Simone uses his photography to support environmental initiatives and is heavily involved in local shark and turtle conservation projects. **www.simonecaprodossi.com**

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

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

NICO DE CORATO
Blogger, marathon runner, triathlete, divemaster and heli rescue swimmer with Bergamo Scuba Angels. You can check my website **www.dubaiblognetwork.com**, contact me on social networks or via email at admin@dubaiblognetwork.com for information about my articles or just to say hello.

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

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

SPIRIT OF THE UNION 2016

IBRAHIM AL-ZU'BI
EDA Executive Director

As we celebrate the 45th UAE National Day, we reflect on the spirit that ties us all together, the Spirit of the Union that enables millions of people to coexist and build lives together. The Spirit of the Union is derived from the vision and leadership of the Late Sheikh Zayed Bin Sultan Al Nahyan, EDA's founder, and now lives on through His Highness Sheikh Khalifa Bin Zayed Al Nahyan, President of the UAE and his fellow leaders of the nation's Emirates who are shaping the UAE's future.

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

I look back at all our events this year, from the rise in EDA's volunteers, to all my discussions with the members and divers that I randomly meet sometimes while diving in the UAE and outside the UAE. Reading the articles in this issue, the first thing that comes to my mind is that divers are making a difference all over the world. In this last issue of 2016 of 'Divers for the Environment', we have very interesting articles for you. You can read our Reef Check updates where divers make use of their underwater adventures and help protect the underwater world. You will also read about lots of initiatives from our dive centres and clubs promoting diving and organising clean ups and fun dive activities.

Clean up Arabia 2016 was another great success this year; we had more than one thousand participants helping to clean our beaches and our dive sites. I would like to thank our Clean Up Arabia sponsors for their generous support, our partners in UNEP, the UAE Ministry of Climate Change and Environment and Dibba Municipality for their support, and most importantly, our EDA members for their dedication and passion to conserve our environment. I have no doubt that all divers want to protect and conserve marine life, in simple words, we want to enjoy our dives and be responsible at the same time; without healthy corals or fish, dives would be boring!

Making a difference goes beyond protecting the environment, although as you will read in this issue, our divers have been so busy organising clean ups and awareness campaigns, I am very happy to see more activities for different stakeholders of the community such as social movie nights at VOX cinemas in the UAE and schools awareness sessions.

With this issue, we are officially launching the opening of Digital Online – EDA's Underwater Photography and Film Competition 2017. I want to wish everyone the best of luck in the buildup to the competition, a big thanks to the sponsors and judges and I am looking forward to seeing the amazing photos at the end of May.

I would like to wish everyone a happy 45th UAE National Day. I also want to wish you all a Merry Christmas and a Happy New Year. I am looking forward to 2017, which I am sure will be as exciting, fun and rewarding as this year.

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

Happy reading and safe Diving!

Ibrahim Al-Zu'bi

Ibrahim Al-Zu'bi

AN EDA MOVIE NIGHT WITH REEL CINEMAS ARABIA'S SHARKS | A JOURNEY OF DISCOVERY

On the 3rd of October, we were invited to a one-off screening of 'Arabia's Sharks, A Journey of Discovery' for our EDA members and diving community by Filmmaker, Jonathan Ali Khan from Wild Planet Productions. The film was shown at the Dubai Mall's Reel Cinemas with Dubai Aquarium & Underwater Zoo and the documentary's camera equipment Sponsor, Canon Middle East FZ LLC. The film had previously been aired on the Discovery Channel, exclusively on OSN during Shark Week.

A Q&A was held after the 56 minute film with Jonathan Ali Khan himself on the making and challenges encountered to completing a project of this genre and topic. He was joined by guest speaker Paul Hamilton from the Dubai Aquarium and their role in the documentary and Munther Ayache from Canon, in regards to the production's camera equipment used.

FILM SYNOPSIS

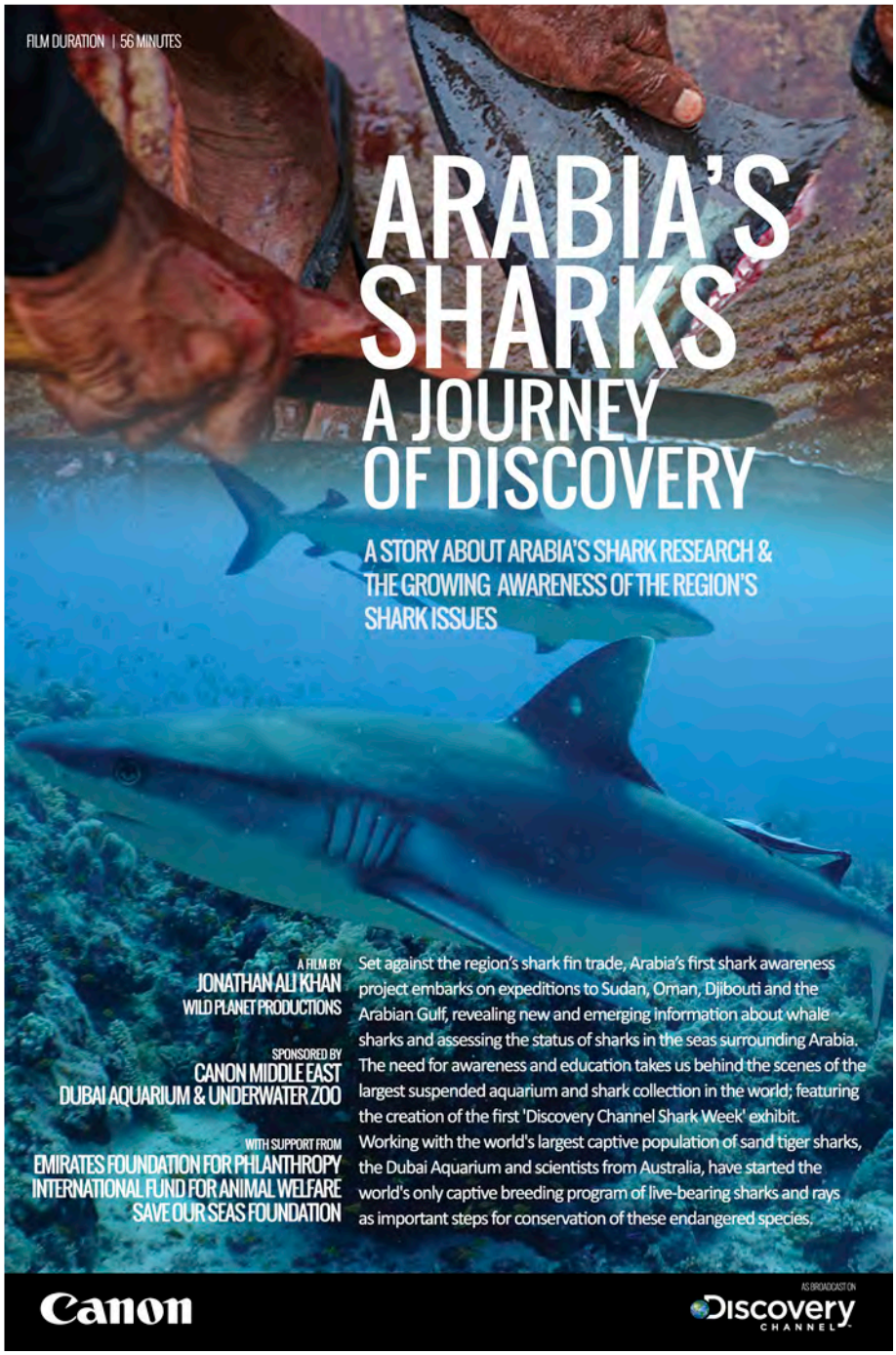
Set against the region's shark fin trade, Arabia's first shark awareness project embarks on expeditions to Sudan, Oman, Djibouti and the Arabian Gulf, revealing new and emerging information about whale sharks and assessing the status of sharks in the seas surrounding Arabia.

The need for awareness and education takes us behind the scenes of the largest suspended aquarium and shark collection in the world; featuring the creation of the first 'Discovery Channel Shark Week' exhibit.

Working with the world's largest captive population of sand tiger sharks, the Dubai Aquarium and scientists from Australia, have started the world's only captive breeding program of live-bearing sharks and rays as important steps for conservation of these endangered species.


PHOTOGRAPHY TIPS SHOOTING SHARKS


PHOTOGRAPHY TIPS SHOOTING SHARKS
THE IMPORTANCE OF CHOOSING THE RIGHT EQUIPMENT FOR DIGITAL PHOTOGRAPHY


FILM DURATION | 56 MINUTES
ARABIA'S SHARKS
A JOURNEY OF DISCOVERY
A STORY ABOUT ARABIA'S SHARK RESEARCH & THE GROWING AWARENESS OF THE REGION'S SHARK ISSUES
A FILM BY
JONATHAN ALI KHAN
WILD PLANET PRODUCTIONS
SPONSORED BY
CANON MIDDLE EAST
DUBAI AQUARIUM & UNDERWATER ZOO
WITH SUPPORT FROM
EMIRATES FOUNDATION FOR PHILANTHROPY
INTERNATIONAL FUND FOR ANIMAL WELFARE
SAVE OUR SEAS FOUNDATION
Set against the region's shark fin trade, Arabia's first shark awareness project embarks on expeditions to Sudan, Oman, Djibouti and the Arabian Gulf, revealing new and emerging information about whale sharks and assessing the status of sharks in the seas surrounding Arabia. The need for awareness and education takes us behind the scenes of the largest suspended aquarium and shark collection in the world; featuring the creation of the first 'Discovery Channel Shark Week' exhibit. Working with the world's largest captive population of sand tiger sharks, the Dubai Aquarium and scientists from Australia, have started the world's only captive breeding program of live-bearing sharks and rays as important steps for conservation of these endangered species.
Canon
AS BROADCAST ON
Discovery CHANNEL

AN EDA MOVIE NIGHT WITH VOX CINEMAS OF SHARK AND MAN

FEATURE AND PHOTOGRAPHY **ALLY LANDES**

EDA had the pleasure of flying British Film Maker, David Diley from Scarlet View Media out to Dubai to screen his award winning film, 'Of Shark and Man' and hold a Q&A with EDA members on the 16th of November at VOX Cinemas in Mercato Mall.

This trip was David's first time to the UAE and we would like to thank the Dubai Turtle Rehabilitation Project and Burj Al Arab Aquarium's David Robinson and Warren Baverstock, and the Dubai Aquarium & Underwater Zoo's Francis Uy and Paul Hamilton for the superb tours of their stunning and educational aquariums.

We would also like to thank David for making the event such a success. David surpassed my expectations with his beautifully executed film and his profound passion for conservation work. I cannot recommend David enough to be a part of his screenings and engage with the audience. David delivered knowledgeable and interesting responses to the simplest and the most complex of questions asked of him at our member's Q&A. There is much to be said about a person that holds such a level of commitment and responsibility to save this critically important species for our future generations.

A Q&A WITH DAVID DILEY

Ally: David, from the Dubai screening and Q&A, what message can you give our readers to recap the night for those who were not able to attend?

David: I think the main thing is, regardless of what it is you want to do, if you really want to do it, you have to commit fully, things very rarely just fall into your lap. Things very rarely just happen, so hard work, commitment and dedication are key to you achieving anything of substance. Also, if there are people out there with the same goals and aspirations as you, if you can work together, do so, it's much more rewarding to work in a team pulling in the same direction.

Ally: You also run underwater film making workshops. Tell us a little about your upcoming one in January as I know the destination is only a short flight from the UAE. This would be a great one for EDA members interested in videography.

David: The workshops are a way for me to not only get more people interested in capturing moving images underwater, but to give people the skills and knowledge to actually tell stories with their films or videos that engage a viewer. It doesn't have to be about conservation, it can be anything about which they're passionate.

The January workshop takes place from January 18th to 25th in Marsa Shagra in Southern Egypt. You couldn't ask for a more perfect place, fantastic diving only a few yards from your accommodation (all shore diving is free of charge, unlimited and the workshop includes a dive on Elphinstone too), total isolation, incredible marine life (they've had Whale Sharks, Oceanic Whitetips and Hammerheads on the house reef and nearby sites recently), excellent visibility, friendly staff, great food and unrestricted access to myself, to ask anything they want and to engage with others in a noncompetitive environment.

I had been planning what to do with my own workshop for a while as it seemed that although there are people out there doing them in various places around the world, there were very few, if any at all, that focused on actual film making, i.e. not just pointing a camera at a subject and editing the footage together to some random music, but to actually plan what you want to shoot, how to shoot it in a way which looks great and tells a story, how to edit that footage and how to convey a message. My workshops go


"MESMERIZING, EXCITING... A REAL SEAT GRABBING THRILL RIDE"
Official Selection Nevada City Film Festival 2016
Official Selection Nice International Film Festival 2016
Official Selection Berlin International Filmmaker Festival 2016
Winner Best Sound Design Nice International Film Festival 2016
Winner Best Editing (Documentary) Nice International Film Festival 2016
Best Film Organiser's Choice Cine Submarino de Agüimes Film Festival 2015
Best Film Audience Choice Cine Submarino de Agüimes Film Festival 2015
Nominated Best Cinematography (Documentary) Nice International Film Festival 2016
Nominated Best Director (Feature Documentary) Berlin International Filmmaker Festival 2016
Nominated Best Cinematography (Documentary) Berlin International Filmmaker Festival 2016
Nominated Science & Education Award Berlin International Filmmaker Festival 2016
SHARK &MAN
SCARLET VIEW MEDIA PRESENTS A FILM BY DAVID DILEY "OF SHARK AND MAN"
STARRING DAVID DILEY MIKE NEUMANN MANASA BULIVOU AND THE SHARKS OF SHARK REEF
CINEMATOGRAPHY BY HUGH FAIRS DAVID DILEY MIKE NEUMANN SOUND DESIGN BY DAVID LAWRIE EDITED BY DAVID DILEY
PRODUCTION ASSISTANT HAMISH HARPER ASSOCIATE PRODUCER FIJI ME PRODUCED BY DAVID DILEY WRITTEN BY DAVID DILEY DIRECTED BY DAVID DILEY
FEATURING MUSIC BY KRIMEWAVE HARUKO GILES WOOLLEY BEFORE THE BEGINNING AND SHIELDS
SCARLET VIEW MEDIA
WWW.OFSHARKANDMAN.COM


David Diley. Photo by Scarlet View Media.

into much more detail than merely discussing camera settings and using edit templates, we cover things like composition, using light, getting coverage and B-Roll, sound design, creative editing, colour correction and digital grading and also the fundamentals of filming marine life in challenging situations, how to plan and execute filming dives and how to behave around marine life.

The workshops are predominantly aimed at beginners and intermediates but are open to anyone who thinks they could benefit from a very modern and different take on the film workshop template. I had to learn all this stuff myself, nobody taught me, I learned by my own research and by getting out there and doing it, so this is a way for me to give people the foundations to develop what I was never given and that is something I am really excited about.

Ally: How long have you been doing them and how often do you get to run one?

David: January 2017 is the first one actually! I'd been planning the workshop and researching the best sites and operators to partner with for the first six months of this year and when I was ready, I spoke to Oonas here in the UK and Red Sea Diving Safaris as they were always my first choice, and thankfully, both were super excited by the idea. My plan is to eventually run six a year, bi-monthly in different locations, and with different areas of focus, e.g. filming sharks, blue water filming, species specific trips, starting the journey to becoming a pro etc.

Ally: Where can we subscribe to your updates for future workshop dates?

David: My website has details when each workshop is confirmed at:
www.scarletviewmedia.com/filmmaker-workshops/
and any news and developments, including new workshops will be announced first on my Facebook page:
www.facebook.com/daviddileyfilmmaker/

If anyone is interested in the January workshop or any future workshops, they are very welcome to message me on my Facebook page and I will respond as quickly as possible to answer their questions.

Ally: With the continuation of promoting 'Of Shark and Man', what is your next project?

David: There's a couple of things at the moment but the main one is a six part series I'm working on with a Canadian Producer and an American Director. It's another shark thing and I can't really go into detail but I can say that once again, it's very different and aims to tell exciting and interesting stories relating to both humans and sharks. We have our pitch document almost ready and will be starting the process to find funding early in the new year. It's a much, much higher budget production than Of Shark and Man with a major TV network in mind.

I'm also developing a horror film with another writer/director which I'm really excited about, so I'm hoping once the series is done, I can have the pre-production on that project done and ready to start.

Ally: Not only are you film making, now branching in to making a horror film, colour correcting and grading, but you also have a musical background and have written and produced some of your sound track on 'Of Shark and Man'. You had kept that one quiet. This is a talent I'm a little jealous of. What is your story with music and how big a role does it play?

David: Music has been a massive part of my life for as long as I can remember. I remember being a kid, maybe around 7 years of age, watching Top Of The Pops when a video by the band W.A.S.P came on, followed by Guns n Roses and I just thought, "wow," there were these scary looking guys with long hair, smoking cigarettes and having a great time, it looked like fun and I was hooked instantly. At around 11, I got into Metallica, became obsessed with them, then picked up the guitar at 15 and spent every waking hour practicing. I had no social life to speak of, I've always been quite shy really so to lock myself in a room and obsess over getting something perfect was my way of expressing myself without the hassle of having to involve other people.

At 18, I went to university to study music and formed a band called Nerve Engine. I was in that band for ten years, touring, recording and trying to "make it big." We did quite well but never quite made it to where we wanted and when we ran out of money, we had to split the band. The guys are still my best friends though, we're like brothers.

I actually used my experience of the music industry when starting out in film as they are quite similar, plus, I treat editing a film the same as I would writing a piece of music, it's all about the story, taking the listener or viewer on a journey and making them feel something, it's a way for me to express myself and hopefully give others enjoyment. So for me to combine the two in Of Shark and Man, was a real pleasure. Not only that, because of my spending so much time in the music world, I have some phenomenally talented friends who I can call on to compose music for me as well, so involving them in my work is a real treat for me too.

Ally: Well David, we'll definitely be watching out for your updates. Enjoy all that you do!

UPCOMING WORKSHOP:
January 18th-25th in Marsa Shagra, Egypt.

WORKSHOP UPDATES & INFO:
www.scarletviewmedia.com/filmmaker-workshops/

FACEBOOK:
www.facebook.com/daviddileyfilmmaker

FILM SYNOPSIS
David Diley is a thirty-two year old man, trapped in a dead end job in England's industrial north and his life is going nowhere. He does however, have a lifelong dream…

Should David follow the advice of everyone around him and forget about it, or should he risk everything and against all the odds, take his one chance to fulfil his greatest ambition, an ambition which finds him in the middle of a feeding frenzy with sixty of the world's most dangerous sharks?

'Of Shark and Man' is a ground breaking film about one man's journey to get closer than anyone thought possible, to the world's biggest Bull Sharks and tell the incredible untold story of Shark Reef in Fiji, one of the greatest marine conservation successes of all time.

'Of Shark and Man' is an epic, incredibly ambitious, cinematic and award winning love letter to the world's most feared predator, in which the shark is the hero.

A huge thank you to our event sponsor, Majid Al Futtaim for having made this possible.

FIRST NAUTICAL ARCHAEOLOGICAL SOCIETY COURSE IN THE UAE

BY **KATHLEEN RUSSELL, PADI COURSE DIRECTOR** PHOTOGRAPHY **DAVE JOHNSTON** & **IAN CUNDY**

Two UAE dive centers, Al Mahara Diving Center and Freestyle Divers, organised the first Nautical Archaeological Society (NAS) Recorder and Surveyor course in Abu Dhabi. The courses were taught by experienced NAS senior tutors, Ian Cundy and Dave Johnston, both from the United Kingdom. The tutors flew into Abu Dhabi to teach the 3 day course held on 10th-12th of November 2016. NAS is a world leading charity, providing resources, education, training and events for people interested in maritime archaeology.

Most of the candidates on the course were PADI Course Directors, Master Instructors, PADI Instructors and tech divers. There was a strong interest to learn how to record an archaeological site through sketching, photography and video in the recorder course. The surveyor course covered 2D survey using offset, trilateration, tries methods, 3D survey of a site and how to use a planning frame to produce a scale drawing. The aims of the course was to introduce basic principles of maritime archaeology, to learn the importance of preservation of archaeological sites, to understand the basic principles of survey/ recording and monitoring and some common methods used on marine archaeological sites. Classroom sessions allowed the candidate to prepare a scaled sketch plan which can be used for future project planning. Divers spent two days on a local wreck in Abu Dhabi applying the practical recorder and surveyors skills.

The UAE has a long maritime history and many artefacts have been found along its extensive coastline. By learning these valuable techniques, participants will have the tools, resources and skills to conduct and record a site with potential historical significance.

Other marine archaeological courses include research topics such as Ancient Shipwrightry, Blacksmithing, Cannon, Social History of Ships, Numismatics Flint Knapping Maritime Iconography and more fieldwork, and post fieldwork courses.

For those interested in future NAS courses, please contact Al Mahara Diving Center (west coast) or Freestyle Divers (east coast). More NAS courses will be offered shortly and will include the PADI Wreck Detective Specialty course.

www.divemahara.com

DIVE TOGETHER
KEEP KHALIFA PORT CLEAN

BY **KATHLEEN RUSSELL, PADI COURSE DIRECTOR** PHOTOGRAPHY **ALLY LANDES**

On Wednesday the 22nd of November, over 40 volunteers including scuba divers, convened at Khalifa Port, Abu Dhabi to bring up marine debris from the port. As the Emirate's main container port operator, Abu Dhabi Terminals is committed to protect and preserve the ecological marine environment at Khalifa Port. This event was supported by Environment Agency of Abu Dhabi, Critical Infrastructure and Coastal Protection Authority (CICPA), Tadweer, Emirates Diving Association, Borouge, Al Mahara Diving Center and Project Aware.

The event was part of Abu Dhabi Terminal's commitment to keep the port and the marine ecosystem clean. Martijn Van de Linde, CEO of Abu Dhabi Terminals was present and inspected the marine debris brought up by the divers before thanking everyone for their efforts in the underwater clean up of the Khalifa Ports. Divers descended to 19-20 meters depth by the berths and tackled underwater pollution and collected the marine debris. Typically, in busy ports like Port Zayed in Abu Dhabi, divers bring up much more plastic pollution, beverage and food containers and recreational fishing equipment; however, the debris brought up by the divers on this occasion, included ropes, boating materials which may have fallen off the marine vessels and very little plastics were found on the port seabed.

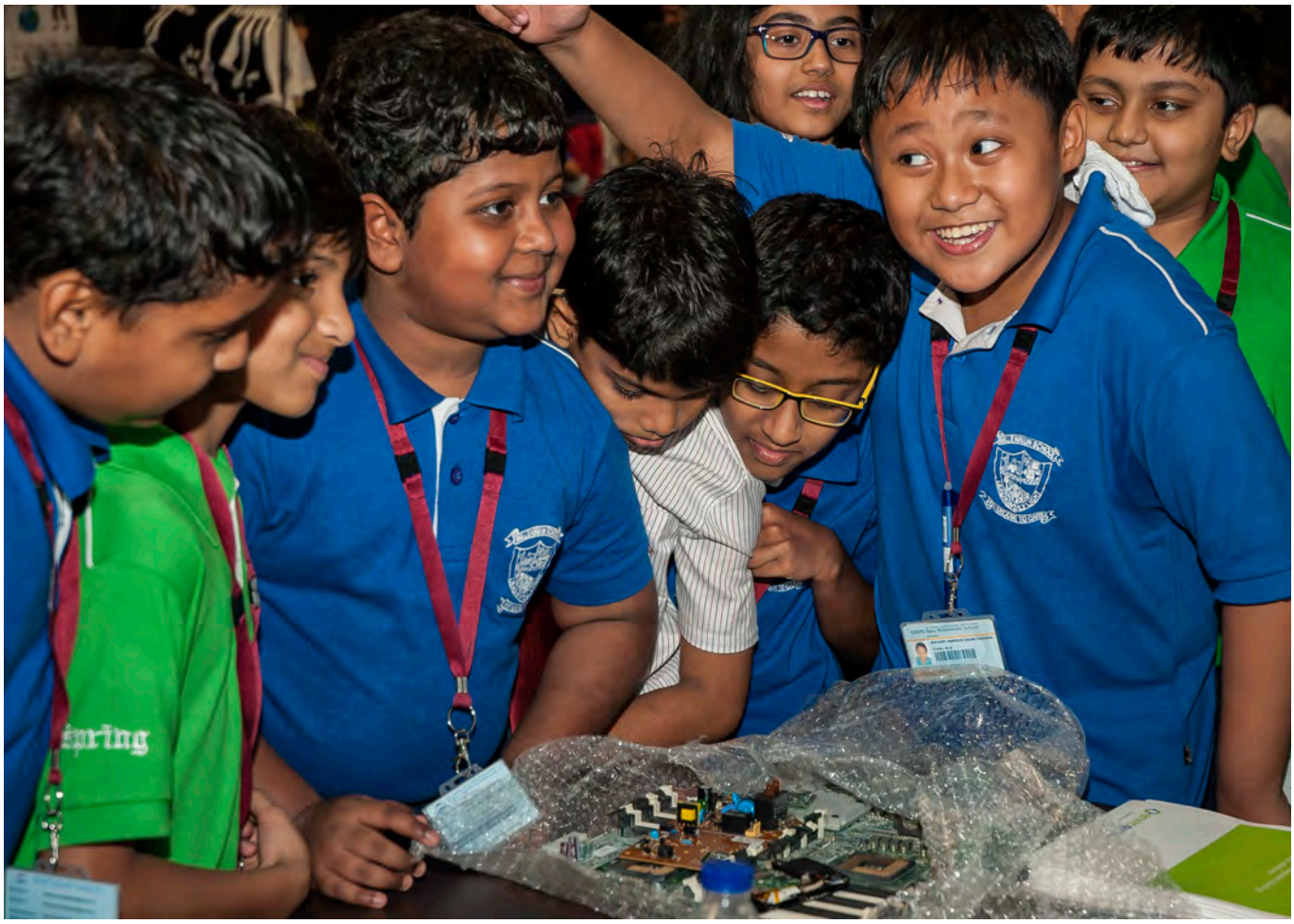
Also present was Environment Agency of Abu Dhabi's mascot, "Dana" the dugong. One of the UAE's flagship marine mammal species that is found in the local waters. The UAE has the largest population of dugongs outside of Australia. The Dugong is classified as Vulnerable on the IUCN Red List of Threatened Species and is protected under UAE laws due to its conservation status and threats to the species. Having "Dana" the dugong present, highlights the need to keep the port and the local marine environment clean.

Al Mahara Diving Center | www.divemahara.com

SUPPORTED BY:

BEYOND COP 21 SYMPOSIUM

BY **TARGET4GREEN** PHOTOGRAPHY **ALLY LANDES**



The third in the series of global Beyond COP 21 Symposium took place at GEMS New Millennium School, Al Khail, Dubai on the 25th of September. The event was a great success and involved over 100 students from 6 schools, as well as visits to the exhibition from around 400 host school students, teachers and parents.

Special guests and experts put some insightful and hard-hitting messages across to the next generation in a series of talks, presentations and workshops. Blue, the environmental division of the Al Serkal Group, raised awareness about recycling cooking oil, an everyday issue that can have a huge impact.

Tatiana Antonelli from the Drop It campaign highlighted the devastating and harmful impact of plastic water bottles on our planet. Other key presentations came from Emirates Green Building Council, Kehkashan Basu (recorded at UN HQ in New York) and Blue, while other exhibitors included Emirates Diving Association, LeakDtech, Eedama, Enviroserve, DGRADE, and Beacon Energy Solutions.

STUDENTS, SCHOOLS & SUSTAINABILITY TOGETHER

We were delighted to bring together students and teachers from GEMS New Millennium, Uptown School, Nord Anglia International School, DPS Sharjah, GEMS Kindergarten Starters and Our Own Indian High School.

"We see the world as a beautiful place but rarely look deep or see how our actions are harming the world. The least we can do is try not to use excessive amounts of things that are harmful to the place we call home. If we are less wasteful personally, we can spread the word in neighbourhoods and across the country."
Sampurna Dutta, 14, Gems New Millennium

"Even something simple like throwing out cooking oil can make a big difference. If you throw it out down the sink, the drains will not be efficient. But if you collect it and dispose of it in the right way, it can be reused as bio fuel."
Hussain Shikoh, 11, Nord Anglia

"I learned a lot about saving water and how our use and wastefulness in water makes such a big impact on the entire planet. One way to save water in the house is to make better choices in terms of plants for the garden and the house. We should choose plants that don't need much water such as a cactus."
Laila Al Mahdy, 12, Uptown School

"It has always been my dream to live a 100 per cent green life and so it was interesting for me to learn about green buildings. Just by considering location, by living nearer your school or work, can have such a big impact in terms of reducing carbon emissions. Steps like this are better for the environment."
Alexandria Baritsky Shepherd, 12, Uptown School

"Huge congratulations to Pete, the teachers, students and all of you for an excellent event. What great energy and initiatives you all contributed."
Sheena Khan, Education and Awareness Officer, Emirates Green Building Council

TARGET4GREEN

The Beyond COP 21 and SDG initiatives, including the Symposium, have attracted interest from schools globally and Peter Milne, Founder/ Director of Target4Green, is also registered with the UK's No1 speaking agency working with schools (primary and secondary), colleges and universities to provide talks, workshops and full day activities.

For more information on the Beyond COP 21 Symposium, see **www.target4green.com**.

BEACON | www.beacon-energy.com
Beacon is an end to end energy management and solar firm empowering companies to save energy across the region and to move away from fossil fuels.

BLUE | www.blue.ae
Blue is the new identity of the environmental division of Alserkal group. Alserkal is a local family who has been developing waste management services and products with a strong focus on the food industry and hospitality sector for more than 25 years. As part of the Symposium, Blue raised awareness on used cooking oil and engaged students in recycling activities.

DGRADE | www.dgrade.com

DGrade is a brand based company providing only the highest quality, ECO – friendly products available. The process begins by sorting and processing plastic bottles into flakes which are then heated and extruded into fibre. The recycled fibre is knitted or woven into fabric which is harder wearing, more stable and just as comfortable as cotton. The fibre can be spun to produce recycled Polyester yarn and can also be mixed with other fibres to make various blended fabrics. The process uses 20% less water 50% less energy and produces 55% fewer carbon emissions than conventional Polyester production, plus the fact that we are not using a finite resource – Oil!





EMIRATES DIVING ASSOCIATION (EDA) | www.emiratesdiving.com

- Emirates Diving Association (EDA) is a non-profit voluntary federal organisation accredited by UNEP as an International Environmental Organization.
- We promote environmental awareness regarding our underwater world through events and produce the only free divers magazine in the region – 'Divers for the Environment', touching on subjects written by EDA members, professional divers and researchers from all around the world.
- EDA's mission is to conserve, protect and restore the UAE marine resources by understanding and promoting the marine environment and promote environmental diving. Divers can prove extremely utile in conserving the marine environment through observing, reporting and preventing environmental abuse.


EEDAMA | www.eedama.org

We are a Masdar City-based company that aims at developing sustainability-related activities in schools. This is done through student led projects, field trips, scientific experiments or even via workshops for teachers. The central idea is that students learn by doing, when possible on a project base, changing behaviors, therefore impacting the whole community. We have recently signed an agreement with The Sustainable City in Dubailand in order to develop and organise educational field trips and experiments in their various real-size facilities (water treatment, biodomes, wind tower, solar installations…), and we regularly organise 'edutainment' trips to Masdar City. We are developing a new trip to a natural water treatment facility (a Reed Bed).

ENVIROSERVE | www.enviroserve.ae

- Enviroserve are the leading and oldest E-Waste and Refrigerant Gas Recycling company in the UAE.
- We value your commitment to the Environment, so we take extra care of your waste, giving you peace of mind to run your business.
- Our services are designed to make your life easier, whether collecting simple waste, planning an office move or a CSR campaign.
- We invest heavily to make your waste disappear as if by magic, only this time, it does not reappear!
- Everything coming through our facility is sorted and processed using industry best practices and trained team members.
- We work with customers to find new ways to champion the environmental cause globally, through programs and charity work.

LEAK DTECH | www.leakdtech.com

LeakDtech are a group of engineers that have found that both private and commercial property owners or tenants alike are not getting their properties built or maintained to high enough standards that cause customers to suffer with constant water leaks, high bills or general bad workmanship which are the three reasons people most call us. LeakDtech Dubai arrive when called and deliver a quality inspection either of just the problem the customer needed help with or the whole property where we conduct indepth investigations and highlight improvements that could be made.

DIVERS DOWN & PROJECT AWARE

BY **DIVERS DOWN**

Divers Down, the professional and friendly 5 star PADI IDC Centre in Dubai and Fujairah has partnered with Project AWARE, a global non-profit movement of scuba divers Protecting Our Ocean Planet, One Dive at a Time. Focused on the critical issues of the Sharks in Peril and Marine Debris, Project AWARE involves a growing movement of thousands of divers in more than 180 countries to work together for a clean, healthy and abundant ocean planet. The foundation has reached important goals over the past two decades with new programs and more online resources, Project AWARE supports divers taking action in their own neighbourhoods to protect the ocean and implement long term lasting changes. Not just divers, across the globe, some PADI instructors and PADI Dive Centres have also committed to ocean protection through the 100% AWARE partnership.

100% partners, additionally support the ocean protection by making a donation to Project AWARE on behalf of each student they certify. It is a great way to remind divers that the place where they learned to dive made a gift to protect the ocean on their behalf. Each student certified through the 100% AWARE project will receive a special version of their PADI card to proudly display their support of ocean conservation and to show everyone that even with the help of a single person, a difference can be made!

A 100% AWARE diving centre is definitely the best place to get informed and educated, as well as learning about reef conservation and environmental awareness.

Divers Down is proud to be one of these centres, committed to excellence in diver training and education at all levels. With two branches in Fujairah and Dubai, Divers Down can offer every level of PADI Courses, from Open Water Diver to Instructor, from Tec Diver to Tec Instructor. Divers Down put all their efforts into educating divers about marine conservation and their marine projects. The diving centre in Fujairah is located inside a 5 star resort with international restaurants, swimming pool, spa and kids activities. The diving centre is equipped with 2 boats, top of the range rental equipment and professional staff from OWSI to PADI Course Director. The Dubai branch is on The Palm, inside the Riva Beach complex, easy to reach from any point of Dubai to conveniently get your dive done or your training continued. Divers Down and the staff pride themselves on their level of professionalism and commitment to the environmental issues that are present in the area and worldwide. Divers Down run a very important international project with UAE schools, in which they teach not only mastering the skills for diving courses, but also the impact they can have upon the aquatic environment. Their AWARE and coral watch program involves the younger generation, helping to conserve and monitor the reef that can be hugely impacted by our actions, as well as environmental stresses such as El Nino. Divers Down have also taken their commitment a step further through the Adopt a Dive Site – pledging to consistently monitor their local dive area through repeated monthly surveys.

"Even by taking local action, we can raise awareness and contribute to global change. Being a 100% AWARE centre we not only lead by example, but also demonstrate to our students the importance of supporting ocean protection. We strive to involve more and more people in the awareness program."

For additional information about Project AWARE and to join the global movement for ocean protection, visit **www.projectaware.org**. For addition information about Divers Down and their program visit **www.diversdownuae.com**.

AL MARSA TRAVEL'S EARLY BIRD PROMOTION

BY **AL MARSA TRAVEL**

Al Marsa Travel is a PADI 5 Star Dive Centre. We opened in 1999, with our main office located in the Dibba Oman Port, along the waterfront. We are listed as one of PADI's 'Top 10 PADI Dive Centres' across the Musandam Peninsula. We are well known amongst the Musandam diving community for our good team spirit and level of professionalism. We are also listed on **www.tripadvisor.com** as one of Dibba Musandam's top dive centres. Dive with us and you can relax knowing you're in the care of the Musandam's most respected dive operation, with some of the region's most experienced professional dive team.

We are the main recommended dive centre for many national and international travel agents and tour operators. We offer tours in Oman and have been working with most of these companies for many years, and continue to provide our services to their guests such as: Schoener Tauchen, Beluga Reisen, Dive Worldwide, Orca Reisen, SUBOCEA, Dive & Travel, Fun & Fly, and many of our loyal customers return year after year and recommend us to their friends. We have built up a good reputation by word of mouth, of which we are very proud.

At Al Marsa, we have a dedicated, permanent team who are all passionate about diving! Our Instructors, Dive Masters and maintenance crew are all highly skilled and qualified and have an excellent command of English. The team have worked with Al Marsa for many years and bring a wealth of diving knowledge and experience that covers the Musandam area. We have many dive sites in the Musandam, each unique in its own right and breathtakingly beautiful, and our dive team have a sound knowledge of all of the sites and will guide divers around the best and most famous of them.

The centre is fully equipped with the latest scuba gear and we frequently purchase new kit. Everything from the regulators to the fins, BCD's to the masks, are all well known quality brands. We have our own compressor on board our boats and a highly skilled maintenance crew. We also have our own classroom facility with air conditioning and white board facilities as well as an open learning/briefing/discussion area.

We have a 20% early bird promotion for a 2 night dhow and dive trip. Reservations to be made 55 days prior to arrival. The promotion is valid until the 31st of December 2016.

Email: reservations@almarsamusandam.com
Oman Mob: +968 9 9363732
Oman Tel: +968 268 36550

AL MARSA *Musandam*

AL MARSA AND SCUBA STEVE CLEAN UP TRIP 2016

BY **STEVE WOOD** – PADI IDC STAFF INSTRUCTOR 636859

L-R: Rob with some of the rubbish collected; Ready to depart for the weekend; Ronnie Smith ready to start the clean up weekend; Relaxing after a successful clean up trip.

For the second year running, we teamed up with Al Marsa Travel and Tourism to undertake a weekend of Dive Site clean ups. Once again, Soheir and the Al Marsa team supported us by providing the Dhow completely free of charge, which encourages divers to sign up for what is a weekend of hard, but very rewarding work. 10 divers set out on Friday morning from Dibba to complete 4 dives.

As we had done in 2015, we focused on sites dived more regularly. So we selected Lima Rock, Ras Lima and The Caves for our clean up activity.

As always, it is important to recognise that the Musandam is generally very clean and we are fortunate that the sites we visit are in extremely good condition. However, there is always rubbish to be collected on any dive site. The Ras Lima sites in particular have a lot of boat traffic as well as being a busy fishing area.

All divers were fully briefed on what to remove and what should be left alone. Ripping an old rope from an area it has been in for a long time, will do more harm than good! They were kitted out with knives and cutting tools, collection bags and gloves. The divers were split into teams with defined areas to cover. Each team decided how they would conduct the dive and who would collect, who would gather and who would handle the collection bags etc. Lift bags were deployed to bring the bags to the surface where they could be collected by the speedboat providing surface support.

On day one, we undertook clean up dives on Lima Rock North and inside Ras Lima. As usual we found lots of old fishing lines (filament line never degrades), plastic ropes and plastic bottles. We also removed anything we spotted floating on the surface. Day two we dived Ras Lima corner and The Caves, again collecting a significant amount of debris.

Perhaps the most distressing part of the weekend was finding a huge net completely covering a large rock on Ras Lima corner that had entrapped a lot of lobsters, crabs and fish, as well as the remains of a large turtle that must have been at least 50 years old. We removed as much of the net as we could, released the lobsters that were still alive, and did our best to cut up the net so it could not trap anything else.

We calculated that over the 4 dives we collected an excess of 60kg of rubbish.

The weekend was another huge success and all the divers felt they had contributed something to keeping the Musandam beautiful.

All divers should endeavour to raise their awareness of the environment in which we dive and the opportunities to take part in the many clean up initiatives that Dive Centres and PADI undertake every year. As a minimum, I urge all divers to have a mesh collecting bag in your BCD pocket to pick up any rubbish you find on your dives.

Many thanks to all the divers who worked so hard and collected so much:

Andy Jones, Chelsea Purje, Hazel Lawn, Gemma Brown, Nicky Barr, Carol Robertson, Ronnie Smith, Vanik Tahmasian, Luz Hidalgo and Caroline Carr.

You should all be very proud of your efforts. Thanks to Soheir and all the team at Al Marsa for supporting us in being able to run the trip again this year. In particular we must thank the Dhow crew who did a marvellous job in properly disposing of the many bags of rubbish we collected.

We hope to run a similar trip in 2017 and would welcome anyone who would like to join us.

CONSERVATIONISTS WELCOME SHARK & RAY LISTINGS AT CITES COP

AFTER 13 SPECIES LISTED IN PLENARY, NGOS LOOK TO IMPLEMENTATION, REMAINING THREATS

Silky Sharks © Andy Murch | www.elasmodiver.com


Thresher Shark © Simone Caprodossi


Devil Rays © K. Vandevelde

JOHANNESBURG, OCTOBER 4, 2016
Conservationists are delighted that CITES* Parties have officially listed devil rays, thresher sharks, and silky sharks under CITES Appendix II. The listing proposals were supported by more than the two-thirds majority required for adoption in Committee on Monday, and finalized today in Plenary.

"This is a big win for all these species of sharks and rays as governments around the world will now have to act to ensure that trade is from sustainable and legal fisheries," said Andy Cornish of the WWF.

Nine devil rays, the three thresher sharks, and the silky shark were proposed by countries all over the globe for listing under CITES Appendix II, which obligates Parties to put in place international trade restrictions to ensure exports are sustainable and legal.

"We are elated by the resounding support for safeguarding the devil rays, some of the oceans' most vulnerable animals," said Sonja Fordham of Shark Advocates International. Devil rays have just one pup every two or three years, leaving them exceptionally susceptible to overfishing.

Ali Hood of the Shark Trust noted, "While we're pleased by this important decision to regulate trade in silky sharks, we stress that complementary fishing limits and measures to reduce incidental catch are key to the effective conservation of this species."

"We are grateful that governments recognize the value of healthy thresher shark populations for both fisheries and tourism," said Ania Budziak of Project AWARE.

CITES Parties now have six months to implement the new international trade obligations for devil rays, and one year to do the same for silky and thresher sharks.

"We urge governments to put in place these vital international trade controls, as a matter of priority," added Amie Brautigam of the Wildlife Conservation Society.

Earlier in the meeting, Parties agreed steps aimed at improving the traceability of shark and ray products, which is fundamental to CITES implementation. Countries' interventions reflected a growing recognition of the vital role CITES can play in shark and ray conservation by enhancing data, improving management, and ensuring sustainable international trade.

Project AWARE, Shark Advocates International, Shark Trust, TRAFFIC, Wildlife Conservation Society, and WWF are working in partnership to promote the ray and shark listing proposals, with support from the Paul G. Allen Family Foundation.

**Convention on International Trade in Endangered Species of Wild Flora and Fauna.*

IS BY-CATCH A PROBLEM FOR DOLPHINS IN THE UAE? DATA FROM THE "REPORT A SIGHTING" CAMPAIGN

BY **ADA NATOLI**

FIGURE 2 & 3: SP002NB, about one year old, re-sighted with its mother and other dolphins just off the Palm Jumeirah in November 2014. It showed clear signs of entanglement and a deep cut at the base of its tail.

The UAE Dolphin Project has been methodically collecting sightings reported by the public since winter 2012, and feeding information to a comprehensive database that gathers simple data such as date, time, location, species and group size. On a small scale, the single sightings may seem insignificant, but in the bigger picture, when all the contributions are pulled together, the outcome is powerful as we have shown in our last article in the September issue of the EDA magazine. Public sightings allow researchers to identify areas where dolphins occur, and this is important information especially for regions where little is known about this species.

Now that we have multiple years of data available, we can also start identifying temporal patterns. For example, it seems recurrent that during the months from October to December, Humpback Dolphins in particular, like to frequent the waters close to shore. The number of sightings around the Palm Jumeirah, Dubai Marina and the nearby coastline always increases during this period.

With the advanced technology of better cameras and them now being more accessible, we are also receiving more photographs and this has opened the possibility of gathering a wider range of data. As dolphins can individually be identified by their dorsal fins, it is not rare that photos of dolphins provided by the public allow us to recognize individuals from of our photo-identification catalogues compiled during surveys done back in 2014.

FIGURE 1: SP002NB a newborn Humpback Dolphin alongside its mother, first identified in October 2013 by the UAE Dolphin Project team.

This proves that the same individuals utilize the same waters across the years.

Photographs are also providing interesting information about other aspects, such as threats and diseases. Among these, one that has recently come to our attention is by-catch. By-catch is a worldwide renowned issue for dolphins, as well as for sharks, turtles, sea birds and whales. Nets are nowadays produced by tough materials which are nondegradable and no matter whether they are baited or not, they keep fishing as long as they are in the water, killing large numbers of marine creatures. In the UAE there is no data available on dolphin by-catch, but this doesn't mean that the problem doesn't exist. We directly witnessed the entanglement of a small dolphin in a fishing line during our survey that we know from previous sightings. We have received a number of other reports that have indicated dolphin entanglements in the past.

Here we would like to report two sightings we have recently received that we think is worth sharing. Fortunately bad news comes in pairs with some good news!

We met the little Humpback Dolphin SP002NB, for the first time back in October 2013 beside its mother and other dolphins when it was just a newborn (Fig. 1). We truly rejoiced when we met the calf and mother again in November 2014! The death rate in the first year of a dolphin's life is high, and seeing that it had survived was great news for the local Humpback Dolphin population! Very sadly though, upon analysing our photo-identification library, we realised that little SP002NB had had the unfortunate bad luck of ending up entangled in what looked like an abandoned fishing line. It was wrapped all around its head and mouth. We could also see deep cuts at the base of its tail, a clear sign of a net or line entanglement that had cut through the flesh (Fig. 2 & 3). That was probably the reason of its erratic behaviour that day with plenty of splashes, jumps and rubbing against other members of the group; it was probably trying to disentangle itself! We were not able to do anything but hope that somehow, SP002NB will be set free and survive.

Then a few weeks ago, exactly two years later, we received an image from a sighting (Fig. 4) and the news that seemed so improbable back then, was finally here! We could clearly identify SP002NB from the scars at the base of the tail and better news still, not a trace of the entanglement to be seen! SP002NB had made it! Hopefully SP002NB, now 3 years old, has learnt a lesson and will hopefully stay away from nets for the rest of its life.

Entangled dolphins are not always so lucky. Just a few days before, we received another sighting along with a video, this time containing disturbing images. It showed a dolphin heavily entangled in a net. The entanglement must have been old as the net had deeply carved into the animal's flesh and had probably grown into it (Fig. 5). Although it looked as it was swimming ok and keeping up with the other dolphins in the group, we sadly have little hope for this dolphin.

Dolphins who are caught up as by-catch have also been reported in other areas such as the Musandam, Oman (Fig. 6), highlighting that the problem is not limited to just UAE waters. Collaborating by-catch awareness campaigns between the fishing industry and the local authorities to collate more information on the issue will help to create solutions to this problem and limit incidents.

Special thanks to those who reported these sightings.

FIGURE 4: Picture reported by the public in October 2016 from Jebel Ali. SP002NB is clearly recognized by the cut at the base of its tail. We know that it is about three years old now, and it also has nice little notches on its dorsal fin that will make it stand out in the years to come. Other images submitted showed no signs of entanglement.

FIGURE 5: This Humpback Dolphin has not been lucky enough to set itself free from the net that it got entangled in. It was reported in October 2016 in Jebel Ali waters. The net has clearly cut through the flesh while probably growing within the wound. There is unfortunately little hope that it will be able to free itself.

FIGURE 6: Another case of a young Humpback Dolphin reported from the Musandam in May 2016, dragging a line that got entangled around its body. We had two sightings of a young Humpback Dolphin entangled from the same area in the same month. Hopefully, it is the same dolphin.

Please **REPORT YOUR SIGHTINGS!** If you encounter a dolphin or a whale, dead or alive, please send us the Date, Time and Location. We would love to receive your images of dolphins you encounter, it will help us track the individuals that we already know, or identify new ones!

YOU CAN SEND YOUR DATA VIA:
Website: www.uaedolphinproject.org
Text Message: +971 56 671 7164
Email: sighting@uaedolphinproject.org
Or post them on our Facebook, Twitter or Instagram pages.

YOU'D BETTER GET A MOVE ON

STORY BY PATRICK VAN HOESERLANDE ILLUSTRATION PETER BOSTEELS

Indeed, the weight belt made him sink to the bottom. It was amazing; Skubba barely felt the heavy belt underwater. At the surface, he walked like a Japanese Sumo Wrestler, but underwater, it felt like NOTHING! Almost nothing.

How wonderful it was to really dive. There, a fish. On hands and feet, he crept along the bottom. His chase didn't last long because he had to go up for air. After filling his lungs with air, he wanted to go down again to look for the fish. But he ended up in a cloud of dust. Total darkness. Fish gone.

He stepped further through the water and dove. He could see again. Great!

There, that fish. Again he crept slowly over the bottom. And again he had to go up. Another cloud of dust formed that hid the fish.

Skubba realized that now that he could stay underwater, he had to choose between lying motionless on the bottom or crawling over it while making a cloud of dust. Whatever he chose, he wouldn't see a lot of fish.

"Fred?!?" Skubba told his friend about his difficult choice and asked if he knew a better solution.

"Walking?"
"Too difficult!"
"Swimming?"
"Too slow!"

Together they looked out over the water as if the answer lay somewhere hidden out there.

"If we make your hands bigger, would you not be able to swim faster?" asked Fred. Before Skubba realized what his friend meant, Fred was already gone.

When Fred came back, he had two old baseball gloves with him. You know those big gloves used by baseball players to catch the ball. These gloves are huge!

"Put them on," Fred said. With the weights around his waist and gloves on his hands, Skubba stood bent over with his hands on his knees and looked like a little troll. Fred started to laugh.

"Go into the water and try to swim breaststroke underwater. Or better still, troll stroke," he laughed.

And yes, Skubba went faster through the water. For a moment he thought he was as fast as fish, but when a small fish shot past him, Skubba knew better. Still, he fully enjoyed his underwater swimming skills.

All went well, until he tried to hold onto something. With these huge gloves on, he was not able to do it. Water started to trickle into his mask. When he wanted to get rid of the water, things got worse. With gloved hands he was so clumsy that he accidently tore his mask off.

Even after he surfaced, he could not put the mask back on. His hands were just too big to use. Skubba had planned to dive the whole afternoon, but without a mask there was no fun. Fred was watching his friend.

"Everything okay there?" asked Fred.

"No," answered Skubba and he showed him that he could not use his hands.

Shortly thereafter, they sat under the tree next to the fisherman's platform.

Walking? Difficult! Swimming? Slow! Troll swimming? Clumsy!

After a while, Fred broke the silence and told Skubba about the peculiar triangular things he had seen in the dive shop. Perhaps that was the solution? But how?

TRIANGLES

STORY BY PATRICK VAN HOESERLANDE ILLUSTRATION PETER BOSTEELS

Would those strange, triangular things that Fred had seen in the dive shop, be the solution to moving underwater? Fred was convinced that they would know if they tried it.

At home, in the back of the garden, they made two large triangles from a sturdy, plastic plate. They went to the lake to figure out how to use them. At the waterfront they discussed what they could do with them. Skubba proposed to put them on his hands. He put his fingers through the holes and Fred tied his hands with a piece of rag to the two plates. He felt like a seal clapping his front flippers. Would this work?

He first tried to swim on the surface. If he could do that, he would try it underwater. Unfortunately, he did not swim very far. At least, not without difficulty. When he explained to Fred that this idea was not a success, he stumbled. He struggled to keep up straight. When he finally stood again, he noticed that he had moved backwards. Fred had seen it too.

"Maybe you need to swim backwards with them?" he shouted.

"I will try!" Skubba replied.

He lay on his back in the water and moved his arms. And yes, he swam backwards.

"It works!"

"Yes, I see that, but you can't see where you're going! Be careful!" yelled Fred. Too late. Skubba bumped into a piece of wood floating around.

"Ow!" That hurt, but it showed that Fred was right. This was not a good solution.

"If you lay in the water on your belly with your arms to your side, then you should be able to swim by moving your arms," Fred explained. "And you will be able to see where you swim to."
That did indeed work. Skubba could even swim faster underwater. He could almost keep up with a fish.

"That's it!" he shouted as he emerged from the water. But Fred was less enthusiastic.

"How will you pick things up?" he asked.

Like a seal, Skubba couldn't hold on to anything. And to grab something with his mouth was not a solution either. He could now swim faster, but he was still clumsy.

"What if we attached those triangles to your feet instead of your hands? Then you could use your hands to hold onto things," Fred thought out loud. This made sense to Skubba, so he came out of the water.

Attaching the triangles to his feet was not easy. Yes, they were able to attach them, but as soon as he started walking with them on, he fell to the ground, or he lost a triangle. After a while, Fred suggested to walk backwards. This way stopped him falling, but the triangles still came loose.

They decided to go back to their little workshop at home to think it over.

"What are you thinking of?" asked Skubba.

"On how we can firmly fix those triangles to your feet," replied Fred.

In the garden shed, they found an old pair of sandals. Fred decided to attach the triangles to the sandals with some screws and bolts. The thick rubber soles protected Skubba's feet against the sharp edges of the screws. Walking was easier and he no longer lost a triangle.

Unfortunately, by the time they had fixed them, it was too dark to go back out and try them out underwater. Testing them would have to wait until the following day.

Yes, tomorrow Skubba will be a real diver!

20th ANNIVERSARY CELEBRATIONS
REEF CHECK HONOURS INTERNATIONAL OCEAN HEROES

BY **REEF CHECK**

Reef Check honoured five 'Heroes of the Reef' for their outstanding ocean conservation contributions at its 20th Anniversary "Save the Reefs, Save the Oceans" gala on the beach in Santa Monica, California on September 15th. Michael Weber, author of "The Wealth of the Oceans" received the Poseidon Award in recognition of his global conservation accomplishments while at the Centre for Marine Conservation, the California Fish and Game Commission and Resources Legacy Fund. Weber's early support enabled the Reef Check California program to get off the ground. Weber stated:

"Reef Check has raised the credibility of citizen science and has become a close collaborator with the state's universities and a trusted partner with the Department of Fish and Wildlife. Reef Check has set a standard for citizen science worth emulating.

Reef Check divers will be able to document the recovery of ocean communities in and around the state's network of marine protected areas. And as a result, Reef Check will be able to tell the kind of hopeful story that will inspire others to care and to act."

The first Hero of the Reef Awardee, Dr. Ruben Torres, Director of Reef Check Dominican Republic, was honoured for 10 years of coral reef conservation including installing a network of mooring buoys, the co-management of the La Caleta marine park, the creation of a sustainable seafood program and a series of recipes for Lionfish, a Pacific species that has invaded the Caribbean.

The second Hero of the Reef Awardee, Julian Hyde, Director of Reef Check Malaysia, was also honoured for 10 years of coral reef conservation including pioneering the use of hydrophones to track blast fishing, the improvement of MPA effectiveness at Tioman Island, and the creation of a dugong sanctuary at Sibu Island.

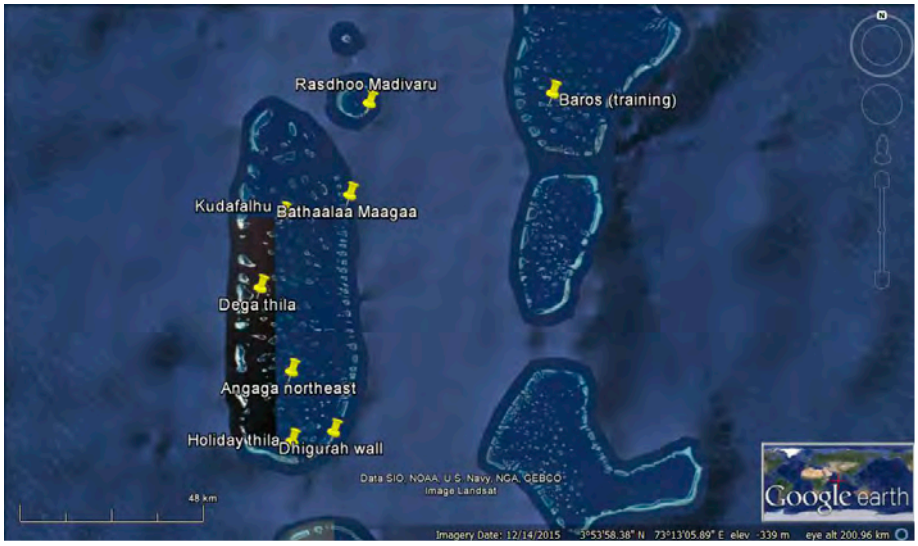
Biosphere Expeditions founder Dr. Matthias Hammer received the Reef Stewardship Award for his 15 years of global conservation activities including the creation of Reef Check expeditions for divers in the Maldives, Malaysia and Oman.

This year's Citizen Scientist of the Year Award was presented to Keith Rootsaert, a California volunteer diver since 2010 who made more than 180 survey dives for Reef Check.

The Reef Check Board and Staff are grateful to all those who attended, bid, donated, and volunteered to make the 20th Anniversary Gala a success! Special thanks to sponsors Houlihan Lokey, Body Glove, Edison International, SWAGTRON, Gary L. Justice, Plumbers Depot Inc., Atlantis Resorts, Paul Gauguin Cruises, and Myers's Rum Platinum White.

BLEACHING & CROWN OF THORNS WREAK HAVOC ON MALDIVES REEFS

BY **BIOSPHERE EXPEDITIONS**



Biosphere Expeditions reflects on the status of Maldives reefs following this year's EcoExpedition. 2017 expedition dates have just been announced – visit **www.biosphere-expeditions.org/maldives** for details.

Both coral bleaching (where hot water stresses and may eventually kill corals) and Crown of Thorns starfish can be considered 'natural' events. But when these events happen often and with increased severity, reef survival is threatened, and therefore the very survival of coral reef nations such as the Maldives is at serious risk.

Recent dive surveys by an international and Maldivian team of divers from Biosphere Expeditions, the Marine Conservation Society and Maldivian partners have revealed a worrying reduction in the amount of live coral in the Maldives over the past year. Healthy coral cover has been reduced to below 10% in more sheltered inner atoll reefs by the recent El Niño that has also devastated much of the Great Barrier Reef. El Niño hit the Maldives in May this year with two weeks of 32 degrees centigrade waters – at least 2 degrees above the 'normal' upper limit of 30 degrees. Outer reefs that are flushed with deeper, cooler water on a more regular basis have fared better (with an average of 25% live coral cover).

Dr. Jean-Luc Solandt, Biosphere Expeditions' programme scientist from the Marine Conservation Society says: "Our surveys showed a clear pattern, with reefs inside atolls being the worst affected. Some of the reefs denuded by the warming have also been hit hard by Crown of Thorns starfish, which eat corals. Sadly, one of the reefs that was beautiful with more than 70% hard coral some four years ago have its remnant corals now being eaten by Crown of Thorns starfish. These coral-eating starfish have decimated the Great Barrier Reef through geological time, and have been affecting the Maldives for over two years now."

Shaha Hashim, a Maldivian conservationist and linchpin for community-based survey and reef conservation efforts, also took part in the expedition and adds: "More stringent efforts to conserve and build up the resilience of these marine ecosystems are crucial for our survival as an island nation. Development planning and policies need to put a higher value on environmental impacts, which is the prerequisite for any social or economic harmony."

Dr. Matthias Hammer, founder and executive director of Biosphere Expeditions, concludes: "We are very concerned for the people of the Maldives. Almost everything depends on healthy reefs: the economy, food, welfare, and tourism income. If reefs are threatened, so is the very existence of the country and its social cohesion. We hope the reefs will recover, and whilst coral bleaching cannot be locally managed, fisheries, litter and pollution can be. We urge the government to use some of the income from the heavily consumptive tourism industry to pay back – to invest in the very survival of their islands and nation. Without investment from this sector, we believe the reefs will struggle to return."

But there is a silver lining too: "What gives us hope is that the last big bleaching event in 1998 was hotter, longer and more severe, and many reefs recovered good coral growth within seven years", says Solandt. Hammer adds: "It is not all doom and gloom. Where officialdom is failing, civil society and committed Maldivians are thankfully stepping in. Ever since Biosphere Expeditions started running its annual research trip to the Maldives in 2011, it has educated and trained Maldivians in reef survey techniques as part of the Biosphere Expeditions' placement programme. This culminated in the first-ever all-Maldivian reef survey in November 2014 and other community-based conservation initiatives since then, the latest in March 2016. Shaha Hashim, for example, has taken part in several expeditions and is now training her compatriots in reef survey techniques and setting up community-based conservation programmes. So there is hope yet!"

CONCORDIA INTERNATIONAL CREATES GLOBAL AMBASSADORS

BY **EMERSYN LYON, CONCORDIA INTERNATIONAL SCHOOL SHANGHAI, AGE 16**

We live on a planet filled with crystal blue oceans, white sand beaches, and shallow coral reefs teeming with life. However, this reality will steadily fade into a memory as we perpetuate our careless habits. Mother Nature's beauty will become nothing but pixels on a screen while the kiss of death knocks on her front door. As a fifth-year returnee on Concordia International School Shanghai's Marine Ecology Program, I have witnessed the harrowing decay of coral reefs in Thailand. At sixteen years old, I've seen a single reef transform from one of spectacular corals and sprightly fish to a depressingly damaged reef. Snorkelers thrash on the surface oblivious to the havoc they inflict under the waves whilst standing on the coral. Speedboats haphazardly plunge their anchors without regard for the life beneath. Furthermore, pollution and global warming continue to tear reefs apart.

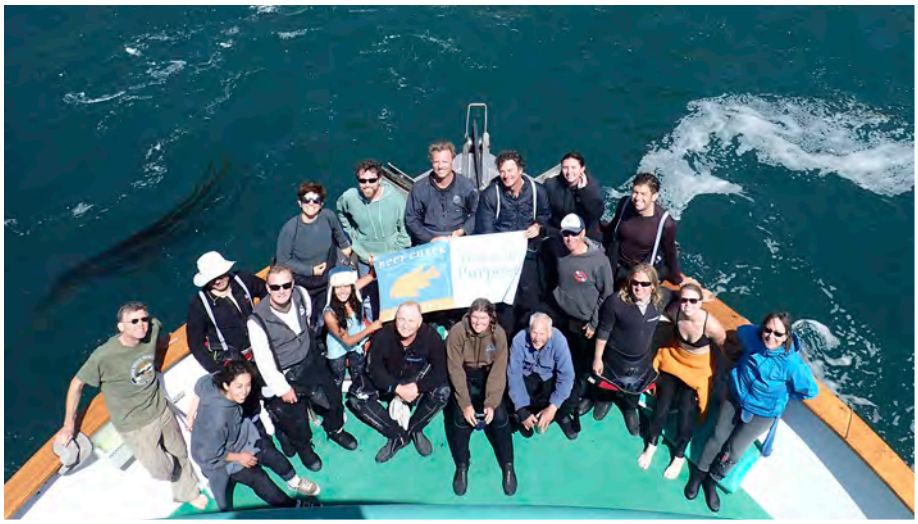
While humans have a great capacity to destroy, we also have the ability to heal. Therefore, Concordia seeks to educate youth and adults globally through our Marine Ecology Program collecting data and documenting changes. Concordia hands over the torch of knowledge to us, the young; the torch that bears the sorrows of our world. Concordia's program is the only one of its kind that conducts Reef Check in the exact same location for the duration of five years. This year marks the ninth year of Concordia's participation in this program. This is the fourth year on Concordia's second reef, which is off the east coast of Koh Phi Phi, Thailand. Our home away from home – the Manta Queen III – is filled to the brim with 23 students and 6 chaperones. The entire group did a total of 598 dives before Reef Check data collection began. Students collect data, analyse, and gain real world experience to a degree where it matters. Reef Check data is gathered over a span of 2 days with a total of 16 collection runs. Students were divided into four teams of six, and each team did two runs of data collection per day. These dives were so intensive that a single dive could take up to one hundred minutes!

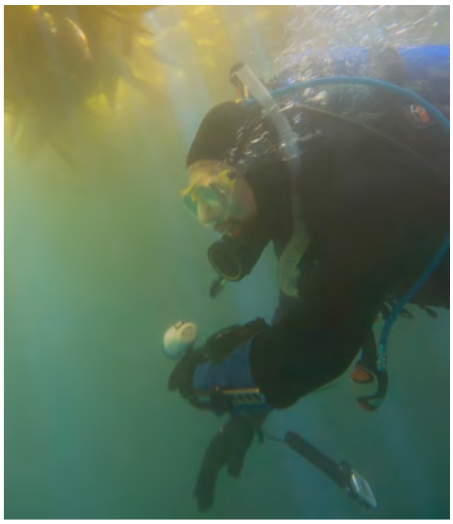
With the Concordia Marine Ecology Program, students open their eyes and strive to create a better world. In fact, the data we collect is used in global conferences regarding reef health. Concordia offers the opportunity of a lifetime to step away from the screens we all hide behind and look to the world with hope for a better future. Our oceans are what we make of them; let's make the seven seas blue again.

DIVERS TOUGH OUT CHALLENGING CONDITIONS ON BIG SUR ECOEXPEDITION

BY **DAN ABBOTT, REEF CHECK CALIFORNIA CENTRAL COAST MANAGER**

PHOTOGRAPHY **MALCOLM HOBBS & ANDREW BEAHRS**





At 2:00am on June 27th, 2016, just one month after the successful completion of the Kickstarter campaign to raise funds for this year's Big Sur and Channel Islands EcoExpeditions, the MV Vision pulled away from the dock in Morro Bay, California. On board was a hardy team of 18 Reef Check California certified divers who over the next three days, would collect data on over 70 indicator species at sites along the Big Sur Coast. Surveying along this stretch of coast is always challenging as ocean conditions can be unpredictable. At the beginning of the trip, no one knew how much we would be able to accomplish.

The ride north from Morro Bay was rough, and within minutes of leaving the protection of the harbour and striking out across the open ocean, everyone awoke in their bunks as the boat repeatedly heaved over waves only to come crashing down with a bang. No one was able to get much sleep that night, and it wasn't until we pulled into the protection of Lopez Point, just south of our first survey site, that the boat calmed down and we were able to get out of our bunks and eat some breakfast. The plan for day one was to survey three sites around Big Creek Marine Protected Area.

Ocean conditions the first day were manageable with moderate wind and waves, and visibility right around 3 meters, our minimum for being able to conduct fish surveys. Our tired but dedicated team of surveyors got in the 50°F water and began surveying the area. On last year's trip, we counted more juvenile sunflower stars in this area than in any other region of the coast, a species that has recently all but disappeared due to Sea Star Wasting Disease. By the end of the day, we had surveyed two complete sites and partially completed a third, but had not seen a single sunflower star.

Day two we headed north to survey sites around the Point Sur Marine Protected Area. Our sites in this MPA were the most exposed of any on our trip. Upon reaching the survey coordinates, we assessed the conditions and called the dive off. The team was disappointed as not only did we fondly remember the beautiful kelp forest and abundant fish at these sites, but the water was crystal clear, just too rough to dive in. We headed south and completed two reference sites outside of the MPA, including a new site we had not previously surveyed, and finished our half-completed site from the day before.

The third and final day of our expedition was promising as we headed to the southern end of the region to our sites around the White Rocks MPA, where conditions were forecast to be calmer. Unfortunately, though calm on the surface, a deep southern swell had stirred up the bottom sediment reducing visibility to only around a meter, not enough for us to collect fish data. We collected information on invertebrate and kelp populations at one site and then headed further south to Point Buchon to complete our site there. Ultimately we were able to return to this area on a smaller boat out of Morro Bay to finish our other three sites in and around the White Rocks MPA.

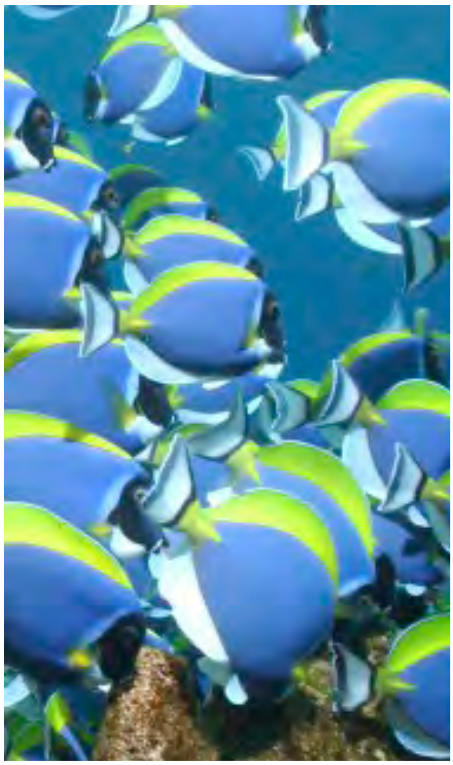
In the end, our dedicated team of volunteers successfully completed nine surveys at sites clustered around the Point Sur, Big Creek, and White Rocks Marine Protected Areas. We found evidence that populations of recovering fish stocks were doing better inside the three Marine Protected Areas along the coast. But we also documented a decline in sea stars due to Sea Star Wasting Disease, especially sunflower stars which were completely absent at our nine sites. Purple urchins – voracious grazers of kelp forests and whose populations have boomed in some areas in the last year, turning previously lush kelp forest into desert-like "urchin barrens" – do not appear to be increasing along the Big Sur coast and were recorded in either similar or lower densities than last year. All of the data we collected on this expedition has been uploaded and is available for free on our Global Reef Tracker for scientists, marine managers and the general public to use.

A big thank you to everyone who backed our Kickstarter campaign and made this effort possible, and to all the hard working volunteers who worked to collect this data in less-than-ideal ocean conditions!

IMPACTS OF MALDIVES BLEACHING EVENT, NEXT EXPEDITION ANNOUNCED

BY **DR. JEAN-LUC SOLANDT, REEF CHECK MALDIVES COORDINATOR**

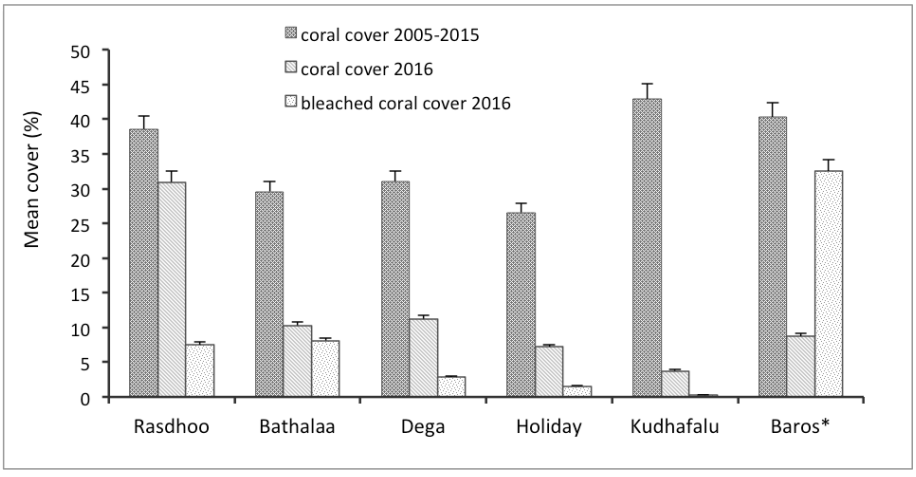
PHOTOGRAPHY **BIOSPHERE EXPEDITIONS**



Biosphere Expeditions, with local partners and The Marine Conservation Society of UK (MCS), has successfully surveyed the effects of the 2016 bleaching event on Maldives reefs. We used Reef Check in our 2016 surveys to provide data on differences between bleaching impacts on inner and outer reefs. The data is being presented at the next Rufford regional conference by Hussein Zahir of LaMer group in the Maldives, who has been developing a relationship with us since 2011, as well as helping us to identify Maldivian participants for our expeditions. The conference is a learning experience for different recipients of Rufford grants in the region over recent years.

The next MCS/Biosphere Expedition to the Maldives is from 15-29 July 2017 with a difference. The second week (22-29 July) is only for divers already certified as Reef Check EcoDivers. This allows participants to have a short refresher day, then get down to 2-3 dives a day of data collection, with the expedition able to move much further southeast than we've done before. We have yet to survey these southern reefs of Felidhoo atoll to record site conditions that haven't been surveyed since the late 1990s. The first week of the expedition (15-21 July) will survey those sites visited on this year's expedition to see how they're doing since the bleaching event.

We hope that experienced and qualified Reef Check EcoDivers will join us on week 2 so that we can get some excellent data on new sites. Please visit **www.biosphere-expeditions.org/maldives** for more information and to sign up.



OMAN'S MUSANDAM CORAL REEFS WEATHER EL NINO

BY **BIOSPHERE EXPEDITIONS**

Despite high salinity and water temperatures, even more extreme in the recent El Niño year, Oman's Musandam Peninsula's coral reefs are thriving, according to a recent Reef Check survey conducted by Biosphere Expeditions. Divers observed coral cover ranging between 28 and 78% at shallow (<10m) depths, with little evidence of coral disease, predation, or bleaching. However, the report cautions that additional stress caused by natural or anthropogenic impacts could severely affect coral and other ecosystems, as has been seen in other reefs in the Arabian Peninsula. Additionally, fisheries in the area have undergone a decline. Biosphere Expeditions thus urges the establishment of a number of no-take zones in the northern part of the Peninsula.

The Musandam Peninsula is located at the northernmost point of Oman, at the entrance to the Arabian Gulf, and is in fact separated from the rest of Oman by part of the United Arab Emirates. The 650 mile coastline is characterized by rocks, coves, and steep cliffs and slopes, and the coral reefs remain relatively untouched by human intrusions such as industrial fishing and recreational diving. The reefs face a different challenge in the form of high salinity and temperature. Though moderate in comparison to the Gulf of Arabia, the Gulf of Oman still experiences summer water temperatures between 23°C and 31°C, with a maximum temperature of 35°C, but due to a strong thermocline this range can be experienced over the course of a single day. Salinity is generally at 36.5% with recorded extremes of 38.9%. Oman's coral reefs have thus been uniquely adaptable, with a resultant variety of coral habitats in the area.

During the last week of October 2015, Biosphere divers used Reef Check methodology to survey eight different dive sites along the northern Musandam coastline. "Corals appeared to be in a healthy 'climax' state on many of the shallow reefs, with many sites hosting very large Porites colonies, indicating no significant damaging events to these corals over the past 400 years," according to the report.

However, high densities of Diadema urchins are causing structural damage to the reef structure, though no grazing pressure was observed. Additionally, the reduced size and abundance of grouper populations, and the sighting of only one lobster, point to pressures of local fishing. The report expresses concern that continued coastal development in the area will add to overfishing, and thus urges the establishment and enforcement of fishing regulations, as well as the designation of marine protection zones.

For more information, please see **www.biosphere-expeditions.org/oman**.

HURRICANE MATTHEW BLASTS
HAITI, CUBA, BAHAMAS AND SOUTH COAST OF US

BY **GREGOR HODGSON, PHD EXECUTIVE DIRECTOR, REEF CHECK** PHOTOGRAPHY **REEF CHECK**

By September 30th, NOAA models indicated that Hurricane Matthew would likely bash the western end of Haiti where six Reef Check staff are based in the city of Les Cayes. With measured wind speeds of 164mph (264kph), Matthew briefly reached Category 5 status, and was the most powerful hurricane in the Caribbean since Hurricane Felix in 2007. On October 2nd, I requested all our staff to evacuate to the capital Port Au Prince. Despite the efforts of Haiti Civil Defence to warn people, it has been 50 years since a storm this intense hit western Haiti, so there was no memory of how bad this could be. Many people also feared losing their possessions if they left their homes, so few evacuated. But with predictions of up to 40 inches (101cm) of rain, 40 foot (12m) swells, and an 11ft (3.3m) storm surge, this was a big mistake for coastal dwellers.

The hurricane was so large and slow moving, that it rained heavily for 24 hours before the eye hit Les Anglais (west of Les Cayes) at 6am local time on October 4th. This caused rivers to flood, bridges to be destroyed, and by then all communication was already down for the entire western end of Haiti.

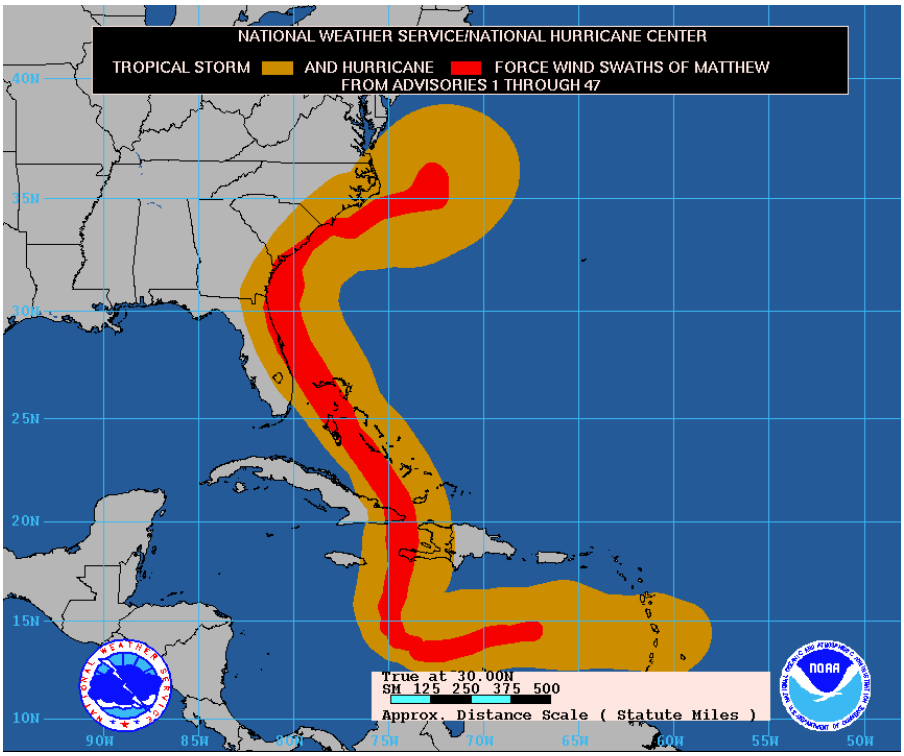
Matthew moved slowly and almost directly north across the southern peninsula with the eye passing out to sea near BonBon, a fishing village where Reef Check works, and located west of the city of Jeremie. Heavy rain and hurricane force winds (145mph) continued for more than 36 hours. The Laguerre family is one we work with near Jeremie. Because their house was only 50m from the sea, we urged them by text to evacuate. Unfortunately, they waited until their roof started to lift off at about 6pm, so that they were forced to run in the dark, repeatedly being knocked down and rolled by 90mph winds until they reached a relative's house on higher ground. Luckily, they were not injured by flying debris such as steel roofing sheets and coconut trees.

Landslides, flooding from rain, waves and storm surge, and intense winds killed over 1000 people and left about 1 million without a roof or house. Cash crops such as cacao and coffee were completely destroyed. Family

gardens, banana, mango and papaya trees were flattened, and goats, cows, and chickens killed, leaving people with little food. Many schools lost roofs and walls.

Reef Check is not a relief agency, but we quickly realized that the large relief agencies were not very familiar with the remote coastal areas affected by the hurricane and did not have local contacts. So we helped to advise USAID's emergency DART team how to get food and supplies to these communities, some of which are only accessible by boat. Working with our partners at the United Nations Environment agency, we agreed to focus on short-term relief efforts to provide much needed solar powered EkoTek LED lights and some food directly to our students and fishermen. Many thanks go out to the Reef Check supporters who generously donated to the relief efforts.

Haitians are incredibly resilient and will rebuild. Once the immediate humanitarian crisis has passed we will send a team to re-survey the best reef in Haiti. Reefs = food.



FEATURE CREATURE
THRESHER SHARK (*ALOPIAS PELAGICUS*)

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

RED LIST CATEGORY & CRITERIA: VULNERABLE
Scientific Name: *Alopias pelagicus*
Common Name: English: Pelagic Thresher, Thresher Shark, Whiptail Shark

Justification: All members of genus *Alopias*, the thresher sharks, are listed as Vulnerable globally because of their declining populations. These downward trends are the result of a combination of slow life history characteristics, hence low capacity to recover from moderate levels of exploitation, and high levels of largely unmanaged and unreported mortality in target and by-catch fisheries.

The Pelagic Thresher Shark (*Alopias pelagicus*) is a large, wide-ranging Indo-Pacific Ocean pelagic shark, apparently highly migratory, with low fecundity (two pups/litter) and a low (2-4%) annual rate of population increase. This species is especially vulnerable to fisheries exploitation (target and by-catch) because its epipelagic habitat occurs within the range of many largely unregulated and under-reported gill net and longline fisheries, in which it is readily caught. Although this species is reportedly relatively common in some coastal localities, current levels of exploitation in some areas are considered to be unsustainable. Overall, it is considered highly likely that serious depletion of the global population has occurred.

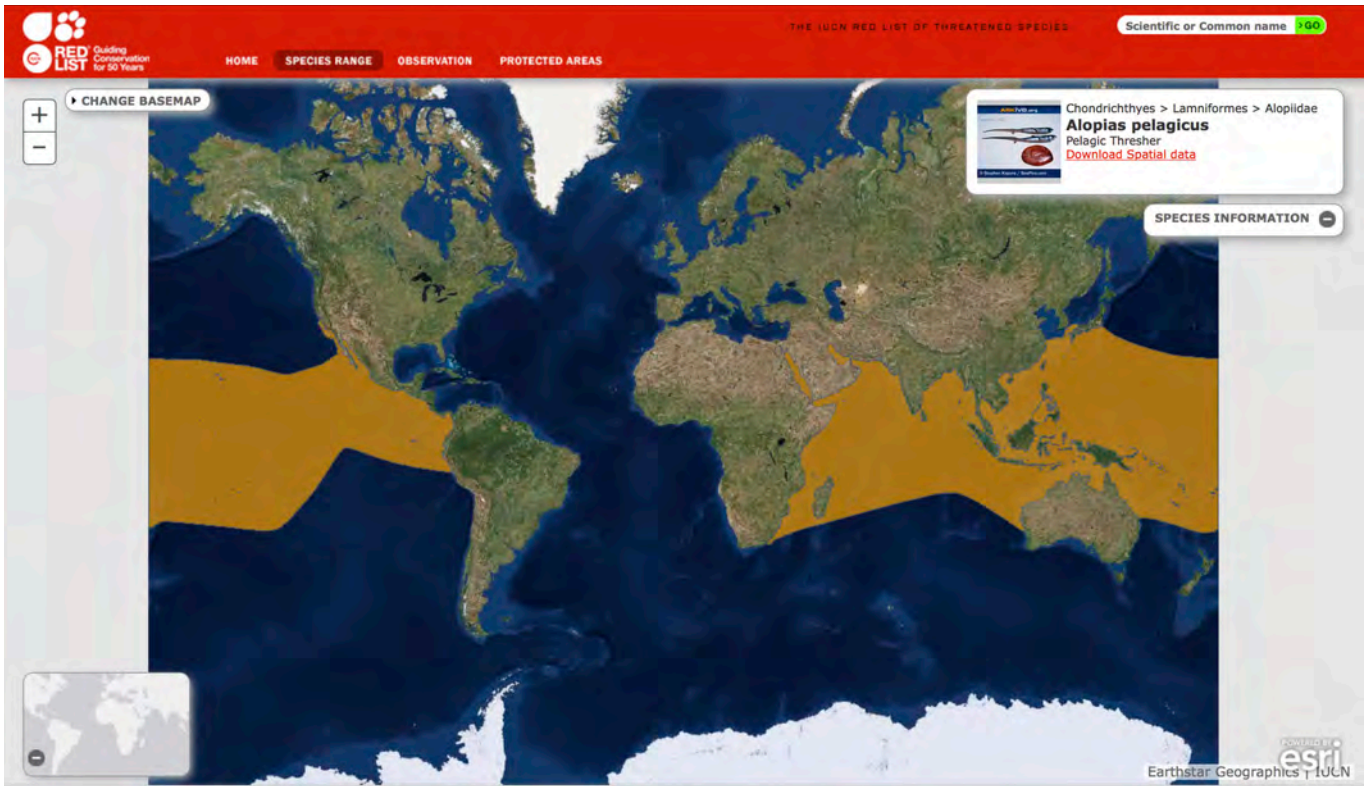
Range Description: Oceanic and wide-ranging in the Indo-Pacific, Indian Ocean: South Africa (Kwa-Zulu Natal), Red Sea, Gulf of Aden, Arabian Sea (off Somalia, between Oman and India, and off Pakistan), Australia (northwest Western Australia). Western North Pacific: China, Taiwan, Japan (southeastern Honshu). Western South Pacific: New Caledonia, eastern Micronesia, Tahiti. Central Pacific: Hawaiian Islands, equatorial waters north of Howland and Baker, Phoenix and Palmyra Islands. Eastern Pacific: USA (California) and the EEZ of Mexico including the Gulf of California), equatorial waters northwest of French Polynesia, and off Galapagos Islands (Compagno 2001).

Countries Occurrence: Native: Australia (Northern Territory, Queensland, Western Australia); China; Ecuador (Galápagos); Egypt (African part)); Eritrea; French Polynesia; India; Indonesia; Iran, Islamic Republic of; Japan (Honshu); Kenya; Madagascar; Mexico; Micronesia, Federated States of ; Mozambique; New Caledonia; Oman; Pakistan; Saudi Arabia; Somalia; South Africa (Eastern Cape Province, KwaZulu-Natal); Sri Lanka; Sudan; Swaziland; Taiwan, Province of China; Tanzania, United Republic of; United States (California, Hawaiian Is.); Yemen (Socotra, South Yemen).

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

Population: Few population data are available for the Pelagic Thresher throughout its epipelagic range. It is unknown whether its Indian Ocean and Pacific Ocean populations are partly isolated. It is very likely that this species migrates between Central America and the Gulf of California.

An ongoing population genetic study of *A. pelagicus* using DNA sequences from the mitochondrial control region indicates gene flow between populations in Mexico and Ecuador (Trejo 2004). However, there is a significant degree of population structure



between Taiwan and both populations (Mexico and Ecuador) studied in the Eastern Pacific.

Current Population Trend: Decreasing

Habitat and Ecology: This species is poorly known. It is probably highly migratory and is epipelagic from the surface to at least 152m depth (Compagno 2001). Factors such as temperature and oceanic currents influence its distribution, for example it is found near the Equator in winter, but not in summer (Dingerkus 1987). Its food preference includes squid.

The Pelagic Thresher Shark is placentally viviparous with oophagy, and a litter size of only two very large (158-190cm) pups. In Ecuador, length at sexual maturity is reported at 140cm precaudal length (PL) for males and 144cm PL for females (J. Martinez per. comm.). Age at maturity near Taiwan is estimated as 8-9.2 years in females and 7-8 years in males (Liu et al. 1999). It reaches a maximum length of 330cm. In the EEZ of Mexico, the breeding season ranges from October to March (Mendizabal-Oriza et al. 2000). Its potential annual rate of population increase under sustainable fishing is thought to be very low and has been estimated at 2-4% (S. Smith pers. comm.), or 0.033 (Dulvy et al. 2008), (compared with the Common Thresher, which is between 4 and 7% (Smith et al. 1998) or 0.254 (Dulvy et al. 2008).

Systems: Marine
Movement Patterns: Full Migrant

Use and Trade: The species is utilized for its meat, liver oil, and hides for leather and fins for shark-fin soup.

Coastal longline fishermen off the coast of Japan report that they retain thresher sharks preferentially over other sharks because of their lower urea content. One fisherman cited values of US$250 per shark for thresher shark carcasses (Gilman et al. 2007).

Major Threat(s): Members of the genus *Alopias*, thresher sharks, are threatened from a combination of slow life history characteristics, hence low capacity to recover from moderate levels of exploitation, and high levels of largely unmanaged and unreported mortality in target (for fins and their valuable meat) and by-catch fisheries.

Thresher shark species (including *A. pelagicus*) were found to represent at least 2-3% of the fins auctioned in Hong Kong, the world's largest shark fin trading centre (Clarke et al. 2006a). Thresher shark fins are generally low value compared to other species because of their low fin ray count (S. Clarke unpubl. data). It is estimated that between 350,000 and 3.9 million thresher sharks (Alopias species) are represented in the shark fin trade each year or, in biomass, 12,000-85,000 mt (Clarke et al. 2006b). These estimates are 1-2 orders of magnitude higher than catches of *Alopiidae* reported to FAO, which since the early-1980s have generally been less than 1,600 tonnes, and around 1,000mt since 1998 (Maguire et al. 2006), Catches of thresher sharks are clearly hugely under reported globally. Although trend data are as a result largely lacking, these fisheries are unlikely to be sustainable. A recent FAO analysis states, "unless demonstrated otherwise, it is prudent to consider these species as being fully exploited or overexploited globally" (Maguire et al. 2006).

Alopias pelagicus has a particularly low (2-4%) annual rate of population increase, which renders it particularly at risk from depletion in fisheries. It is subject to high levels of by-catch mortality from tuna fisheries and is a target of some smaller shark fisheries, for example in the Gulf of California, Red Sea and possibly Southeast Asia. Under reporting of catches means that trend data for this species are largely lacking, but data available for the Common Thresher (*A. vulpinus*), which is significantly more fecund and resilient to fisheries, indicate declines in CPUE as high as 80% in the northeast Atlantic over two decades (Baum et al. 2003).

Sharks have been fished heavily by pelagic fisheries operating in the Indian Ocean and significant reductions are thought to have occurred there as a result of intensive pelagic fishing effort (Compagno, L.J.V. pers. comm.). The area of these fishing operations included known pelagic thresher ranges, and this species is especially vulnerable to fisheries exploitation as it is readily caught in gillnets and on longlines, even getting its tail caught in the nets or on hooks. *Alopias pelagicus* is a known by-catch of the Spanish longline fleet targeting swordfish in the Indian Ocean (IOTC 2000). It has been fished by longline in the northwestern Indian Ocean, and is or has been caught in large numbers in the Red Sea and the Gulf of Aden.

In Indonesia, and probably elsewhere in Southeast Asia, *A. pelagicus* are caught in very high numbers by tuna longliners throughout the region, especially south Java where they fish in or close to Australian waters (W. White pers. comm.).

The species is also fished in the Central Pacific and is currently an important catch off Taiwan, with about 222t landed annually. A spawner-per-recruit (SPR) analysis of *A. pelagicus* in eastern Taiwanese waters suggests mean SPR of pelagic thresher for 1990-2004 was below the biological reference point (BRP) of SPR = 35% suggesting that this stock was slightly overexploited. The authors concede that this assumes a single stock, a hypothesis that cannot yet be accepted or refuted (Liu et al. 2006). This work also provided an untuned Virtual Population Analysis which indicated that the abundance of pelagic thresher stock decreased from 141,398 in 1990 to the lowest level of 97,551 in 2000, and increased thereafter to 153,331 in 2003 (Liu et al. 2006). However, the trend of abundance could not be validated with catch per unit effort series because fishing effort data were not available (Liu et al. 2006). The low population growth rate of this species means that the increase to 2003 could not have been caused by recruitment to a closed stock.

Japanese assessment of data from research longline surveys in the Pacific and Indian Oceans suggests that thresher shark (*Alopias* species) catch per unit effort increased in the 1990s (to near one shark per 1,000 hooks) over levels in the 1970s (near zero sharks per 1,000 hooks). However, this result is thought to be possibly attributable to an increase in hook depths in the latter period. In recent years, based on logbook data, recorded Japanese catches of thresher sharks worldwide ranged from 252 to 596mt with an average of 347mt. The resource is considered stable with no management action required other than ongoing monitoring (Japan Fisheries Agency 2006).

Pelagic Threshers are caught by shark fishermen in large numbers in the Gulf of California and the Pacific coast of Mexico. It is taken off Central America by artisanal fisheries and the local tuna fleet. Ward and Myers (2005) estimated the biomass of thresher sharks to be approximately 5% of the virgin biomass and estimated a decline in abundance of 83% in the East tropical Pacific (within the three generation period). These estimates were made by a comparison of pelagic longline research surveys in the 1950s carried out in the tropical Pacific Ocean with recent data (1990s) collected by observers on pelagic longline fishing vessels, which have been standardized to account for differences in depth and soak time (Ward and Myers 2005).

When *A. pelagicus* occurs off the west coast of the USA during El Niño years, females comprise 83% of the catch, of which 41% are pregnant. This aggregating of females may possibly make them additionally vulnerable to entangling gear such as gill nets (S. Smith pers. comm.).

Off the Pacific coast of Mexico, Pelagic Threshers are by-catch of the pelagic longline fishery west of Baja California Sur and the opening of the Sea of Cortez down to the southern Mexican border. Unstandardised catch rates are relatively high with around three individuals caught 100 hooks (Mendizábal-Oriza et al. 2000). In addition to being caught in the high seas pelagic longline fishery, this species is also caught in inshore coastal gill nets and longlines and offshore (but not oceanic) longlines and gill nets (Mendizábal-Oriza et al. 2000). Analysis of longline data from the EEZ of Mexico's Pacific coast (from 1986-1999) shows that *A. pelagicus* represented 33% of the sharks and 19% of the total catch of all large pelagics. There is an apparent negative trend in the CPUE (No/100 hooks) from 1986-1999, but this data has not been standardized in order to determine the statistical significance of this trend. This trend is unreported and the data source is unknown. Recently, this fleet (now with fewer longliners) has moved towards the west coast of Baja California and Blue Shark is currently the most important species caught.

In the principal port in Ecuador, Manta, a total of 150,321 individual sharks have been landed between 2003 and 2006, of this *A. pelagicus* comprised 36%, with *A. supercilious* comprising 3%. Therefore *A. pelagicus* make-up 92% of thresher shark landings here.

Conservation Actions: This species is mainly taken on the high seas, outside waters managed by coastal States. Family *Alopiidae* is listed as a highly migratory species under the 1995 UN Agreement on the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (UNFSA). The Agreement specifically requires coastal States

Photo by Simon J Pierce

and fishing States to cooperate and adopt measures to ensure the conservation of these listed species. To date, there is little progress in this regard. See www.unclos.com for further details.

The FAO International Plan of Action for the Conservation and Management of Sharks (IPOA-Sharks) recommends that Regional Fisheries Organisations (RFO) carry out regular shark population assessments and that member States cooperate on joint and regional shark management plans. This is of particular importance for pelagic sharks such as *Alopias pelagicus* whose stocks are exploited by more than one State on the high seas. Although steps are being taken by some RFOs to collect species-specific data on pelagic sharks, and to ban the practise of shark finning (the removal of fins and discard of carcasses at sea), to date no RFO has limited shark catches or drafted a "Shark Plan" as suggested in the IPOA-Shark guidelines. It is widely recognised that shark catch statistics submitted to RFOs by Contracting Parties do not represent the total removals of sharks and are also very limited with respect to the size, age and sex composition of the catch. Much greater monitoring and research investments directed at sharks in particular, and other by-catch species in general, need to be made by the Parties.

Precautionary adaptive collaborative management by regional fisheries organizations and fishing States of target and by-catch fisheries is urgently needed for this biologically and behaviourally vulnerable shark.

The Convention on Migratory Species (CMS) is developing an agreement for the collaborative management of migratory shark species. This may be a useful supplement to traditional fisheries management measures, particularly since the latter are largely not being applied to pelagic shark stocks.

This animal requires careful monitoring because of its limiting life-history traits and the evidence of declines in parts of its range, although available data is currently insufficient to assess the global status of this species. The highly migratory nature of this species could cause seasonal fluctuations in catches or CPUE. However, for proper interpretation of the status of *A. pelagicus*, analyses combining CPUE from fleets operating in both international waters and within the EEZ of countries where *A. pelagicus* is captured should be performed as a matter of urgency.

Citation: Reardon, M., Márquez, F., Trejo, T. & Clarke, S.C. 2009. ***Alopias pelagicus***. The IUCN Red List of Threatened Species 2009.

www.iucnredlist.org

CLEAN UP ARABIA ON THE EAST COAST

PHOTOGRAPHY **ALLY LANDES**

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

Emirates Diving Association (EDA) organized the 21st annual Clean Up Arabia on Friday the 30th of September, supported by Le Meridien Al Aqah Beach Resort Fujairah and Dibba Municipality, and was sponsored by Majid Al Futtaim, Dubai Duty Free and Chalhoub Group. 400+ community volunteers participated in the beach and dive clean ups.

The campaign clears beaches and key dive sites from harmful marine debris and raises public awareness about the negative impacts that marine debris has on our health and that of our wildlife.

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

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

RUBBISH COLLECTION RESULTS

East Coast beach and dive clean ups on Friday the 30th of September.

BEACH	
TRASH TYPE	TOTAL
MOST LIKELY TO FIND ITEMS	
Cigarette Butts	2990
Food Wrappers	383
Plastic Take Out Containers	254
Foam Take Out Containers	159
Plastic Bottle Caps	657
Metal Bottle Caps	376
Plastic Lids	359
Straws/Stirrers	393
Forks/Knives/Spoons	154
Plastic Beverage Bottles	382
Glass Beverage Bottles	275
Beverage Cans	402
Plastic Grocery Bags	253
Other Plastic Bags	197
Paper Bags	128
Paper Cups & Plates	136
Plastic Cups & Plates	308
Foam Cups & Plates	140
FISHING GEAR	
Net & Pieces	14
Line	1
Rope	25
OTHER TRASH	
Balloons	3
Cigar tips	52
Cigarette lighters	16
Construction materials	70
Fireworks	12
PACKAGING MATERIALS	
Other plastic/foam packaging	58
Other plastic bottles	44
Strapping Bands	17
Tobacco packaging/wrap	29
PERSONAL HYGIENE	
Condoms	6
Diapers	3
Syringes	1
TINY TRASH (< 2.5 cm)	
Foam Pieces	426
Glass Pieces	321
Plastic Pieces	799
EXTRA	
Large Foam Pieces	12
Slippers	12
Dried Leaves	137
Wood Pieces	34
Charcoal Pieces	9
Metal Pieces	17
Hangers	9
Tissues	32
Clothing Items/Fabric	3
GRAND TOTAL:	**10108**

UNDERWATER	
TRASH TYPE	TOTAL
MOST LIKELY TO FIND ITEMS	
Cigarette Butts	4
Food Wrappers	1
Plastic Bottle Caps	85
Metal Bottle Caps	50
Plastic Lids	2
Straws/Stirrers	9
Forks/Knives/Spoons	11
Plastic Beverage Bottles	8
Glass Beverage Bottles	21
Beverage Cans	28
Plastic Grocery Bags	11
Paper Bags	17
Paper Cups & Plates	7
Plastic Cups & Plates	3
FISHING GEAR	
Net & Pieces	16
Line	1
Rope	11
OTHER TRASH	
Cigarette Lighters	3
Construction Materials	3
Tires	2
PACKAGING MATERIALS	
6-pack Holders	2
Other Plastic Bottles	15
TINY TRASH (< 2.5 cm)	
Foam Pieces	1
Glass Pieces	3
Plastic Pieces	14
GRAND TOTAL:	**328**



















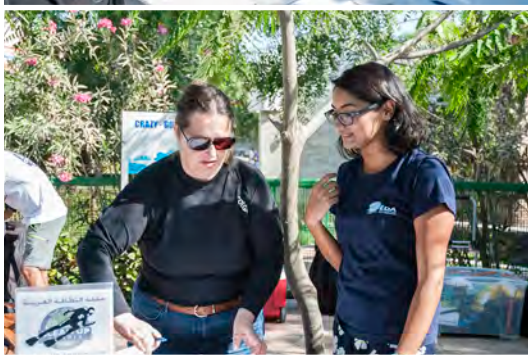














OTECT
ENVIRONMENT













EXPORT



















مهمتنا مسؤوليتنا





Dubai
Duty Free






















Promote
Protect
Preserve




MAJID AL FUTTAIM

LET'S GET CLOSE TO THE GREAT WHITE SHARK WITH JOEL LAMBERT

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

On one of my Etihad flights, somewhere over the Mediterranean Sea, I slept a few hours, thanks to the comfort of my business class seat. Once awake and left with only an hour left to land in Abu Dhabi, there was not enough time to watch a movie, so I went for a documentary about Great white sharks. Hmmm…it seemed interesting.

That's how I got to know about Joel Lambert. Two things got my attention while watching the episode; the pod (a specially designed hemispherical dome) used to get in close contact with big predators, and the use of advanced military techniques and strategies to manage situations where animals at the top of the food chain are involved.

After landing, clearing passport control, and passing baggage claim, I enjoyed breakfast at the arrival lounge while waiting for my transfer. I turned my MacBook on and began to look for some information about Joel Lambert and his TV series. I decided to write him an email, introducing myself and checking his availability for an interview to be done via Skype or phone since I'm based in Dubai.

After a few hours, I got his reply. He had a stopover in Dubai coming up! What fate! So we met after a few days in a restaurant close to the Dubai International Airport.

Joel Lambert is an exceptionally skilled former US Navy SEAL and star of the Discovery Channel's hit show, Lone Target/Manhunt and Predators Up Close. Joel has also appeared in a number of small and big screen roles such as Hollywood blockbuster, American Sniper, where he portrayed a Delta sniper. He constantly seeks out new endeavours to satisfy his curiosity and test the limits of his abilities.

Joel, among many other things, became proficient in basic and advanced SERE (Survival, Evasion, Resistance & Escape) skills, urban evasion, field craft, tracking, counter-tracking, booby traps, and all the rest of the tricks and techniques he now applies during his shows all over the world.

NdC: In the choppy waters of the South Atlantic, just below Cape Town, you had the chance to meet the great white shark.

JL: Correct. It's hard to imagine a 2000-pound animal launching itself out of the water while hunting, but the great white shark does just that. This spectacular behaviour is called breaching and great white sharks breach in order to catch fast-moving prey, like seals. Swimming fast at the surface, sharks can fly 10 feet into the air. Unfortunately, one can virtually never determine where a White Shark is going to breach before it actually does, making this phenomenon difficult to study or capture on film; breaching is also relatively rare because the shark has to use lots of energy to propel itself. But while the team was fixing the pod for use at sea, we could witness the most spectacular form of shark hunting on the planet – the breach – when a 2-3 ton great white leaves the water at 40km/h to take out unsuspecting young seals in False Bay. After that, I assessed the impact power of the sharks using an accelerometer, to be sure the pod was safe enough and then we agreed to test it in shark-infested waters.

After a while of being in the pod, a shark came very close and I could hear Gemma (Gemma Care is a passionate advocate of shark conservation and protection, assisting Joel during this episode. Ever since her childhood she has been captivated by these creatures, and over the years has developed a particular fascination with great white sharks.) via the communication system asking me with her British accent, "Joel! Are you touching the shark?" And I replied, "Of course I'm doing that!".

NdC: The pod has been realized to be used on the ground. What difficulties did you face to covert it for in-water use?

JL: Main issue was the floatability; an accidental sinking or underwater instability with the pod going upside-down, could mean a big risk for the people inside the pod. So we did many tests to ensure the correct position of floating devices in order to have enough stability underwater and while positioning the pod in the water.

Another potential issue was a crack in the plexiglas due to the ice and/or shark impact. That's why we assessed the impact power of the sharks before using it at sea.

NdC: Lion vs White Shark; which episode did you prefer?

JL: Even though the great white shark is the perfect predator, I feel we are more related to lions. It's something closer to us.

NdC: But come on, you are "a seal", you should be related to sharks. Especially great whites, they eat seals.

JL: (Joel starts laughing) Old one mate…but you are right! In remote eastern Zambia, I got up close with an alpha male lion while shielded inside the special pod. During a thrilling night in the pod, lionesses shredded the robust bite-force meter, and a big male tried different ways to get in. When a herd of buffalo appeared, I could assist the pride's hunting prowess.

NdC: Let's talk about safety. In water or on the ground, people think you take too many risks sometimes.

JL: That's a good one. As a former Navy SEAL, when planning a mission, I try not to leave any safety procedure to chance. But of course to reach some goals, you need to get ready to have a fear reaction that allows you to perform better. It's not unsafe; it's consistent with who I am.

NdC: Do you have any advice for candidate adventurers?

JL: Just step out! Just go for it. Then of course study what to do in situations you may be in. I would learn the things I need to do and then I would definitely listen to more experienced people.

We thank Joel for his time and hope to join one of his next adventures for a social media close-up.

Photo by Massimo Ziino for Dubaiblog and web

ABOUT JOEL
(Source: Discovery Channel)

Raised in a small logging town in Washington State, Joel grew up with little direction, but knew what he wanted out of life – something that would challenge him. He recounts a story from when he was 10 years old, about his father's friend who tried out to be a SEAL, but quit during a training exercise where he had to be revived after he was thrown in the water with hands and feet tied behind his back and tested to survive. As a kid, Joel would swim in the deep end of the pool and think about that story. One day, he decided that trying out to be a SEAL would be the ultimate challenge he had been searching for.

At 22, Joel went to a Navy recruiting office and did nothing but train to ensure he was at top physical condition to be accepted. In 1998, Joel joined the Navy and made it through Basic Underwater Demolition/SEAL (BUD/S) – the brutal selection course for the SEAL Teams – where he proudly served during his 10 year stint with the military. He was deployed on numerous combat missions to locations including Afghanistan and Kosovo.

Joel operated within SEAL Teams 2 and 4 for eight years. During that time, he planned and participated in over 20 combat missions, headed the mission critical ordnance department containing all weaponry and optics for 16 SEAL operators, and even trained SEAL operators and foreign special operations personnel from Singapore, Thailand, Greece, Egypt, Germany, Netherlands and Estonia.

After his last tour in Afghanistan, he spent two years as a BUD/S Instructor – the screening and selection program for the Navy SEALs. He took on this new role with the understanding that helping to create the next generation of Frogmen is as important as serving in combat. During his time as an instructor, Joe learned the designation "Master Training Specialist" in recognition of superior training and briefing skills and was consistently in the top 10 percent of instructor staff.

The Dubai Turtle Rehabilitation Project had released 100 critically endangered turtles including Beau, this large 50kg male amputee Loggerhead turtle from the Burj Al Arab back on the 16th of June to celebrate World Sea Turtle Day. Beau was the second amputee to be released back into the wild.

SEA TURTLES

ARE WE HUMANS CARELESS, CRIMINAL OR CUSTODIANS?

PART 3: WHAT ARE WE DOING TO THEM?

FEATURE **PAUL WARWICK** PHOTOGRAPHY **ALLY LANDES**

THREATS TO SEA TURTLE POPULATIONS

Each year hundreds of thousands of hatchling Sea Turtles emerge from their nests on beaches throughout the world. Sadly, only an estimated one in 1,000 to 10,000 (dependent upon species and location of nesting sites) will survive through to adulthood to sustain the "Circle of Life" that underpins the whole of our natural world. The natural obstacles faced by young and adult Sea Turtles are staggering, but it is the increasing threats caused by humans and their business and recreational activities that are driving them and many other marine species towards the "precipice of extinction".

Harvesting for Consumption: Although Sea Turtles have both spiritual and mythological importance to many cultures around the world, this has not prevented humans from consuming either their eggs or meat. In many coastal communities, especially in Central America and Asia, Sea Turtles have provided both a primary and supplementary source of food for many villages. During the nesting season, turtle hunters comb the beaches at night looking for nesting females. Often, they will wait until the female has deposited her eggs before killing her when she is most vulnerable – then, they take both the eggs and the meat and in some cases other valuable parts of the turtle for products, including the oil, cartilage, skin and shell. Many countries forbid the taking of any Sea Turtle eggs, but in many places, enforcement is lax, poaching is rampant, and the eggs can often be found for sale in local fish markets around the world. Whilst this may seem cruel, senseless and irresponsible to First World Countries, to a local fisherman who has to either feed his family or raise money in the absence of any other alternatives, he does what he can. So it is a reasonable argument for them to ask the question, "what would you do if you were living the life we lead?".

Illegal Sea Turtle Shell Trade: Hawksbill Turtles, recognized for their beautiful gold and brown shells, have been hunted for centuries to create jewellery and other luxury items. As a result, these turtles are now listed by almost all conservation organisations as CRITICALLY ENDANGERED. Scientists estimate that Hawksbill populations have declined by almost 90 percent during the past 100 years. While illegal trade is the primary cause of this decline, the demand for shells on the black market continues even today. The lack of accurate information about Sea Turtles unfortunately leads many tourists to unwittingly support this international trade in these endangered species. Buying, selling or importing any Sea Turtle products in many countries around the world, is strictly prohibited by law.

Commercial Fishing – Long Line and Trawl: Each year, hundreds of thousands of adult and immature Sea Turtles are accidentally captured

Al Ouda, the large 120kg female Green turtle who was successfully released back in April 2016, was the first amputee that the Dubai Turtle Rehabilitation Project released back to the wild. Both turtles were fitted with satellite tags to monitor their movements through their new adaptation.

by fishermen around the world either by highly mechanized fishery operations, to small-scale sustainment fishermen. Global estimates of annual capture, injury and mortality are staggering – 150,000 Sea Turtles of all species killed in shrimp trawls alone, more than 200,000 Loggerheads and 50,000 Leatherback Turtles captured, injured or killed by longlines, and large numbers of all species drowned in the illegal gill nets. The extent of gill net mortality is not fully known, but Sea Turtle capture is significant where it has been studied, and the drowning of Sea Turtles in gill nets may be comparable to trawl and longline mortality. Deaths in gill nets are particularly hard to quantify because these nets are set by uncounted numbers of local fishermen in tropical waters around the world. Other fisheries that accidentally take Sea Turtles, include dredges, trawls, pound nets, pot fisheries, and hand lines.

Marine Debris – Ingestion and Entanglement: It is estimated that more than 100 million marine animals are killed annually due to the increasing presence of plastic debris in our oceans and seas. More than 80% of this plastic comes from land; it washes out from our beaches and streets, travels through storm drains into streams and rivers, flies out from landfills, thrown deliberately into the sea or discharged as trash from vessels transiting our oceans and seas. As a result, thousands of Sea Turtles accidentally swallow these plastics, mistaking them for food. Leatherbacks especially, cannot distinguish between floating jellyfish – a main component of their diet – and floating clear plastic bags. Most of the debris is recognizable: plastic bags, balloons, bottles, degraded buoys, plastic packaging, and food wrappers. However some plastics have begun to degrade and aren't so easy to see, so small in fact, that it is invisible to the naked eye. Sea Turtles ingesting these particles, which cannot be digested, end up with a lethal accumulation in their bodies, becoming sick or even starving. Sea Turtles are affected to an unknown, but potentially significant degree, by entanglement in persistent marine debris, including discarded or lost fishing gear, including steel and monofilament line, synthetic and natural rope, plastic onion sacks and discarded plastic netting materials. Monofilament line appears to be the principal source of entanglement for Sea Turtles around most of the coastlines they visit.

Artificial Lighting: Nesting Sea Turtles depend on dark, quiet beaches to reproduce successfully. Today, these Sea Turtles are endangered, in part, because they must compete with tourists, businesses and coastal residents to use the beaches that they and their ancestors have used to nest for eons. Man-made coastal developments covering traditional nesting sites, results in artificial lighting on the beach that discourages female Sea Turtles from nesting. Instead, Sea Turtles will choose a less-than-optimal nesting spot, which affects the chances of producing a successful nest. Also, near-shore lighting can cause Sea Turtle hatchlings to become disoriented when they are born. Instead, heading for the relative safety of the ocean they wander inland where they often die of dehydration, predation, or even from being run over on busy coastal streets.

Coastal Armouring: Sea Turtle nesting beaches everywhere have been substantially altered by urbanisation and tourist development. To protect this prime real estate, many coastal property owners have built coastal armouring structures such as sea walls, rock revetments and sandbags to help protect their property from natural erosion. These man-made structures threaten Sea Turtles' nesting habitats by interrupting the natural nesting process through a reduction of available nesting habitats and the displacement of Sea turtles to less optimal nesting areas.

Beach Erosion: One way to address beach erosion is through beach nourishment. This consists of pumping, trucking or otherwise depositing sand on a beach to replace what has been lost to erosion. While beach nourishment is often preferable to armouring, if it is not done correctly, it can negatively impact upon the nesting sites for Sea Turtles and their mating and nesting behaviour. Dredging for the sand to nourish a beach can cause direct threats to Sea Turtles and their nearshore marine habitats. Hopper dredges have been directly responsible for the incidental capture and death of hundreds, if not thousands of Sea Turtles across the globe.

5 juvenile turtles were sponsored and tagged by the Dubai Aquarium & Underwater Zoo back in June for the DTRP's release. One Loggerhead, 2 Greens which are an endangered species (one pictured above) and 2 Hawksbills, which are critically endangered.

Beach Activities: Human use of nesting beaches can result in negative impacts to nesting Sea Turtles, incubating egg clutches and hatchlings. The most serious threat caused by increased human presence on the beach is the disturbance to nesting females. Night-time human activity can prevent Sea Turtles from emerging on the beach or even cause females to stop nesting and return to the ocean.

Beach Furniture: Beach furniture and other recreational equipment (e.g., cabanas, umbrellas, boats, canoes, small boats and beach cycles) can reduce nesting success and increase false crawls on nesting beaches. There is also increasing documentation of nesting females becoming entrapped in beach furniture and falling to dehydration, excess stress and entanglement.

Beach Driving: Beach driving either at night or during the daytime, can have a serious impact to the nesting habits of Sea Turtles. Night time driving can disturb nesting females, disorient emerging hatchlings, and crush hatchlings attempting to reach the ocean. Tire ruts left by vehicles can extend the time it takes a hatchling to reach the ocean and increase their chance of being caught by one of the many predators. Driving during the day can cause sand compaction above nests resulting in lower nest success as the hatchlings experience difficulty climbing out of the nest. Additionally, beach driving contributes to erosion, especially during high tides or on narrow beaches.

Invasive Species Predation: Around the globe, Sea Turtles and hatchlings alike are victims to natural predators; crabs, raccoons, boars, birds, fish and sharks all play their role in the natural food chain. However, urban development along coast lines has introduced many non-native species that have become invasive predators for Sea Turtles and other coastal wildlife. As an example; Florida itself has one of the most severe invasive species problems in the United States. Domesticated dogs and cats will devour eggs and hatchlings and even attack nesting turtles. In many areas, trash left behind by humans encourages inland animals to migrate to beaches for food, further increasing the scope and number of potential predators.

Marine Pollution: Marine pollution can have serious impacts on both Sea Turtles and the food they eat. New research suggests that a disease now killing many Sea Turtles (fibropapillomas) may be linked to pollution in the oceans and in near-shore waters. When pollution enters the water, it contaminates and kills aquatic plant and animal life that is often food for Sea Turtles. Oil spills, urban runoffs from chemicals, fertilizers and petroleum all contribute to water pollution. Because the ocean is so large, many incorrectly assume that pollutants will be diluted and dispersed to safe levels, but in reality, the toxins released from these pollutants become more concentrated as they break down in size. As a result, these smaller, more toxic particles become food for many links in the marine food chain, which unfortunately includes Sea Turtles. Constant consumption of infected/affected prey means that Sea Turtles accumulate increasing doses of the toxins in various organs and tissues in their bodies, resulting in physical, psychological and behavioural impacts to individuals and eventually death.

Climate Change: Because Sea Turtles use both marine and terrestrial habits during their life cycles, the effects of climate change are likely to have a devastating impact on these endangered species. Climate change may well affect nesting beaches. With melting polar ice caps and rising sea levels, beaches are starting to disappear. As the water level begins to rise, the size of nesting beaches decreases. Stronger storms, predicted as a result of increasing temperatures, will continue to erode coastal habitats. Higher temperatures can adversely affect sea turtle gender ratio. Increasing incubation temperatures could result in more female sea turtles, which reduces reproductive opportunities and decreases genetic diversity.

Natural Disasters: Natural disasters seem to be a feature of our ever changing world whether caused by natural phenomenons or man's impact on weather and the natural world. Natural disasters from hurricanes and cyclones, to earthquakes to storms at sea, can all affect the population of Sea Turtles. Remember these are air breathing reptiles and they need to surface to take air on a regular basis, despite being able to stay submerged for a considerable period. Swimming in

The juvenile Loggerhead with its tag, ready to be released by the DTRP team.

maelstromic waters exposes them to stress, possibly injury as despite being strong swimmers, they are still air breathing and few animals can withstand the rampant forces of nature at its worst. It is also worth mentioning that these animals rely on beaches for nesting and catastrophic weather and high seas can destroy nesting grounds and the developing hatchlings, reducing the already depleted numbers entering the marine kingdom – Sea Turtles rely on numbers to ensure the survival and continuation of the species.

Although these threats to Sea Turtles and destruction of their habitats seem almost too big to overcome, there are many things within our control that can be changed. Greater public awareness and support for Sea Turtle conservation is the first priority. By learning more about Sea Turtles and the threats they face, you can help by alerting decision-makers when various issues need to be addressed.

CONSERVATION AND MANAGEMENT

So what is being done to conserve these wonderful, placid, serene and remarkable creatures? Worldwide initiatives led by The United Nations, IUCN, WWF and other International Conservation Agencies recognise the plight of our marine habitats and the impact human activities have upon all marine creatures. International efforts in Research, Education and Awareness, Environmental Policy and International Cooperation are beginning to take hold, but once again we are reacting to a developing situation and not being pro-active in avoiding it in the first place. It is all very well and good for educated "First World" countries to say that there is a problem, but it is all a question of perspective and whether problems affect you directly. For a "Third World" or developing economy, a fisherman whose livelihood and feeding his family depends upon the "fruits of our oceans and seas", their perspective is completely different and they do not consider or envisage the long term impacts of their action.

Conservation in Action: Mere protection of the species is not enough for some populations, policies agreements and enforcement, which is generally lax to non-existent, is meaningless, they need active assistance to recover their numbers and reduce the mortality rate brought about by all nature of threats. Sea Turtles do not breed well in captivity, in the main, they are open ocean animals and so the help they need is in their own environment. On the occasions they venture onto the littoral to breed and propagate, they equally need our help and assistance to maximize the chances of successful nesting.

Some of the measures to provide this active assistance include:

- The establishment of Sea Turtle Sanctuaries and Sea Turtle Rehabilitation Centres to help sick and injured Sea Turtles so they can be returned to the wild.
- Secure nesting sites need to be identified and assistance given to hatchlings make the relative safety of the ocean.
- The establishment of volunteer groups to "guard" nesting sites and help the hatchlings into the sea, to at least give the species a "fighting chance" at survival and increasing in numbers.
- Active Eco tourism opportunities to bring the issues associated with Sea Turtles to the public eye.
- Working with local indigenous communities to develop alternatives to making a living from fishing for Sea Turtles.
- We actually know very little about most species of Sea Turtles, therefore if we are to help them survive, we need to gather as much information as possible about every aspect of their life cycle. This research covers such areas as:
  - Satellite tracking allows researchers to track sea turtles as they swim from place to place. These satellite tags do not harm the turtles in any way and are designed to eventually fall off. The data will tell us where important feeding areas are, help us understand migration patterns, and anticipate where turtles may come in contact with fisheries and their gear.
  - Locating and identifying nesting sites so as to provide adequate protection from man's activities during the nesting periods.
  - Reducing the effects of marine debris and pollution by attacking the "root causes".

Addressing Overharvesting and Illegal Trade:

- There are a number of initiatives which have been put in place between Formal and QANGO International Conservation

Groups and National Governments.
- Working with local communities to reduce turtle harvesting and egg collection. Because the exploitation of sea turtles is often driven by a lack of economic choices developing alternative livelihoods so that local people are no longer dependent on turtle products for income is a major step forward.
- Support for programs that promote the value of Sea Turtles working through TRAFFIC, the wildlife trade monitoring network, to stop the illegal trade of turtle meat and eggs and other turtle based products.
- Establishment of local rangers groups to patrol turtle nesting beaches and protect against poaching and the provision of training and equipment. The rangers collect important data and inform their communities about laws to protect turtles.
- Improved training for law enforcement officials in areas where demand for turtle products is highest.
- Public awareness campaigns in also targeting areas where turtle trade is the highest.
- Radio broadcasts and advocacy events spread the message among local fishermen, souvenir shop owners and tourists about the problem of turtle trade.

Eliminating and Reducing By-catch:
- Initiatives run by the major conservation organisations, working with the fishing industry and local fishermen, aim to use technology and techniques to reduce Sea Turtle (and indeed other large marine mammals and animals) by-catch. This includes the switch to more turtle-friendly fishing hooks ("circle" hooks) for long line fishermen and the use of special Turtle Excluder Devices (TED) in large nets which allows not just turtles but other larger marine animals to safely escape the net.
- WWF runs an international competition, known as Smart Gear, to attract creative new ways to solve by-catch problems and to advance the best of those ideas. Winning devices have been designed to minimize the by-catch of turtles on tuna longlines and help turtles avoid gill nets. Turtle movements are being tracked using satellites to help prevent future interactions between fisheries and turtles and work with fishermen to help them save turtles caught in fishing gear.

Protecting Sea Turtle Habitats: International Conservation Organisations work around the world with national governments and local communities to establish both permanent and temporary marine protected areas (MPAs) ensuring Sea Turtles have a safe place to nest, feed and migrate freely. Governments are being actively encouraged and lobbied to strengthen legislation on, and provide funding for, Sea Turtle protection. WWF supports local Sea Turtle Conservationists in many parts of the world to monitor and patrol turtle nests. These efforts often lead to ecotourism opportunities and offer alternative livelihoods to local inhabitants.

Minimizing the Impact of Climate Change: WWF studies how Sea Turtles are being affected by climate change and helps determine the best ways to reduce their vulnerability to changing environmental conditions. We work around the world with communities to monitor and protect nesting beaches, helping Sea Turtles be more resilient to the future impacts of climate change. In the Eastern Pacific and Caribbean we work to raise awareness of the threat of sea level rise on nest sites and the importance of shade for nests.

Raising Awareness Through Education: Education and Awareness in conjunction with habitat protection are probably the "biggest tools" in the conservationist's "bag of tricks". International bodies working with the marine industry(ies), national governments, local communities and scientists are putting out the message of how important all marine life is to the health of our oceans and seas and future well-being of all people. Education in conjunction with locally managed but internationally funded conservation projects have changed the approach of local communities to Sea Turtles and other marine animals; management, conservation, ecotourism, alternatives to hunting Sea Turtles are all improving the quality of life for local communities, increasing job opportunities leading to a sustainable future and not one which is finite. Conservation Groups have helped to teach fishermen how to rescue and resuscitate Turtles found accidentally caught in fishing gear, and then to release them safely back into the sea. Such efforts show that fishermen can play an important role in marine turtle conservation. The oceans and seas are not a "bottomless pit" from which we can continue to draw resources, uncontrolled and unmanaged, and Sea Turtles are just the tip of a much, much larger issue. We can no longer afford to "stick our heads in the sand", our actions are destroying habitats, polluting, poisoning and killing the very systems and creatures we rely upon to maintain balance. We must educate and inform, offer alternatives and take control, otherwise our future and future of others is bleak – we could see the extinction of all Sea Turtles in our lifetime.

Regional and National Efforts: International efforts would be futile without the support and direct action regionally and by national governments. Cooperation and management of marine and littoral environments are critical to the survival of all species of Sea Turtles, especially on more developed coastlines where no environmental assessment has been conducted before building. Where communities depend upon Sea Turtles and other marine creatures for a living, realistic alternatives need to be offered and these communities should be co-opted into being the local custodians of our marine heritage.

THE UAE'S TURTLE POPULATION

Of the seven recognised species of Sea Turtles in the world, four can be found in the waters around the UAE; the Green Sea Turtle, the Hawksbill Turtle, the Loggerhead Turtle and the huge Leatherback Turtle. A fifth species, the Olive Ridley Turtle is found in neighbouring Oman and from Pakistan to India, and is certainly a transitory visitor to UAE waters from time to time. Two of the five, the Green Sea Turtle and the Hawksbill Turtle, actually have nesting sites on beaches in the UAE as well as feeding in UAE waters. While little is known about the other three, the huge Leatherback Turtle has been seen on just a handful of occasions feeding on the vast seasonal abundance of jellyfish (the sole component of its diet) in Arabian Gulf waters. The Loggerhead Turtle has recently been confirmed to occur in the Arabian Gulf waters of the UAE, but next to nothing is known about its status or distribution in the waters around this country. The Olive Ridley Turtle has only twice been recorded in and around the UAE, but it nests in neighbouring Oman and also in India, where mass nesting in synchronised waves or 'Arribadas' sometimes includes tens of thousands of nesting turtles in a single season. Even if this species is unlikely to nest in the UAE, it is worth looking closely at the turtles you see as you may discover the occasional stray.

The UAE Federal Law No.23/1999 covers the exploitation, protection and development of living aquatic resources; it bans the hunting of Sea Turtles of all types, sizes and ages, in any area of the fishing waters or the beaches around the UAE. The law also prohibits collection of turtle eggs or tampering with the turtles' hatching or breeding nests, trading turtles, their eggs or transferring them from one place to another.

Hunting Sea Turtles and marine mammals of all types and sizes, or collecting their eggs and tampering with their hatching and breeding nests is subject to strict penal actions which includes huge fines, confiscation of boats and fishing equipment, permanent withdrawal of fishing permits and even lengthy prison terms. Fishermen, who unknowingly trap Sea Turtles with their equipment, are required by law to take sufficient measures to release them safely back into the water and report any such occurrences to the appropriate authorities.

SO WHERE ARE WE?

Like a number of other marine species, Sea Turtles are sitting at the top of the WWF and IUCN ENDANGERED "Hit List". However, unlike many other marine creatures being animals of both the land and the sea, they are being attacked on all fronts from; destruction and development of their traditional nesting sites, an increase in terrestrial and marine

predators, to poisoning from pollution, dying from debris, and drowned and tangled by lines and nets, and just straightforward abuse from the unknowing and uncaring. They need our help and support if they are to survive this relentless uncontrolled onslaught. So are we careless, or do we care less? Are we criminals, if we do nothing, or do we want to be the custodians that we should be and protect and preserve these wonderful creatures for future generations?

Every single one of us can do our part for Sea Turtles, no matter how large or small, whether it be:

- Support marine conservation efforts in establishing more Marine Protected Areas (MPA) – approximately 12% of all land is protected, whilst only 1% of our seas and oceans are protected.
- Donating to Sea Turtle Conservation (Indeed marine conservation at large, many marine species are under threat).
- Volunteering your time at Sea Turtle Sanctuaries.
- Volunteering your time at Nesting Sites during the season (there are many in Oman and around the UAE).
- Reporting injured or captive Sea Turtles to the local Environment Agency.
- Reporting any vandalism (deliberate or accidental) or plundering of nesting sites.
- Not buying any products derived from Sea Turtles.
- Promoting ecotourism where you and others can actively help.
- Educating and informing the ignorant and uncaring.

Remember, we are all linked to the oceans and seas and the health of our marine world is important to the health of our world at large. Every single animal in our water world has a role to play in maintaining a healthy, vibrant marine environment which can support the chemical and climatic cycles of our planet. The loss of Sea Turtles would not only have a profound effect on the health of our oceans and seas, it would be an even more profound and sad reflection upon us as human beings that we allowed this to happen when we could and should have done something about it!

So do we become careless, or eco-criminals to future generations or do we want to take responsibility and ownership of the problems we are causing and be the custodians of a marine heritage that we should be? Saving species, maintaining diversity and preserving the environment should be at the very "core" of the way of government enterprise, business and recreation is planned, conducted and monitored. To do that requires the "power of the public" – it is not just an issue for the conservation groups or eco-warriors, this is our world, our life, our future and it has to start here and now, so why not with Sea Turtles?

"Always Keeping the Fun in Diving"

Tags don't stay on long on juvenile turtles due to their fast growth rate. The glue holding the tags onto the carapace eventually cracks and breaks off as the shells take on their new form. The tags' batteries are made to only last 90 days, and although this is a short period of time, the juvenile turtles' journeys are just as important as those of the adults.

EXPLORERS JOURNAL MARS THE MAGNIFICENT

FEATURE **RICHARD LUNDGREN, FI12 MEMBER NO 7250**

It was true that we had followed a sprawling wreck debris field for the last 12 hours, but could this really be it? I only had to glance at the screen to understand why there was excitement. What we saw was exactly what we had longed to see. Not an intact wreck, but rather a massive wreck site with a complete 40-meter long hull side, cluttered by debris, wreckage, and artifacts.

The revolutionary mosaic of Mars the Magnificent. The mosaic is built from 640 individual photos. Photo by Tomasz Stachura.

Joakim Holmlund prepared the BlueView multi-beam sonar that was used to create 3D models of the wrecksite. Photo by Ingemar Lundgren.


Diver measuring the tail end of one of more than 120 cannons onboard

It is the 31st of May 1564. A naval engagement between Sweden and the combined forces of Denmark and Lübeck rages off the coast of the Swedish island of Öland.

The smoke from the fires is thick; heat and noxious fumes from burning gunpowder mix with screams of terror and agony. The sound of steel striking steel, unremitting musket fire, and bursting cannon balls is deafening. Cannon balls scream by, smashing into railings with devastating force. Wood and metal splinters cut down gun crews toiling at their posts. Decks are awash in the blood of the injured, making footing treacherous; the youngest members of the crew pour sand on the deck to allow gun crews to fight on. On the top deck of Mars, the remaining Swedish soldiers are fighting courageously and repel wave after wave of boarders. The situation is desperate, the ship is on fire and it is only a matter of time before the fire will reach the ship's magazines.

Surrender, and lowering the flag, is unthinkable. This is not a gentleman's battle; capture will inevitably result in a gruesome death to serve as deterrence. Only those few of noble blood can hope to be held for ransom. The Danish-Lübeck soldiers are driven by frightening urgency to capture Mars, claim her, and get a share of the ship's bounty. This goal is far more important to the commoner than the royal ambitions of noble lords and kings.

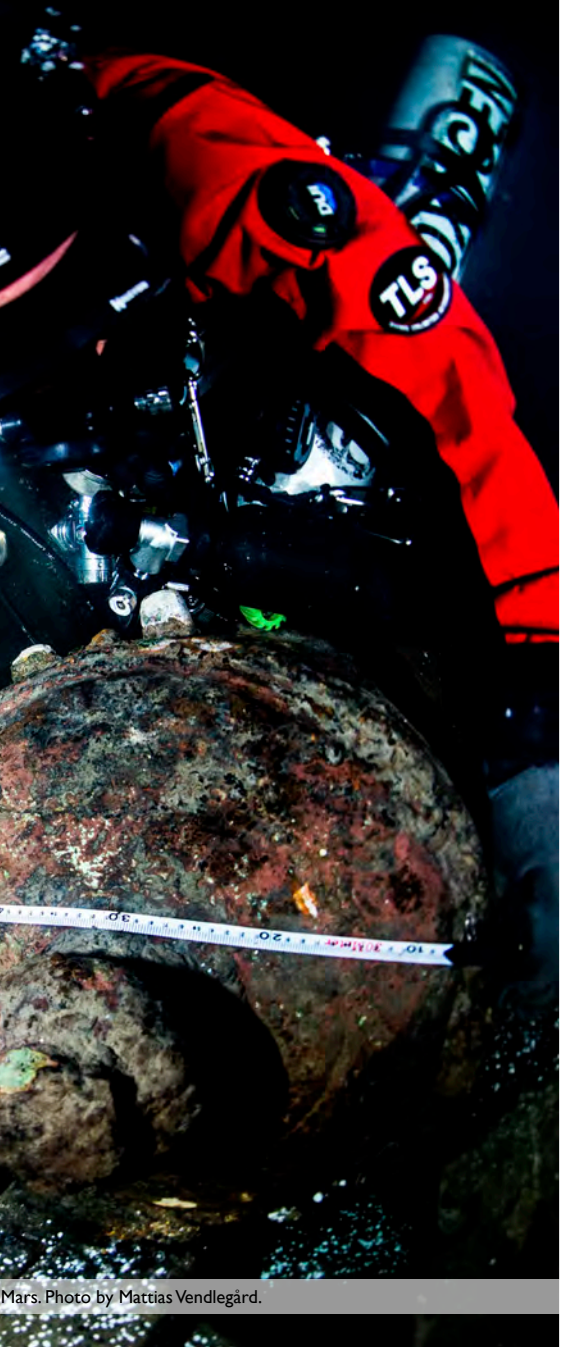
Cannon balls from Mars and her attacker traverse the short distance between the two ships locked together, rail-to-rail, by grappling lines. Forty-eight-pound cannon balls strike with the force of a thousand jackhammers, shattering bridge timbers and turning the inside spaces of the enemy ships into abattoirs. Cries of pain mix with howls of aggression and anger.

Suddenly, a powerful explosion rocks Mars, lifting her deck and scattering the battling combatants onto the deck. Her demise inexorable, the Mars struggles to remain afloat. But this is the end for Mars; the glorious battleship is sinking. Swedes and Danish-Lübeck alike desperately try to abandon the sinking ship as the heat from the burning Mars causes the water around her to boil like the devil's cauldron.

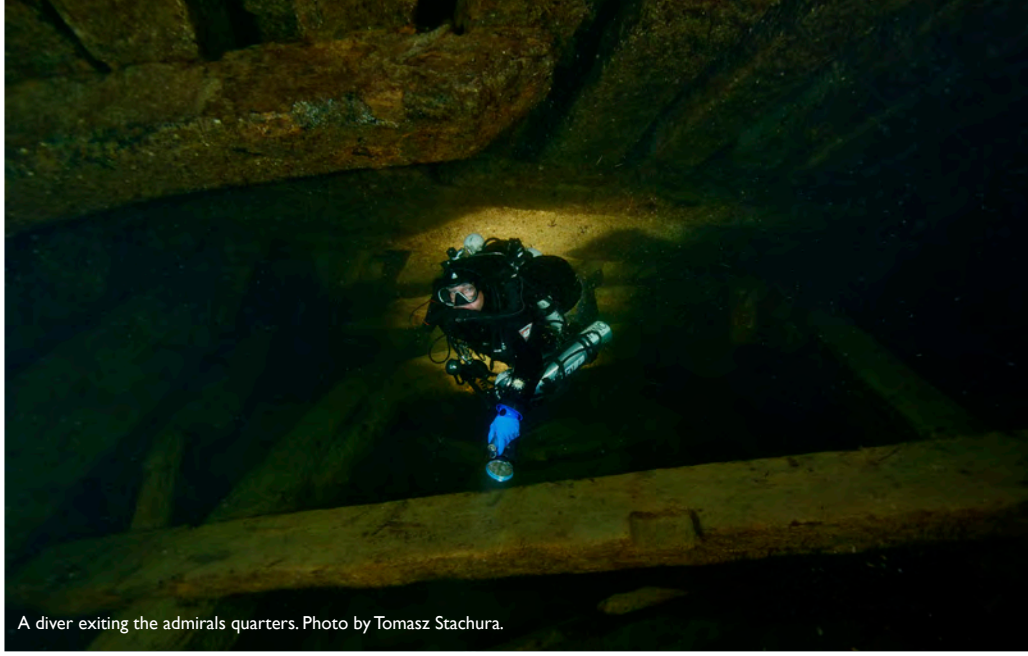
An enormous cloud of steam rises, like a ghost, out of the ocean. Mars the Magnificent is no more.

447 YEARS LATER… A MONUMENTAL DISCOVERY

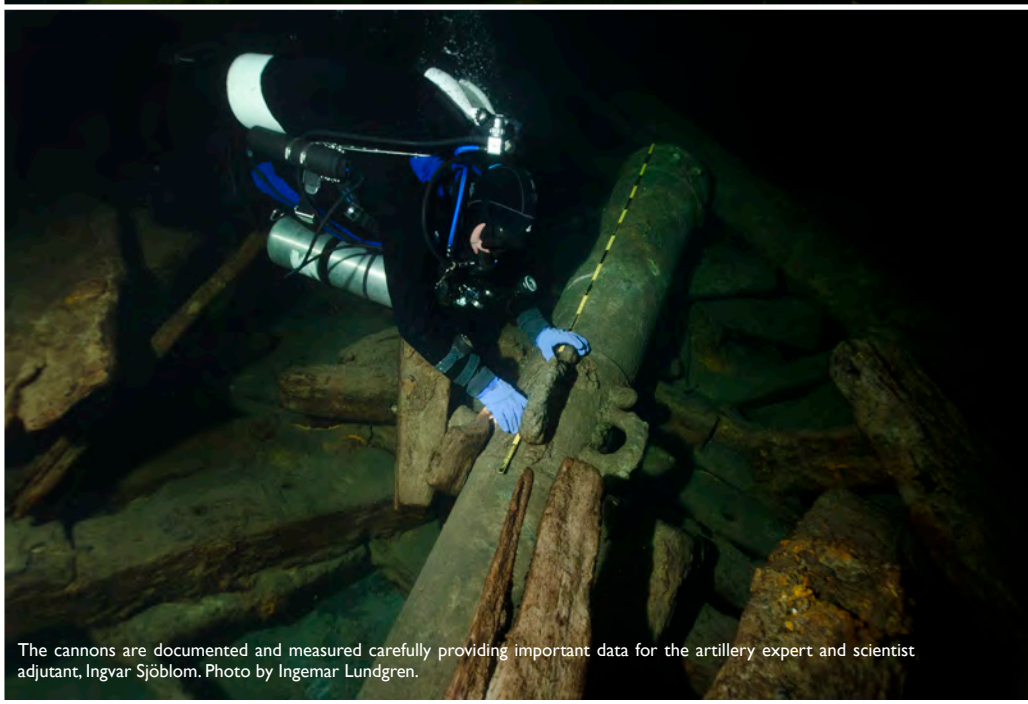
It is May 2011, off the coast of Öland; a small group of technical divers onboard a research vessel is surveying the sea bottom using state-of-the-art sonar. They have spent the last twenty years searching for the legendary ship, Mars the Magnificent. According to many, it was a hopeless endeavour; everyone with an interest in finding Mars had already tried and failed, including Anders Franzen, famous for discovering the Vasa and Kronan. But things are about to change. Yet unknown to the divers, their relentless search is about to pay off. They will soon be responsible for one of the most notable discoveries in nautical history: the remains of the once fierce Swedish battleship, Mars. After 447 years of being blanketed in darkness, Mars will see the light again and, like



Mars. Photo by Mattias Vendlegård.



A diver exiting the admirals quarters. Photo by Tomasz Stachura.



The cannons are documented and measured carefully providing important data for the artillery expert and scientist adjutant, Ingvar Sjöblom. Photo by Ingemar Lundgren.

the discoveries of Vasa and Kronan, will help enrich nautical history in a remarkable way.

"Guys, come here and have a look at this!" Christopher said, urging us to come to the sonar station. He had spotted something unusual while operating the side scan sonar. As this was not the first wreck Christopher had seen on the sonar this summer, I was intrigued by the tension in his voice. It was true that we had followed a sprawling wreck debris field for the last 12 hours, but could this really be it? I only had to glance at the screen to understand why he was excited. What we saw was exactly what we had longed to see. Not an intact wreck, but rather a massive wreck site with a complete 40 metre long hull side, cluttered by debris, wreckage, and artefacts.

"What do you guys think?" Christopher asked. "We have her, we finally have her!" I said excitedly as the importance of the moment and the implications of the discovery dawned on me. We still had to dive on the wreck to confirm her identity, but we knew already that we had made the discovery of a generation. The smiles on the faces of the team members Fredrik, Christopher, and Anton said it all: today was the day!

FIRST DIVE ON MARS

The contours of something huge gradually came into view as we descended towards 230 feet. It was dark and cold, very cold, and I couldn't help shivering; but was I shivering because of the cold or was it because of the anticipation? Weeks had passed since we first saw what we hoped would be the Mars the Magnificent on the sonar screens, and I couldn't wait to get down there. A seabed survey contract had forced us to leave the wreck immediately following the initial discovery. "This is insane!" I remember thinking. After a twenty-year search, we make the discovery only to have to leave the site unclaimed and unprotected to go about doing other things. We were playing the odds, gambling that someone else would not stumble upon the wreck site as we had.

In the beam of my team member Fredrik's powerful HID light, I glimpsed something coming into view below. It was definitely part of a wooden hull and soon the full magnitude of its size became apparent to us. "We are the first to land on Mars," I thought, and I couldn't help giggling into my regulator. What we saw before us was an impressive section of hull constructed of solid oak; as we moved forward, rows of cannon portholes became visible. Though the ship's timbers had degraded over time, we could still feel how powerful and mighty this ship once was. As we followed the hull in a southeast direction towards what seemed to be the stern area, we were baffled to find that we not only could look into what must have been Admiral Bagge's private quarters, but we could dive into it as well. As we moved into the overhead, my eyes opened wide, eager to record every possible impression. It is here that Admiral Bagge's fabled treasure must still be hidden. It was because of this treasure that the Danish-Lübeck attackers sought Mars, and the reason why they fought so fiercely. Did they plunder the loot or was it still here? The records fail to provide an answer, but I have a feeling that future dives might. The treasure, real or

not, eluded us this time and we moved out, pressing even deeper.

As we neared the sea bottom, we made our way into what resembled a milky mist and visibility immediately diminished from 70 feet to just a few feet. We tightened up our formation and shared a quick light signal to confirm that everything was okay. In the mist I spotted something that looked familiar and I headed towards it. I couldn't believe my eyes when I realize it was a bronze cannon, almost five meters long. Its eerie, eroded, bronze-green colour reflected in my light beam. "Cannon, cannon!" I shouted in my mouthpiece. As I heard my words echo, it took me a few moments to realize that Fredrik was also yelling. Turning towards him, I saw his reason for yelling and stared in disbelief. Fredrik had found a pile of no less than seven cannons, all of different calibres. The size of the dolphins, handles, grapes, and rear handles of the larger ones was astonishing. This was more impressive than what I had seen in even the best museum of my wildest dreams. I pondered this as I gently swept sediment from the back end of one of the cannons. The contours of a crest became more visible, and suddenly I could see what would become indisputable evidence confirming that this indeed was the wreck of Mars. Inscribed on the cannon was a crown above a shield with a coat of arms that resembled a crossbow made out of corn. It was the emblem of Swedish King Gustav Vasa. This was Mars the Magnificent!

EPILOGUE

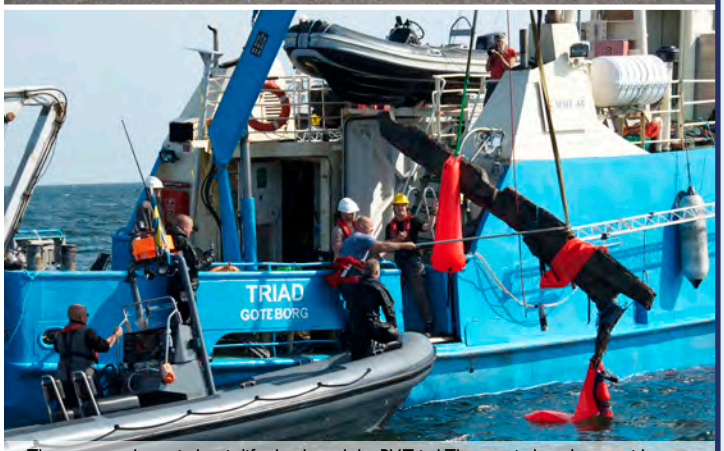
The County Administrative Board of Kalmar has placed a moratorium on diving, fishing, and anchoring at the site. A research project was initiated to exhaustively research the wreck, and two successive years of research have been conducted.

A scientific group, headed by Professor Johan Rönnby, was assembled after the discovery to study the Mars. As discoverers we, Ocean Discovery/GUE, have two seats on the board and work together with the group to determine the best way to protect, document, and in the future, possibly excavate Mars the Magnificent. To date, three successful studies have been conducted which have resulted in several scientific reports. Since our discovery, a Mars museum and a theme park have opened to the public, and a world unveiling is being planned. Recently, his Royal Highness Carl XVI Gustav of Sweden and the state governor initiated a partnership with Ocean Discovery to create a marine sanctuary, which will incorporate Mars, and the more than 150 other wrecks located by the team. Plans for building an authentic replica of Mars are also underway.

The battle of Öland 1564.

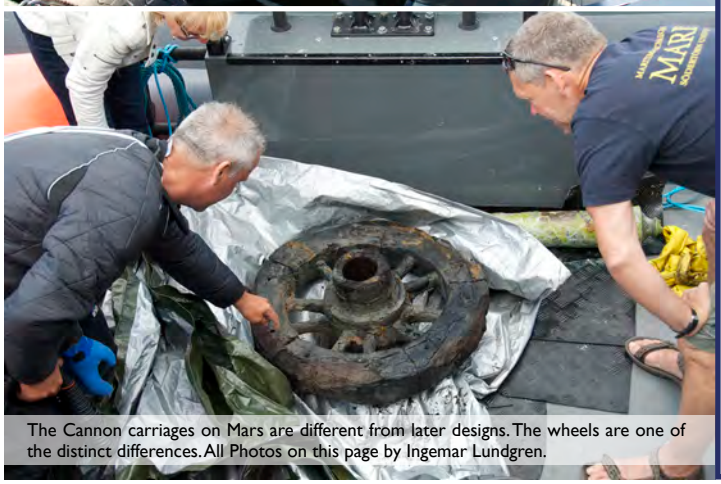
Detailed computer analysis of the recovered coins. Professor Johan Rönnby and project leader, Richard Lundgren. Photo by Tomasz Stachura.

The recovery team proud and happy after an intense working day. The cannon recovered is called a Falcone and it's the only one ever-found in Scandinavia.



The recovered top timber is lifted onboard the RV Triad. The top timber shows evidence of fire onboard at the time of the sinking.

Professor Johan Rönnby assisted by Jarrod Jablonski, Liam Allen and Ryan Gilliatt in order to secure the recovered cannon carriage before conservation.



The Cannon carriages on Mars are different from later designs. The wheels are one of the distinct differences. All Photos on this page by Ingemar Lundgren.

RICHARD LUNDGREN

Richard Lundgren has worked as a diver professionally around the world for more than 20 years. He's been fortunate to participate in many sensational exploration projects such as HMHS Britannic, sister ship of the RMS Titanic, and the discovery of the mighty ship, Mars the Magnificent, sunk during the Nordic seven-year war in 1564.

Lundgren is a founding member of the exploration organization, GUE, Global Underwater Explorers and serves with the board of directors. Richard is a fellow member of The Explorers Club, Member of the Board of Scientific Divers and Chief Executive Office of **www.oceandiscovery.org**.

Lundgren pioneered Technical and Cave diving, and exploration diving in Scandinavia in the early 1990s and part founded the prestigious exploration groups, Baltic Sea technical Divers (BSTD), and Ocean Discovery. As president, Lundgren spearheaded numerous explorations worldwide during the 1990s including targets like the Spanish gold galleon outside Key West, the M1 experimental submarine of the coast of Plymouth, the blue hole caves in the Bahamas and Bimini and setting the North European cave penetration record in arctic conditions.

The success of the Ocean Discovery ongoing project, 'the search for the Admiral's fleet' is nothing but sensational. Ocean Discovery has since early 2000, discovered and explored more than 120 shipwrecks. Many of these wrecks have earned international fame and become research projects for scientists globally.

Lundgren also works professionally with sea bottom surveys and environmental ocean studies specialized in advanced sonar systems and ROV's, Remotely Operated Vehicles.

Lundgren has participated in numerous underwater expeditions worldwide and is recognized as one of Europe's most experienced trimix divers and underwater videographers. With thousands of dives to his credit – including cold-water dives, wreck, cave and technical dives using stage deco techniques, specially mixed gases and diver propulsion vehicles – Lundgren is an accomplished photographer and cinematographer with a contagious passion for discovery and exploration. Richard served as the deep cameraman on National Geographic, PBS and NOVA production – First Face of America.

EXPERTISE

- Exploration Diver any environment
- Scientific Diver and Dive Leader
- Commercial Diver and Dive Leader
- Cinematographer with Red Epic and Sony F55 experience
- ROV Operator with work class and survey experience
- Surveyor with MBES and SSS experience
- Commercial Captain and Engine certification class VIII
- Photogrammetry and site surveys including creation of photo mosaics and photogrammetry

AWARDS

- Discovery Award 2014 – For outstanding contribution or significant research that has resulted in a discovery that has advanced the field of technical diving. TEKDiveUSA
- Diver of the Year 2011 Global Underwater Explorers
- Citizen of the Year 2012
- Diver of the Conference 2012 Eurotek
- The Spirit of Independent Award Fort Lauderdale film festival
- Film Award at the International Film Festival in Zagreb

View over part of the exhibition at Västerviks Museum. In the foreground, part of the Elefanten's ship stern can be seen and in the background, the unique mosaic of the Mars is shown. Photo by Daniel Nordenskiöld, Västerviks Museum.

MARS THE MAGNIFICENT AND THE SWEDISH MARITIME HISTORY OF THE 16th CENTURY – AN EXHIBITION PROJECT

FEATURE **VERONICA PALM, EXHIBITION PROJECT LEADER, VÄSTERVIKS MUSEUM**

In the summer of 2011 the Västervik-based dive team Ocean Discovery located a large wreck at a depth of 75 meters, just east of the Swedish island Öland in the Baltic Sea. The wreck was identified as Mars the Magnificent – one of today's most stunning archaeological finds!

THE WRECK SITE – A TIME CAPSULE

The discovery of the Mars (1563) was the start of a major new research project, which enables fantastic opportunities for new knowledge of the naval history of the 16th century, an eventful era in the development of new large warships and warfare in the Baltic Sea. There are also possibilities to gradually document how officers, crew and soldiers lived on board the ship and the tools, equipment and personal effects they used. A combination of old and new weapons technology was used and the Mars was armed with more than 120 cannons. The wreck site constitutes the biggest source of knowledge about 16th century cannons known today.

The first archaeological surveys on the wreck were carried out in 2012 and 2013, but the research team, under the direction of PhD Johan Rönnby, Professor of maritime archaeology at Södertörn University/MARIS, has only begun uncovering the true facts about the Mars. The conditions for the preservation of organic materials and the absence of the ship worm, terredo navalis, in the Baltic Sea are unique and the Mars wreck is extremely well preserved. Since she settled down on the ocean floor 450 years ago, it is as if time has stood still. The hull are in good condition and both sides of the ship are quite intact. Timbers and several artefacts show traces of the raging fire on board before the ship sunk, but one can still see cannons in the gun ports, cannon balls, pieces of rope, pots in the galley as well as personal belongings scattered on the wreck site. Broken timber, cannons broken in half and human remains reveal the inferno and brutality of the events surrounding the sinking of the Mars. Over time we will learn more about the battle of Öland, the Mars and life on board. The archaeological documentations have only begun.

AN EXHIBITION PROJECT

The discovery made headlines in the national and international press and has generated a large and legitimate interest in the scientific community. An important aim is also to make the research results accessible for the public.

Discovery of the Mars has not only lifted the city of Västervik as a base of an internationally renowned dive team, but has also highlighted a very exciting and important part of the region's history. During the 16th and 17th centuries, Västervik was one of the most significant naval and commercial shipyards in Sweden, in which many of the great ships of the era were built. In 2012 Västerviks Museum was therefore entrusted with developing an exhibition project focusing on 16th century naval history with the Mars as the basic story. Västerviks Museum are now the principal arena for mediation of new results that emerge in the Mars project.

Jon Adams, PhD and Johan Rönnby, PhD are measuring the salvaged cannon which has been placed in a temporary tank before being moved to the exhibition. Photo by Veronica Palm, Västerviks Museum.

Through generous contributions from the local foundation Sparbanksstiftelsen Tjustbygden as well as the scientists from the MARIS – maritime archaeology research institute – of Södertörn University, the Swedish National Defence College, the Swedish Maritime Museum, Ocean Discovery and several marine companies and divers, the first exhibition opened in 2012. Since then, the exhibition has expanded to the museum's main exhibition hall, covering about 300 square meters.

The exhibition, Mars the Magnificent and the Swedish Maritime History of the 16th Century, focuses on the development from armed merchant ships to large specially built and heavily armed warships, the importance of the Kings shipyards, where Västervik was one of them, as well as maritime archeology as a science. Based on the current research, the story about the Nordic seven year war and the battle of Öland are told. In the exhibition, the Mars is presented together with previously known and excavated wrecks from the same era, such as the merchant ship Ringaren (1530) which sank just north of Västervik and the Kings warships Kraveln (1525) and Elefanten (1563), the latter a sister ship of the Mars. The partnership with the National Maritime Museum has enabled us to show almost all of the items that have been recovered from Swedish 16th century wrecks so far. The exhibition is in its current form alongside the artefacts based on text and image banners, and dispersed in the exhibition are several screens where underwater film and photos from the expeditions are shown. Exclusively for the exhibition, a 25 minute long documentary has been produced, shown in a new film studio and included in the visit of the museum. The documentary is also a popular feature for group tours, often shown on a widescreen in the exhibition hall.

METHODOLOGICAL DEVELOPMENT & NEW TECHNOLOGY FOR DOCUMENTATION & VISUALIZATION

The documentation of the wreck is complicated due to the great depth of 75 meters and requires great expertise in diving and manoeuvring the ROV´s and other instruments. In order to document the wreck, the archaeologists and divers therefore need to use new and revolutionary technologies. One of the projects main objectives is to develop and use non-intrusive archaeological documentation methods to gather information and data from the Mars without affecting or changing the wreck site. These results then need to be processed on land and methods for visualization has to be developed. The latter also has great potential in terms of exhibitions and public events.

The team has already developed methods for digital film and photo documentation on large depths. Under the light of a new especially built light rig deployed over the wreck site, the divers, equipped with high tech cameras, have already spent hundreds of hours documenting the wreck. For example over 600 still images, shot by the underwater photographer Tomasz Stachura, have been merged into a single photo mosaic where you can see the wreck site in its entirety. This mosaic is unique and is now a central part of the exhibition at Västerviks Museum, printed on a 10 by 5 meter large screen, complemented with facts and photos in a digital application for IPad. An application for smart phones is being developed as we speak.

In the exhibition, visitors can see the first salvaged items from the Mars, supplemented with additional items and timber from contemporary wrecks from the 16th century. In 2013, the research team salvaged three ship timbers, two cannons and a gun carriage for examination on the surface, with the intention to reconstruct a cross-section of the hull. The objects are placed in a specially built water filled tank in the exhibition hall. To be able to show these objects in parallel with the ongoing research is somewhat unique. Often it can take years before salvaged items can be displayed for the public.

Just recently the objects have been photographed with high resolution cameras to test photogrammetry as a method for documentation and 3D visualization. This method for underwater documentation, tested and developed by Ocean Discovery's high tech diver, Ingemar Lundgren, has now been proven to be an excellent tool for documentation, even

The salvaged items from the Mars wreck placed in the tank in the exhibition hall at Västerviks Museum. Photo by Veronica Palm.

at the bottom of the sea, and the tests carried out at the wreck site in 2013 shows that it can be used for 3D projections, reconstructions and animations as well as for model printing using a 3D printer. It then becomes an important tool for non-intrusive archaeological documentation, scientific work and public visualization, since it enables surveys of artefacts and wreck sites "over the surface". 3D projections and even actual models in different scales are under production for the exhibition. The museum's aim is to, alongside the research project, develop the shipwreck exhibition, for example with more digital components. A future plan discussed is to display 3D projections and underwater film in a dome theatre. Visitors will be able to "visit" the Mars wreck on land, in the near future!

THE PAST AND THE FUTURE

Västervik has historically been a major and important shipbuilding region. The reconstruction of the city in the 1540s was primarily due to the establishment of the shipyard and dry dock initiated by the Swedish King Gustav Vasa (1523-1560). Several ships in his fleet were built here, but it was under the reign of his son, King Erik XIV (1560-1568), that Västervik became one of the leading naval yards in the kingdom. In the 1560s three of the Swedish navy's largest ships were built at the shipyard – St Christopher, Tanthejen and Mars' successor Neptunus, later renamed Röde Draken (the Red Dragon). The building trend continued into the 1570s when the Swedish navy launched another large ship – Smålands Lejon (Smalands Lion) estimated to 1,100 tons. The ship building tradition in Västervik carried on in to the late 1800s. Even though the Mars was not built in Västervik, she was built in Björkenäs 140 kilometres further south along the coast and launched in 1563. This magnificent ship and the town of Västervik are part of the same important and very interesting story – the emergence of the Swedish naval fleet and the art of shipbuilding during the 16th century.

Västerviks Museum, in collaboration with MARIS, Ocean Discovery and the Visualization Centre in Norrköping are now working on a pilot study regarding development of methods of nondestructive archeology and visualization. Our common ambition is with the Mars project as a base, to develop new methods for the presentation of research results. The study will be the start of a major development project for alternative research methods instead of, or as a complement to, excavations and salvage that lead to expensive conservation costs for museums and cultural heritage institutions, as well as creating new opportunities for public experience through development of visualization technologies for exhibitions. The methods are also of interest for various institutions and companies working with underwater documentation.

With Västervik's background in the maritime history it's an excellent location to build a base for maritime field archaeology underwater documentation and adequate facilities for dissemination of research results in collaboration with MARIS and Ocean Discovery. The research results from the Mars project will be presented through various channels to researchers, students and professionals as well as to schoolchildren and the general public. In an extended and modern visual museum the field of maritime archaeology and the 16th century maritime history can be presented as a complement to existing museums exhibiting ships from the 17th century, such as the Vasa Museum in Stockholm and the Kronan in Kalmar County Museum, and for example the National Maritime Museum and The Naval Museum with focus on late maritime history.

During this summer, new dives are planned

at the wreck site and the Mars will then be documented further through film, photos and measurements. At the same time, research progresses in the archives. The wreck's potential as a source of knowledge is immense and in time, we will learn more about the Mars and life on board one of the largest warships in the 16th century. The exhibition, Mars the Magnificent and the Swedish Maritime History of the 16th Century is an ongoing project that will evolve as the research is progressing. We are looking forward to many exciting developments during the upcoming years.

VERONICA PALM

Veronica Palm is employed as an archaeologist and deputy director of Västerviks Museum. Västerviks Museum has been entrusted with developing an exhibition project on Mars, acting as the principal arena for mediation of new research findings that emerge in connection with the Mars project over the coming years. Veronica is the project leader of the exhibition project called Mars the Magnificent – Naval History of the 16th Century.

TOP: View over part of the exhibition at Västerviks Museum. In the foreground the salvaged objects from the Mars. **MIDDLE:** The IPad application and the unique mosaic construction of the Mars. Photos by Daniel Nordenskiöld. **BOTTOM:** Veronica Palm, Johan Rönnby and Ingemar Lundgren working with documentation of the salvaged objects from the Mars. Photo by Adam Norman.

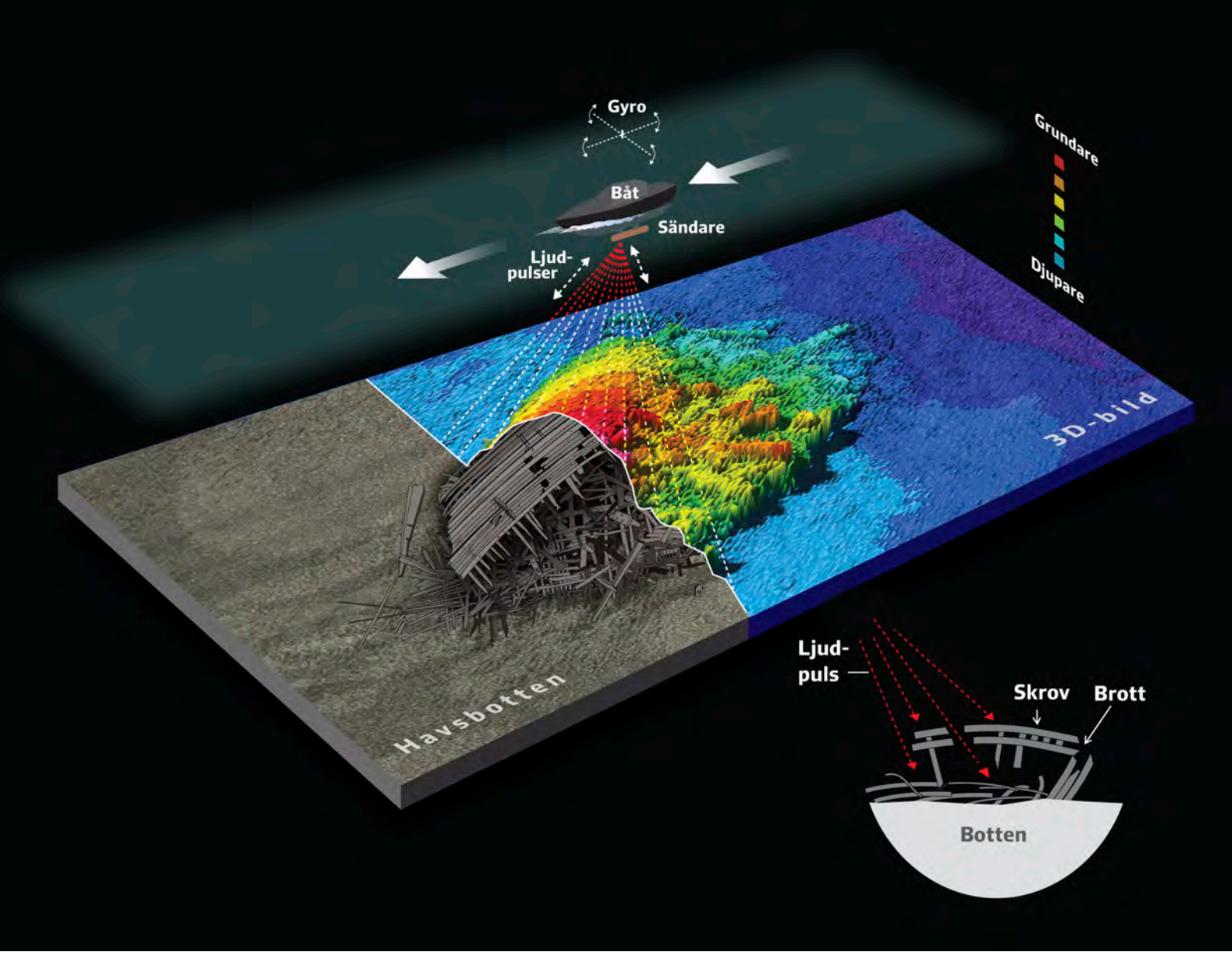


FIGURE 2 (above) An illustration of the vessel passing the wreck site showing the beams. © Alexander Rauscher, Peter Grensund/Svenska Dagbadet. (Top right) An image of Mars resting with the port side up on a ridge of Till. **FIGURE 1** (bottom row) Vessels from MMT that participated in the project. From left, Icebeam, Triad, and Mama Duck.

DEVELOPING TOOLS FOR NON-INTRUSIVE ELECTRONIC MARINE ARCHAEOLOGICAL WRECK EXCAVATION

THE MARS PROJECT

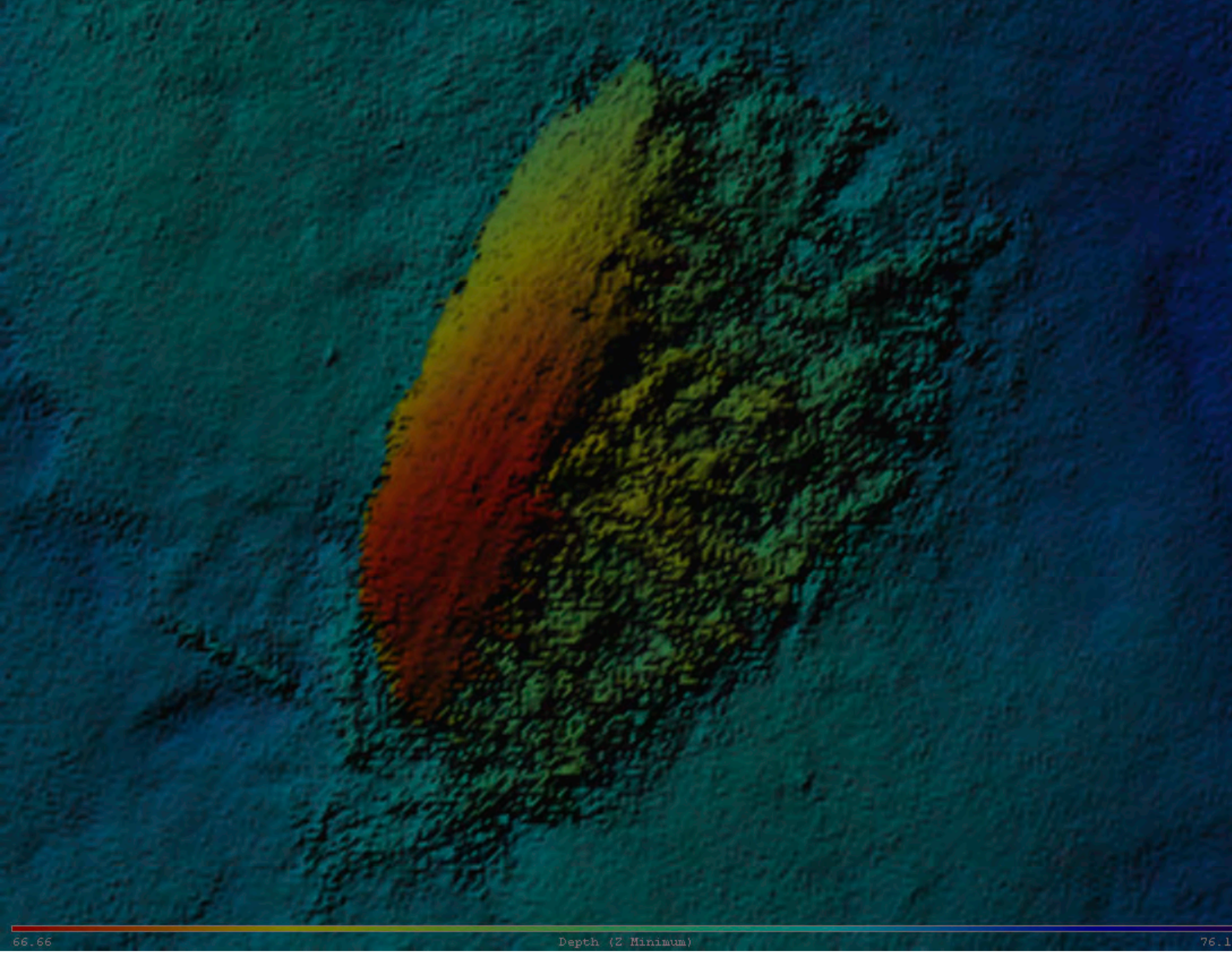
FEATURE **JOAKIM HOLMLUND, PH.D.**

Exploring archaeological sites in the Baltic Sea varies significantly from similar work in other parts of the world. Low biological activity and the lack of wood worms and oxygen in deeper waters keep structures of old wrecks intact; sometimes even whole ships can be found structurally whole. This, in turn, allows for detailed investigations of ships that are several hundred years old. Even so, due to the depths at which they are often located, it takes a long time to execute a comprehensive archaeological investigation of these undisturbed wreck sites.

For several years now, the marine survey company Marin Mätteknik (MMT) has worked with Södertörn University's Maritime Archaeological Research Institute (MARIS) to develop new tools for deep water archaeologists (Dixelius et al., 2011). As a member of the survey industry, MMT works with clients who demand high-resolution survey systems to ensure precision in cable and pipeline installation. While in years past these precision instruments were carried by ships, they are now carried by ROVs and AUVs, delivering 3D multibeam echo sound (MBES), film, photomosaics, side scan sonar (SSS), and other geophysical information. As one can imagine, the data made available by this sophisticated technology is very useful to archaeologists, laying the foundation for developing tools for non-intrusive archaeology or, in essence, electronic excavation.

At the Mars wreck site, several of these sophisticated data collection devices were used. The wreck was discovered with high-resolution SSS, and the site and the surrounding area were thoroughly mapped by state-of-the-art MBES. This data helped create a large-scale 3D image of the seafloor, and helped locate unknown debris near the wreck site. Thus far, four MMT vessels have been used in the project; the MV Icebeam, MV Triad, MV Askholmen, and Mama Duck. Each serves a distinct purpose and each carries different equipment.

Multibeam systems have been the primary instrument for mapping the site. The first was the Kongsberg EM3002 on the vessel MV Askholmen which undertook a complete survey of the wreck site and surrounding



area. From this survey, information regarding where to best position the mooring blocks was gleaned. Furthermore, the 3D data yielded by the Askholmen also provided the Triad, equipped with the higher resolution Kongsberg EM2040, with a template for a future survey pass. The 3D map created by the data collected by the Askholmen was also used for navigational purposes in dive operations, for example, in the precise placement of the down line (less than a meter off).

Simply put, MBES resolution is divided into range resolution and spatial resolution; range resolution depends on bandwidth while spatial resolution depends on the opening angles. While a higher bandwidth (frequency) yields better range resolution, its range is shorter because water absorbs energy. The opening angles of each beam provide a footprint which increases with the distance from the detected target; hence, it's best to be as close to the target as possible. Figure 2 shows a typical MBES setup on a vessel. This includes two sensors and receiver heads that transmit and receive ultrasonic pressure waves; these sensors/receivers collect information in a fan shaped profile while the vessel transits. Data collection can be described as several hundred beams measuring simultaneously, perhaps 10 to 30 times a second depending on the sea bottom's depth. Figure 3 shows that it is possible to get a decent overview of the wreck site and surrounding area; however, the footprint of each beam at 75 meters deep is quite large.

These efforts are now augmented by constantly evolving technologies for mapping above and below the sea surface. Once gathered, 3D photo imagery can be presented on Google Earth. Lidar, a remote sensing technology, previously used from airplanes and unmanned helicopters to obtain detailed 3D imagery of infrastructures at a centimetre resolution, have now made their way beneath the sea surface and there are now lidar scanners for UV applications. A lidar displays high-resolution images that are an order of magnitude better than using traditional ultrasound survey techniques (cf. **www.2grobotics.com/**).

Using HD cameras to produce mosaics of several hundred high-resolution images yields high resolution imaging information. However,

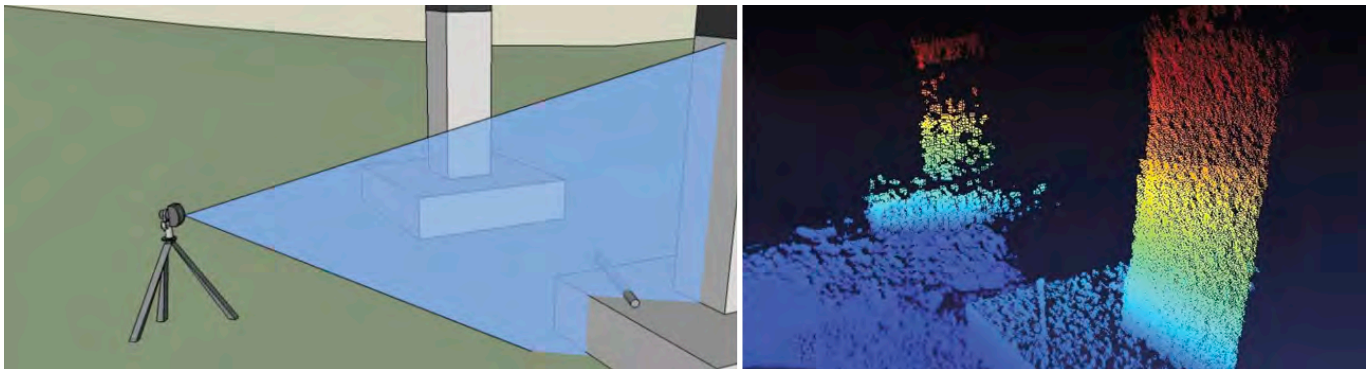


FIGURE 4 On the left, an illustration of the Blueview 3D scanner on a tripod, and on the right, a corresponding result of a bridge fundament survey

these are 2D captures, and though one can build a 3D image from these captures, the scale of objects at varying distances in the mosaic gets problematic. Hence, the best way to build a correct 3D model of an object is to use a scanner or MBES, though the major drawback will be the use of light as a source of illumination given the rate of its absorption. Typically, Baltic Sea visibility is limited to just a few meters, so any scanning method that relies on light as a source of illumination will be hindered in function.

The footprint of the Kongsberg EM2040 at a depth of 75 meters is too big to yield detailed information; one might detect single planking of less than a 0.5 meter width, but no detailed information about construction details. So, researchers must be closer to the wreck. Though MMT still uses ROVs and AUVs carrying MBES (Dixelius et al.), and will use similar tools in the future on Mars, during the 2013 summer expedition, MMT and MARIS tried (with very good results) a new high resolution MBES system: a so-called mechanical scanning multibeam system, a Blueview BV 5000 3D scanner.

The Blueview 3D scanner was mounted on a tripod together with a 360-degree scanner and launched from the Triad which was stationed above the wreck in a six-point mooring position. The tripod was equipped with a mechanical scanner that could be controlled from the surface. The elevation and azimuth could be adjusted to create a 3D image of the surroundings. The maximum range of the BV5000 1.35MHz is approximately 30 meters; however, the longer the range, the larger the footprint. During the Mars wreck site scans, the range was kept to less than 15 meters to maintain high resolution.

A scan plan was formulated to encompass the wreck site from all directions, which required positioning the Blueview on top of the port side of the wreck. Divers dropped down sticks on the sides and on top of the wreck to serve as reference points (cf. Figure 5). We used a small ROV (Ocean Modules V8) to move the tripod with the scanner and ultimately managed to cover roughly half the wreck site. Unfortunately, the current increased which made it impossible to move the tripod with this ROV. Divers could have moved the tripod; however, there were too many positions still to be scanned, and because a scan could take about 20 minutes at depth before the tripod had to be moved, it was an inefficient use of the divers' short bottom time.

Overall, the 3D data captured by the Blueview yielded invaluable information for mapping the wreck site. From the scans, archaeologists could use the 3D data to take measurements and get curvatures. One of the next phases of the Mars project entails combining the high-resolution HD photo mosaic of the wreck and the accurate 3D MBES data from the ROV and Blueview on a tripod. It is not difficult to understand why archaeologists have high hopes for this technology that can allow them to create an accurate mosaic of high-resolution images to help analyse shipwrecks. In addition the Blueview data will be very important to both verify and correct future 3D-Photogrammetry work on Mars and other archaeological sites. The combination of the high resolution from photographs and the accuracy and range of MBES, makes a very useful tool for archaeologists to post examine the wreck site after the completed field work.

Figure 7 shows the stern made up by 4 Blueview scan positions. The image also shows all the debris that is scattered below the stern and the archaeologist can in post examination measure different planks and their positions relative to the wreck site.

From the perspective of MMT, participation in this project has been interesting. There have been many maritime enthusiasts who have been involved in this project in some capacity on each of the vessels that have been used in this nonprofit venture. MMT's owner, Carl Douglas, who sanctioned his company's involvement in this project, has a genuine interest in the maritime history of the Baltic Sea. In cooperation with MARIS, this project has presented a great opportunity for marine archaeology education, which comes in handy for MMT when working on large infrastructures underwater.

Regarding the software for processing I have so far been evaluating two packages. Leica Cyclone Register is the traditional package used for processing of these point clouds, however it requires some training before one can use the full extent of the package and retrieve good results registering the different point clouds together. The other software used is EIVA Navimodel. EIVA has been very accommodating in this project and developed new tools for the processing in Navimodel that simplified the process a lot. Navimodel is easy to start with, to register point clouds without too much basic training in the package.

So far in the project, without having finished with the 3D mapping, I like to thank some people at Teledyne and EIVA for excellent support, especially Ed Cheesman, Nick Lesnikowski and Jon Robertsson from Teledyne, as well as Mikkel Bak Vester and Jesper Knudsen from EIVA.

REFERENCES: Dixelius et al. The Ghost Ship Expedition: Frontline Deep Water Archaeology in the Baltic Sea. Hydro International. February 2011.

FIGURE 5 On the left, an image from the 3D data of the stern with the reference rods marked out. The circle in the center is the shadow from the tripod, covered by adjacent scans upon registering all the scans together. On the right, the photomosaic. Photo by Tomasz Stachura.

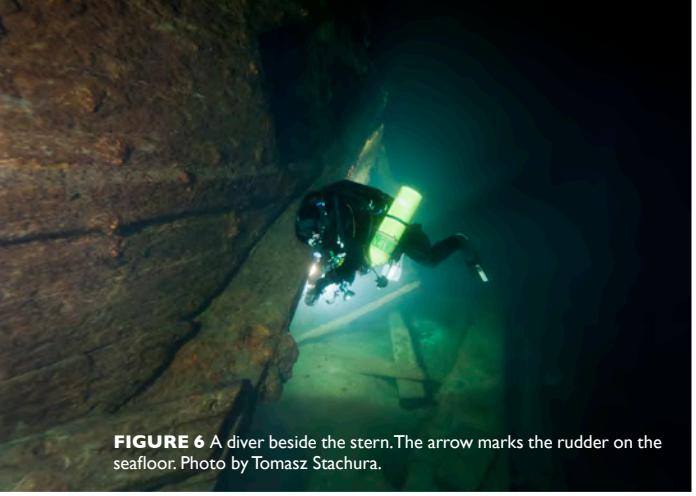


FIGURE 6 A diver beside the stern. The arrow marks the rudder on the seafloor. Photo by Tomasz Stachura.

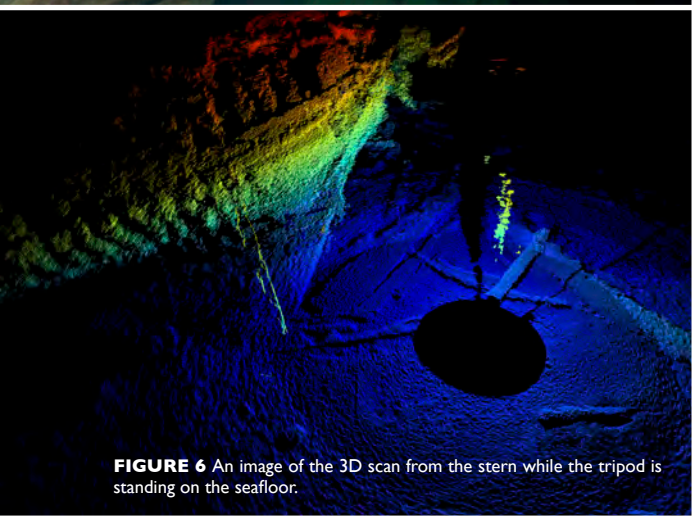


FIGURE 6 An image of the 3D scan from the stern while the tripod is standing on the seafloor.

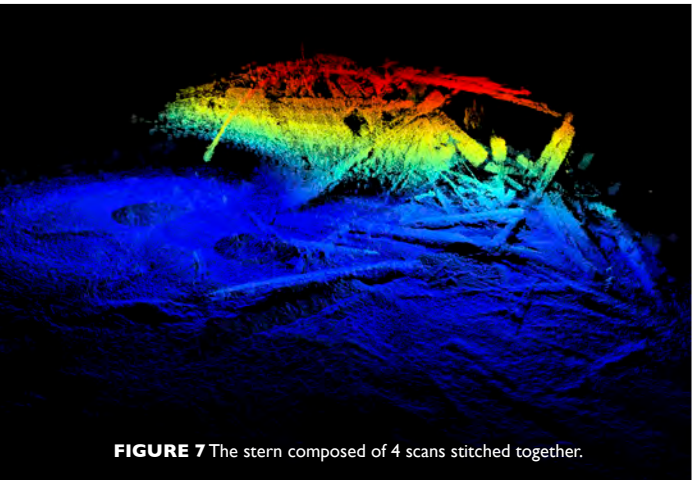


FIGURE 7 The stern composed of 4 scans stitched together.

DR. JOAKIM HOLMLUND

Dr. Joakim Holmlund has been diving wrecks since the beginning of the 80s, most of which have been north of Norway and, as of late, in the Baltic Sea. However, Joakim has also participated in several excavations in the South China Sea together with, among others, the National Museum of Negara in Malaysia.

After earning his Ph.D. in Physics at Chalmers University of Technology and a few years of research, Joakim transitioned to offshore business with the survey company MMT. His work at MMT involves developing and using the most current UV technology and infrastructure to map the seafloor.

Recently, Joakim has also worked with the Maris Institute of Archaeology at Södertörn University to upgrade archaeological tools. His focus has been to find and evaluate tools that are usable in deeper waters that are not accessible to conventional diving.

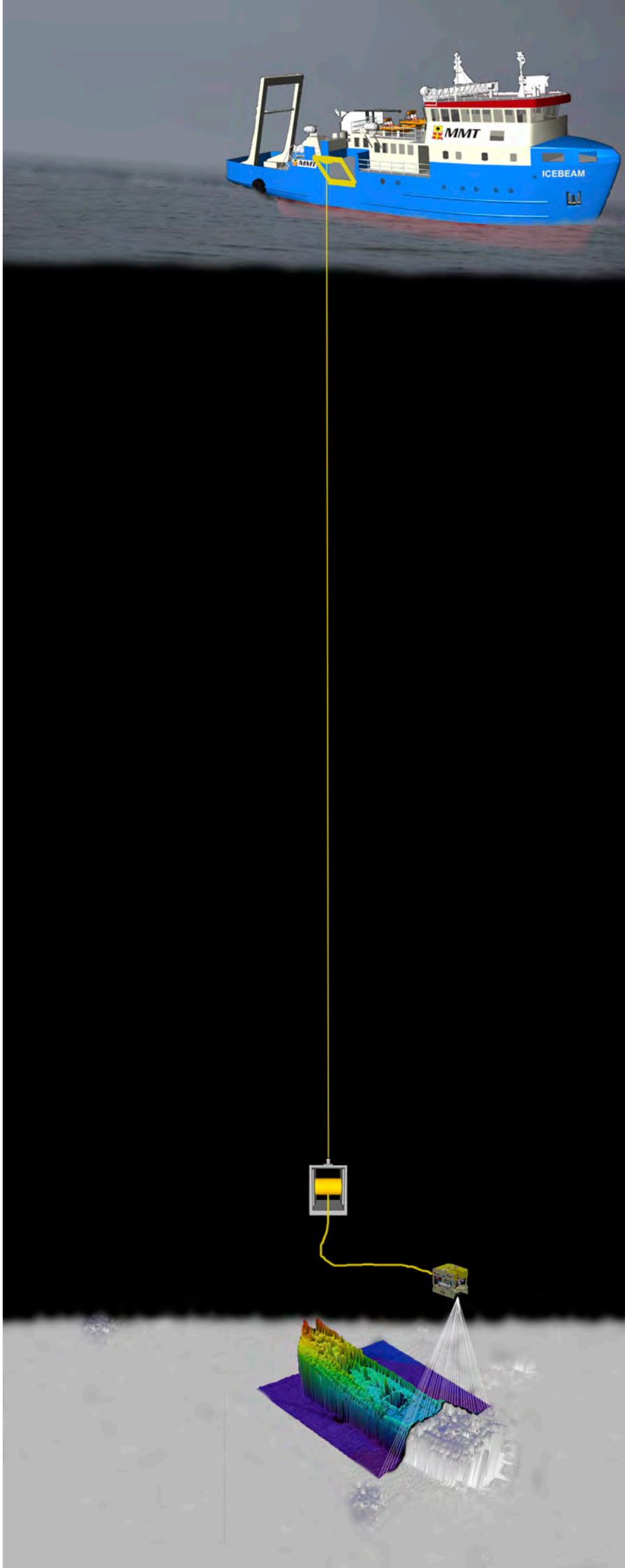


FIGURE 3 On the right, MBES mounted on an ROV. Above the wreck, an ROV garage (TMS) hangs. The ROV leaves the TMS and surveys the wreck site with high resolution MBES.

MARITIME ARCHAEOLOGICAL INVESTIGATIONS OF A LEGENDARY SHIP

FEATURE **JOHAN RÖNNBY, PH.D.**

LEFT: Professor Johan Rönnby inspects the silver coins recovered by Jarrod Jablonski, Fredrik Skogh, Liam Allen and Richard Lundgren. Photo by Carl Douglas. **RIGHT:** The Swedish King Carl XVI Gustav compares his own modern coin with the 448 year old coin of his predecessor Erik the XIIII. Carl Douglas in the top of the picture is a direct descending relative to King Erik the XIIII. Photo by Ingemar Lundgren.

A BALTIC WRECK

In the summer of 2011, after many years of searching, a team of divers from Ocean Discovery discovered the wreck of Swedish King Erik XIV's legendary flagship Mars. It rested at 75 meters depth, approximately 12 nautical miles southeast of the island of Öland in the central Baltic.

The Baltic Sea is one of the best places in the world for shipwreck archaeology. One reason is that most of the organisms, including the shipworms, *Teredo navalis*, cannot exist in the brackish and cold waters of the Baltic. Another factor is topography, especially along the coasts of Sweden and Finland. The vast archipelagos consist of a plethora of small islands and reefs which make navigation difficult. Between the islands, the bottom is relatively deep. In this calm, dark, and cold environment, time seems to almost stand still. Ship hulls may be preserved intact for hundreds of years; some with masts still standing. The absence of a significant tidal period in the Baltic also means that erosion by flowing water, which can break down and wear on shipwrecks, is not a factor. There are other places in the world with similar physical conditions for preserving wrecks, such as the Great Lakes in North America or the polar oceans. However, there is another reason the Baltic is so special for maritime archaeological studies. This small, northern European inland sea has, for a long time, been heavily trafficked, and the number of shipwrecks indicates the number of ships that once travelled these waters. Intensive maritime communication, trade, and shipping, as well as naval warfare, can be traced back to prehistoric times. Seafaring is a central part of the region's history. The Baltic Sea is, in that respect, a northern version of the Mediterranean Sea, which also served an important role in maritime history.

THE KING'S NEW SHIP

The giant Swedish warship Mars (sometimes also called "Miraculous") was larger than any other contemporary or past vessel on the Baltic when it was built in 1563. She went down practically brand new on May 31, 1564, after a fierce battle against a fleet from Denmark and Lübeck.

The historical background is complex and dramatic. In the early 16th century, Denmark and Sweden were still unified under the same king. However, in 1523, the Swedish nobleman Gustav Vasa led a successful uprising, and was crowned the new Swedish King. During his reign, he established a "modern" Swedish state government, in which a new tax system and a modern army and navy were important components. King Gustav died in 1560 and was succeeded by his eldest son, Erik. To underscore his authority, Erik chose to call himself "King Erik the Fourteenth," asserting that he had thirteen mighty Viking royal ancestors.

King Gustav was a largely self-educated man who ruled his new country, Sweden, as a landlord administering his farm. His son Erik was different; he received a solid education, spoke Latin and several other languages, played music, and studied European politics. He was, however, also hot-tempered; though friendly and melancholic at times, he would suddenly turn angry and dangerous. He was very much the kind of Renaissance ruler described by Machiavelli in "The Prince."

King Erik was very ambitious. For instance, he tried, without success, to convince Queen Elizabeth of England to marry him. As a new regent he also expanded Swedish territory to include areas on the eastern side of the Baltic Sea, and introduced harsh taxes on foreign ships. In 1563, he built a powerful new flagship, which he named after the Roman war god Mars. The new ship was, in a way, an alter ego for the king and his ambition.

King Erik's ruthless policies and his claim for dominion over the Baltic Sea challenged the trade interests of both Denmark and the Hanseatic city of Lübeck. As a result, in 1563, the Nordic Seven Year War broke out. It was a hard and cruel war, and the civilian population suffered tremendously. When the war ended in 1570, there was no clear "winner;" instead, this conflict initiated a protracted period of battling in Northern Europe, which included Sweden up until 1720.

THE BATTLE

The Battle of Northern Öland in 1564 was one of many bloody clashes fought on land and at sea during the Nordic Seven Year War. The Mars, under the command of Admiral Jacob Bagge, was the largest vessel in the Swedish navy, which consisted of 38 ships of various sizes. The 1500s were a period of transition for naval warfare. Boarding tactics, where warring ships latched together to enable man-to-man fighting, were being replaced by regular artillery battles, where ships fired on each other from a distance. The events outside Öland in the summer of 1564 are illustrative of this transition.

The Battle of Northern Öland lasted for two days. On the first, Mars sunk the Lybckian ship Långe Barken using heavy artillery. After disengaging and resting during the night,

the fleets resumed hostilities the following morning. The enemy ships approached and fired on the Mars, while their crews threw burning fireballs made of grease. Eventually, a fire ignited onboard the Swedish flagship. In the ensuing chaos, two German ships – the Der Engeln and Der Fux – manoeuvred alongside the Mars, allowing a couple of hundred enemy soldiers to board her. As the Mars burned, vicious man-to-man combat endured. Suddenly, there was an explosion amidships, followed by an even worse explosion in the stern. Mars the Miraculous sank quickly, taking more than 800 men down with her.

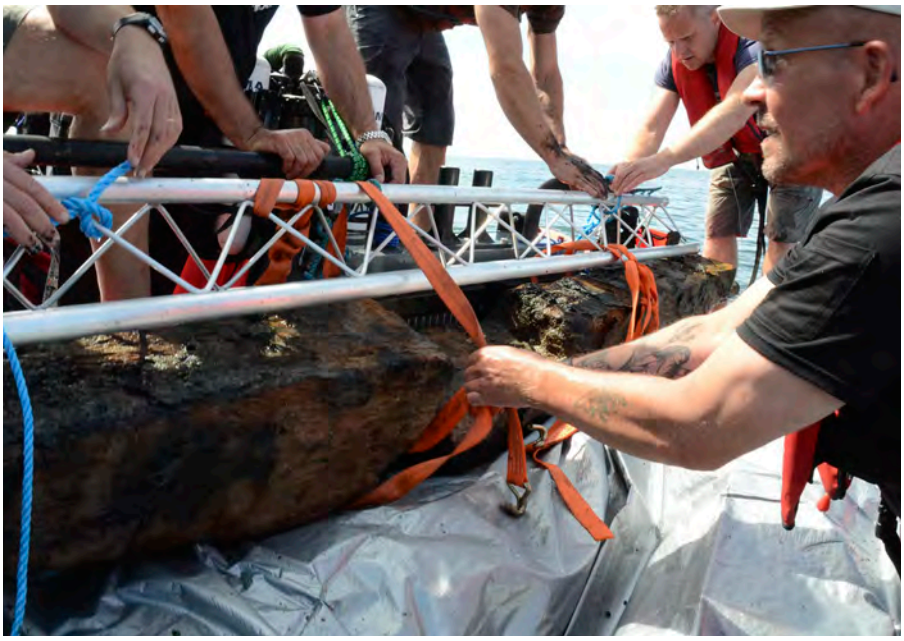
The result of this dramatic event on May 31st, 1564, is today a sunken, well-preserved marine battlefield on the Baltic seabed, complete with burnt timber, cannons, and associated maritime relics.

THE INVESTIGATION

The first archaeological investigation of the Mars wreck was conducted in the summer of 2012; the work continued in July 2013. This exploration of Mars has been one of the largest marine archaeological projects in the world; five survey vessels and more than 40 people have been involved in the field work. The work has been carried out with the help of technical divers, but also with underwater robots and multibeam sonars. A 3D scan of the wreck was initiated using a BlueView scanner with the goal of combining this data with the detailed photomosaic constructed in 2012. To brighten up the Baltic Sea's darkness at 70 meters, a light rig was hung ten feet above the wreck, strong enough to light up a small sports field.

An important scientific objective for 2013 was to reconstruct a cross-section of the "battle space." As part of this goal, ship timbers were salvaged for detailed examination on the surface. These timbers provided vital information regarding the construction of the hull and the high stern castle of Mars. As expected, all timbers were heavily blackened by fire.

In addition to timbers, two of Mars' approximately 120 bronze guns were salvaged; a unique, small – roughly 150kg – rail gun known as a falkon, and the front and rear of a shattered 3 meter long cannon known as a fältslanga. Many of Mars' guns are in a similar state as the fältslanga, probably the result of the intense heat engulfing the vessel before she went down. On the rear of the recovered cannon is the coat of arms of King Erik XIV, complete with the double Vasa sheath. The discovery and salvage of the long-range fältslanga, a crucial tool during the battle, can be used to reconstruct the history of the fight. Finally, a gun carriage was also salvaged. It has large spoke wheels and a rough protruding axle. The gun carriages of Mars are of a completely different and older style than those found on later wrecks, including Vasa (1628) and Kronan (1676).



Professor Johan Rönnby, the scientific leader, ensures that the recovered top timber is covered up in wet protective materials to save it from degradation before the item is rushed to shore for conservation. Photo by Tomasz Stachura.

In terms of history, Mars is linked to a dynamic period in European history during which Renaissance princes like Eric XIV were vying to construct new states and consolidate new dynastic positions of power. Ships and fleets were a vital part of this process, especially in the Baltic region. How these massive, first-generation warships were constructed at the end of the medieval period and beginning of the modern period is almost completely unknown. Examining the Mars on the bottom of the Baltic Sea and studying the salvaged artefacts provides singular access into maritime history, particularly in this region.

The wreck of Mars, however, is not just the remains of a ship; it is also a well-preserved maritime battlefield. Further research here will provide fresh insight into unknown issues related to practical solutions in naval battles during early modern times. But the scope for research is more extensive than this. The opportunity to study the battlefield space also invites discussions and reflections regarding mental and psychological aspects associated with warfare in general, and human behaviour in such situations and environments.

COLLABORATION

The scientific archaeological study of Mars is a part of a multidisciplinary research project at Södertörn University called "Ships at War – Early-Modern Maritime Battlefields in the Baltic." The study is also a unique collaboration between the Maritime Archaeological Research Institute (MARIS) at Södertörn University, The National Defence College, and the companies Ocean Discovery, Deep Sea Production, and Marin Mätteknik (MMT). Also, an international television documentary has been created to feature the archaeological study.

The ability for universities and private companies to work together on such a project is unique and has gained international interest. Companies and universities are responsible for different specialized knowledge. We are convinced that cooperation between academia and industry can give us new insights and perspectives, which can both generate new scientific results and contribute to strengthening the company's abilities and competitiveness. However, regardless of all scientific, practical, and economic benefits of our collaboration, what really links us together is that diving, exploration, and solving mysteries is fun!

JOHAN RÖNNBY, PhD

Johan Rönnby, PhD, is the Professor of Maritime Archaeology at Södertörn University, Head of the Maritime Archaeological Research Institute, MARIS at Södertörn University and a professional diver.

- PhD from Stockholm University 1995.
- Senior curator/marine archaeologist at the National Heritage Board, Stockholm, 1994-97.
- Teacher and researcher at Södertörn University since 1997.
- STINT fellow and visiting professor at Skidmore College, USA, 2005.
- External examiner at Southampton University 2001-2005.
- Associate Professor (docent) in maritime archeology at Helsinki University since 2008.

His research and publications has focused on shipwrecks in the Baltic Sea, but has also covered Viking Age lake dwellings, harbours and submerged prehistoric landscapes, coastal landscapes and man's cultural and social interaction with water.

MARS PROJECT: RECONSTRUCTING THE HULL

FEATURE **NIKLAS ERIKSSON**

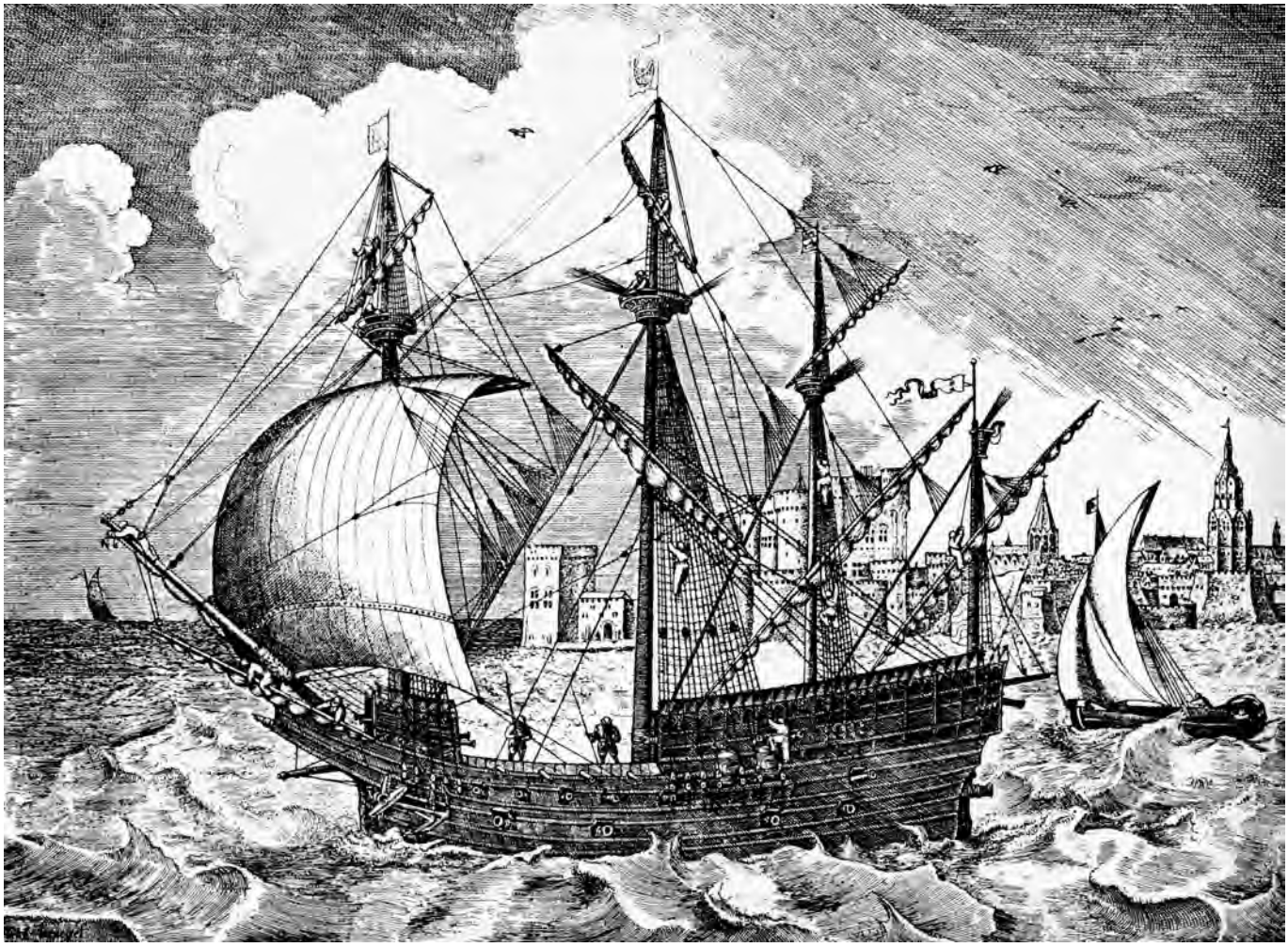


FIGURE 1 Pieter Bruegels (1525-1569) engraving of a large heavily armed warship. Note the high sterncastle the four masts with arsenals of spars ready to be thrown against enemies. Mars would have looked something like this, but larger!(after Landström 1980).

Information detailing the architecture of 16th century ships is scarce. Besides King Henry VIII's ship,the Mary Rose, which sank in 1545, the number of archaeologically investigated wrecks from this time period is negligible. With the discoveryof Mars, we are suddenly faced with another nearly complete ship from that era. But even if a significant portion of this ship has survived, piecing the wreck together is quite a task; a challenge compounded by the fact that the remains rest 75 meters from the sea surface. However, the task of surveying and reconstructing the Mars is, of course, a very stimulating one, not least because the initial work has revealed many unusual and surprising construction features that are not found onboard post-16th century ships of war.

FROM BOARDING TO ARTILLERY, FROM MEDIEVAL TO MODERN

Medieval naval warfare is sometimes described as field-battles that had gone to sea. Merchant vessels were outfitted into warships and used to transport fighters to enemy warships. The primary at-sea battle tactic was for these merchant vessels to come alongside enemy warships to allow their soldiers to aboard. The enemy warship then became the battlefield where armed combatants fought face-to-face.

When warfare-specific vessels were introduced, they were equipped with high fore and sterncastles intended to deter an enemy from embarking. Height was of tactical importance, as it allowed a fighter to shoot down onto the deck of the enemy vessel with longbows, crossbows, spears, and later in history, lob hand-grenades.

In time, fighting ships became more like sailing artillery platforms, an evolution that was dictated by the advancement of artillery. As guns became more efficient, innovations in shipbuilding became vital. In Northern Europe, the perhaps most visible change was the introduction of carvel construction by the end of the 15th and beginning of the 16th centuries. On a carvel-built hull, the strakes of planking are laid side by side and the strength of the hull comes from internal reinforcing frames. This is in contrast to the clinker technique, in which the strakes of planking overlap and the strength comes from the shell of the hull. Most notably, the introduction of carvel construction facilitated the ability to cut gun-ports in the hull side. Large guns could thus be installed low down in the ship, keeping the centre of gravity low, which helped stabilize the vessel. Another important aspect was that the new technique enabled the construction of much larger ships. During the 16th century the size of naval ships increased rapidly as they grew into colossal entities.

Ship design in the 16th century was done informally by copying and modifying previous designs; construction drawings were not widely used until approximately 100 years after the construction of the Mars. Even so, images exist that help to reveal something of the appearance of Mars. In fact, several 16th century artworks portray gigantic warships with high fore and stern castles. Among these, the engravings of the Flemish Renaissance artist Pieter Bruegel the Elder (1525-1569) are especially noteworthy. Bruegel's representations depict a number of floating fortresses with up to four masts and an impressive array of guns, from large, high-caliber muzzles pointing out from the gunports along the sides of the hull

FIGURE 2 Picture from a manuscript on artillery, signed Rudolf van Deventer and written in between 1585-87. The picture shows a large Swedish ship fighting a Danish. Note the burning fireballs (Original in the Royal Library, Copenhagen).

to smaller guns that appear on all four sides of the box-like fore and sterncastles (Figs. 1 and 2). But a careful inspection of these images reveals that these floating fortresses even carried guns up in the masts. The small round platforms in the masts – or "fighting tops" – supported small swivel guns. Firearms, however, were not the only weapons used in the rig of these ships. In the fighting top, an arsenal of spears appears alongside guns, and the end of the spears are equipped with sharpened grappling hooks that would tear an enemy rig apart if it were to sail too close.

The ships in Bruegel's engravings appear to be grotesque mechanical monsters. The question that arises is how accurate are his outlandish representations. Were warships so monstrous in the 16th century, or are these images just an expression of artistic license? The wreck of Mars provides us with the opportunity to finally see for ourselves what one of these large warships really looked like.

SITE FORMATION

According to witnesses from the battle in 1564, when the powder storage area exploded, Mars' foremast flew straight up in the air like a crossbow bolt. The remains of the ship on the seabed further underscores the extent of this violent detonation and the course of events that followed. Today, the ship's forward portion is nearly annihilated, and what remains of the heavily-framed hull is broken up into three more or less coherent parts. Survey results so far suggest that the ship broke up into these three pieces while it was still on the surface. The keel, over 50 centimetres thick and made of oak, is cracked like a match, and loose parts of the stern have been found over 60 meters from the portside.

When the hull made contact with the seabed it listed to starboard. Looking at the plan (Fig. 3), its portside area is perhaps its most identifiable section, whereas the rest of the site appears as a chaotic, unstructured jumble of burnt and eroded materials. However, there is certain logic to this stack of ship timbers, bronze cannons, bricks, cordage, human remains, and other materials, and it will be possible to reconstruct quite a lot of the ship's interior.

In contrast to the dramatic foundering, the past four hundred years appear to have been remarkably uneventful down in the deep. Over time, the wood has softened and iron corroded, but overall, King Erik XIV's ship is remarkably well-preserved. Large hull structures with cannon ports, deck knees, and rigging details are still detectable and indicate clear traces of fire and bombardment. Even the metal in the bronze cannons, bearing the Vasa dynasty's coat of arms, reflect the diver's lights under thin layers of sediment.

Initial surveys have revealed that Mars had two gun decks running from stem to stern. These decks are easily distinguishable from the gun ports in the preserved portside. In the sterncastle, Mars also had a quarterdeck that ran from the main-mast to the stern, onto which lighter ordnance was placed. In the aftermost part of the sterncastle, the ship also had a poop-deck. Underneath the two gun decks was the orlop deck, which served as a dry storage area for gunpowder, personal effects, cordage, spare sails, carpenters stores, and so on. Below the orlop deck was the hold used for the storage of provisions. In all, Mars was comparable to a five-story building with the number of decks it supported. When the hull disintegrated, these levels collapsed and now rest comfortably on top of each other. Naturally, it is difficult to sort out and determine the original location of the loose deck beams and other timbers that lie scattered underneath or just above the conspicuous port-side. But it is not impossible!

The components of the different deck levels have been measured in relation to the stress that guns or cargo would have exerted on them. The dimensions of the deck beams may thus be used to establish their original location. In the same way, notches and abutment surfaces in the different beams, frames, knees, and similar timbers can be used as clues to piece together the wreck into a ship.

Much of the information that is required for this reconstruction may be gathered using ROVs. For a nautical archaeologist, this is an unusually comfortable way of doing fieldwork; sitting in front of a TV screen with a cup of coffee, watching the source material come into view. But even if it is possible to do much of the assessment of the different artefacts from the comfort of the air conditioned and dry ROV booth, it is complicated to take measurements with an ROV. The size of different objects can be estimated by scale reference using laser-pointers oriented parallel to each other. As described by Joakim Holmlund in this issue, the shape, dimensions, and proportions of large structures can also be recorded using multibeam sonar and Blueview laser.

Besides recording measurements of the wreck at the seabed, a few timbers have been raised to the surface. These specific wreck components were intentionally selected because they were informative in regards to the shape of the hull, the dimensions of deck-levels, the height between the decks, and the methods used when the ship was built (Fig. 4). The aim has been to reconstruct a cross-section of Mars in order to highlight the distinctiveness of a 16th century ship. As mentioned above, this was a period of transition, from boarding tactics to artillery fights. Mars was built in the very middle of this transition, and this is evident when examining the ship in cross section. While the lower hull consists of heavy frames and large dimensions to carry the load of the modern, heavy bronze guns, the upper structures are much more lightweight. Mars' sterncastle is reminiscent of the high structures on medieval ships, meant to discourage the enemy from boarding. This sterncastle would never be able to withstand bombardment from the guns she carried on the lower gun-deck.

The situation corresponds well with for instance the written accounts concerning the Spanish Armada that attacked England in 1588. A witness observed that "the upper work (…) was of a thickness and strength sufficient to bear off musket shots. The lower work and the timbers thereof were out of measure strong, being framed to planks and ribs four or five foot in thickness, insomuch that no bullets could pierce them."

In the 17th century, the lightly built upperworks of fighting ships decreased to a few strakes of clinker-laid planks along the bulwark instead of large quadratic castles in the bow and stern. On Mars, the lower parts of the hull are heavily built, perhaps so that "no bullets could pierce." Several marks from roundshots reveal that the wooden walls withstood gunfire quite well. In fact, Mars was lavishly built. All the frames and other curved construction elements are made out of so-called compass timbers, or naturally curved pieces of wood. This is an extremely expensive way of building ships, even if the result is a very strong hull. One hundred years after Mars was launched, it was impossible to build a ship in this manner. The supply of compass timber was short and the construction of large carvel-built hulls had been updated so that their hulls could be built with less demand on high quality wood.

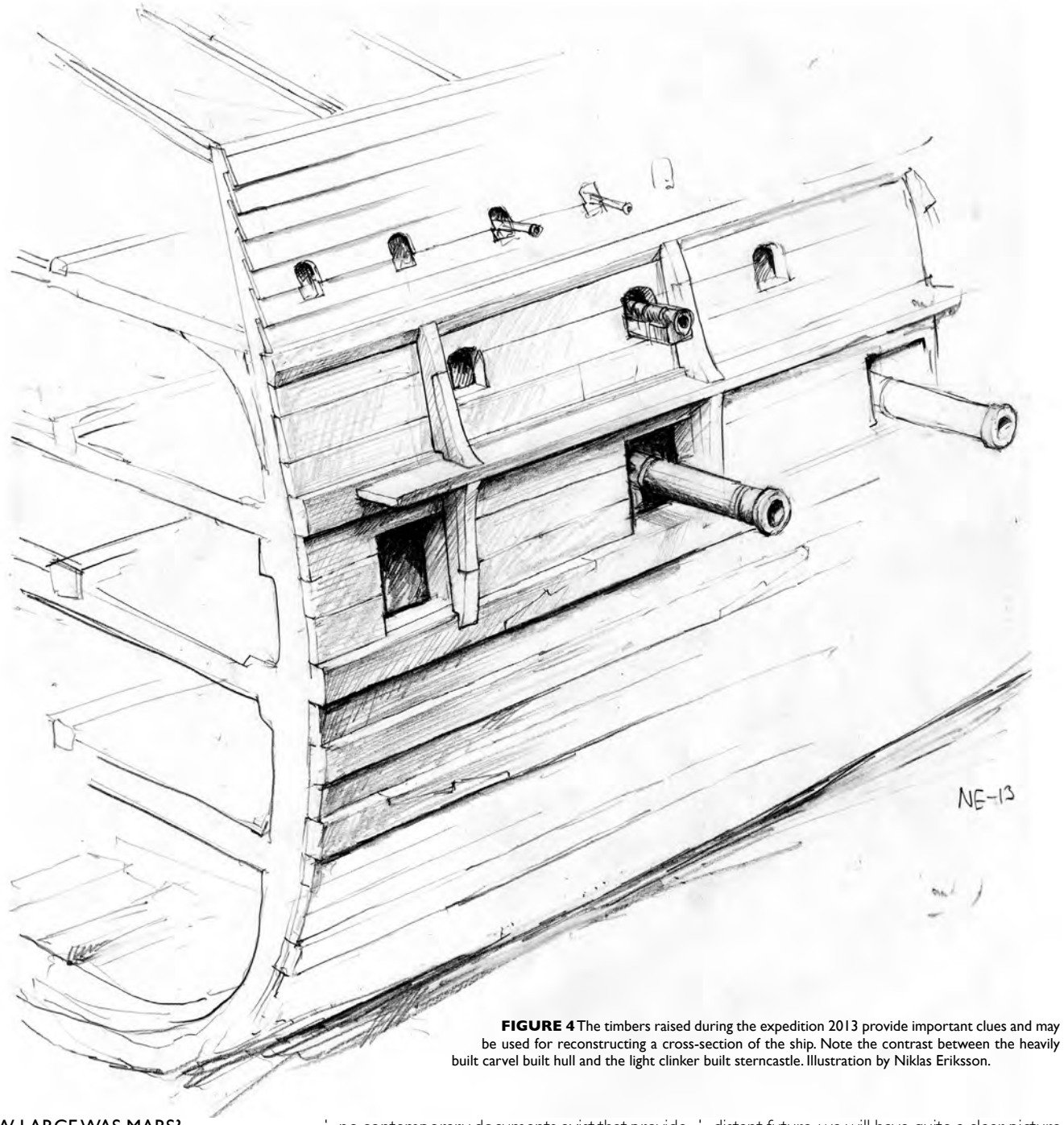


FIGURE 4 The timbers raised during the expedition 2013 provide important clues and may be used for reconstructing a cross-section of the ship. Note the contrast between the heavily built carvel built hull and the light clinker built sterncastle. Illustration by Niklas Eriksson.

HOW LARGE WAS MARS?

Mars may be regarded as the prototype of the large fighting ship. One hundred years later the sailing artillery platform template had reached its final form, with three masts and muzzle-loaded guns in ports along the hull side. This construction continued until the mid-19th century, when it was replaced by ironclads, rotating gun-turrets, steam engines, and so on. During the 16th century, Sweden, Denmark,and Lübeck were struggling to learn how to build even larger ships. The arms race around the Baltic Sea may be regarded as an experimental workshop for the construction of fighting ships and naval warfare.

The foundering of the enormous Mars was a great triumph for the allied forces. Needless to say, they were not slow to use the Swedish defeat for propaganda purposes. Pamphlets describing the victory over the enormous Swedish warship were soon in print. However, no contemporary documents exist that provide a clear indication of how large Mars really was. Over the past 400 years there has therefore been much speculation on the ship's impressive dimensions. According to a contemporary chronicle, the ship was "ten feet longer than the cathedral in Lübeck." Another measure of a ship's size is by the number of guns present, and there are many conflicting reports and calculations based on this. Some state that the ship should have had just over a hundred guns while others indicate as many as 172.

From the initial surveys of the Mars wrecksite, we have learned a lot about how a 16th century warship was built and how it was used. However, the material from the two field expeditions still requires further processing and analysis. It is when fieldwork ends that real archaeological reconstruction begins. Reviewing the material so far, things look promising, and eventually, in a not so very distant future, we will have quite a clear picture of what Mars used to look like. But there is still a lot of work to do before we get there.

NIKLAS ERIKSSON

Niklas Eriksson is a diving archaeologist. He was formerly employed as a Curator at the Swedish National Maritime Museum in Stockholm and is currently a doctoral researcher at Södertörn University. He is specialised in the technologies of shipping and in recording and visualisation of historic wrecks. His current research interests focus on the use of space on board ships and maritime processes of urbanism in the Early Modern period. Alongside this, he is working on recently discovered wrecks in deeper water, including the Ghost ship, Mars and the Sword.

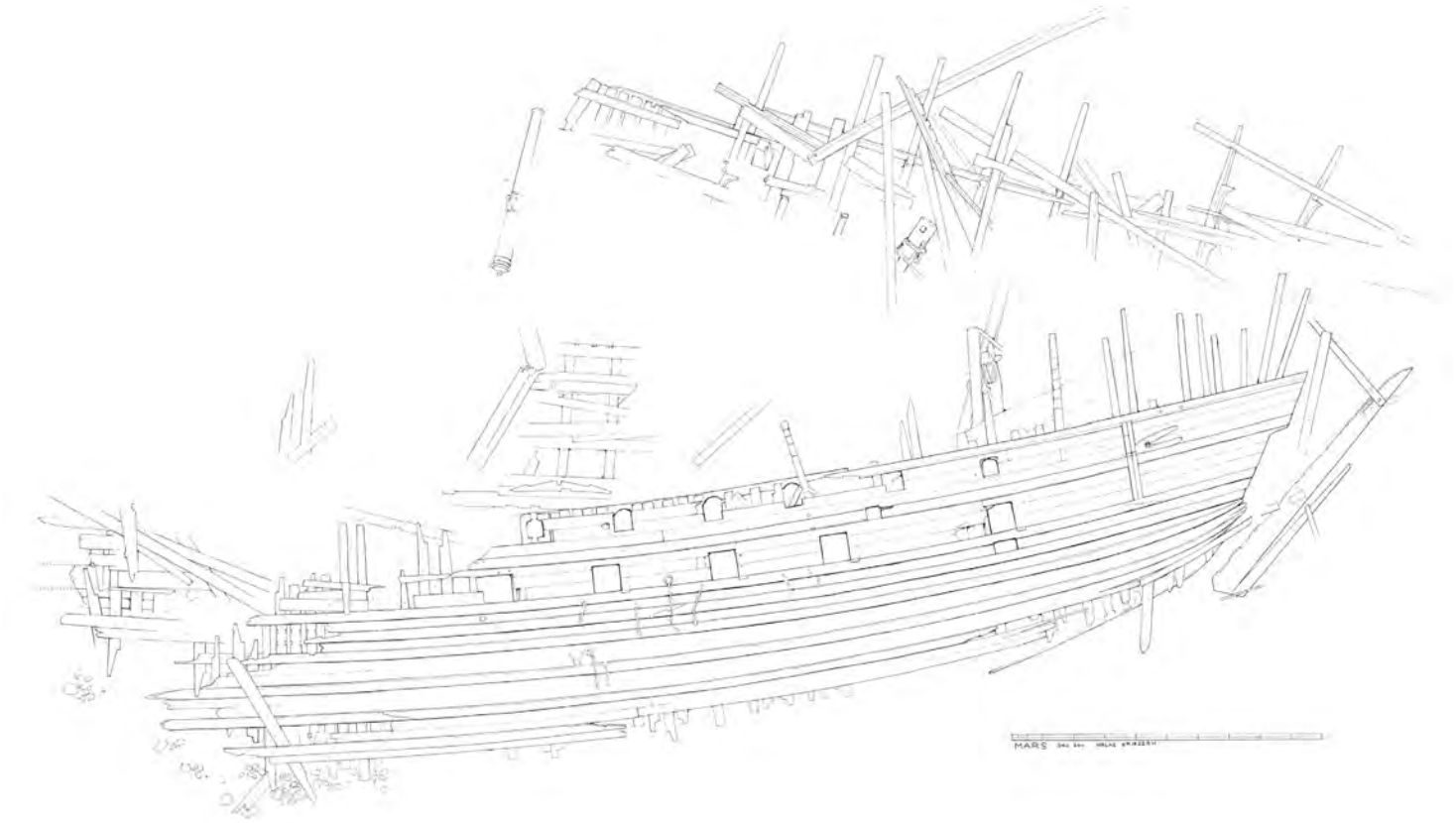


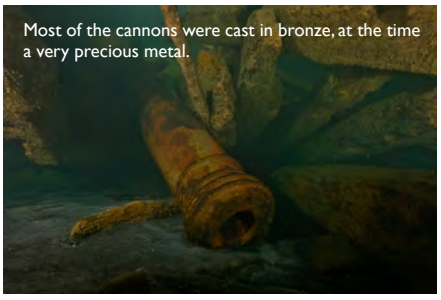
FIGURE 3 Siteplan made after the first fieldsurvey. The wrecksite is seen from above with the exploaded bow pointing to the left. Note the gun ports along the still coherent port side and the rudder resting loose on the seabed. Illustration by Niklas Eriksson.

GUNS ON MARS

FEATURE **INGVAR SJÖBLOM** PHOTOGRAPHY **TOMASZ STACHURA**

Imagine more than hundred guns scattered all over the wreck site. It is nearly impossible to describe how unique this is. It is like the discovery of a hundred "new" paintings and drawings made by Leonardo Da Vinci – even better than every other piece we previously knew were made by his hand. Together with the historical sources, we can almost sense the tide of history. Everybody knows about the fantastic Baltic Sea where the lack of saltwater clams (*Terredo navilis*) provides the perfect conditions for a "Tintin wreck" to be found. Also, the Swedish Archives provide a unique possibility to investigate the historical context of ordnance artefacts. The combination of analysing (comparing) historical sources on one hand and marine archeological artefacts on the other hand, is vital and one of the core methods for the Mars research team. In the contemporary Ordnance Accounts from the Military Archives, we know in detail the amount of guns, ammunition and even every single powder ladle expected to be found in further investigations.

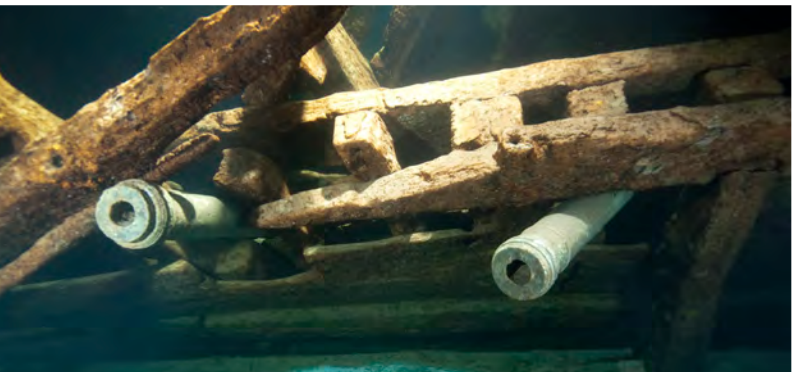
Down to the nitty gritty. Mars was altogether armed with 122 guns in different sizes. Previous research has estimated there being



Most of the cannons were cast in bronze, at the time a very precious metal.

between 106 to 200 guns. The amount of armament on Mars has been a tricky question and been discussed a lot in out of dated research. The span relies on different sources from the involving countries (i.e. Lübeck and Denmark). It is easy to follow the miscalculations if you go to the original accountings. It is just common sense, not even historical source criticism. The Danish and Lubeckian sources were based on intelligence reports and the interrogation of the Swedish prisoners. Of course, the quality differs even if they were contemporary. Therefore, the actual primary sources from the early Swedish royal administration are more reliable. Brass guns was very expensive to produce, therefore they are also very well documented. We can actually follow the brass guns, step by step, the copper ore from the mines in Falun, to the gun-founder, the Royal Ordnance and end up on Mars. It really is amazing.

Mars was built in Björkenäs shipyard near Kalmar 1561-1563. In the sixteenth century Sweden (including Finland), there were shipyards in all the big cities (Stockholm, Kalmar, Åbo, Älvsborg). When finished, the ship was sent to Stockholm shipyard for equipment and armament. Just for the transport from Kalmar to Stockholm, she got a minimum armament of three larger muzzle loaded brass guns (one demi culverin and two falcons, "dubbla falkonetter"), twelve smaller iron guns (skeppshakar) and 50 spears. Even the expert on Swedish marine history, Jan Glete, did not calculate the guns from Kalmar together with the loaded guns in Stockholm. There is no evidence that the Kalmar guns were unloaded in Stockholm. It is easy to understand why they have not been included with the summary of all the loaded guns. The list of the loaded guns in Stockholm was also used as the list over the lost guns in the administrative reports.



LEFT: Cannons are still pointing out through their potholes on the starboard side of the hull. **RIGHT:** A unique photo of a cannon still in its carriage. To the right rolls of lead are stacked. The lead was used for hull repairs but also for casting ammunition for muskets and small caliber cannons.

Mars got her full armament in Stockholm. In April and May 1564, 103 metal guns were loaded on board outside of the old castle, Three Crowns. Another four guns were contributed from other warships. Altogether Mars received her full armament of 122 guns! Not all of them were on the Warship, some of the small ones, armed the longboat (esping). Mars longboat had ten small calibre brass falconets "falkon" (0.5 pounder). Somehow the longboat was changed with the longboat belonging to the "smaller" warship, Elephant (1200 ton displacement), which was armed with two falconets and two "skeppshakar". This boat must have been connected to Mars (1800 ton displacement), which was marked in the source as lost when Mars sank. To summarize, we are expected to find 112 guns, near or in the wreck site and four smaller guns on the Elephant's longboat.

The Lion's share of the guns were made of brass (a metallurgic mix of circa 95% copper and 5% tin). Copper was expensive and worth its weight in money, therefore the weight was marked into the guns in roman digits. These digits are like a license plate to a car. For the larger ones, the weight of each gun was rare and unique because the gun maker used different amounts of copper ore due to the copper's quality in order to make the gun stable. It made large guns of the same calibre, but with different (and unique) weights. These were the preconditions the research team, together with the explorers, came across when they went on the first expedition with the aim to determine if this was the Mars wreck. Many artefacts made it clear that this could be Mars, but backbiters wanted to see the ship's bell and the ship's name to fully be satisfied. I don't think they even knew that the ship's bell had not been introduced back then.

Two guns can fully, and without question, identify the wreck as Mars. These were the cannon and the long culverin (notslanga). This was the heaviest gun (almost 5 tons) and the longest gun (over 5 meters). In November 2011, I was called in to join the research team as the historical expert on the Swedish 16th century navy and ordnance. I brought with me, copies from the original sources from the archives. I can hardly describe the feeling on board the research vessel when the explorers told me that they had found markings on one of the guns. Roman digits were visible when filmed with the ROV (robot video camera). What could it be? I knew immediately what it was. It read "XXIIII:IX:XVIII" which tells us without a doubt that it was from the 16th century. Even the Swedish King, Erik XIV spelt his name Ericus XIIII as the 14th king with the name Erik. The digits 24:9:18 marked the weight in "skeppund, lispund and markpund". Translated to kilograms, the gun's weight was circa 3300 kilograms. According to my copies, it was the long culverin, made in Stockholm by the gun-founder Thomas Matsson! We were all stunned and the research expedition finally concluded and identified that it was Mars. It was a key moment followed by a celebration with coffee and cookies.

During the sixteenth century, the gun calibre was measured by the weight of the shots they fired. Later, during the seventeenth century, the guns were classified by the bore diameter and recalculated to the weight of shots they fired. It means that a cannon was classified as a 40 pounder during the sixteenth century and 48 pounds during the seventeenth century. The long culverin was classified as a 20 pounder (or 24 pounder). During the Mars expedition in 2013, I identified one of the two cannons on Mars, also by the weight inscription. The gun-founder Gillius Packet, cast the large gun in Stockholm in mid April 1564. A notice in the acknowledgement tells us that the gun was supposed to be delivered to Mars. The gun master Esbjörn Staffansson, reported the cannon and it finally ended up on Mars. Through photographs, documentary film and for the second time, weight markings (hardly visible) were discovered on a gun inside the wreck. The markings: "XXXV:XVI:VIII" means that the gun weighed almost 5 tons (4875 kilogram). It was an amazing feeling to have found and identified the largest gun on the wreck site.

According to my calculations, Mars had 24 heavy brass guns on the main gun deck, 36 guns on the upper gun deck and 62 small calibre guns on the castle deck, fighting top and long boats. The heaviest guns were placed on the main gun deck. They were all cast and muzzle loaded brass guns between 1.5 to 5 tons of weight and 3 to 5 meters long. According to

Mars carried a range of different ammunition and calibers. This is a cannon ball made out of stone and was probably intended for use in one of the four back loaded iron cannons.

the administration sources, it was 24 guns (two cannons, two demi cannons, seven half cannons, two long culverins, ten whole culverins and probably one demi culverin). On the upper gun deck, most of the guns, 32 of them, were made of brass, but there were also four cannon periers, i.e. so called "stone guns", large breech loaded wrought iron guns equivalent to cannons. Except for the cannon perier, the "middle sized" brass guns differed between 0.35 to 1 ton and between 2.5 to 3.5 meters long (four demi culverins, 20 half culverins/sakers and 8 falcons). Needless to say, they were also of a large size compared to seventeenth century guns. In the castles, on the fighting top and in the long boats, the 48 (or 50) small calibre brass falconets and twelve iron "skeppshakars" were placed. This smaller artillery was managed by soldiers and at least the "skeppshakars" could almost be compared to a heavier variant of muskets in later centuries.

It should be pointed out, that this is based on calculations from the primary sources. This is our best hypothesis of what to expect to find 70 meters below the surface. A gun in a gun port questioned supply and demand. Often there were not enough guns to fill all of the ships gun ports. There is a high probability that Mars got "full" armament due to the fact she had so many newly cast guns in a row. But we cannot be sure until we have studied the wreck in detail. This jigsaw puzzle of comparing historical sources and archeological artefacts makes the research suggestive and challenging.

One mystery left to be solved is the exploded cannon perier. According to the Swedish admiral Jakob Bagge, the fire on Mars started during the close combat and was caused by the explosion of a cannon perier called the apostle. Eight or nine people were killed and the explosion made the bridge above the stone gun raise 30 centimetres. When Mars was in flames, the officers took the decision to give up the ship. A hundred Swedish crew members were captured and brought to the Lubeckian admiral ship, the Angel (der Engel) and the Henning Kragens warship. Hundreds of Lubeckian soldiers and sailors gushed in trying to take their rightful place of the captured ship. At the same time, the fire reached the powder chamber in the bow. The gigantic explosion was so powerful that the fore mast went up in the sky like an arrow. The ship broke into pieces and sank with six hundred Swedes and hundreds of Lubeckian conquerors.

Is it possible to find the mystery cannon perier that caused the fire? Is it a true story? Apostle was the name of the largest 10 inch cannon perier. The gun shot stones of 25 centimetres in size. According to the administrative sources, Mars did not have the apostle cannon periers – "only" two 8 inch, one 7 inch and one 5 inch stone gun. Maybe the admiral mistook an 8 inch for a 10 inch cannon perier? Bagge was not an expert and apostles were common on the largest ships. For instance, the Elephant that admiral Bagge commanded the previous year, had four apostle cannon periers and Saint Eric had two.

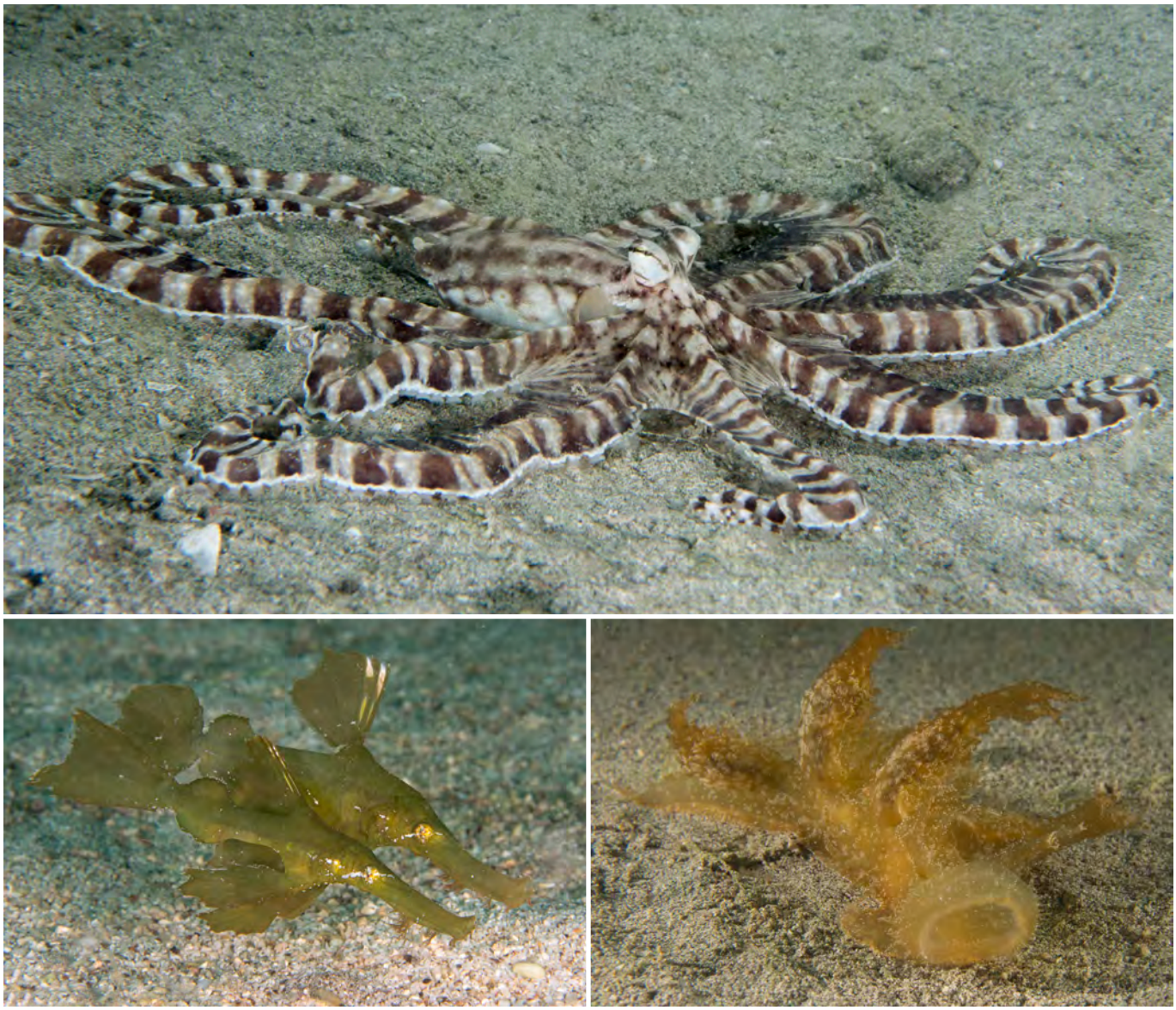
One of the cannon periers was found when the divers started to explore the wreck. This evidence, together with ship design and loads of brass guns, was originally a strong hypothesis that this could be Mars. Today we have discovered three, maybe four cannon periers. One is still in its place and still sticking out from a midship gun port, on the upper gun deck of the starboard side. It has been measured to circa three meters and is probably the 7 or 5 inch stone gun. During the research expedition in 2013, one of the 8 inch cannon periers was measured to four meters long. These two cannon periers are visible in their whole length. We have found the remaining two wrought iron guns. At least parts of them are visible. Could this be two stone guns or two pieces of the same stone gun? We still don't know if these gun artefacts will support or falsify Jakob Bagges story. Time will tell due to our continuing research.

The guns on Mars are the real treachery. 450 years ago, the brass guns lasted for over a hundred years of use. The carvel built warship lasted for 20 to 30 years in service. The guns value often superseded the value of the ship. Hundreds of brass guns, more than 450 years old were found in one place. Two of them were salvaged (one whole culverin and one small calibre falconet). Take the opportunity to go to the museum in the explorer's home town, Västervik. Sense the tide of history. Amazing!

ONE MAN'S TRASH IS ANOTHER MAN'S TREASURE

FEATURE AND PHOTOGRAPHY **STEWART CLARKE**

You'd be amazed at how quickly these resourceful creatures will utilize trash as a foothold to gain advantage in their fight for survival.



I'm sure we are all aware that the increasing amounts of trash that end up in our oceans is a major problem for the environment. We've all no doubt seen the photos of plastic waste forming mass rafts out in the Pacific Ocean and the increasing instances of micro plastics finding their way into the food chain. It's becoming a global problem of truly staggering proportions with no sign of abating.

Within the UAE it's not hard to spot the amount of trash that gets dumped either on land or into the seas, and we all have a responsibility to try and limit this. Over the last few years we are seeing some very pro-active measures to remove some of this trash via such programs as Dive Against Debris and Clean Up Arabia, all very commendable initiatives.

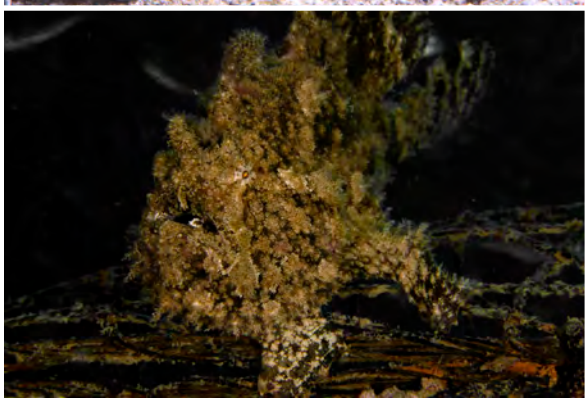
Now, what I'm about to suggest may be seen by some as controversial, possibly even a bit nonsensical. However, to some extent I don't mind an element of trash in our seas and believe in some circumstances it can actually be a positive thing for the ecosystem and those organisms living within it. It would be true to say that much of the coastline around the UAE can appear as featureless and barren as the deserts contained on the land. But just like those deserts, there can exist fragile and highly complex ecosystems containing a multitude of unique and highly adapted organisms. At some point in the past, these areas may actually have contained underwater structures and delicate coral systems, but due to dredging and other such damaging acts, these environments were destroyed. What was already a somewhat harsh environment has become even more so through the acts of man.

In order to survive in these featureless environments, a wide range of techniques have evolved to help these creatures go about their day to day existence. This can be through a number of unique tactics such as mimicry, camouflage or behavioural traits that all help to give an organism the edge within its environment. Survival is tough in these areas; you either develop complex defence mechanisms, hide or get eaten.

The vast majority of divers within the UAE will never come across the majority of these critters, preferring instead to cruise around the reefs and wrecks on our coastlines. For the intrepid few who choose to seek out these creatures a veritable smorgasbord of macro life awaits, and it can bring great rewards for the underwater photographer.

Now you may be asking yourself what this has got to do with trash in the sea, well its quite simple. Certain types of trash can provide oasis like opportunities of harbourage and refuge for many of the critters that live in these areas. For example, in one such featureless area the presence of abandoned bottles and soda cans has helped to create vibrant communities of octopus, crabs and shrimps all happily ensconced in their man made homes. I've even found Octopus hanging out in old Lays crisp packets or underneath disposable fast food cartons, anything that can provide a bit of protection from predators.

You'd be amazed at how quickly these resourceful creatures will utilize trash as a foothold to gain advantage in their fight for survival. Seahorses for example can often be found on abandoned ropes, juvenile catfish on the other hand appear to prefer to hang



out within abandoned tyres. Old fishing pots are normally teeming with life as well, they are often covered in a wide variety of Nudibranch feeding on the various algae and bryozoans that proliferate during the cooler months – and one such pot had a pair of frogfish happily living on it for a couple of months, no doubt making the most of the abundant food source in the form of juvenile fish that shoal around these temporary structures.

These "muck" sites can also throw up a very special surprise every now and then. Up until last year nobody in the UAE expected to find a Mimic Octopus (*Thaumoctopus mimicus*). As the name may suggest, this is an Octopus that uses mimicry to try and outfox its potential predators, they can impersonate Lionfish, Sea Snakes and also Flatfish in its attempt to flee from harm. This is a creature on many people's wish lists when they head to Indonesia or the Philippines. However, we have found a few sites where they appear to be surprisingly common, encountering 3 or 4 individuals on a single dive. We are not sure if this species is endemic to the UAE or is an invasive visitor, but it appears to love the more mucky areas.

In addition, we have also found a number of Robust Ghost Pipefish that appear to thrive in these same areas and I'm sure it's only a matter of time before we find some other unique species. I wouldn't be surprised if there are some Wonderpus out there, and possibly even a Blue Ringed Octopus or two.

We are also finding a number of very interesting Nudibranch, many of which have had no previous records in this region. Overall through the work of the UAE Branchers, we have now reached a species count of 284 for the region, around 30 of these have been found exclusively on these muck sites. As winter approaches and the waters around the UAE begin to cool again, we expect this number to increase further as we concentrate our diving on these "muck" areas. I only hope the recent clean ups have not destroyed too many of these sites, albeit through good intentions.

The point I am trying to make, is that whilst these clean up efforts should be applauded, we need to keep in mind that we might just be destroying some very fragile environments in the process of carrying out our good deeds. I'm all for removing items that might present a direct danger to the marine environment and its inhabitants such as pollutants, hooks, fishing line and abandoned fishing nets. We also need to do our best to limit the incidents of trash finding its way into the sea in the first place. Just keep in mind though, that those cans you are picking up and putting in a trash bag might just contain an octopus or two.

Now I may be coming at this from a completely selfish point of view, as I obviously want to find and photograph the weird critters that survive in these areas of trash. People may argue that it's not a natural environment and therefore my argument is a moot point. If that's the case then let's remove all the wrecks and car chassis that we seem to dive so much as well then, those soda cans and bottles are like wrecks in microcosm and all add to creating a vibrant ecosystem.

So next time you are on an underwater clean up, just keep in mind that by removing certain types of trash, you might just be trashing some delicate creatures home. It can actually be more beneficial to the ecosystem leaving some of that trash behind, rather than blindly trying to fill your bag to the brim.

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ABOUT DIGITAL ONLINE

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

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

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

THE SPONSORS

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

Thank you to BFC Travel Management, Tourism Malaysia, Philippines Department of Tourism, Freestyle Divers, Al Marsa Musandam, Canon, Grand Stores, Le Meridien Al Aqah Beach Resort Fujairah, Al Mahara Diving Center & Anantara Sir Bani Yas Island Al Sahel Villa Resort, Millennium Resort Mussanah Oman & Oman Sail, Nomad Ocean Adventures, The Dive Centre, MTM Marine LLC, Divers Down, and Al Boom Diving.

THE JUDGES

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

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

2009 | KEMPINSKI HOTEL, MALL OF THE EMIRATES

2011 | THE JAM JAR

2012 | GALLERY OF LIGHT – DUCTAC, MALL OF THE EMIRATES

2013 | GALLERY OF LIGHT – DUCTAC, MALL OF THE EMIRATES

2014 | AMERICAN UNIVERSITY IN DUBAI

2015 | AMERICAN UNIVERSITY IN DUBAI

2015 | ANDY MURCH, GUEST SPEAKER AT AUD

2016 | AMERICAN UNIVERSITY IN DUBAI

THE DIGITAL ONLINE JUDGES

ANDY MURCH | BIG FISH EXPEDITIONS
Wildlife Photographer

Andy Murch is an award winning wildlife photographer and the founder of Big Fish Expeditions. Specialising in images of marine predators over the last two decades, he has probably photographed more shark species than any other diver. Andy's images and shark stories have appeared in hundreds of books and magazines around the world from titles as varied as Scuba Diving, FHM, the New York Times, Digital Photography Magazine and the Journal of Zoology. Andy is the creator of the ever expanding Shark and Ray Field Guide on Elasmodiver.com and the driving force behind the Predators in Peril Conservation Project.

Elasmodiver Shark and Ray Picture Database: www.elasmodiver.com
Marine Life Images: www.marinelifepics.com
Predators in Peril Project: www.PredatorsInPeril.org.

WEBSITE: www.bigfishexpeditions.com
FACEBOOK: Big Fish Expeditions

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

Simon is a marine conservation biologist and a Co-Founder and Principal Scientist at the Marine Megafauna Foundation. Most of his work focuses on the world's largest fish: the whale shark. He also works with other threatened species, particularly sharks, rays, sea turtles, and for the protection and management of important marine habitats. He acts as a science advisor for the Wildbook for Whale Sharks global photo-identification library, and also a Director of Wild Me, the non-profit organisation which oversees it's development. Finally, he's a Member of the IUCN Shark Specialist Group, an invited group of experts that synthesises scientific knowledge and assists in the development of global conservation strategy for these fish. Since 2012 he has become increasingly interested in photography as a way of documenting his work, and for communicating his enthusiasm for nature and wildlife in general. His photographs and videos have been published by a wide variety of media outlets, including New Scientist, the Washington Post, Scientific American, BBC Wildlife, Discovery, Earth Touch, Huffington Post, Yahoo, Rough Guides, and Sport Diver.

WEBSITE: www.simonjpierce.com
FACEBOOK: Simon J Pierce Photography

IMRAN AHMAD | ESCAPEINC. DIVE & PHOTOGRAPHY
Professional Photograper

Imran Ahmad has been capturing the magnificence of life both above and below the water's surface for over 20 years. A celebrated and internationally published professional photographer, Imran is committed to showcasing, preserving and protecting the ocean's environment and its surroundings. Clients can find photographic solutions for corporate, commercial, wildlife, creative arts, publishing, photo clinic and underwater projects. A graduate from Middlesex University with a Bachelor of Arts in Film making, he is the brand ambassador for RGB Lights (Japan), and a member of the Ocean Artist Society.

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

WEBSITE: www.escapeinc.com.sg
FACEBOOK: Imran Ahmad Photography

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

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

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

WEBSITE: www.discovernomad.com
FACEBOOK: Nomad Ocean Adventures Musandam

JONATHAN ALI KHAN | WILD PLANET PRODUCTIONS
Managing Director

JAK is a topside wildlife and underwater cameraman, producer, director and editor with a strong passion for the natural world having worked on a wide range of unique projects in the region and is recognized as an authority on environmental, conservation and diving related issues. His fascination with filming all started after years of working as a photojournalist and shooting underwater stills. His primary interest is in marine subjects that led to the creation of Ocean World Productions in 2003. In 2008, JAK left Ocean World Productions in order to focus entirely on natural history TV development, leading to the recent creation of Wild Planet Productions.

WEBSITE: www.wildplanetfilms.org
FACEBOOK: Wild Planet Productions

ALLY LANDES | EMIRATES DIVING ASSOCIATION
Project Manager, Events Coordinator, Editor, Graphic Designer, Photographer & Videographer

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

WEBSITE: www.emiratesdiving.com
FACEBOOK: Emirates Diving Association

THE DIGITAL ONLINE RULES AND GUIDELINES 2017

RULES AND GUIDELINES

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

ADDITIONAL RULES

- By entering the competition, entrants declare that they own copyright of the submitted photographs and films and it entails an automatic acceptance of all the rules. EDA reserves the right to publish images in the 'Divers for the Environment' magazine, EDA's social media pages and on the EDA website. Images will also be used in any future promotional material for EDA events and competitions royalty free, but copyright remains with the photographer. Use of images or video will require no additional written or verbal permission from the photographer or videographer.
- Competition organizers will take the utmost care in handling digital files submitted to the competition. However, competition organizers will not be held responsible for any loss of the submitted material at the time of uploading images. No media such as CD's, DVD's, memory cards and sticks will be returned to the participants.
- Images (photos or videos) must not have already been submitted to previous Digital Online Competitions.
- Photos and videos must be taken underwater unless specified in a category description.
- Manipulation is restricted to colour correction, brightness, contrast, sharpening and cropping. The Digital Online judges reserve the right to examine untouched images if requested.
- Removing backscatter is allowed to an extent, this does not include the removal of subjects such as fish or divers or cutting and pasting sections of images from one to another.
- The deadline for all entries is Sunday, 23rd April 2017, at 11:59pm (GST – Gulf Standard Time).
- The finalists will be announced and their work displayed at the exhibition and award ceremony in May 2017 **(Date and Venue TBC)**. Participants who do not make it to the evening of the event will be asked to collect their prizes from the EDA offices.
- Prizes will be announced in March.
- We pledge to run this photography and video competition ethically and with integrity. Our judges have volunteered their time to help. The photographers' details remain hidden to the judges during the judging process.
- All judge's decisions are final.

REGISTRATION AND UPLOADING ENTRIES

- Registration and submission entry is open from Sunday, 8th January 2017 and the final deadline is on Sunday, 23rd April 2017, at 11:59pm.
- The participant must be a valid EDA member. Submit entries via email to photo@emiratesdiving.com with the requested category detail information.
- File names should include photographer's name and the category. (e.g. TSmith-Macro.jpg, TSmith-WA.jpg, TSmith-BestofUAE.jpg, TSmith-B&W, TSmith-Compact.jpg).
- Photo entries must be saved in jpeg format and should be sized between 2000 and 6000 pixels in the longest dimension. Please limit your images to a maximum file size of 5MB. Images will be viewed on a monitor and should be in the AdobeRGB 1998 or sRGB colour space.
- Video submissions must be in mp4 format and can be sent via e.g. We Transfer or Dropbox with file name of the Videographer.
- The preferred method of entry is electronically, however, if this method is not possible due to slow internet connection, you are able to submit via DVD, memory card or stick. Please note, media will not be returned.
- You will receive an email to confirm your registration and photo/video upload. If you do not receive one within 24 hours, your email may not have come through and you may need to try again.

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

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

PHOTOGRAPHY CATEGORIES

Photographers may enter one photo per category.

Details to include with each photo submission:

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

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

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

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

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

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

VIDEO CATEGORY

Title: THE BIG BLUE

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

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

JAWSOME GUADALUPE

CLOSE ENCOUNTERS WITH GREAT WHITES

FEATURE AND PHOTOGRAPHY **SIMONE CAPRODOSSI**

We descended the few steps into the cage and kneeled down in a corner ready for some shark action. There was no time to wait as the first shark went past immediately and we can barely recall more than a couple of minutes without at least one shark in all the surface cage dives we did from that moment on.

We've all grown up with JAWS and the Great White Shark (*Carcharodon carcharias*) is the most iconic, scary and fascinating of all sharks. Seeing one underwater had always been on my bucket list and I had ticked the box a couple of years ago in South Africa. False Bay close to Cape Town. That is an amazing place to see sharks predate on fur seals in their natural environment, but the underwater experience, especially in August, was not as great as the water was freezing, visibility very poor and the shark action on the bait, very slow. So despite officially having crossed the item off my list, I was left with even more desire to properly see them, and of course photograph these amazing animals.

When Barna, our friend and owner of Encounters, a great adventure and diving operator in Mexico that we regularly travel with decided to put together a group and charter a boat for Isla Guadalupe last September, I was of course the first to sign up a good year in advance.

Isla Guadalupe is a remote volcanic Island about 250km off the West coast of Baja California. Great Whites were discovered to aggregate around this hotspot from August till October every year. The sharks are attracted by a huge colony of fur seals and northern elephant seals that come to breed on the island over these few months. The island has been a seal sanctuary since 1975 and is a designated biosphere reserve.

It is also known to photographers as the best place in the world to photograph Great Whites. This is not only because the number of sharks are high and the interaction is good, but the water is also some of the clearest in the world with 30-40 metre visibility, as well as not being cold, that really is a welcome bonus.

Given the distance and the lack of any structure besides a small research centre, the only way to get there is on a 4 day liveaboard. The trip is extremely well setup making it long but very easy. The straightest way over is to fly into San Diego and the liveaboard includes a bus pickup from San Diego hotels that takes you overland through the Tijuana land crossing and heads straight down to the port of Ensenada, about a 3 hour drive from Tijuana. If you don't have a US visa, you can also go straight to Tijuana Mexico and be picked up from there on the way.

In Ensenada, the crew was promptly waiting to load up all our bags and getting swiftly ready to leave the port. By about 1pm, we were happily waving goodbye to the mainland – and internet and phone connection – incredibly excited about the days to come.

We felt very much at home on the Sea Escape as we had been on their boat before, 2 years ago when we had done our trip to Socorro. Many Baja California boats run the Socorro trip in the winter/spring and Guadalupe is done in the autumn. We were happy to see some of the boat crew again and to meet our new Captain for this adventure, Jonathan, a very experienced captain with many Guadalupe seasons behind him, and many tales of amazing Great White encounters.

As soon as we were onboard, our cabins were assigned and it was time for the first of many delicious lunches. Then Jonathan briefed us on the days to follow and everything was getting closer, more real and more exciting. It had only just dawned on us that the real time at Guadalupe would only be two and a half days and we really hoped that the shark action would come quickly to make the most of what seemed quite short.

It was then time to relax and enjoy the long ride as well as catch up with good old friends who had come on other Encounters trips with us and meet some new fellow travellers. The boat has a large roof deck that makes a perfect sunset watching spot and we let the afternoon fade away in the beautiful red clouds, savouring the thrills of what was yet to come.

Dinner time came quickly, followed by an early night's sleep so we would be fresh for the next day.

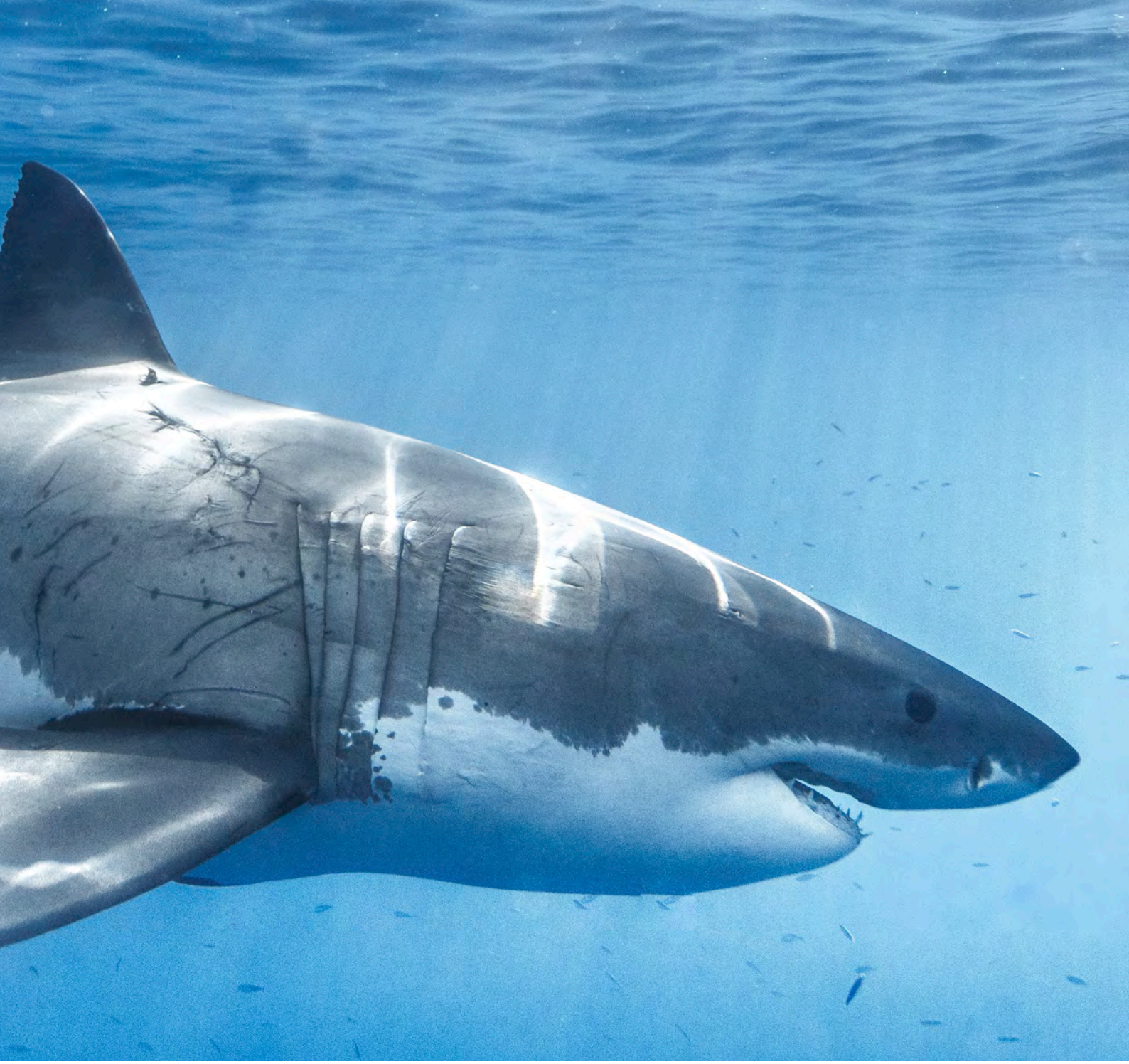
The dawn of our first day with Great Whites finally came and after a lazy wake up and time spent sorting out our photography gear to arrive fully prepared, we were called up to the deck as Guadalupe started to appear as a tiny speck on the horizon on a bright sunny day.

The speck slowly became a large wall of volcanic rock standing out proudly in the middle

of the open ocean. Only one other cruise boat was there that had started the cruise a couple of days earlier and a small boat from the tiny research centre that runs dedicated research dives to understand the behaviour and movement of these amazing animals.

We moored in our spot a few hundred metres from the rocky cliffs and the crew immediately started getting ready for the action. Everyone moved to the top deck to watch the cages – that would be our safety underwater homes – being lowered into the water with the air systems getting connected and ready for use.

With years of experience, in less than an hour, the boat was fully prepared for Great White encounters. Now we were only missing the first shark to appear to jump into the cage. Jonathan told us that the sharks were normally quick to come around, but at times a few hours



were needed. We were again lucky and not even half an hour after the guys had started baiting, when the first fin crossed the water's surface and a young male shark ventured close to the cages officially opening our adventure.

The boat carries 18 passengers and 2 cages can take 4 people at a time comfortably. The groups alternate in and out every 40 minutes so long as there are sharks around. It is actually a great system, as it avoids getting too cold in the water.

We actually waited to be in for the second round to observe some of the action from the top first and also as typically, the sharks take a few minutes to get more confident and come closer. The thrill was mounting as we watched the shark brush tightly past the cage a few times and we were getting a little jealous with those already in on the action.

40 minutes went by so fast and we started getting ready for our turn. To keep space in the cage you can't go in with full diving gear and tank, there is a SNUBA system with long air hoses to breathe directly from surface tanks. You don't even need to have a diving certification to do it as the cages are at the surface. So all that is needed is a nice wetsuit as the water is not very cold, but you stay stationary for 40 minutes with some heavy weights to keep you well grounded to the bottom of the cage.

We descended the few steps into the cage and kneeled down in a corner ready for some shark action. There was no time to wait as the first shark went past immediately and we can barely recall more than a couple of minutes without at least one shark in all the surface cage dives we did from that moment on.

We decided to shoot without strobes as there is a bit of scatter in the water due to the tuna bait, plus it is hard to manoeuvre strobes between the bars of the cage. The surface light is also really beautiful and changes through the day, offering totally different moods to the images.

The amazing visibility we were promised is strikingly true. I have rarely seen such blue and crystal clear water in all my life. You can see the sharks approaching from the distance, coming in closer and closer, often right up to the cage. They are incredibly majestic animals and very far from the aggressive killing machines they are portrayed to be. Most of them are very shy at first, but they come over with calm curiosity and it's only after some time they dare to really go for the bait.

Once they decide to go for it in full "Jaws" style, their top predator force comes out and

we witnessed several bait attacks where they suddenly disappeared into the dark to then come back in a straight vertical to surprise the bait handlers and catch the bait in a spectacular breach out of the water. You really would not want to be that tuna head.

We also quickly found ways to stay busy with shark action photography during our surface time by working on shooting from the water's surface to get some split levels and remote close action.

I teamed up with David Robinson to shoot some remote closeup action. We had a soft Outex underwater housing for a Canon 70D that can be controlled wirelessly from a smartphone. We attached the camera to a monopod and one of us stood close to the cage holding the camera just at the surface, really close to the sharks, while the other was shooting remotely, watching the action from an iphone screen. We only got a few viable images, but we were really excited by our very, very, very closeup shot of the toothy grin that nearly cost us getting the camera chewed up.

The crew works tirelessly during the time at the island, starting to bait at first light around 7am and not ending until the sun has fully set. As a few non-photographers start to get a bit bored and choose to skip some of their time in the water, you get extra shark time as the days go. On the second day, I remained in the water until dusk taking 3 straight turns as no one wanted to come in to replace me and I didn't have to be asked twice on whether I wanted to stay. I had to pump the ISO up as the scene got darker, but the sharks' confidence and moodiness just kept getting better as the light went down.

In the early mornings there is also the opportunity to dive in a deeper cage and get lowered down to about 20 metres. There the action is quieter as there is no deep baiting, but it is quite a unique feeling. The surface cage has the boat on one side, while at depth you are truly surrounded by the blue and sharks can come from every direction. We were not lucky with deep shark action, but still enjoyed the experience and the hundreds of small fish that surrounded us as we descended.

On the evening of the second day, we had the pleasure to have a presentation from the lead scientist researching the Great Whites in Guadalupe, Mauricio Hoyos Padilla. It was really interesting to learn more about these animals and to understand more of the research, and the threats that these charismatic animals face.

The last morning was a tough wake up as we only had a few hours left and we even forgot to have breakfast, using every minute we had left, down in the cage or shooting by the surface. By the third day, a few sharks had gotten familiar with the boat and were getting bolder and challenging the crew to be more alert as to not loose the bait under their fast attacks. We had up to 5-6 sharks around the cages that morning and plenty of breaching action. Incredibly memorable. Eventually the time came to pull up the cages and start moving back towards the mainland. We were filled with thrilling memories of these encounters. Dolphins accompanied our ride home and only 22 hours later we were back where it all started.

The trip is quite short, but the experience is so intense that even 3 days felt like a really long time and the thousands of images in the camera seem to suggest that it was much longer than that.

I cannot recommend this incredible trip any more than I have, it is a true bucket list experience and it definitely ranks high up on the top of all my other underwater encounters.

I want to thank the fantastic crew of the Sea Escape who run an absolutely perfect operation and Barna and Encounters for again putting together a great group of people and arranging everything around the trip smoothly, as well as sorting out any issues we had before and after.

ENCOUNTERS
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Email: info@encounters.com.mx
www.encounters.com.mx

MARSA SHAGRA, EGYPT

WHERE DIVING IS MORE THAN A PLEASURE

PART I

FEATURE **PHILIPPE LECOMTE – WWW.PLONGEE-PASSION-PHOTO.COM** AND **MIREILLE PLASSE**
TRANSLATED FROM FRENCH **ALLY LANDES**

Once again, the magic of the Red Sea does not fail to impress. The beauty of the reefs in Egypt continue to remain such a pleasure to dive and it's thanks to the efforts of preservation by the Egyptian government.

Egypt, with its pyramids, its mountainous desert, the Nile or its strait well known to industrial sailors, has one other very important economic asset. Egypt possesses a jewel so unique, appreciated by all divers: the Red Sea. This sea, found between Africa and the Middle East is one of the smallest seas in the world. With a length barely 2000km long, by a width of 300km, this sea is one of the 5 most loved scuba diving destinations in the world. The incredible water visibility, as well as the aquatic fauna, make her a unique and magical place.

With only a 3h30 flight from the United Arab Emirates, Egypt and its Red Sea coastline, offers divers of the Middle East an underwater world to be explored of a first class rating. The most famous destination is Sharm El Sheikh, but I'm going to tell you about a region found further south. At approximately 800km from Cairo, Marsa Alam is a small town which we get to either by air or by road via Hurghada. Here you will find numerous hotels to choose from, each just as luxurious from one to the next.

At the end of August, my friend Steven Surina from Shark Education, a shark specialist, contacted me via Facebook and suggested I join him in Marsa Alam. With the mild temperatures of this period, the chances of coming across Oceanic Whitetip Sharks (*Carcharhinus longimanus*) are at their highest. Always ready to dip my fins and camera at a moments notice into magical places, I decided to take 6 days leave. I had no problems in choosing my accommodation as I had already been to Marsa Shagra village on a previous trip back in 2011. Marsa Shagra is in an ecological lodge offering quality service and is a PADI dive centre. It is situated right in front of one of the most beautiful and most visited of dive sites in the Red Sea: the reef of Elphinstone. At the beginning of September, I thus embarked on a flight to Hurghada via Cairo, to reach Marsa Shagra village by road in 2h30.

I arrived in the evening at around 9pm. When I awoke the following morning, I had the immense pleasure of admiring a landscape of rare beauty, the desert mountains with their base racing into the Red Sea of deep blue-green and the coral reef appearing through the surface.

The lodge offers different styles of accommodation. You have the choice between traditional tents, small huts with basic amenities or air-conditioned chalets. There is a cafe and large dining room where the meals are always served in buffet style. Down by the beach, an open terrace equipped with big screen is also used as a coffee corner where divers gather to discuss their stories of the day.

Marsa Shagra has a beach facing a small bay with its own coral reef. Guests can take

advantage of the beach and do dives within its calm water.

The dive centre is located a stone's throw from the beach, near the pontoon where the dive centre's semi-rigid boats are tied up giving divers easy access to them. The practical design of the semi-open dive centre, possesses large lockers where divers are able to leave their belongings in complete safety. There are big rinsing tubs as well as showers, drying racks for equipment and electrical outputs to charge lights and other electronic devices.

The dive centre is very well organized and its instructors and dive guides are always there to help or advise you.

The dives take place in 3 different groups. Group A, sets off on dives in close proximity to the village, whether diving directly from the shore or being dropped off by Zodiac a few hundred metres away from the beach, on the north or south side. For these dives, divers just need to register their names up on the board before setting out from the beach.

The second group, Groups B and C, depart from the dive centre, but go on longer journeys on their large semi-rigid boats.

SOME OF THE DIVE SITES OFFERED:

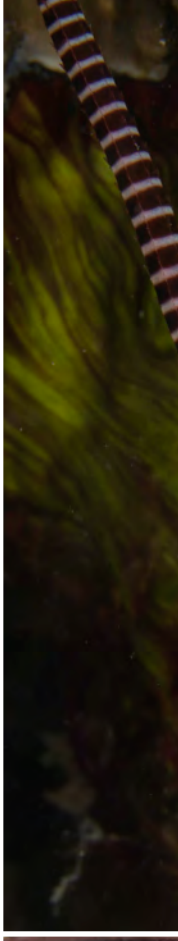
- **Sharm Abu Dabab:** Canyon.
- **Shaab Abu Dabab:** Canyon and coral garden with small wreck.
- **Nemo City:** As the title implies, a lovely dive site with lots of clown fish and a beautiful reef.
- **Elphinstone Reef:** A long reef in the middle of the Red Sea, perfect for spotting large predators.
- **Om Halhala:** A beautiful reef strewn with gardens of coral and a nursery of reef sharks.
- **Shaab Samadai:** The site to find dolphins.

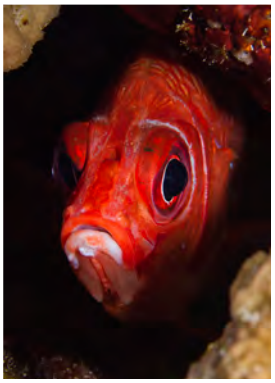
The third group is reserved for half day or full day excursions. The club organizes transportation by bus and plans a picnic for lunch. These excursions offer visits to two other villages which belong to the same company, Red Sea Diving Safari, which is located further south. The first village is Marsa Nakari and the second, Wadi Lahami.

THESE DIVE SITES VARY GREATLY:

- **Marsa Abu Dabab:** Coral reef attracting manatees and green turtles.
- **Abu Ghusoun:** Wreck dive.
- **Marsa Egla:** Coral reef.

As my stay was only 5 days, I was not able to visit all the dive sites, but my goal was to dive 'Elphinstone' in the mornings (See Part 2 of this article on page 100) and to then explore the sites of the north and south around the village.





On my first day, I was acquainted with the Sales Manager, Sarah O'Gorman, who herself, is also an underwater photographer. She gave me a lot of advice during my stay, helping me plan my schedule, and suggested I dive two particular dive sites further south in Marsa Nakari on one afternoon. In the Red Sea, it is custom to start diving the calmer sites before beginning the other more advanced excursions.

DIVE SITE ON THE SOUTH SIDE

This dive site is explored by following the coral reef on your left hand side. The barrier is a wall of 10-12m. The site gradually slopes down between 26-30m. On the bottom, small rocks and white sandbanks follow one another all the way up to the entrance of the bay of the village. Down to a depth of 30m, another drop, this time to approximately 50m hits a sandy bottom. These dives though are made along the bottom at 30m max. Life appears from every nook and cranny. On the various sandbanks, Speckled Sandperch (*Parapercis hexophthalma*) balanced on their 2 pectoral fins, stay still in watch, trying to surprise shrimps and small crabs. With successive leaps, they move along the bottom always on alert. It is not uncommon to come across huge Giant Morays, (*Gymnothorax javanicus*) as they glide between the rocks. On these sloped bottoms you will sometimes find big rocks covered with various soft and hard corals. Don't hesitate to stop here and observe the often invisible fauna residing in these complicated living structures. These areas often act as cleaning stations and their resident cleaner shrimps and other young cleaner fish wait to groom larger species such as the Coral Grouper (*Cephalopholis miniata*) or Peacok Grouper (*Cephalopholis Argus*).

Further along, 2 Titan Triggerfish (*Balisoides viridescens*) quarrel at one end of the reef. When the winner claims his territory, he heads straight over to a cleaning station to benefit from the pampering. In the big rock crevices, I suddenly spot purple-blue fish darting about. I settle down motionless in front of one to realise they are Orchid Dottybacks (*Pseudocrhomis fridmani*). They are endemic to the Red Sea. A very deep purple one, possesses a small black line across its eye making it look like a pirate. They live in small groups of 5 or 6, making them easy to observe once located.

In the small caves, at the foot of these large corals heads, Lunar-tailed Bigeye fish (*Priacanthus hamrur*) observe you with their big red eyes. In their awkward appearance, they give the impression of effortlessly floating on the spot.

Swimming around to the other side, you cannot miss the Masked Butterflyfish, (*Chaetodon semilarvatus*). Always travelling in pairs, these bright yellow fish are one of the emblems of the Red Sea. They are very easy to spot and you will be able to effortlessly approach them to take one or two photos. A little farther along, we come across a vast coral, formed by what looks like, lettuce leaves – called Turbinaria. This coral grows to remarkably resemble a pale green cabbage. While continuing on our way, we suddenly spot a ray with blue spots on the sand. A Bluespotted Stingray (*Taeniura lyma*). These graceful rays are also very common in the Red Sea. They are very easy to spot, but if you get too close, they will scarper fast, swimming away with their skirt doing the French Cancan.

Carrying on, we come across a Foster's





Hawkfish (*Paracirrhites forsteri*) perched on the top of corals, looking around him attentively to surprise prey.

Suddenly, the rocky bottom disappears, gradually giving way to a totally sandy bottom, signalling that we have arrived to the bay of Shagra and the dive south has come to an end.

DIVE SITE ON THE NORTH SIDE

The dive site on the North is rather similar to that of the South, except that it possesses more rocks. For this dive, Sarah joined me and my two French friends to help us discover some of the hidden places we would not have found on our own. In effect, our personal dive guide for the day is used to making a daily dive at 6am without fail before beginning her work day.

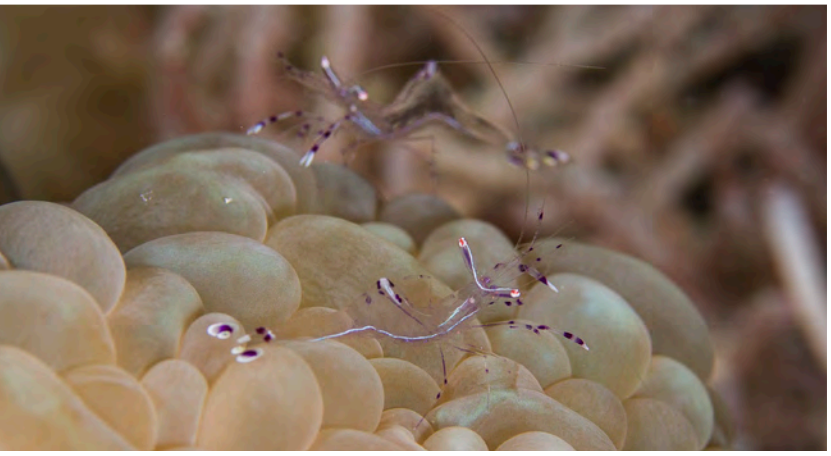
Sarah tells the Zodiac's captain, the exact dropoff location where the dive will take place. Taking our positions, we do our backward roll entries together to find ourselves once again in the underwater realm. The visibility is magnificent with more than 25m ahead of us. Sarah signals us to follow her towards an enormous rock lying on a bottom at 20m. At the top of these rocks, there are often one or two fire corals which take up residence. With their fan shape, these corals make a good lookout post for a lot of fish, but we need to take care not to brush up against them as contact on skin is very urticant and gives you a strong burning sensation that can last several days.

A Masked Puffer (*Arothon diadematus*) takes refuge within the fire coral, trying to elude us. They are very common in the Red Sea and when surprised by divers, they aimlessly swim around in circles looking for an escape. In a crack on the side of the rock, Sarah points out a Broad-banded Pipefish (*Dunckerocampus boylei*). This very discreet fish, lives in rather small and dark crevices. They constantly move, twisting themselves like a snake. In the same place, I spot a dark fish with yellow stripes. Upon closer inspection, I notice that it's a Six-striped Soapfish (*Grammistes sexlineatus*) and its light yellow stripes make it look like it's wearing a pair of pyjamas.

We move from this teeming spot of life to continue our way over to the sandbanks. Here, motionless in 1 or 2m over the sand, the Blue Blaquillo (*Malacanthus latovittatus*) watches over its territory to hunt invertebrates, its favourite prey which shelters in the sand. This large sized fish, between 40 and 50cm, is rather wild. He does not allow us to approach him, making it very difficult to photograph. It is also quite common to see a second species of tilefish, the Flagtail Blanquillo (*Malacanthus brevirostris*), as they swim together over the same sandbank.

During my discussion with Sarah at the start of my arrival, I had mentioned to her that shrimps and other shellfish were a topic of my interests in photography. This is why during the dive, Sarah guided us towards an enormous bubble coral. This coral houses various species of shrimps. Bingo! In a corner of the coral, 2 shrimps of the *Periclimens* family crawl over the supple bubbles. A magical moment.

On our return to the dive centre, we decided to plan a night dive for that very evening. For the lovers of night dives, Shagra village offers them every night. With both the ease of doing a shore dive or choosing to take a short boat ride to drop in a little further along, night dives have never been so accommodating.



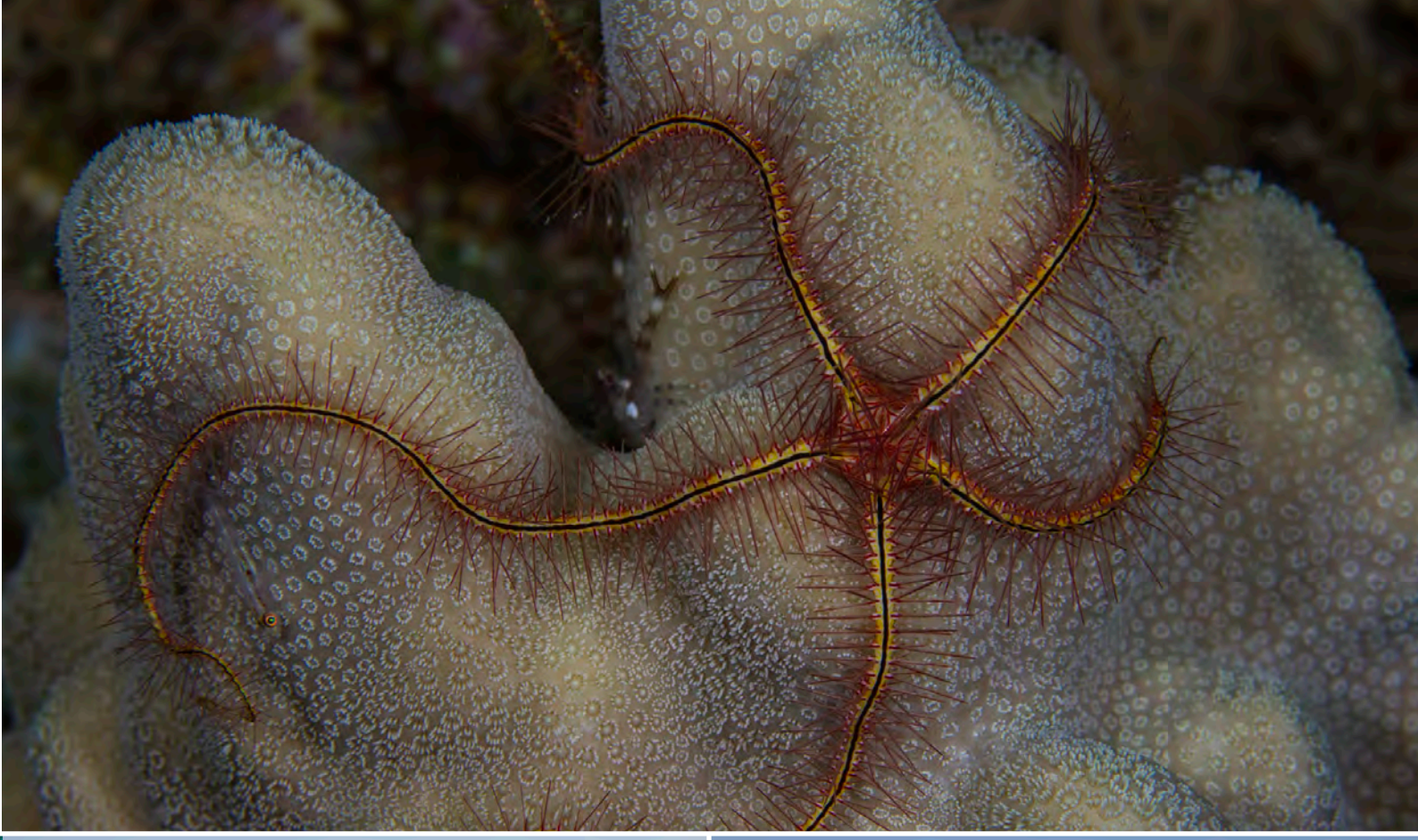
On the hour planned, with our lights charged and our equipment checked, we are again in the water. Having finned a few metres away from the beach, I begin to inspect the corals. There, a Common Marbled Shrimp (*Saron marmoratus*) becomes easy to see with the beam of my light. A little farther, parrotfish sleep quietly in their protective mucus secreted "sac" sleeping bags. Inside a big sponge, shaped like a funnel, a Red Sea Rifleman (*Caesio suevica*) sleeps soundly. To go unnoticed in the eyes of its predators, this fish changes colour at night, taking on a dark tone. Nudibranches also explore more easily at night. This evening, we are lucky enough to see two different species. Lionfish are also rather common in the Red Sea and easy to observe at night. On this dive, we light the path of a Common Lionfish (*Pterois volitans*) taking advantage of it gulping down prey. Just before coming out of the water, we got to see a Leopard Ray (*Himantura uarnak*) who was quietly resting on the sand. Not disturbed by our approach with lights ablaze, we pass over it and let it finish in its quest to feed.

In the anticipation to write this article, I had asked to dive on various sites to have the opportunity to take very diversified photos. The last day of my stay, Sarah booked me in on a one half-day trip to do two dive sites further south. These sites are situated not far from the village Marsa Nakari, which is only a 30 minute journey away by minibus. At the spot, one of the dive guides from the dive centre did a small briefing on the sites to 4 other customers with Sarah and myself, before we got on board the semi-rigid boat for about a ten minute journey.

HABILI NAKARI: ★★★★★
Depth: 25m
Dive Time: 50 min
Temperature: 28°C
The site is a big rock in the shape of a pillar, the base of which is down to 25m and sits 2m below the surface. The rock's diameter is no more than 6-8m. We begin this dive in a spiral descent circling this long rock. It is covered with soft corals from the *Dendronephthya* family, Teddybear Corals. These corals can be various colours of red, orange, yellow, purple or blue. Their bodies are almost transparent and on certain species, it is possible to see straight through them. Among these soft corals, the hard and other black corals grow side by side along the rock's surface. By the thousands, the various Anthias, *Pseudanthias* pass in between the branches of the corals, resembling ceaseless firework displays.

On arriving to the bottom of the pillar, we swim over a garden of coral, strewn with small sandbanks. There, we cross paths with red mullets, the Yellowsaddle Goatfish (*Parupeneus cyclostomus*). These red mullets possess long barbs which allow them to search between corals and sift through the sand, in search of food. The individuals from this group are all yellow which indicates they are sub-adults. In adulthood, these fish become yellow and purple.

We move over to a group of small coral heads. Even there, the marine life explodes in a multitude of brightness and colour. Red Sea



Bannerfish (Heniochus intermedius) in small groups mix with various species of Butterflyfish and Surgeonfish. Sarah signals me to turn around and head back to our starting point. The dive ends in 5m as we loop around this immense coral head which we had started from.

SHAAB NAKAIRI: ★★★★★
Depth: 20m
Dive Time: 50 min
Temperature: 28°C
After approximately resting for 50 minutes aboard the boat, we enter the second dive site. It is a long reef headed in the direction from north to south. Following the flow of the current, we approach the site from the western side. The reef is surrounded with a wall of coral, reaching down between 18-20m. The boat drops us in, in the opposite direction of its usual anchor point. The dive consists of by-passing the reef from the other side until we join our boat on completion. On this site, there are fewer and duller coloured soft corals. However, we appreciate the very wide view of the coral garden around the reef thanks to the exceptional visibility. Within a short moment, a juvenile Napoleon Wrasse (*Cheilinus undulatus*) catches our attention and circles us for a few minutes. I always get so much pleasure seeing these big fish. With their slow swimming pace, they are in fact, fast swimmers who let you know it as soon as you try to get closer. With the force of their very powerful pectoral fins, they very easily outsmart you. Before beginning our ascent along the coral wall, a big blue Steephead Parrotfish (*Scarus gibbus*) allows me to photograph it while continuing to glide over the corals. My last dive of the trip comes to an end, and I savour the last moment of this magnificent and unique deep blue sea, before going back up to the boat.

Once again, the magic of the Red Sea does not fail to impress. The beauty of the reefs in Egypt continue to remain such a pleasure to dive and it's thanks to the efforts of preservation by the Egyptian government.

In conclusion, I would like to thank the whole team of Marsa Shagra for their kindness, their good humour and their professionalism. All of this would not have been possible without them. These professionals allowed me to fully enjoy my stay in the village of Marsa Shagra. I highly recommend everyone to visit these villages where the words, "Diving, pleasure and good humour" stand true.

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MEETING WITH THE LORD OF THE OPEN SEA

THE OCEANIC WHITETIP PART 2

FEATURE AND PHOTOGRAPHY **PHILIPPE LECOMTE – WWW.PLONGEE-PASSION-PHOTO.COM**
AND **STEVEN SURINA – WWW.SHARKEDUCATION.COM**
TRANSLATED FROM FRENCH **ALLY LANDES**

We head straight over the reef and there, by looking into the blue at only 5 metres below the surface, my first Oceanic Whitetip swims straight towards us. This mysterious shark is now swimming around us. He's slow and so graceful. After circling the divers twice, without showing any signs of nervousness or aggressiveness, he disappears into the blue.

My travels generally have a specific purpose; to dive with sharks. This trip to Egypt was in fact to see a mystical shark still missing from my photography library and allow me to get to know the behaviour of these magnificent animals. This shark is no other, than the Oceanic Whitetip Shark (*Carcharhinus longimanus*).

Thanks to the help and advice from my friend Steven Surina, a professional diver and shark behaviourist, I found myself in Egypt in Marsa Shagra Village to take the opportunity to dive with Oceanic Whitetips at the world famous dive site, Elphinstone. As you found out from Part 1 of this story, the Marsa Shagra Village is situated just in front of this famous reef, lost in the middle of the ocean depths of the Red Sea. To quickly describe Elphinstone, it is a reef of elongated shape approximately 10km from the coast. Its English name was given in honour of Lord John Elphinstone in the 1830s.

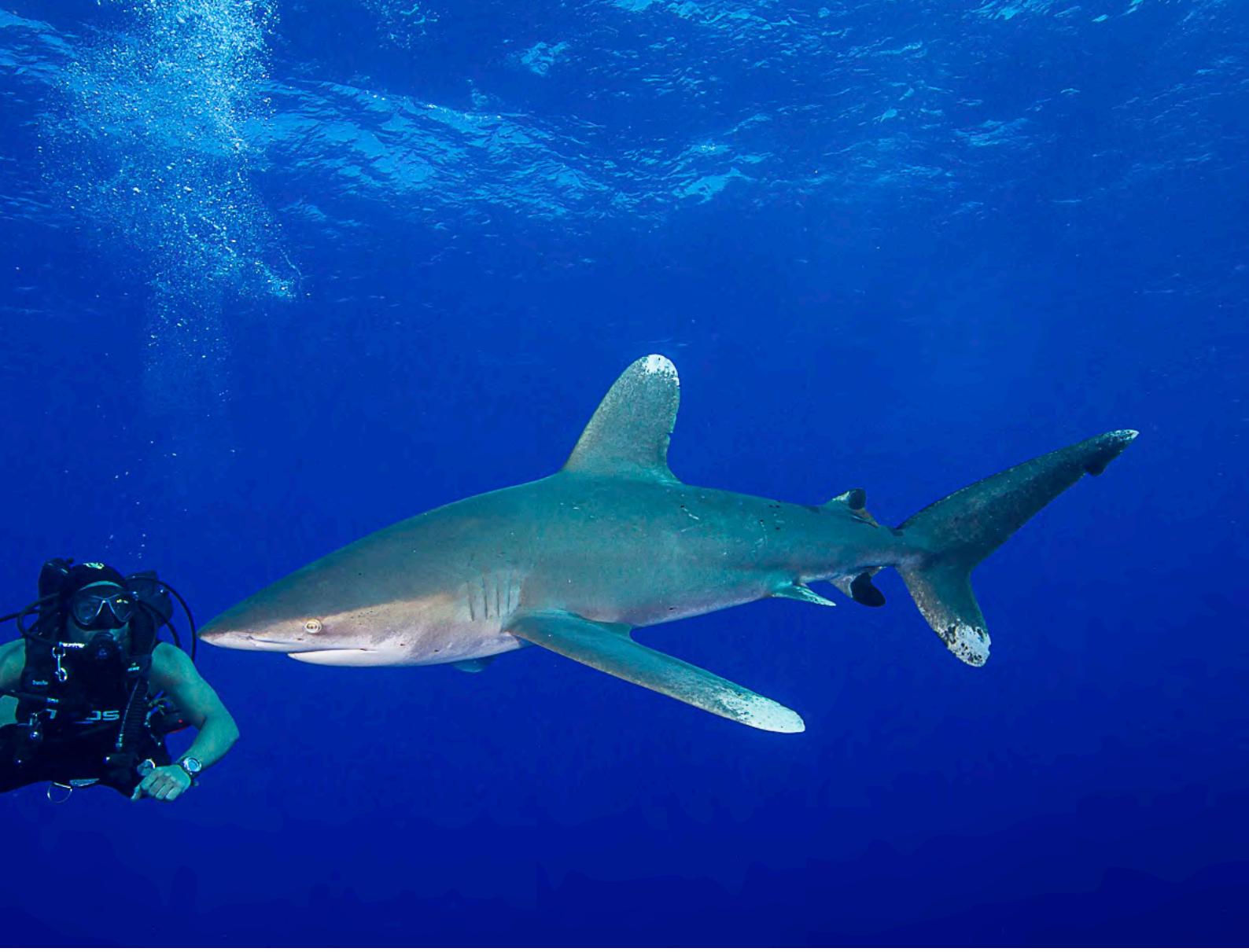
Of a length of more or less 400 metres by 30 metres wide, the reef levels off with the water's surface and its vertical walls descend to a depth of 200 metres. Located Northwest and Southeast, this reef is one of the few places in the world where the Oceanic Whitetip can be seen annually from September till December. In this place, you will have the chance to observe these sharks in their natural environment without any artificial lures. The Egyptian government prohibited means of enticing the sharks as this caused several accidents which in the past, led to several deaths. With their curious and inquisitive behaviour, these sharks rarely approach coasts and reefs. That is why Elphinstone is a unique place along with Brothers Island and Daedalus Reef in the Egyptian Red Sea where we can spend time near a reef in the company of the Oceanic Whitetip Sharks.

For a long time the Oceanic Whitetip was considered a dangerous shark to man and being misunderstood once again, took on the name, "The Shipwreck Shark". This shark lives within a harsh environment where food is hard to come by. These pelagics have very strange behaviours and don't naturally approach divers. They often stay on the verge of the visibility. Oceanic Whitetips have an inquisitive side to them. They will approach a diver in confrontation to see if the diver is an opponent, and in the evenings to see if the diver could be potential prey. When in the water, vigilance is essential. Even if the Oceanic Whitetips spend most of their time between the surface and 10 metres, they nevertheless regularly raid the water column up to more than 100 metres looking for food or to protect their territory. These sharks distinguish themselves from most of the other sharks by their large rounded dorsal and pectoral fins and their white extremities. These sharks can reach more or less 3 metres in length.

Having discussed my intentions to meet Oceanic Whitetips, Sarah advised me to make the two first dives of the day on Elphinstone to get the biggest chance of crossing them and getting as many photos as possible. The dive centre proposes a dive at 6am and 9am everyday on the reef. Tarek, one of the dive guides, gives us the first dives briefing. The dive profile instructs us to get into the water on the south side. They are more often found on this side of the reef and then go in and out of the big blue on the East. According to the current and if the sharks do not show up, it is possible to follow the reef for 20 minutes, return to the plateau on the South to get another chance to see them by being diverted into the blue.

Moorings were installed on the reef which the cruise ships must tie up to. Elphinstone is an inescapable dive destination when you do a Red Sea cruise. It is rare not to see at least one or two boats around the reef.

With a 5:30am wake up call, the day appears peaceful with a light breeze on the bay of Marsa Shagra Village. After a cup of coffee



and some biscuits, I headed to the dive centre to get my dive equipment ready and check the batteries in my flash and camera. On the boat, we are ten divers who all want to cross paths with the Oceanic Whitetips at the sun's first light. In only 15-20 minutes from the village, Elphinstone shyly appears by sight from the foamy waves breaking over the top of the reef. The current is light and moves southward. We do a backwards roll into the water after the Captain's signal, along the reef's East side and go down to the plateau on the South. The Red Sea has kept its promise; a deep blue colour, with breathtaking visibility, reaching out to more than 30 metres. We head straight over the reef and there, by looking into the blue at only 5 metres below the surface, my first Oceanic Whitetip swims straight towards us. This mysterious shark is now swimming around us. He's slow and so graceful. After circling the divers twice, without showing any signs of nervousness or aggressiveness, he disappears into the blue. An unforgettable moment of my first photos with an Oceanic Whitetip. We continued our dive in the direction of the plateau in the South, down to 20 metres. There is some activity as we cross paths with a school of trevally in search of food. Far off, we can make out boat hulls tied to the mooring. Suddenly, our guide points his finger in the direction of one of the boats. Another Oceanic Whitetip turns up. We slowly swim towards him to admire this shark's colours of blue grey swimming in circles below the boat. Repeatedly, the shark came no less than 50cm from my dome, then with one fast movement, it took a sharp bend and then continued swimming into the blue. Sharks and rays are indeed cartilaginous animals. It allows them to make this kind of movement, changing direction fast and within a small space.

This reef is a place where a lot of predators pass. In the open water or along the wall, it is common to cross paths with Dogtooth Tuna (*Gymnosarda unicolor*). This great predator possesses a jaw that remains slightly opened, where we can easily distinguish their sharp teeth which are used to kill their prey instantly.

Coming near the end of our dive, we follow our guide into the blue, his surface buoy in hand. Suddenly, a big barracuda joins us for a few minutes. This species of barracuda, recognizable by its large black dots on the end of its body, often swim over the plateau. Most of the time, the larger ones swim solo.

Our first dive ends and all the divers come out of the water filled with happiness. During the 4 days, we crossed paths with various sharks. Certain individuals recognizable thanks to distinctive marks such as bites by the gills, damaged dorsal fins or another individual who had his dorsal fin rolled up. We were also able to observe some juvenile male sharks. It shows that the Oceanic Whitetip population in the Red Sea is able to reproduce. I do hope to see this magnificent shark again.

In theory we don't know why the sharks come to the reef. They are too young sexually to reproduce because their sexual maturity is only reached when animals are 9-10 years of age and around 2.5-3 metres for females. Furthermore, there are no bite marks visible on the females. They do not come to feed because they can't specifically find pelagic fauna around the reef, so they may come there to be cleaned by other fish, or by opportunism linked to the waste effluent of the cruise ships. Before 2003, Oceanic Whitetips were not seen as there were too few boats.

I highly recommend this trip to all divers out there and take the opportunity to see the Oceanic Whitetip Sharks. I want to thank all the team of Marsa Shagra Village and the guides which accompanied me during my dives on Elphinstone.

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www.sharkeducation.com

INTERVIEW WITH FREEDIVING RECORD HOLDER ANDREA ZUCCARI

FEATURE **CLAUDIO DI MANAO**

The debuts, the records and his research with DAN: "Safety Must Come Before Performance".

Andrea is a record-holder and an innovator with a natural predisposition for freediving. One day he decided to change his life by moving to Sharm el Sheikh, Egypt, to work as a diving instructor. He then found himself among the greatest free diving champions of all time, and later invented a method called "Aware Equalisation."

Andrea, you seem like someone who grew up at the water's edge. Have you always had this love for the sea?
I was born and raised in Rome, Italy, and I spent every summer vacation with my parents at the beach until I was 17. We would go out each morning by dinghy, and not come back until the late afternoon. I spent literally everyday in the water and I found that it felt more natural to me to be underwater, than out of it. My parents told me how at only three years old, I would go underwater with a swim mask.

Then you started diving with SCUBA.
My instructor was "old school," and before teaching me how to SCUBA dive, he made me do two months of free diving in a pool. Maybe it was during that course that I found my love for the sport. A few years later, I decided to leave my regular job in Rome and move to Egypt as a full-time diving instructor.

And then a DAN Member.
Exactly. I signed up with DAN for professional diving insurance. Following that, I participated in several DAN Foundation initiatives. In 2014 I underwent some tests for research on predisposition to pulmonary edema (Study Awarded with International Awards, read the article on Alert Diver). Then I was invited by DAN researcher Danilo Cialoni to Y-40, the deepest pool in the world, where I was examined underwater for PFO in free diving.

Sooner or later we get to free diving.
At Sharm, a friend of mine challenged me to do an apnea dive and I accepted. We reached 30 metres depth. The next month, whenever I had a day off, I would go to Ras Umm Sid (a deep coral reef that's accessible by land) and already by the fourth day of practice, I reached 50 metres. That's when I realized it was time to take a course. I was descending to consistent depths, without any preconceived notions. Today I realize what a risk I was actually taking with those first dives!

Sharm el Sheikh is an important part of your life…and in your records?
I would say it played an essential role. At Sharm there was a branch of Apnea Academy Red Sea, the training organisation founded by Umberto Pelizzari. There I met Riccardo Mura, my instructor, who later became my coach. Living in Sharm, I was able to train whenever I wanted. Only 10 months after the start of the freediving course, I participated in the world championship and made it to 7th place with a dive at 51 metres depth in Constant Weight Without Fins.

Moments of fear?
I have always been very competitive and this is what allowed me to reach great depths at relatively fast times, but never without mishap. Freediving was for me, during that period, being able to reach the surface and say, "I'm alive? Yes. Alright, so now I can dive even deeper!" Often after a deep dive I would cough up blood (hymoptisis), spit blood, or even go unconscious. But fear? No, I never felt it.

Tell me about a wow moment.
When I first started freediving, I would download all the films and documentaries I could find on the subject, and many of them featured Umberto Pelizzari. Watching those videos, I dreamed about breaking one of his records, which actually happened in 2013. I had just recently opened the Freediving World Apnea Centre and in January of that year, I made a descent to -155m, establishing the new Italian record for No-Limits Apnea, and surpassing Umberto's 10 year long record. In No-Limits you descend with the aid of a weighted sled, and return to the surface using an inflatable lifting bag. This is the discipline that allows you to go deeper. It is called No-Limits because there are no limits to the weight on the sled, there is no limit in the speed at which one descends or surfaces, and there are no specifications for the design of the sled itself.

In July 2015, I made a new Italian record, diving to -175m and became the second place world record holder after Herbert Nitsch.

For diving and freediving instructors, diving safety is often regarded with pride; a point of honour. What does diving safety mean to Andrea Zuccari?
I admit that I've had a very fortunate start. Today, I view the sea and its depth with greater respect: I strive to be more aware, create protocols and work with long term training programs, and in doing so, many of my dysbaric issues have greatly diminished. This summer, while I was in training to beat the Italian record for Constant Weight (the current record is -104m), I reached -105m more than once, but I decided not to try and officially surpass the record. I was aware of having reached my limit and I did not want to try to beat the record at all costs. I decided to wait until the following year when I could do the dive and be certain of my results. Diving safety is fundamental to me, it is more important than the performance itself.

What is a typical day like in the life of a deep diving man, a record-holder?
If I'm preparing for a record, my day starts at 6am, I'm in the water by 7:15 for training, breakfast at 8:30 and then ready to work in the dive centre at 9am. Usually I keep "dry" in the morning and give theory lessons, then in the afternoon I go back out in the water with the students or with other athletes.

What has been your contribution to freediving?
When I started my first SCUBA course, I didn't even know what equalisation meant, it was just something I did by instinct. When I became an instructor, however, that was something I had to teach to others, so I started to learn about it, deepening my knowledge, and I later developed a method which I called Aware Equalisation. Today I teach equalisation for the Apnea Academy and I hold workshops on that topic all over Europe.

Your next step?
The world record in Variable Weight Apnea (you descend to the maximum depth with the aid of a weighted sled and surface using your own forces, by finning or pulling yourself up along the rope). The current record is -145m and my personal record in this discipline, which I established in 2013, is -135m.

But the real dream of Andrea Zuccari is the world record in No-Limits, right?
The current record is -214m and I promised myself to take on that record only if I'm followed by an equipped and well-trained medical team. To do a dive of that kind, it's necessary to have various medical specialists at hand: a cardiologist, neurologist, pulmonologist; and not only on the day of the record, but during the final months of preparation. The medical-scientific knowledge on the physiological response at such a depth is still scarce, so I would only feel secure in attempting a dive of that magnitude with an experienced organization. I would not put my life at risk to achieve it.

Your favourite diving spot?
Shark & Yolanda Reef in summertime. That is when I can be there very early as boats full of scuba divers start arriving at 9am, which can be dangerous for freediving. I've been diving in that spot for years and I'm still amazed at the colours of the coral, the 780m drop from the wall at Shark, and the enormous quantity of fish that gather there from May to September.

ANDREA ZUCCARI – THE STATS

- Zodiac sign: Scorpio
- Age: 41
- Born in Rome (Italy) to an Italian father and Swiss mother.
- Lives in Sharm el Sheikh, Egypt.
- Favourite diving spot: Shark Reef, Ras Mohammed, Red Sea.
- Instructor at Apnea Academy International since 2008.
- DAN Member since 2005.

RECORDS

- 2006 - 2011 10 National Swiss Records.
- 2011 World Record No-Limits in Tandem / -125m with German diver Anna Von Boetticher.
- 2013 World Record No-Limits in Tandem / -126m with Greek diver Stavros Kastrinakis.
- 2014 Italian Record No Limits, -175m.

ABOUT THE AUTHOR

DAN Member since 1997, Claudio Di Manao is a PADI and IANTD diving instructor. He's the author of a series of books and novels about diving, including Shamandura Generation, an exhilarating portrait of Sharm el Sheikh's diving community. He collaborates with magazines, newspapers and radio, talking and writing about diving safety, marine life and travels.

DAN | AlertDiver

BAROTRAUMA IN BONAIRE

FEATURE **LANA SORRELL, EMT, DMT**

THE DIVER

On a recent trip to Bonaire with his dive club, Rick (a pseudonym) was completing his fourth dive of the day, which was his 14th dive in a three-day series and his 145th lifetime dive. Certified approximately two years prior, Rick was 38 years old and in good health with no significant medical history except what he describes as "athlete's asthma" as a child.

THE INCIDENT

Prior to beginning his third dive of the day, Rick felt tightness in his chest. He discounted it as a result of eating leftover pizza for lunch and even mentioned that he needed to take an antacid. The chest discomfort resolved during the boat ride to the dive site, so he proceeded with the dive, descending to a maximum depth of 45 feet. He took lots of photos during the dive and occasionally inverted himself to see inside the reef. After he surfaced from the next dive, Rick boarded the boat and immediately noticed a change in his voice, a sore throat and crackles under the skin around his neck.

When Rick was completing the second dive of his wreck-diver certification a year before, he surfaced completely exhausted with a burning sensation in his throat. After he removed his gear, he noticed a change in his voice and what he describes as water under the skin around his neck. Others in his group discounted his symptoms as bad gas or water in the ears. That evening he took an over-the-counter pain reliever and Benadryl and went to bed early. All symptoms had resolved by the following morning, and he completed the last two dives of the certification without any problems.

THE DIAGNOSIS

A doctor at the local hospital on Bonaire performed a complete neurological assessment on Rick and diagnosed pulmonary barotrauma (pressure injury to the lungs) and subcutaneous emphysema (air under the skin). The chest X-ray was unremarkable. The treating physician noted no complications besides the subcutaneous emphysema in the neck, which did not affect the airway, so he administered high-flow oxygen and allowed Rick to return to his resort. A CT scan the following day revealed abundant mediastinal air around the heart and lungs and in the neck. It also showed at least two large blebs (cystic air pockets) in the apical regions of Rick's lungs. He returned to the hospital daily so doctors could monitor his progress.

Due to the risk of a pneumothorax during air travel, Rick was admitted to the hospital two days after the incident to breathe 100 percent oxygen for six hours. The doctor took these aggressive measures to speed Rick's

recovery and allow him to travel home with his group. A follow-up CT scan three days after the incident (and one day prior to his scheduled departure) showed the same blebs as before, but much less extra-alveolar air in the mediastinum. After consulting with pulmonary specialists both locally and in the US, the treating physician cleared Rick to fly home with his group.

DISCUSSION

Pulmonary barotrauma generally occurs at the end of a dive when trapped gas causes alveoli (air sacs in the lungs) to expand during ascent and ultimately rupture if normal exhalation is impaired by breath-holding or a lung problem. Gas from a ruptured lung can leak into one or more of four places:

1. The area around the heart (pneumomediastinum, also known as mediastinal emphysema).
2. The pleural space between the lungs and chest wall (pneumothorax).
3. The bloodstream (arterial gas embolism [AGE]).
4. Under the skin around the upper chest and neck (subcutaneous emphysema).

The risk of pulmonary barotrauma is greater in people who have blebs in their lungs. Blebs are abnormal balloon-like air sacs most often caused by inflammation, which destroys the thin walls that separate alveoli. Although these are common in smokers, they have also been found in nonsmokers. Blebs empty air slowly because of their thin, nonelastic wall. On exhalation during ascent, pressure can build, causing rupture.

People with blebs are also at risk for spontaneous pneumothorax (collapsed lung). People with a history of spontaneous pneumothorax are automatically disqualified from diving due to the high risk of pulmonary barotrauma. There is a consensus among dive physicians that, despite the appearance of normal lungs via testing or imaging, someone with a history of spontaneous pneumothorax should not dive under any circumstances.

Rick's pulmonary barotrauma manifested as pneumomediastinum. The principal symptom is a substernal ache or chest tightness. This is likely what Rick was feeling prior to his third dive. On occasion a diver may experience sharp pain in the shoulders, back or neck that may be aggravated by deep breathing, swallowing, movement of the neck or trunk, coughing or lying flat. Voice changes, such as the "Donald Duck" voice that results from breathing helium, are also common. The crackling sensation Rick described under the skin around his neck is known as subcutaneous crepitation (grating or rattling). The air trapped under the skin was caused when air escaped from the chest cavity and into the soft tissues of the neck.

Breath-holding, rapid ascent and certain lung diseases can cause pulmonary barotrauma, the risk of which is increased by lung diseases such as asthma (if not optimally medicated) because of the risk of bronchospasm and/or obstruction of air passages. Lung scarring or inflammation caused by sarcoidosis or interstitial fibrosis prevents proper gas exchange and increases the risk of pulmonary barotrauma. In addition, individuals who have previously experienced a spontaneous pneumothorax or pneumomediastinum are at an increased risk. Generally speaking, people with lung conditions that may increase the risk of pulmonary barotrauma are advised to avoid scuba diving. For those with underlying lung diseases, the risk of pulmonary barotrauma increases with rapid ascents, especially when conducted close to the surface, where the relative pressure changes are greatest.

Physicians trained in dive medicine recommend that anyone who has experienced pulmonary barotrauma be properly evaluated before returning to diving. Unfortunately, Rick didn't recognize his symptoms during training dives a year earlier as subcutaneous emphysema, so he continued diving without talking to a doctor. Fortunately for Rick, he recognized his symptoms after the second occurrence and was properly treated.

Rick has since returned to diving after two successful surgeries to correct the blebs.

DAN | AlertDiver

UPCOMING EVENTS

DIVE MIDDLE EAST EXHIBITION (DMEX)

28th February - 4th March 2017 | At the Dubai International Marine Club, Mina Seyahi

Anchored firmly at the centre of the UAE's diving community with 154,000 certified divers, DMEX celebrates its 10th anniversary being co-located with the Dubai International Boat Show.

www.boatshowdubai.com

DMEX
DIVE MIDDLE EAST EXHIBITION

DIGITAL ONLINE 2017

8th January - 23rd April 2017 | EDA's Underwater Photography and Film Competition

Digital Online 2017 opens for submissions on the 8th of January and closes @11:59pm (GST) on the 23rd of April. Category submissions must be emailed with correct labels to photo@emiratesdiving.com. The rules and guidelines can be found on page 83.

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

EDA'S NEW OFFICE LOCATION

We have moved! The new EDA offices are now located in Jumeirah 1, Al Hudaiba Awards Buildings, Block B, Second Floor, Office #214. We are open from 9:00-16:00. Come on over!

EDA
جمعية الإمارات للغوص
Emirates Diving Association

MISSION STATEMENT

To conserve, protect and restore the UAE marine resources by understanding and promoting the marine environment and promote environmental diving.

LEGISLATION

Emirates Diving Association (EDA) was established by a Federal Decree, No. (23) for the year 1995 article No. (21) on 23/02/1995 and chose Dubai as its base. The Decree stipulates the following responsibilities for EDA.

- To legislate and regulate all diving activities in the UAE.
- Ensure environmentally respectful diving practices in all EDA members.
- Promote and support the diving industry within the UAE by coordinating the efforts of the diving community.
- Promote diving safety in the commercial and recreational diving fields through standardization of practices.
- Promote and preserve historical aspects of diving within the gulf region and enhance environmental education to diving and non diving communities through EDA activities.

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DIVE MIDDLE EAST EXHIBITION

28 Feb - 4 Mar 2017

Dubai International Marine Club, Mina Seyahi

DIVE INTO A MARKET OF 154,000 UNDERWATER ENTHUSIASTS

Anchored firmly at the centre of the UAE's diving community with **154,000** certified divers., DMEX celebrates its 10th anniversary being co-located with the Dubai International Boat Show.

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