

BLUE & GREEN LAAMU

*The Marine Conservation & Sustainability
Newsletter by the Maldives Underwater Initiative*

NOVEMBER 2023

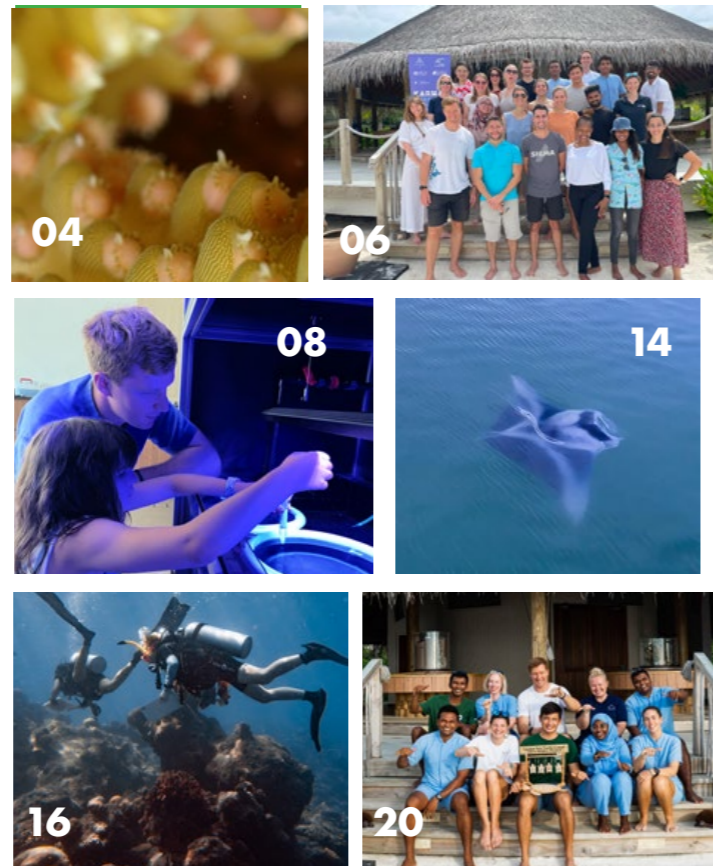


MALDIVES UNDERWATER INITIATIVE by Six Senses Laamu





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THE BIG STUFF

-  **616** sharks were sighted
-  **186** rays were sighted
-  **276** turtles were sighted
-  **309** Guests joined on megafauna surveys

OUR EDUCATION

-  **1519** moments of education were shared with guests
-  **174** moments of education were shared with hosts
-  **115** moments of education were shared with the community



SIX SENSES CONSERVATION

THE CALM BEFORE THE SPAWN

The MUI team has been very busy with their coral spawning research this month! After having collected data on coral spawning in Laamu for over two years, the team is now using that information for larval restoration. This means that when a spawning event is expected, it is all go for the preparations! This includes checking the colonies for eggs, tagging colonies with red eggs, making more spawn collection cones, preparing the larval rearing pools and pre-conditioning the tiles that the corals will settle on.


After all this preparation, the team was rewarded with a big single species spawning event! When divers noticed the coral's setting (preparing to spawn by holding the egg bundles in their mouth), they worked quickly to place the spawn collection cones over the top and waited for spawning. The team counted over 30 colonies setting!

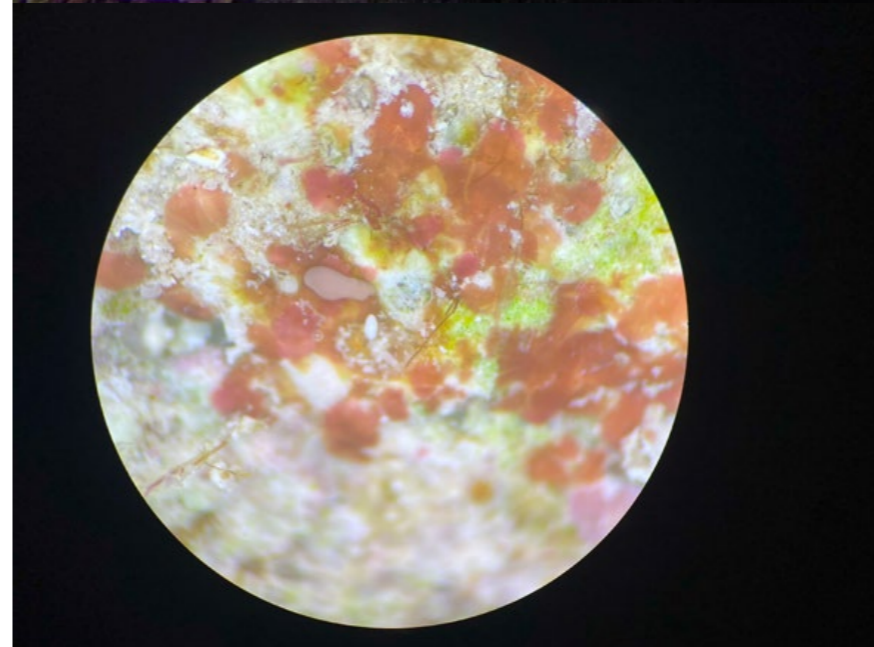
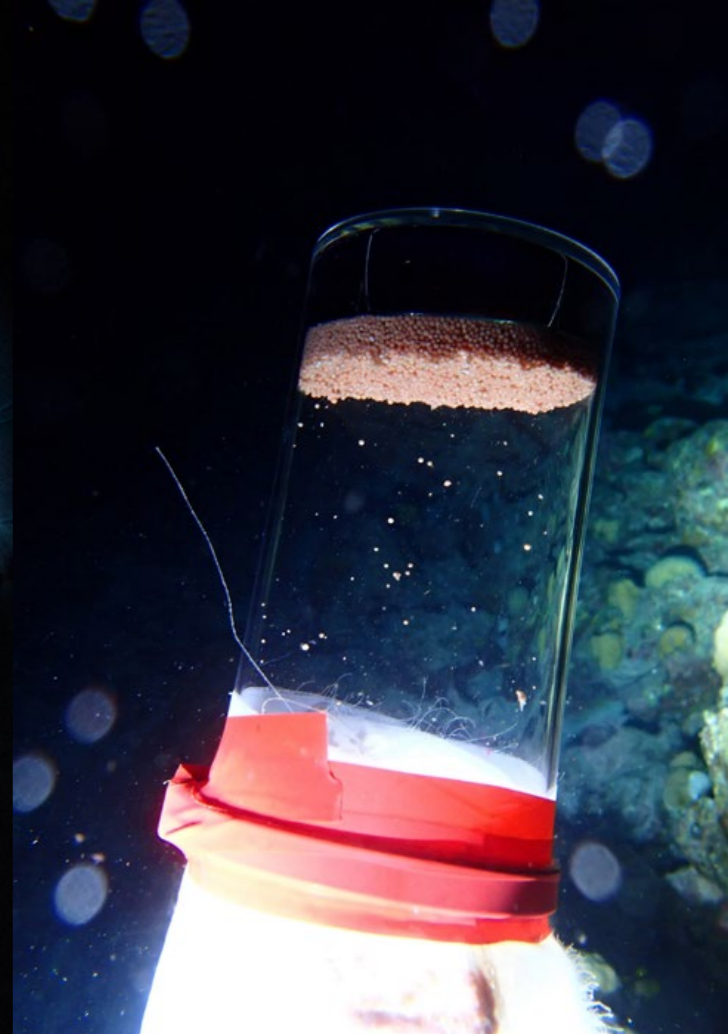


 **12** colonies' spawn collected

 **1,052,516** fertilized eggs (released into the water)

 **30 +** colonies spawning

 **1254** settlers growing in the lab



As the dramatic spawning event was coming to an end, all the spawn cones were brought to the surface and mixed together for ex-situ fertilization. The team watched excitedly as the embryos slowly developed before them, the embryos were then transferred into larval pools where they developed and then settled down on the pre-conditioned settlement tiles. We counted 1254 settlers in our tank in addition to ~ 1,052,516 fertilized eggs being cloud released into the water!

This process gives the vulnerable baby corals a headstart in life. In nature, huge numbers of the developing larvae are eaten by fish, or drift far away from reefs and are unable to find a suitable place to settle. By raising them in a safe environment we are giving them a better chance at survival and therefore supporting the natural recovery of the reefs around Laamu.

MUI IN SPACE!



KARMAN WEEK 2023 MALDIVES

in collaboration with  MALDIVES SPACE RESEARCH ORGANISATION




Since the dawn of time we have looked to the stars. Space has impacted our beliefs and cultures, allowed us to explore the world, and even helped us develop amazing technologies. Our marine life is also dependent on celestial bodies, often using it as a calendar to help coordinate spawning or migrations.

As pioneers of marine conservation and sustainability, the MUI team is always looking for new technologies and partners to expand and enhance our research, education and community engagement, and this time we looked to the stars. Six Senses Laamu was the hosting partner of Karman Week, the annual meeting for Karman Project's flagship Fellowship program. The Karman Project is an internationally recognized non-profit foundation that is focussed on building a cooperative future in space. Coordination of the event was made in collaboration with Maldives Space Research Organisation (MSRO), who is committed to helping the Maldives benefit from the use of space technologies.



 **15** space fellows visited

 **17** postcards sent to space

 **57** students engaged



The 15 Fellows range from experts who design spaceships and spacesuits, tell the stories of space, develop policy or medical research experiments and bring the science of space to Earth through experiential art exhibitions. The Karman Week group held multiple workshops and think-tank sessions, aimed at utilizing their own knowledge and connections, and leveraging space technologies to benefit the Maldives and sustainability. The MUI team provided an invaluable contribution by providing local Maldivian and ocean contexts.

Karman Week wasn't just here for the dolphins and sun. We visited the local school at Hithadhoo, doing a 2-hour session for the students in grade 7, 8 and 9. Students heard from the space experts, asked questions about how we survive in space, and then wrote a 'message to space' on a postcard that will eventually be sent into space and then returned to the students, as part of Blue Origin's 'Club for the Future'. Guests also had multiple opportunities to spend

time with the Karman Fellows, including presentations, a mocktail party and, best of all, stargazing!

Space and sustainability have a promising future. Each of the Karman Fellows have made a 'Karman Commitment' to either MUI or MSRO. We can't tell you what they are just yet, but we can say that you will be the first to find out in our future editions of Blue & Green.



NEW AND IMPROVED JMB SESSIONS

With many returning Junior Marine biologists on the island in November, the team jumped into action to create new and exciting sessions for these highly experienced students. The team was excited to run 3 completely new sessions for students in the month of November. The first of these sessions was a turtle identification session which involves the students learning, from our turtle biologists at the Olive Ridley Project, how to identify turtles using their facial scale patterns as well as learning what other information needs to be collected during a turtle encounter, following this learning, the students get to join a boat trip to go and find turtles to identify on our beautiful reefs of Laamu. This session wraps up with the students going through their photos and, using a condensed turtle database, they actually look up and identify the turtles sighted.

Another new exciting session developed was our Coral Spawning session, in this session students learn about our exciting and innovative research in larval restoration and once again get to hands on by actually visiting our coral tanks and either counting the eggs, larvae or growing coral we have in the tanks, depending on what stages are available at the time. These new sessions really gave the JMB students this month a great insight into the actual work of a marine biologist, and all that it involves. We hope these sessions have continued to inspire and excite these students with the possibility of one day maybe these students will be taking our place here in the MUI team!

 **8** new students to JMB

 **3** brand new JMB sessions

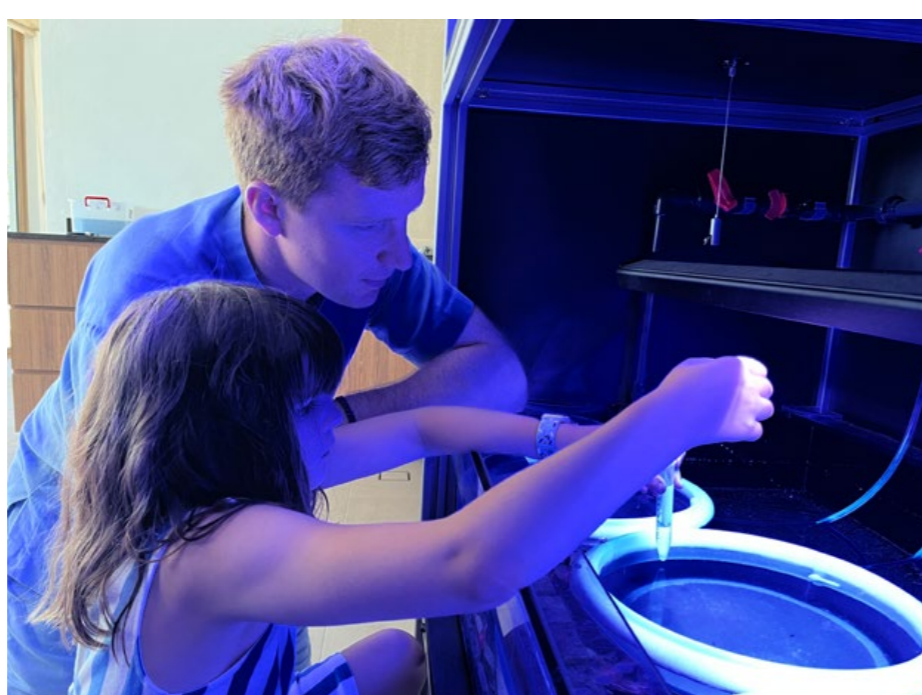


PHOTO QUADRAT SURVEYS HAVE BEGUN - PICTURE THAT!

To prepare for the upcoming bleaching event the team has started to complete photo quadrat surveys to catalog the benthic composition on the reefs around Laamu.

The effect of the global climatic event El Niño, which causes warming of global sea temperatures, is expected to reach the Maldives in early 2024. Due to this, there is a bleaching event predicted for around April-May 2024 throughout the Maldives.

In order to properly catalog this event, the team has started to collect data on the coral cover at multiple sites around Laamu. This way the health of reefs can be tracked over a long period of time and the impact of the bleaching event can be monitored. The surveys will be repeated during the bleaching event and then after the bleaching.

The results of these surveys may reveal which sites tend to be most at risk of bleaching and which sites are of priority for future restoration efforts.



 **840** photo quadrats taken

 **10/33** surveys completed

THE MANTA TRUST



 **16** Remote Underwater Video Systems deployed



2 new specialty divers certified



1 Manta sighted feeding in Isdhoo Harbour

THE NEW "EARS ON THE REEF" STUDY

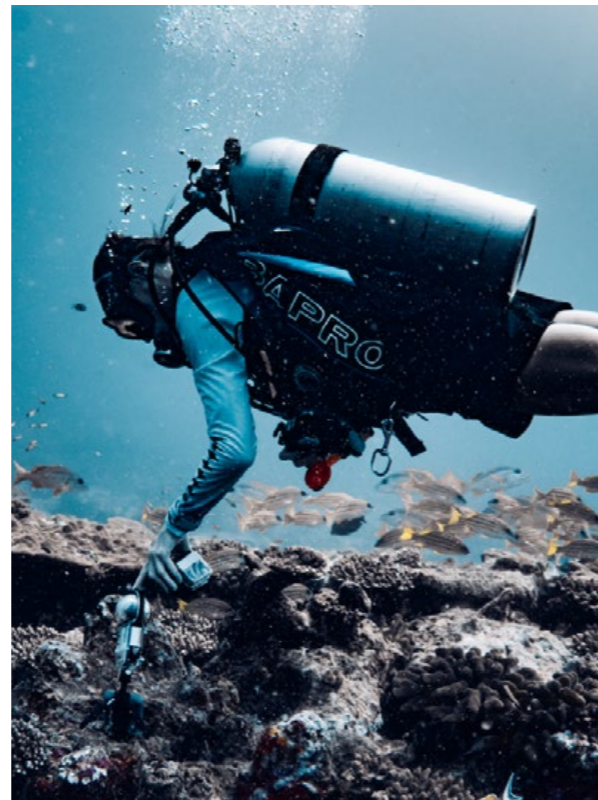
For some years now, the Manta Trust have collected thousands of hours of footage every year through Remote Underwater Photo systems which are cameras that are deployed on manta ray cleaning stations to record animal behavior and cleaning station activity when humans aren't there - hence the team calls this the "Eyes On The Reef" project.

Since March this year, the MUI team has been recording underwater acoustic measurements to better understand the coral reef soundscape and fish communications thanks to the collaboration with Bristol University in the U.K. This November, the Manta Trust officially started two new Master thesis projects under the supervision of Dr. Steve Simpson of Bristol University and kicked off the "Ears on the Reef" project. The purpose of this research project is to explore the acoustic soundscape of manta ray cleaning stations and aggregation sites in Laamu Atoll in the Maldives. The study aims to collect baseline data to establish a spatial sound map of cleaning stations around the Atoll, and investigate the relationship between the acoustic soundscape and manta ray presence, abundance, and behavior. Furthermore, this research seeks to examine the potential for manta rays to locate cleaning stations through sound cues and analyze the communication patterns of cleaner fish before and during client interactions. Additionally, the project aims to investigate the nocturnal acoustic soundscape and explore the feasibility of using infrared cameras for visualizing the relationship between the acoustic data and the animal activity on the cleaning station. Finally, the study will assess the possibility of identifying indicator species for the health of cleaning stations and investigate human sound pollution on manta ray cleaning stations and its potential impacts on fish communication. The Manta Trust is incredibly grateful for the collaboration with Bristol University and the whole MUI team, to drive this research further and can't wait to really start listening to what our oceans have to say.

 **6** acoustic listening devices deployed



2 new MSc projects started



MEET OUR REMOTE STUDENT MISCHA

Mischa Andon is a MScR Marine Biology student at the University of Bristol (UK), who alongside her research partner Sam Johns, will be working with the Manta Trust in Laamu Atoll in Spring 2024.

Mischa developed a keen interest in the impact of sound on marine species during her BSc in Biology, including conducting fieldwork examining how grey seal behavior is impacted by boat noise. With a passion for increasing public awareness about environmental issues, Mischa volunteers with the Bristol Zoological Society to engage the public with creating effective conservation strategies.

As part of the Manta Trust 'Ears of the Reef' project, Mischa aims to quantify temporal variation in the diversity of biotic sounds at manta cleaning stations, and assess levels of disturbance from boat and SCUBA noise. Mischa is already analyzing underwater sound recordings collected by the Manta Trust between May and October 2023 from cleaning stations located around Laamu. Sound provides crucial sensory information to cleaner fish and manta rays, so understanding acoustic indicators of ecosystem health and impacts of anthropogenic disturbance at cleaning stations will help improve conservation and management strategies.




 **1** student studying cleaning station soundscapes

MEET OUR REMOTE STUDENT SAM



Sam Johns is a MScR Marine Biology student at the University of Bristol (UK) who, with his research partner Mischa Andon, will work with the Manta Trust at Laamu Atoll in Spring 2024. Sam will be using cutting-edge acoustic recording technology to monitor the health of manta ray cleaning stations. Sam first discovered his passion for the marine environment through the University dive club, including SeaSearch dive surveys throughout the UK. These experiences fostered his love for the sea, but also developed his knowledge of conservation practices.

In 2023, Sam has been analysing recordings collected by the Manta Trust in Laamu Atoll during May–October 2023. He is exploring spatial variation in the soundscapes at a range of cleaning stations and other reefs, and is excited to join the 'Ears on the Reef' project in 2024. Industrial expansion and extractive activities threaten cleaning interactions between mantas and their cleaners at these important sites. Sam's project will focus on impacts of anthropogenic disturbance, including from SCUBA and boating activities. This work will inform best diving practices, as well as furthering our understanding of the local soundscapes and their applications for conservation.

 **1** student studying noise pollution on cleaning stations

A HUNGRY MANTA SIGHTED IN ISDHOO



Surface feeding is one of the various types of manta ray feeding techniques and it is rare to see a feeding manta ray in Laamu, however one juvenile reef manta ray surprised the Isdhoo community by surface feeding in the Isdhoo harbor!

This quirky young reef manta ray was spotted by the community feeding in Isdhoo harbor almost daily from 11th to 15th of November. The juvenile has not been able to be identified as a Laamu manta and the team is still trying to match up the individual with all other 5500+ reef manta rays in the Maldives. The manta was definitely not shy about making its presence known by barrel rolling and surface feeding in the community harbor for so long and even showing off by somersault feeding. From the reports of the Isdhoo community, our Community Outreach intern,

Ni was eager to make her way to Isdhoo and document this spectacle herself. With the information sent to the Laamu Manta Community Viber group, she was able to witness and record invaluable data of this sighting. Groups of children admired the little manta ray feeding so close to their homes, and Ni was able to teach them about manta ray biology while showing them manta ray behavior - what a great outdoor classroom.

The team would like to thank Sha from MRR and the community of Isdhoo for reaching out and submitting the sightings information. It's thanks to these submissions that we can learn more about manta ray presence in rarely surveyed areas so far North and the team is excited to learn whether this manta ray already has a name.

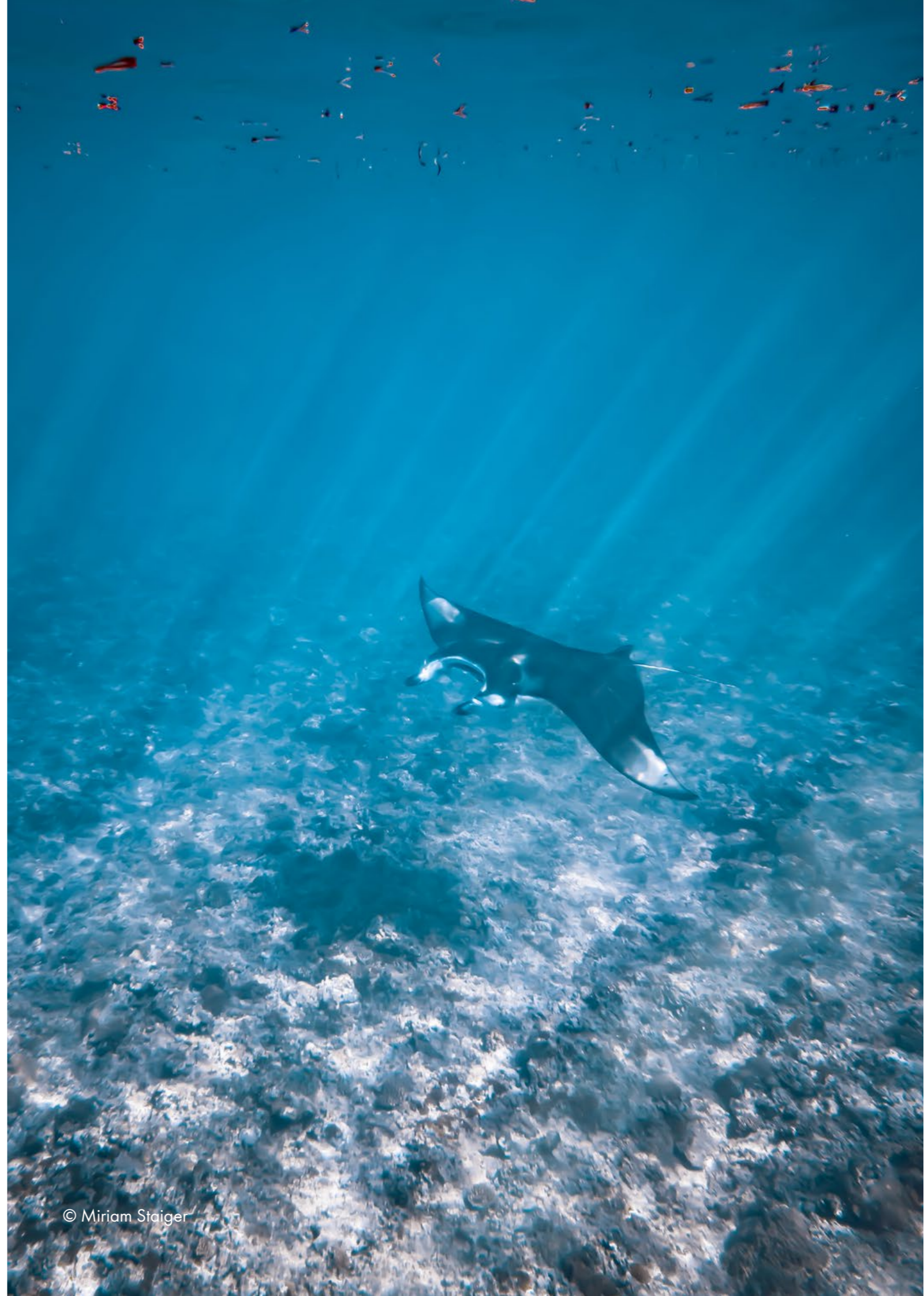
MANTA SPECIALTY COURSES

There are two newly certified manta specialty divers in Laamu! This month Laura and Carlos did the PADI Manta Ray Specialty Course, which is run by the Manta Trust and Deep Blue Divers. It involves a variety of topics, information and skill building which includes manta ray biology, manta ray behavior, threats to manta rays and the essential skill of manta ray identification!

The course dives into deep detail about manta rays and their ovoviviparous reproduction, gestation period, courtship behaviors and course of evolution. Apart from the biology the course also goes into depth about the upsetting realities of manta ray targeted fisheries, net entanglements and other key threats to Mobula species (Mobula is the family name of Manta rays and Devil rays!) around the world. Of course it's not all theory! The course highlights and teach the importance of following the code of conduct for interactions with Mobula rays as well as creating a memorable learning experience with two manta dives.



2 qualified speciality divers



ULTRASOUND EXPERTS



This month, the Manta Trust was incredibly excited to welcome back Marie-Aude Genain and Ray Rochester on island here at Six Senses Laamu. A couple of years ago, Ray Rochester, Dr. Mark Deakos and our General Manager Marteyne were the driving forces behind getting the world's first contactless underwater ultrasound scanner developed. The idea of scanning manta rays has been a project together with IMV Imaging, University of Cambridge, Manta Trust and Six Senses Laamu.

Earlier this year, the Manta Trust and the University of Cambridge published a paper on the "Use of underwater contactless ultrasonography to elucidate the internal anatomy and reproductive activity of manta and devil rays (family: Mobulidae)" led by Niv Froman and co-authors Marie-Aude Genain, Guy M. W. Stevens and Gareth P. Pearce. The Manta Trust proved the applications of underwater ultrasonography as a non-invasive method to study the reproductive organs without physical contact. The study showed that ultrasonography is a reliable method of determining sexual maturity and gestational status in free-swimming manta rays.

Much of the data was collected here in Laamu and the team is incredibly proud to be able to continue conducting this research on a long-term basis. Whenever the Manta Trust goes on research dives within Laamu Atoll, the ultrasound scanner comes with them underwater, in the hope of gaining more insights into the reproductive traits of our Laamu manta rays. Since the publication earlier in the year, the team has been able to conduct nearly 40 ultrasound scans and has successfully scanned pregnant manta rays.



For the first time, Ray, Marie-Aude and the Manta Trust team presented together on the history, the challenges and the success of this project, showcasing incredible findings and special insights of the published study and what research has been conducted since then. The team is incredibly grateful for all the support this project has received over the years. It is an incredibly exciting time for the Manta Trust team and we would like to thank everyone for attending this special evening talking all about mantas and ultrasounds!

In honor of Ray's support of the team over many years, the Manta Trust have adopted a reef manta ray and called it "Ultra-Ray". Thank you Ray, and Marie-Aude, for your continuous efforts and support. We are extremely grateful for all the work.



1 special presentation held



BLUE MARINE FOUNDATION



 **14** fishers sold fish

 **5** guest recreational fishing trips

 **389** fish landed

KICKING OFF THE ANNUAL REEF MONITORING SURVEYS



This month the team started the annual reef surveys scheduled for this year, focusing on three crucial survey sites within the boundary of the Hithadhoo Community Conservation Area. Four transect replicates are conducted at each survey depth, during which the team observes ecologically important fish species, invertebrates, benthic cover, and assesses various impacts and reef damages.

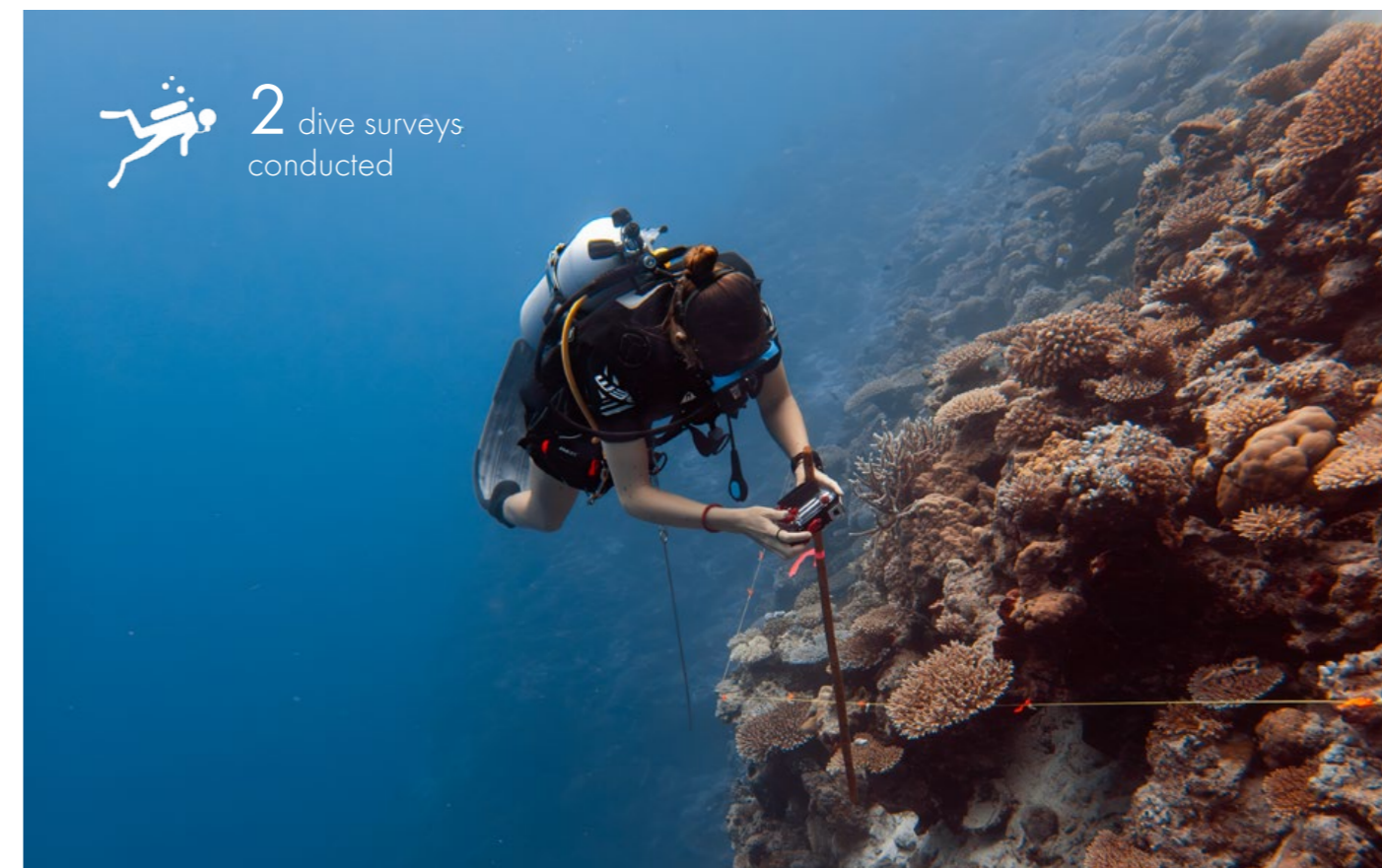
In the first pair, one team member conducts fish surveys, including parrotfishes, rabbitfishes, trevallies, jacks, angelfish, surgeonfish, while the other focuses on emperor, snapper, groupers, butterflyfish, and sweetlips species. This is performed every 20m along a 100-meter transect line, with observations made 5 meters on either side of the transect.

Prior to the surveys, the team underwent training in fish length estimation. The training involved an exercise using 20 wooden sticks of different measurements, requiring them to guess the length of each stick. Surveyors must confidently determine the length with an accuracy rate of 95% or above, as water can distort the perception of fish sizes, making them appear larger and closer than they actually are. This proficiency is crucial for conducting accurate fish surveys. These training exercises ensure that the team is well-prepared to gather reliable data during the surveys. Each member's ability to accurately estimate fish lengths contributes to the overall precision and reliability of the collected data.



The second buddy pair surveys invertebrate species such as sea cucumbers, Giant Clams above 15cm, Crown-of-Thorns (COTs), cushion starfish, lobsters, octopus, spider conch, and sea urchins, covering 2.5m on either side of the transect tape checking every nook and cranny. Following the invertebrate survey, the team collects water samples from both ends of the transect and captures photo-quadrats across the entire transect. Furthermore, any megafauna sighted, along with metadata and water quality measurements, are documented. This year, the team has expanded the list of surveyed species to align with the National Coral Reef Monitoring Framework (NCRMF) of the Maldives Marine Research Institute.

With the designation imminent, obtaining baseline information for the reef area is crucial to monitor the effectiveness of the area's protection. Long-term monitoring of Laamu is planned annually for 14 sites, with all 29 sites scheduled to be surveyed every three years.



LAAMASEELU MASVERIYAA ROLLOUT PREPARATION



In preparation for the rollout of the Laamaseelu Masveriyaa programme (LSMV), Maldives Resilient Reefs' Project Officer Aiham spent a few days at Six Senses Laamu, where the programme to supply resorts sustainably caught reef fish began in 2020.

The purpose of the visit was to meet with relevant resort staff who are involved in the programme to get their feedback on how it's working and to see how the programme works 'on the ground'. From meeting fishers with their catch to the kitchen team, who checks for juvenile (undersize) fish and the finance team, who prepare the fishers' payment. Aiham had productive and positive conversations with everyone, including the fishers and will take this invaluable information with him when implementing the programme at three additional resorts in three different atolls. The team is so excited to expand the LSMV programme, which provides sustainably caught fish to tourist establishments and at the same time aims to improve the livelihoods of fishers and manage reef fish populations.



 5 Meetings held



THE OLIVE RIDLEY PROJECT



13 new turtles identified



175 submissions by MUI and DBD



99 hatchlings emerged



1016 turtles in Laamu

AND THAT'S A WRAP!



Remember that nest that was relocated last month? Well it hatched!

On the night of November 12th, we had the last nest on island hatch with 72 hatchlings emerging and starting their journey from the beaches of Six Senses Laamu. This was the final nest of 13 nests laid this year, marking the end of all turtle hatching events for 2023! The commitment, time and effort of the 30 Nest Watch volunteers that were monitoring this nest made it possible for over 50 guests and staff to witness this beautiful spectacle of nature. The ORP and MUI team were present to educate guests about sea turtle biology, their nesting ecology, and the broader threats they face and what ORP is doing to tackle them.

The excavation conducted two days later revealed a hatching success rate of 73%, as well as five more live hatchlings trapped at the bottom! This was a huge relief for the team as this nest had to be relocated just weeks before

due to the threat of beach erosion from high spring tides. While nest relocations within the first 12 hours after laying are relatively safe, relocations anytime after can be incredibly risky as the movement of the eggs may disrupt development.

In the Maldives, beach erosion is a common occurrence from the natural movement of sand around the islands, but it can have an adverse impact on local nesting populations. Emergency relocations such as these may become a more common occurrence in the future with the increasing threat of climate-associated sea level rise and storm surges. It is therefore crucial to demonstrate that they can be conducted successfully with proper training, so that authorities such as the Environmental Protection Agency (EPA) can support future capacity building to better manage situations such as this.

With this final nest, the team were able to end the 2023 nesting season on a positive note, and watching the 5 live hatchlings make their way into the ocean as the sun was setting was truly the cherry on top!

LAAMU HITS A MILLENNARY MILESTONE!



The Olive Ridley Project (ORP) team in Laamu has achieved a remarkable milestone by successfully identifying and documenting over 1000 unique green and hawksbill sea turtles in the atoll! ORP have been collecting photo ID data since they joined the Maldives Underwater Initiative (MUI) in 2018 to reveal more information about Laamu's turtle populations.

To celebrate, the team organized a special Management Cocktail event at Sip Sip beach, which included turtle themed canapes and drinks, fun games and activities at our turtle stall, and an exciting lucky draw for guests to get the chance to name the 1000th turtle! The turtle in question was a juvenile hawksbill that was sighted merely weeks before in the reefs around the resort, and has since been named 'Nora' by the lucky winner.

Reaching 1000 turtles does not only mark a monumental achievement for the team, but also represents a significant step towards improving our understanding of local sea turtle populations, including their behaviors, habitats and migration patterns. Not only that, but it also maintains Laamu's position as the third largest database of wild turtles in the Maldives. This accomplishment would not have been possible without the collaborative efforts of the MUI team, the dive team at Deep Blue Divers, Reveries Diving Village in L. Gan, and other committed Six Senses guests and staff, and ultimately underscores the importance of collaborative effort in conservation.



While the number of identified turtles in Laamu is increasing, it does not necessarily mean the same for the population. Rather, photo ID reveals the distribution and movements of the atoll's resident turtles. Reaching a thousand turtles is in part the result of new recruits entering the population, but mostly due to increased survey efforts by the team to less explored sites. There are still large areas of

reef in the northern half of the atoll that remain unexplored, and thus, an accurate assessment of population trends cannot be made yet. The team will continue exploring new sites and maintaining survey efforts at existing ones to build on current research findings and eventually identify changes in the population.



1000
identified turtles

TURTLE IN THE SPOTLIGHT

Say Hello to Dottie! (GR1565)

Dottie is one of the juvenile green turtles that we frequently see at Hithadhoo Corner - a known hotspot for green turtles and manta rays in Laamu Atoll. Dottie was only first sighted in January this year, but even though they are a relatively new turtle to our reef, they have already been sighted 40 times!

Dottie is one of the cheekiest juveniles at Hithadhoo Corner, and as you can

see from the photo, they aren't afraid of getting up close and personal with divers and other greens of a much larger size! This turtle was actually adopted and named after one of our previous dive instructors from Deep Blue Divers, whose energetic and flamboyant personality will live on in Laamu through this turtle, and continue to enrich the experience of all divers that pass through Six Senses Laamu.

While sea turtles generally show high site fidelity to their resting and

foraging sites, they might migrate to different locations between life stages. For instance, the Maldives is a suspected developmental habitat for hawksbill turtles as the majority of identified individuals are juveniles. They may move to different reefs within or outside of the country when they reach adulthood. For now, we hope to continue seeing Dottie in Laamu for many years to come.

 **41** sightings



OUR HOME



16 guests experienced our local islands



42,053 kWh renewable energy



5,885 Kg metal recycled with SecureBag



346 eggs produced

MANGROVE ADVENTURE

Mangrove kayaking is our newest adventurous activity. With beautiful scenery and an abundance of wildlife, this activity has touched the hearts of everyone that has experienced it.

Mangroves are an important marine habitat with multiple benefits to our marine ecosystem. They protect the coastline from erosion, act as a vital habitat for marine life and serve as nurseries for different species of fish. Mangroves also act as a highly-effective carbon storage system, helping to mitigate climate change. Additionally, they offer resources

for local communities and support biodiversity, making their conservation crucial for environmental health and sustainability.

This particular mangrove forest is one of the six Marine Protected Areas (MPAs) within the Laamu atoll. It is the first community-led activity in an MPA. This demonstrates the strong sense of ownership from the community, and helps ensure that conservation measures will be supported by the local community. Community-led initiatives like this are the future of local tourism in Maldives, as they offer alternative livelihoods to extractive

activities that are harmful to the marine environment.

Additionally, mangrove kayaking raises awareness about the importance of mangrove ecosystems, furthering environmental education and conservation efforts within the community. This mangrove forest kayaking experience helps reconnect people with nature, contributes to the local economy and encourages stewardship of the natural environment among community members.



22 guests participated



WE COULD NOT HAVE DONE IT WITHOUT YOU!

We are tremendously grateful to the multitude of donors who so generously donated funds to the MUI team's research projects; we are indebted to you all.

A special shout-out to our friends who donated \$10,000 USD and more:

Jeffrey
Andy and Amy
Erin and Don
Take Two London
Sabine and Guy

We look forward to sharing with you the achievements that you made possible.

To learn more about marine conservation and sustainability initiatives at Six Senses Laamu please contact:

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To stay up to date with the latest news, events and visiting experts follow the Maldives Underwater Initiative and Six Senses Laamu on social media.

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