Research Project SCI321

Assessment of Oceanic Manta Ray (*Mobula birostris)* and Whale Shark (*Rhincodon typus)* sightings in Fuvahmulah using Local Ecological Knowledge (LEK)

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Section 1: Abstract

Marine megafauna are considered culturally, economically and ecologically significant in the Maldives. They generate substantial monetary benefits through tourism, and are extremely popular with local communities due to their charismatic nature and sheer size. Studies on megafauna species in areas where significant hotspots coincide with remote locations are still limited throughout the world, including the Maldives. One such example is the unique and globally significant population of oceanic manta rays and whale sharks in Fuvahmulah atoll. Dedicated research attention has only been given to this site over the last few years. However, citizen science data, dive log book records and anecdotal reports from fishers have reported the presence of both species in Fuvahmulah waters throughout the years. This study aims to collate data on both species with the use of fishers and scuba divers' Local Ecological Knowledge (LEK) by using semi-structured interviews to fill the gaps in knowledge. A total of 25 participants were interviewed, and the data gathered was analysed using a mixed method approach. The four main themes identified include (1) Experience levels and background information, (2) LEK on focus species, (3) Threats and (4) Perception and awareness of research and conservation efforts. Results suggest that both fishers and divers have a wealth of knowledge that can be used to understand both species better. They also indicated the sightings of oceanic manta rays and whale sharks have decreased throughout the years, both in terms of sighting frequency and numbers of individuals seen at a time, in contrast, the locations and time of species sightings remain similar. The study also identifies the need, as well as opportunity, for research and conservation efforts to be more inclusive of the local communities in their research communications, as participants were seen to be keen, supportive, and willing to learn about the research. Having the support of these experienced fishers and divers could be key to bringing improvements in future efforts informing conservation and management strategies.

Section 2: Acknowledgments

This work was carried out in part during an internship offered by the Manta Trust. The internship which took place as a joint expedition with the Maldives Whale Shark Research programme provided a fantastic learning experience. I would like to thank Simon Hilbourne, Kaitlyn Zerr and Tam Sawers from the Manta Trust team for hosting me and for trusting me to lead the important work of gathering local ecological knowledge from Fuvahmulah, and for their generous advice, and support offered throughout the internship and after. Similarly, to Clara Canovas from the Maldives Whale Shark Programme for always being at hand for any last minute data needs or for words of encouragement and wisdom. I would also like to acknowledge Aahil, Sanid and Amaany from Fuvahmulah for assisting with finding survey participants and for driving with me to locate participants' homes when they were harder to reach. Most importantly, I would like to thank the participants of the study who took the time to provide the information, without which this study would not be possible. Finally my utmost appreciation and sincere thanks to my supervisor Nashath for her advice, guidance, helpful discussions, words of encouragement as well as patience throughout the entire process.

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Section 3: Introduction

The Maldives is regarded as a hotspot for marine megafauna, attracting many tourists from all over the world and generating substantial income from tourism activities, mainly through diving and snorkelling. A total of 16 species of rays and 40 species of sharks have been recorded from the Maldives (Maldives Environment and Energy [MEE], 2015). Scuba divers and snorkelers commonly encounter 15 species of sharks (Kuiter, 2014). This includes globally significant populations of manta rays and whale sharks (MEE, 2015).

The same megafauna are also some of the most threatened species, with low fecundity, late maturation and large size, they are prone to a multitude of natural and anthropogenic threats. The world's largest batoid ray, capable of reaching a disk length of 7m, the oceanic manta ray (*Mobula birostris),* as well as the world's largest fish, the whale shark (*Rhincodon typus)* - with a maximum size of 18.8 m (McClain et al., 2015) - are no exception. Threats from direct fishing pressure, bycatch in commercial fisheries, unsustainable tourism and vessel strikes have landed both animals in the IUCN Red List of threatened species (Pierce & Norman, 2016; Marshall et al., 2020).

Local research attention has been high for both whale sharks and manta rays in the Maldives, however, these efforts have primarily focused in the central atolls for whale sharks as well as manta rays (Cagua et al., 2014; Perry et al., 2018; Allen et al., 2021; Armstrong et al., 2021). In the case of manta rays, it was only recently discovered that oceanic mantas were a new species, different to the more commonly encountered reef manta ray (*Mobula alfredi).* Hence several knowledge gaps remain for these elusive giants. Inevitably, most prior research in the Maldives have also been conducted on the more frequently sighted and coastal reef manta rays (Strike et al., 2022).

While oceanic manta rays have been recorded by the Manta Trust throughout the Maldives, these sightings have been few and far in between, except in the atoll of Fuvahmulah (MMRP, 2019). Citizen science data, anecdotal reports from fishers and divers were also plentiful on sighting records for both oceanic manta rays and whale sharks . For whale sharks, this area seemed to indicate a strongly female sex bias as well as larger individual sizes compared to the central areas of Maldives (Maldives Whale Shark Research Programme [MWSRP], 2022). As such, researchers from the Manta Trust and the Maldives Whale Shark Research Programme recently started having joint yearly expeditions for field

data collection in Fuvahmulah. However, there is a significant data gap in the historical status of both species from this region of the archipelago. This expands to species occurrence, habitat use, abundance, threats etc.

Local Ecological Knowledge (LEK) is gaining popularity as a method to fill in data gaps in areas where scientific data has been limited, and similar efforts have also been carried out in the Maldives (Sawers, 2014,). This research aims to collate data on both oceanic manta rays and whale sharks by tapping into the LEK of people that have spent large parts of their life at sea; those of seasoned fishers and scuba divers from Fuvahmulah. Through the use of semi-structured interviews, the study aims to understand the sighting patterns of both species, including the timing and location and compare historical and current sighting frequency with in-field surveys. Additionally, the study aims to delve into the threats the species are facing. Lastly, to understand the level of awareness and perception of research and conservation efforts. For the effective conservation and management of species, researchers and resource managers can benefit from this data to inform future policy and management decisions.

Section 4: Literature Review

Background on Manta rays (*Mobula sp)*

Two species of the large batoid, filter feeding manta rays; reef manta ray (*Mobula alfredi)* and oceanic manta ray (*Mobula birostris)* are known to occur within the Maldives, with both species supporting globally significant populations (Stevens, 2016). The Maldivian Manta Ray Project [MMRP] was established as a founding project by the Manta Trust, who later went on to establish several projects all over the world, at different manta aggregation hotspots. Since 2007, the MMRP has been continuously studying both populations of manta rays in the Maldives (MMRP, 2019)

Manta ray tourism is popular in the Maldives and has been reported to bring US$ 8.1 million in direct revenue to the country (Anderson et al., 2011b). Anecdotal reports show that many years later, this trend continues to increase with the expansion of tourism throughout the archipelago. Despite the popularity, several gaps exist in the understanding of behavioural ecology of both species of manta rays. While both species inhabit tropical and subtropical

waters, oceanic manta rays exhibit circumglobal distribution, whereas reef manta rays exhibit semi-circumglobal distribution (Nicholson-Jack et al., 2021)

The reef manta rays are large in size, slow to mature and have extremely low fecundity (one of the least in any vertebrate) and exhibit migratory and aggregatory behaviour, making them extremely vulnerable to anthropogenic threats (Stevens, 2016; Nicholson-Jack et al., 2021).

For oceanic manta rays, even though they are the largest of all ray species, ecological data, behavioural data and natural history is limited, in part due to their offshore distribution and oceanic nature (Stewart et al., 2016; Armstrong et al, 2020; Andrzejaczek et al., 2021), and as such, similar life histories are assumed for both species under a precautionary principle (Stevens, 2016). Globally, both species are under threat both from targeted fisheries, driven by the trade of gill plates in Asian markets, as well as from accidental bycatch. Fernando & Stewart (2021) report that the total annual capture from 'small-scale' artisanal fisheries in Sri Lanka exceeds the estimated annual captures of mobulids in all global fisheries combined, being fished at a rate much higher than their population growth rate. Furthermore, data from this study shows that the average catch size of mobulid rays is also decreasing. Both species have been listed in Appendix ll of CITES in 2013 (Lawson et al., 2017). Oceanic mantas are listed as endangered on the IUCN Red List (Marshall et al., 2020) and reef mantas are listed as vulnerable on the IUCN Red List (Marshall et al., 2018).

Furthermore, unregulated tourism as well as habitat degradation, pollution and climate change (which affects their food source and habitat) can threaten both species (MMRP, 2019).

Individuals of both species can be identified with the characteristic pattern of dark markings on their ventral side, which act as a unique fingerprint (Kitchen-Wheeler, 2010).

In the Maldives manta rays are sighted in a number of different reefs, some of which have been established as Marine Protected Areas [MPA]. However, only one of these MPA's, namely Hanifaru Bay within the Baa Atoll Biosphere Reserve, has a management plan and rangers established to monitor enforcement in the area (MEE, 2015).

Reef Manta rays (*Mobula alfredi)*

Reef manta rays are known to frequent shallow coral reef habitats, as sites for thermoregulation and predator avoidance (Stevens, 2016). Their visitations to cleaning stations have been suggested as a site for social behaviour such as courtship and mating (Stevens, 2016). Juveniles of this species are known to use shallow lagoons as nursery habitats (Stevens, 2016). The Maldives is recorded to have the largest reef manta ray aggregation site in the world, at Hanifaru Bay, located in the Baa Atoll Biosphere Reserve (Armstrong et al., 2021). Here they are known to forage on tidally driven plankton patches and exploit the seasonal productivity (Armstrong et al., 2021) Reef mantas occur throughout the Maldives, where they are known to migrate biannually; from East to West during North East monsoon season, and West to East during South West monsoon season (Anderson et al., 2011a). The site use as well as behaviour of reef mantas are heavily influenced by these biannual seasonal migration patterns (Nicholson-Jack et al., 2021). As the mantas forage on zooplankton, which are reliant on phytoplankton, manta rays are thought to be infrequent at extreme windward side of the Maldive, which would have lower foraging efficiency (Anderson et al., 2011a; MEE, 2015).

Focus Species

Oceanic Manta rays (Mobula birostris)

Oceanic manta rays are the largest of all ray species, and are known to occupy pelagic offshore habitats. Due to their offshore nature, most of the ecological studies on manta rays have focused on the coastal reef manta rays while oceanic mantas remain less studied (Stewart et al., 2016)

Results from archival satellite tagging studies by Stewart et al., (2016) showed that oceanic manta rays exhibit seasonal shifts in diving behaviour, most likely in association with prey (zooplankton) availability, and also had seasonal distribution shifts in order to accommodate the upper limits of thermocline where zooplankton are known to aggregate (Stewart et al., 2016). Another study also reported oceanic manta rays exhibiting reverse diel vertical migration, likely motivated by combined foraging and thermal recovery strategy

where oceanic manta rays dove to feast on vertically migrating zooplankton at night, but remained closer to surface waters to rewarm body temperature between dives (Andrzejaczek et al., 2021). The sighting records from Australian coastal waters also show similar patterns where coastal sightings of oceanic manta rays are rare, and prefer offshore waters (Armstrong et al., 2020)

In the Maldivian archipelago, unlike the reef manta rays, oceanic manta rays are only regularly sighted seasonally, in the Southernmost atolls of Addu and Fuvahmulah (Stevens, 2016; MMRP, 2019) These Southern sites lie within close proximity to deep offshore habitats, similar to range where oceanic manta rays are found throughout the world (Nicholson-Jack et al., 2021).

The MMRP, through structured surveys and citizen science data, had recorded 768 individual oceanic manta ray's throughout the Maldives by the year 2019 (MMRP, 2019). However, the vast majority of this came from Southern most atolls of Fuvahmulah and Addu (MMRP, 2019). Through dive log books maintained by dive schools from Fuvahmulah, it was clear that, although year round 'search effort' was only available in the form of logged scuba dives, manta sightings were rarely ever recorded outside of March and April, suggesting seasonality patterns. The data submitted by citizen scientists for the years 2010, 2015 and 2018 also coincided with this pattern (MMRP 2019). As such, dedicated field visitation to study the oceanic manta ray population during the oceanic manta season of March - April was started in the year 2019. The results from 2019 showed that only 7% of the individuals were re-sighted, suggesting a highly transient population with minimal residency at Fuvahmulah or Addu (MMRP, 2019). At present, it is unknown where oceanic manta populations in the Maldives originate from or travel to. As such, the MMRP team is working to answer these questions.

While rays are protected in the Maldives, elsewhere in the world, it is not the case. 300 km North of the Maldives, Sri Lanka hosts the biggest manta and devil ray fishery in the world, fishing extensively through the Indian Ocean. Therefore, the close distance between the Maldives and Sri Lanka and the fishing tendencies of Indian and Sri Lankan fleets can raise concerns, especially with the current limited knowledge of movement patterns (MMRP, 2019). Oceanic manta rays in particular have been caught frequently; as bycatch in pelagic fisheries as well as in the targeted fishery for their gill plates (Couturier et al., 2012).

Whale Shark (Rhincodon typus)

Whale sharks were first scientifically described in 1828 from the coast of South Africa (Smith, 1828). They are the largest species of all extant fish, recorded to reach a size of 18.8 m (McClain et al., 2015). Regardless of their large size, they are filter feeders, feeding mostly on planktonic organisms, as well as on coral and fish larvae and small fish (Rowat & Brooks, 2012). They are one of the only three large filter feeding sharks, alongside basking sharks *(Cetorhinus maximus)* and megamouth sharks *(Megachasma pelagios)* (Rowat & Brooks, 2012). Whale sharks are circumglobal, and distributed between the tropic of cancer and tropic of capricorn (Compagno, 2001). They are epipelagic species and can be found both in coastal and oceanic waters (Rowa & Brooks, 2012). To a large extent, most coastal aggregations around the world consist of juvenile individuals, while the larger mature individuals are found in more oceanic regions (Ramírez-Macías et al., 2017). Throughout the world, whale shark hotspots exist in: Philippines, Ningaloo in Western Australia, Mozambique, Seychelles, the Maldives, Djibouti,, Belize, Holbox Mexico, Northern and Southern Gulf of California, Northern Gulf of Mexico and Galapagos etc. However, studies have shown that most of these places only have seasonal presence. The Maldives, Honduras and Mozambique are reported to have year round presence of whale sharks (Perry et al., 2018; Sarah Wormald, 2022). Whale sharks lead solitary lives but are known to aggregate for feeding purposes in places like Mexico (Coppint et al., 2018).

Due to their large size, very few predators prey on mature sharks, however, during their juvenile years, whale sharks can be predated upon by large predators such as orca and marlin, as well as by predatory sharks such as tiger sharks (Speed et al., 2008). Orca's are the only predator known to hunt fully grown whale sharks (Fitzpatrick et al., 2006) . While natural predation is not a particularly huge threat for these sharks, they face a host of anthropogenic threats. Bycatch - largely due to tuna purse seine fisheries, directed shark fishing (for meat, skin, fins and liver oil), irresponsible tourism practices and entanglement in fishing gear as well as collisions with large ships and small boats are all common threats for whale sharks (Rowat & Brooks, 2012; Ponzo et al., 2013; Womersley et al., 2022). Much of these threats are also heightened due to its mobile nature. More recently, threats such as microplastic pollution have also been identified, raising concerns due to the sharks filter feeding nature (MWSRP, n.d).

The culmination of all these threats have now led to the whale shark being categorised as endangered on the IUCN Red List (Pierce & Norman, 2016). The global whale shark

population is made up of two sub-populations; the Indo-Pacific and the Atlantic which respectively make up 75% and 25% of the global population. Over the last 3 decades, the Indo-Pacific population decreased by 63%, changing its status from Vulnerable to Endangered, and the Atlantic population decreased by 25%, making this population Vulnerable. As the overall population decline was inferred to be over 50%, due to the Indo-Pacific population making up the majority, the status of the global population was uplisted to Endangered in the year 2016 (Pierce & Norman, 2016). Whale sharks are listed on Appendix ll of the Convention on International Trade in Endangered Species of Wild Fauna and Flora [CITES] which restricts trade in body parts and regulates the export and import of body parts through a permit system (CITES, 2021). They are also listed in Appendix ll of the Convention on the Conservation of Migratory Species (CMS) (Convention on the Conservation of Migratory Species of Wild Animals, n.d)

Historically, whale sharks were hunted in the Maldives, specially in Baa atoll, and Ari atoll, for their large livers which were exploited to obtain oil for waterproofing of boats (Anderson & Ahmed, 1993). Following tourism interest and decline of whale shark numbers, whale shark hunting was banned and they were protected by the government in 1995 (Ali & Sinan, 2015). At present, whale sharks are being sighted in large numbers showing high levels of site fidelity (Allen et al.,2021) in South Ari Atoll Marine Protected Area [SAMPA], a site which was reported to bring in US$ 9.4 million through whale shark tourism (Cagua et al., 2014). The Maldives Whale Shark Research Programme [MWSRP], a registered NGO has been conducting studies on whale sharks in the Maldives, primarily in South Ari Atoll from 2006 onwards (MEE, 2015). The SAMPA population consists of mostly juvenile males which make up 95.69% of the population (Harvey-Caroll et al., 2021), averaging at 5m in length, who uses the site as a secondary nursery habitat, mainly for thermoregulation and predator avoidance, as they are more likely to be preyed upon by larger sharks in more offshore waters (Perry et al., 2018). Riley et al., (2010) reports that the whale sharks using this habitat could likely be permanent residents of the archipelago, at least until they reach maturity.

However, trends from data submitted to the citizen science platform ‘Big Fish Network’ maintained by the MWSRP show that large numbers of whale sharks are also seen each year in Baa atoll, Huvadhu atoll, and Fuvahmulah atoll (Big Fish Network [BFN], 2022). BFN data also show that the whale sharks encountered from Fuvahmulah are generally larger individuals and hold a strong female bias (BFN, 2022). The trends in whale sharks

sighted in Fuvahmulah have not made it to literature thus far. However, anecdotal reports from dive centres and fishers shed light into the occurrence of whale sharks in the area.

Local Ecological Knowledge (LEK)

Local Ecological Knowledge (LEK) is being increasingly used to fill gaps in scientific data where research effort has previously been lacking, and as such, over the last decades, literature on LEK and Traditional Ecological Knowledge (TEK) has been systematically included as a management tool for the fisheries sector (Johannes et al., 2000).

Sharks and rays are both charismatic megafauna that are threatened with fishing throughout much of their range. At sites where these do not have direct fishing impact, but have high implications for tourism, LEK can be used to understand different aspects of species sightings as observers are more prone to recall memories of charismatic megafauna (Pottie et al., 2021).

One way of estimating past population sizes is by going through fishing catch records and logbooks, however, often fishery data does not include records of non-commercial species (Pottie et al., 2021) To overcome this, prior studies had enlisted the help of fishers to identify key aspects such as spatial distribution, abundance and overlapping fishing pressure by bycatch on megafauna species, through interviews (Sawers, 2014; Pilcher et al, 2017; Pottie et al., 2021) As fishers memory and ability to recall and provide information has been known to be affected by cultural and economic value of catch, culturally and economically important, large sized charismatic megafauna are ideal species to be studied using LEK (Pottie et al., 2021).

In the case of the Maldives, anecdotal reports from fishers show that the seasonal occurrence of shark and ray species have been well known to them (Anderson et al., 2011a). Similarly, informal divers' log book records as well as diving guidebooks also provide a valuable source of knowledge on the historical status of shark and ray species (Anderson et al., 2011a). However, only minimal effort has been allocated to compile and synthesise this wealth of knowledge, which has the potential of improving species understanding as well as providing resource managers and conservationists and researchers with further insight into the species (Anderson et al., 2011a).

In the Maldives, Anderson et al., (2011a) and Manta Trust's project MMRP have previously studied manta rays through structured interviews with fishers and scuba divers with the use of LEK and TEK in Baa atoll and Laamu atoll(Sawers, 2014). They are also

working on gaining this knowledge from across the Maldives in future projects, and as such, this report hopes to add onto this directory.

Study location background: Gn. Fuvahmulah

Fuvahmulah atoll (figure 1) makes up one of the only 4 oceanic platform reefs of the archipelago, including Alifushi, Kaashidhoo, and Thoddoo (MEE, 2015). The total reef area of the atoll is 10.18 km^2 (MEE, 2015). The South of Maldives where Fuvahmulah is located is known to be less influenced by monsoons like the rest of the archipelago, while the influence of equatorial currents which alternate from Eastward and Westward side is felt stronger (Anderson et al., 2011).

Tourism in Fuvahmulah is on the rise, as reported from anecdotal observations, and the current patterns suggest that tourism is only going to expand throughout the years as awareness, marketing and promotion of Fuvahmulah as 'the Galapagos of the Maldives' continues (Zublu, 2020). Indeed, there are very few dive sites in the world where one location could offer close and cage-free encounters with species such as whale sharks, tiger sharks, thresher sharks, silver tip sharks, hammerhead sharks, oceanic manta ray and sunfish (MMRP, 2019).

Figure 1. Aerial image of Fuvahmulah

Section 5: Methodology

Data collection

This study utilised social surveys to gain local ecological knowledge (LEK) of senior fishers and scuba divers through in person interviews. Data collection took place from 26th April to 5th May, and from the 8th to 16th of August by the author. Prior to the start of the interview process, the island council was consulted, and the research objectives and plan for the study was discussed in detail. The council was also consulted on which prominent fishers and scuba divers to approach.

Interview participants were sought via a deliberately non-random process. The study aimed to prioritise and reach fishers and scuba divers with over 10 years of experience, however, this was later disregarded due to the limited number of participants. A list of fishers and divers were put together with the help of local manta trust field staff and a Fuvahmulah Nature Park conservation officer. One by one, participants were contacted via phone and briefed on the research as well as how much time it would take, and asked for an appointment to conduct the interview. More participants were also sought out in person at the local fish landing site. Additionally, snowball sampling was used, where at the end of the interview process each participant was asked if they could recommend any of their peers to participate in the research, and suitable suggestions were added onto the list of participants during the process.

A total of 25 participants, including 21 fishers and 4 scuba divers were interviewed. Interviews took anywhere between 45 minutes to 1.5 hours, depending on the readiness of the participants to share their experiences. Interview locations were decided by the participants, so as to ensure they felt comfortable throughout the process. The chosen locations included homes of fishers, cafe's, fishing boats and roadside park areas. All interviews were carried out in-person and face-to-face. However, in one instance, part of one participant's interview was completed via phone due to time limitations at the initial interview time.

Interview Design

A semi-structured interview questionnaire which included a mix of both open and close ended questions was used. This questionnaire was adapted from a Manta Trust interview questionnaire that was developed for an ongoing study with a focus on mobulidae and on fisher knowledge (Appendix A). The present study's adapted questionnaire included

questions on mobulidae as well as whale sharks, and was developed for both divers and fishers (Appendix B). While responses for all mobulidae were gathered (to be used at a later stage for a wider Manta Trust study), the only mobulid this study focuses on is the oceanic manta ray. The same questionnaire was used for fishers and scuba divers, with questions alternating between the two professions. Questions were asked in a way that allowed the participants to respond and elaborate on certain parts with more flexibility, and ensure the data received was rich in quality. Questions were asked in the following categories:

- Demographics, experience levels and background information
- Fishing / Diving experience
- Fishing methods and focus species (for fishers only)
- Species specific questions to identify whether they could differentiate between species
- Geographic locations of focus species
- Time/abundance/ numbers of focus species
- Patterns of change (if any) to the environment and biodiversity
- Historical and current pattern of sightings
- Threats and historical landings
- Perception and knowledge of local conservation efforts

To account for any misunderstanding or confusion that could stem from the variations of local species names from different regions of the Maldives, these questions were aided with species pictures as a visual guide. Additionally, local names from Fuvahmulah dialect were recorded separately whenever they were brought up by the participants.

To identify locations where oceanic manta rays and whale sharks are generally seen, a gridded map of Fuvahmulah atoll was shown to participants aUsing the grids as a guide, they were asked to identify locations where species were sighted.

Data analysis

A mixed method approach was used for this study. Where possible, the data was quantified. While the data was collected with specific areas and questions in mind, the analysis was open to identifying and including new themes and questions that came up throughout the research process. This also allowed for greater freedom and flexibility to

understand the participants' experiences and knowledge in-depth and to elaborate on certain concepts.

The contents from the interviews were first transcribed into Microsoft Excel and descriptive graphs were generated. The data were then sifted through and coded according to certain ideas. A mix of both emergent coding and structured coding was used. They were then thematically analysed to focus on the key objectives.

The themes include:

- Background information
- LEK on species sightings
- Threats
- Perception and awareness of research and conservation efforts

The identified species hotspots mentioned by the participants were mapped by overlaying the gridded map onto a google earth image of Fuvahmulah. Sighting data collected by MWSRP and Manta Trust through citizen science data and those collected by field staff were compared with the locations identified by LEK.

Ethics

This research was carried out under a blanket ethics approval. All in-person interviews were conducted after first giving a brief outline of the study and an introduction of the interviewer as well as a short introduction of the parties involved to the participants. A small briefing about the type of information that would be collected was given to the participants prior to the interview, as well as the amount of time it was expected to take. Participation was voluntary and it was mentioned to all participants that they could decline any of the questions asked at any point with no explanation as they were under no obligation to answer if they did not want to. They were also free to end the interview if they wished to do so. All interviews were conducted with informed consent. Participants were also given the freedom to ask any questions before, during or after the interview. At the end of the interview, they were also directly prompted whether they had any questions to clarify.

They were also informed that personal identification information will not be revealed by the interviewer and that where quotes were used, they would be used without revealing individual identification information.

Section 6: Results

Demographics, experience and background information

Average age of fishers was 57 years, where the youngest of the interviewees was 39 years and the oldest were 70 years olds (figure 2). 19 out of the 21 fishers interviewed are still engaged in fishing. While most are artisanal fishers, 3 had mentioned they only go fishing on their time off or after finishing their primary job. The vast majority (n=20) participants spent on average more than 20 days a month out at sea, while the remaining participant claimed to spend on average 15 days a month at sea.

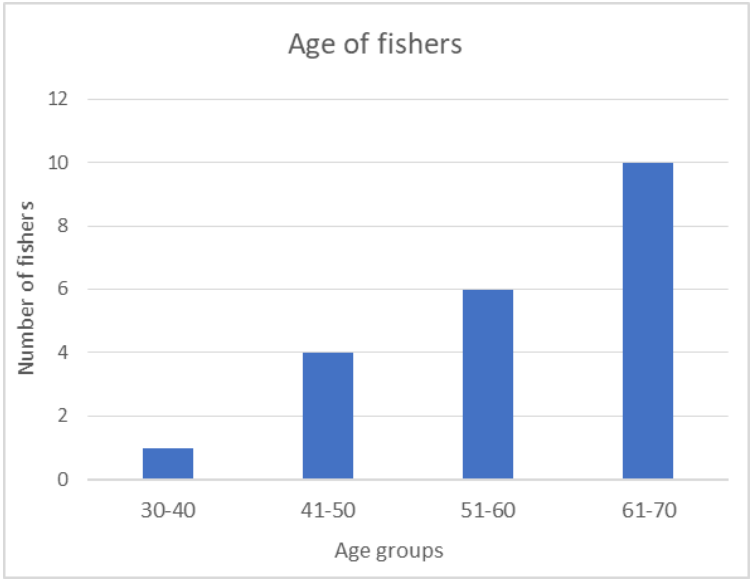

Figure 2. Age of fishers who participated in the study

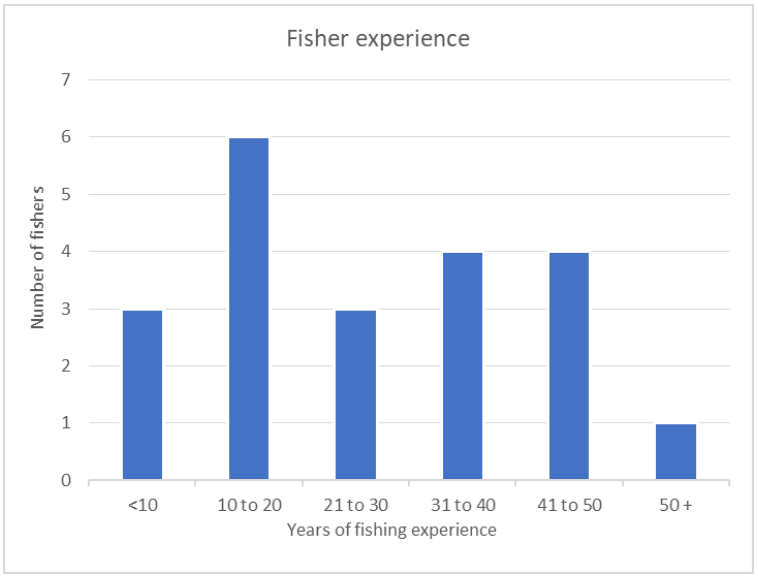

Figure 3. Experience levels of fisher participants

On average, fishers had 28 years of fishing experience, where the minimum years of experience was 2 years and the maximum was 55 years (figure 3). Those with less than 10 years of fishing experience were also included in the analysis, based on the fact that they are out at sea for over 20 days a month and are currently involved in fishing.

Two main types of fishing are carried out by those interviewed. This includes pole and line or *'dhosheege masverikan'* and troll fishing or *'vadhu masverikan*' for skipjack tuna and yellowfin tuna. *'Leynu elhun'* was also briefly mentioned by a few participants . Another type of fishing routinely carried out, and typical to the South of Maldives, namely to Addu atoll and Fuvahmulah is that of Promethean escolar *'Kattelhi'* fishing. This type of fishing is primarily done at dusk. To a lesser extent, some level of bait fishing *'en verikan*' is also carried out. However, those that mentioned live bait fishing near Fuvahmulah only do this once or twice a year. The targeted bait include round scad *'Rimmas'*, fusilier *'Muguraan*', '*Ran'baali*' and cardinal fish '*Boadhi'*. Additionally, grouper '*faana*' and flying fish *'fulhangi'* are also used for bait fishing, specifically in the '*nakaiy*' of '*Atha* and *Hitha*'. Only one fisherman mentioned fishing for billfish '*Hibaru*' and wahoo '*Dhigumas*' ('*kurumas*' as referred to in Male' dialect) (table 1).

Fishers stated that from time to time, they find whale sharks and oceanic mantas acting like natural Fish Aggregating Devices (FAD's) in that they herd target catch such as skipjack tuna, yellowfin tuna, scad and other bait fish under their bellies, specially while

travelling in the open ocean. The megafauna were also reported to be associated with remoras and pilot fish.

The fishers are mostly engaged in one day or half day trips. They also often do two trips a day- once in the early morning and again later at dusk for 'kattelhi' when the catch is good.

Table 1. Catch type from fishers interviewed showing regular or direct effort and those which are only fished occasionally or inferred throughout the interview process

Fisher no	Catch type						
	Skipjack tuna	Yellow fin tuna	Promethean escolar	Reef fish (undefined)	Bait fish	Wahoo	Billfish (undefined)
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							

Ocassionally / inferred effort

Caught regularly / Direct effort mentioned

A list of species have been put together with the local names in Male' dialect and where mentioned, in Fuvahmulah dialect. This list is by no means an extensive list, and merely contains the names that came up naturally during the interview process, therefore not all species mentioned would have corresponding local names from both dialects (table 2). The names in latin for Fuvahmulah dialect have also been verified by a Fuvahmulah local.

Table 2. List of species

Family / Species name	English name	Local name	
		Male' dialect	Fuvahmulah dialect
Katsuwonus pelamis	Skipjack tuna	Kalhubilamas	Kalheyla maha
Thunnus albacares	Yellow fin tuna	Kanneli	Kannaali
Promethichthys prometheus	Promethean escolar	Kattelhi	Katteylhi
Caesionidae	Fusilier	Muguraan	
Decapterus macarellus	Round scad	Rimmas	
Apogonidae	Cardinal fish	Boadhi	
		Ran'baali	
Acanthocybium solandri	Wahoo	Kurumas	Dhigimaha
Mobula birostris	Oceanic manta	Kandu en'madi	Raah'dhigathu madi
Rhincodon typus	Whale shark	Fehurihi	Fehurihi
Sphyrnidae	Hammerhead shark	Kaaligan'du miyaru	Beedibol meyre
Mola mola	Sunfish		Masburi
Alopiidae	Thresher shark	Kandi miyaru	Nagul meyre
Galeocerdo cuvier	Tiger shark	Femunu miyaru	Femunu meyre

From the 4 scuba divers interviewed, the average age was 35, with the youngest being 32 and the oldest being 41 (figure 4). All 4 divers interviewed have more than 10 years of experience working as dive professionals, with a maximum of 26 years of experience and a minimum of 11 years of experience. All except one spend over 20 days on average at sea, actively diving. While the remaining diver had dove almost everyday in the past, he currently only dives during the busier or peak dive periods, but remains active running the dive operations.

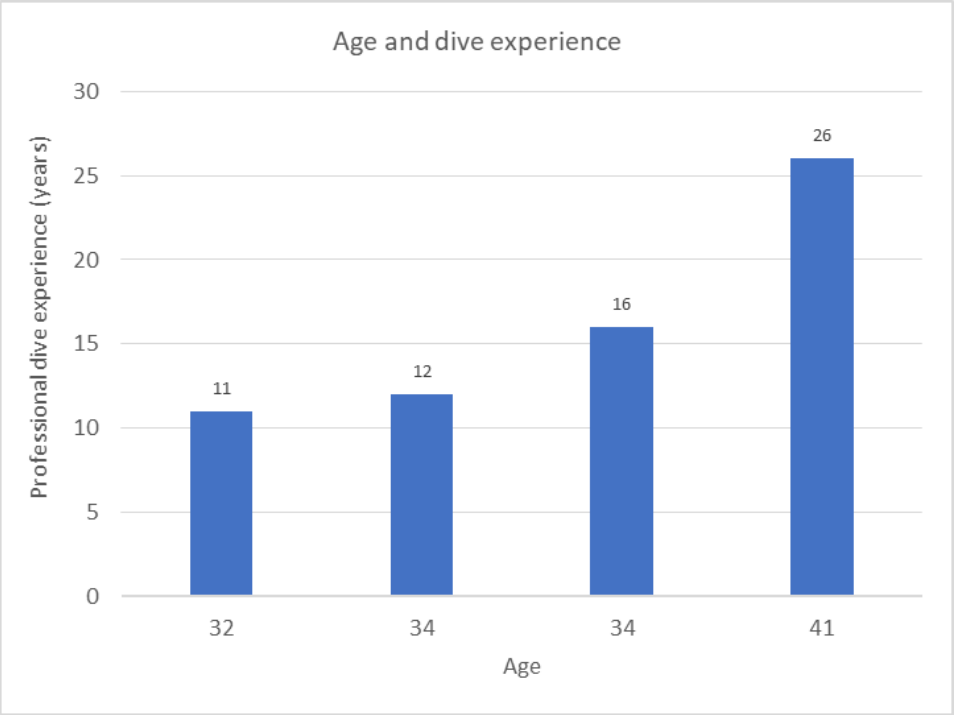

Figure 4. Age and dive experience of participants (scuba divers)

LEK on species

All questions related to the focus species were started after images of similar species and species that do not occur naturally in the Maldives were shown in order to gauge their species recognition skills and knowledge. All divers were seen to have no issues with species recognition and were shown to possess great levels of species knowledge.

In the case of fishers, they generally spot the animals from above the water surface, and hence stated they are not always able to recognise species as effectively, especially between species in the mobulid family. They have no issues in recognising whale sharks due to their characteristic spots and stripes. However some were not able to tell the difference when pictures of a reef manta ray and oceanic manta ray were shown side by side. Nonetheless, they reinstated the size of the species they were able to recognise, indicating they were referring to the focus species; oceanic manta rays.

Time and location of sightings

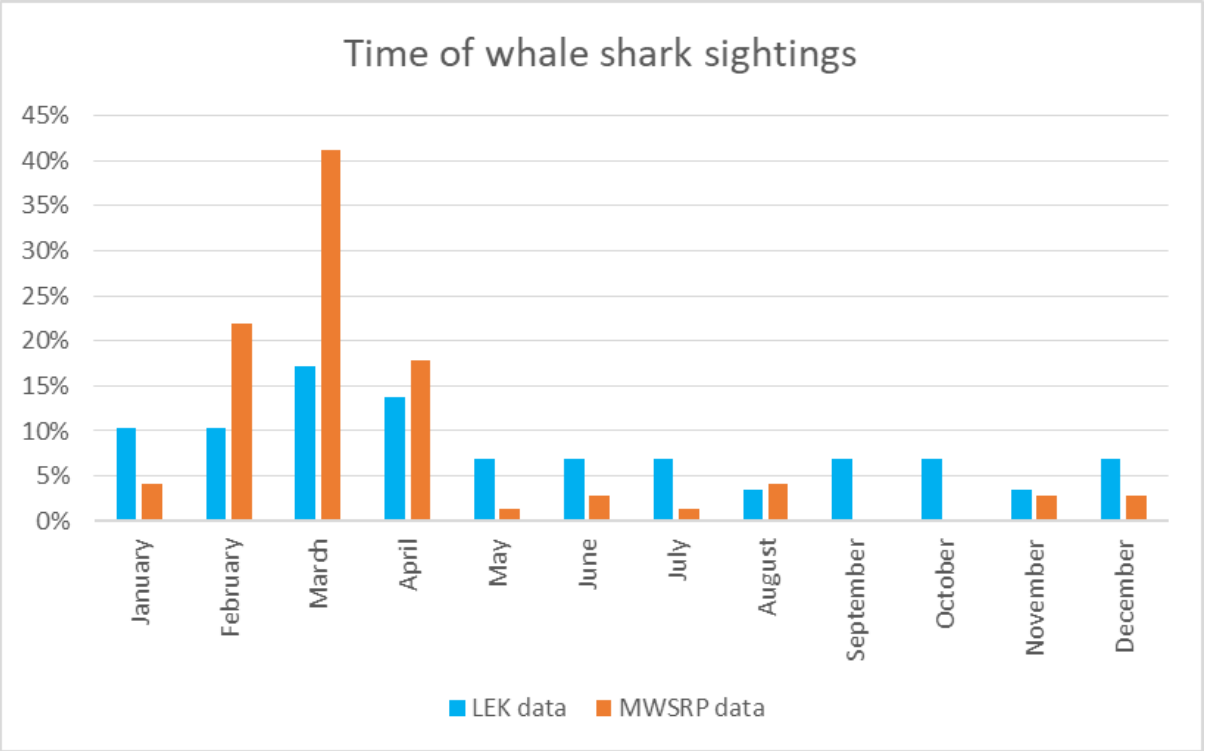

Figure 5. Time of the year when whale sharks are perceived to be seen by participants and time of year sightings have been recorded as scientific data by MWSRP

When asked about the time of year whale sharks are mostly seen, respondents mentioned that chances of seeing them are higher during Northeast monsoon, especially when the currents are slight. March, April, January and February were voted as the months with highest chances of seeing whale sharks by 17%, 14%, 10% and 10% of respondents respectively (figure 5). LEK data also indicate presence of whale sharks throughout the year, however this is only with less than 10% of votes for the rest of the months. Sighting data received by MWSRP's citizen science platform as well as field surveys, showed that recorded sightings were highest in March and February, followed by April, with 41%, 22%, and 18% respectively. However, in lesser numbers, sightings have also been recorded by MWSRP in all months, with the exception of September and October. This included sighting data between 2014 and 2022 (figure 5).

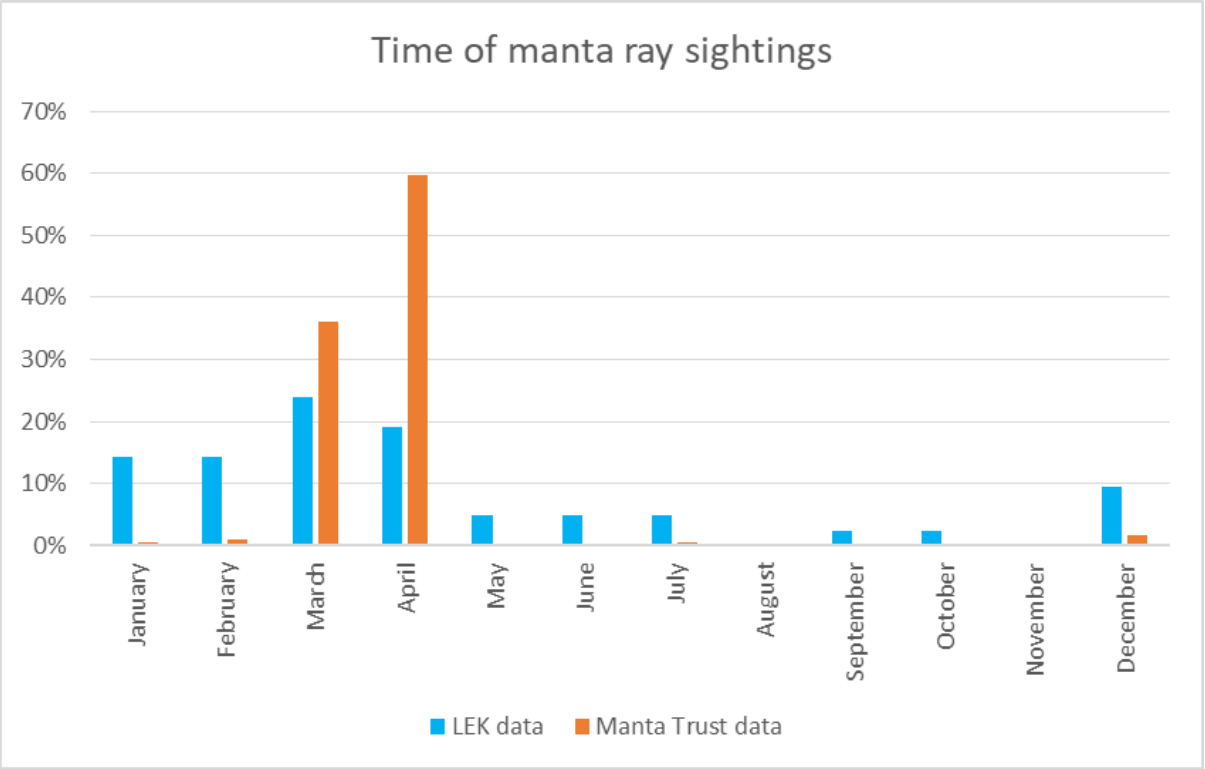

Figure 6. Time of the year when oceanic manta rays are perceived to be seen by participants and time of year sightings have been recorded as scientific data by the Manta Trust

When asked about the time of year oceanic manta rays were most likely to be seen, March and April, followed by January and February received the highest votes from participants, with 24%, 19%, 14% and 14% of votes respectively (figure 6). December was seen as the next most likely month with 10% of participant votes. Despite this, LEK indicates sightings from all months except August and November. Scientific data collected through field surveys by Manta Trust (in March and April) and received via citizen scientists submissions between 2008 and 2019 from Fuvahmulah and Addu atoll indicate that the largest number of sightings were recorded in April and March with 60% and 36% respectively (MMRP, 2019). From Manta Trust data, sightings are also seen to have occurred in December (2%), February (1%) and March (1%). However, field data has not been collected consistently throughout the year.

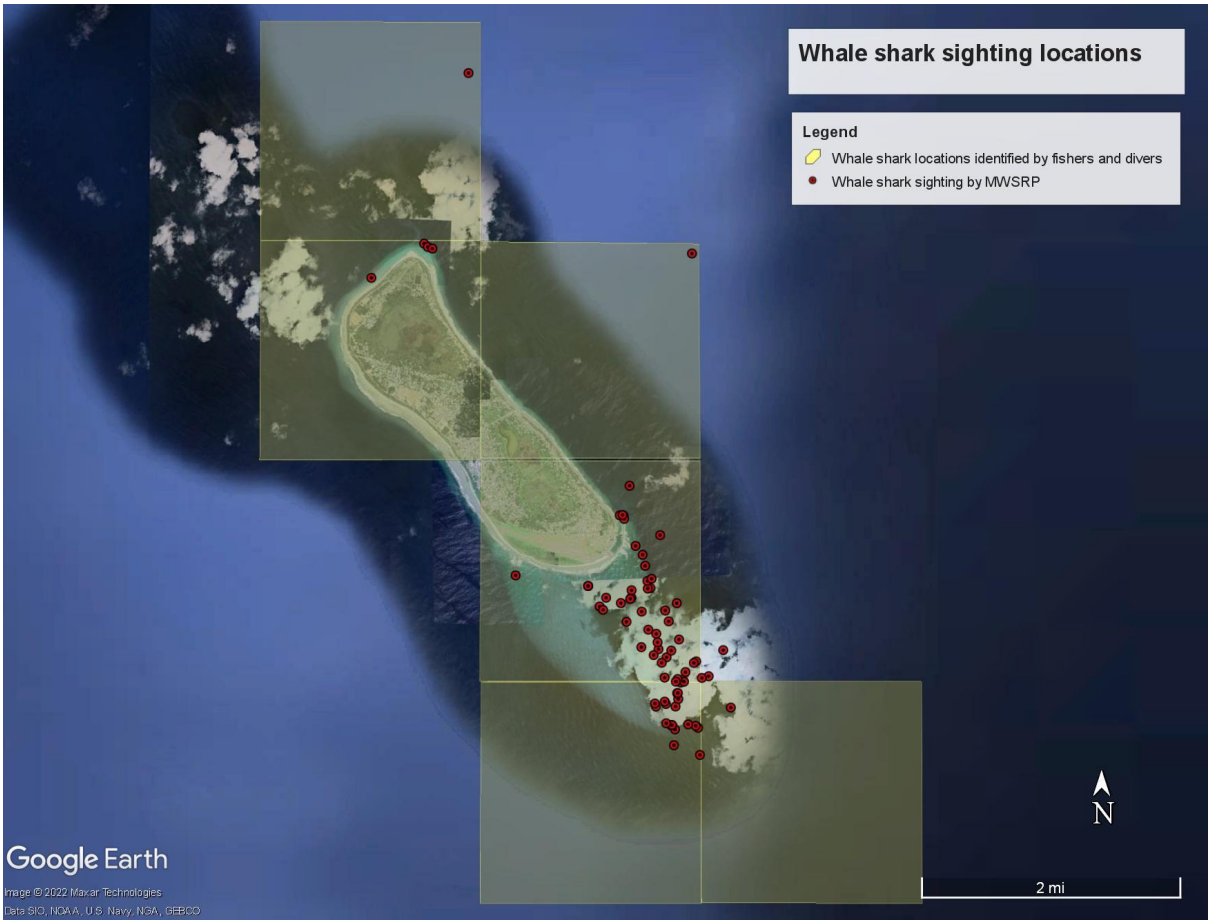

Figure 7. Sighting locations of whale sharks identified by fishers and divers alongside sighting data from MWSRP

Through citizen scientists contributions over the years and by MWSRP's survey efforts in Fuvahmulah in 2021 and 2022 during March and April (MWSRP, 2022), a total of 73 whale shark sightings were recorded, as shown by the red dots in figure 7. Only one sighting was received in both 2014 and 2015, however, more sightings per year were recorded from 2018 onwards. The yellow polygons indicate the areas identified by fishers and divers as areas where whale shark sightings have generally been seen from the gridded map they were shown.

Participants stated that oceanic manta rays were always around during the time of the year when they are expected to be seen. However, with whale sharks, their presence is less common or predictable.

When fishers and divers were asked about whether or not there had been any changes to oceanic manta ray sightings throughout the years, 45% respondents mentioned they have noticed a decrease in numbers of manta rays seen together at a time, as well as to the frequency of sightings (60%) (figure 8). 36% of respondents stated they are unsure whether

there had been changes to numbers, and 15% were unsure about changes to frequency of sightings. Meanwhile, 20% of respondents state they have noticed an increase in frequency of sightings and in the number of manta rays seen at a time (9%). 9% of respondents have noticed no changes in numbers of manta rays seen at a time or to frequency of sightings (5%).

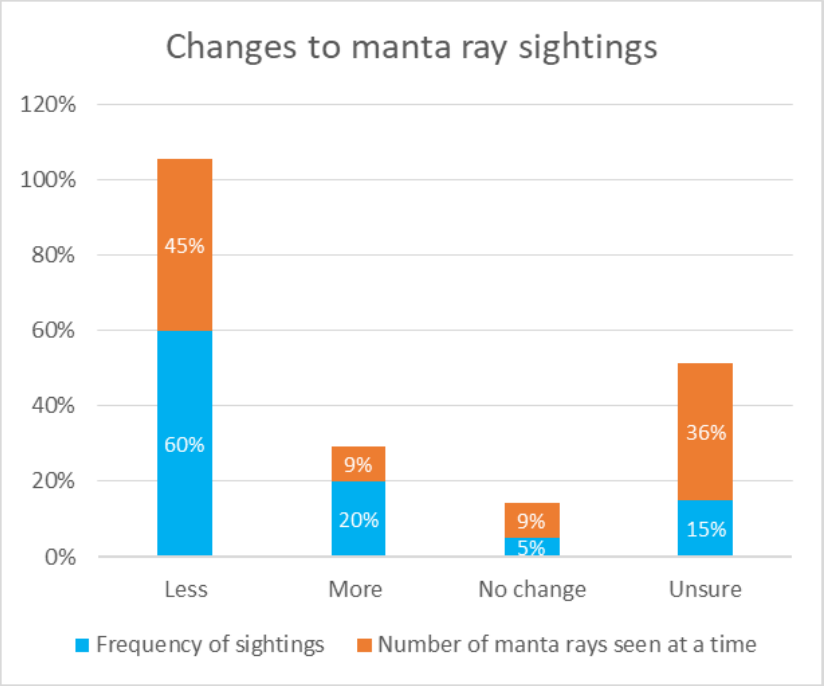

Figure 8. Perceived changes (if any) by fishers and divers to manta ray sightings over the years in terms of frequency of sightings and number of manta rays seen at a time

A large percentage of respondents stated they noticed no changes in the frequency of whale shark sightings (12%) or number of whale sharks seen at a time (47%) (figure 9). However, 47% of respondents stated the frequency of whale shark sightings have decreased during their careers and 20% or respondents stated having noticed a decrease in the number of whale sharks seen at a time. In contrast, 7% of respondents stated they noticed the number of whale sharks seen at a time are higher now compared to the past, as well as an increase in frequency of sightings (24%). 18% of respondents were unsure of any changes to frequency of sightings and 27% were unsure of changes to numbers of whale sharks seen at a time. They acknowledged that they are not able to pay enough attention to noticing these changes.

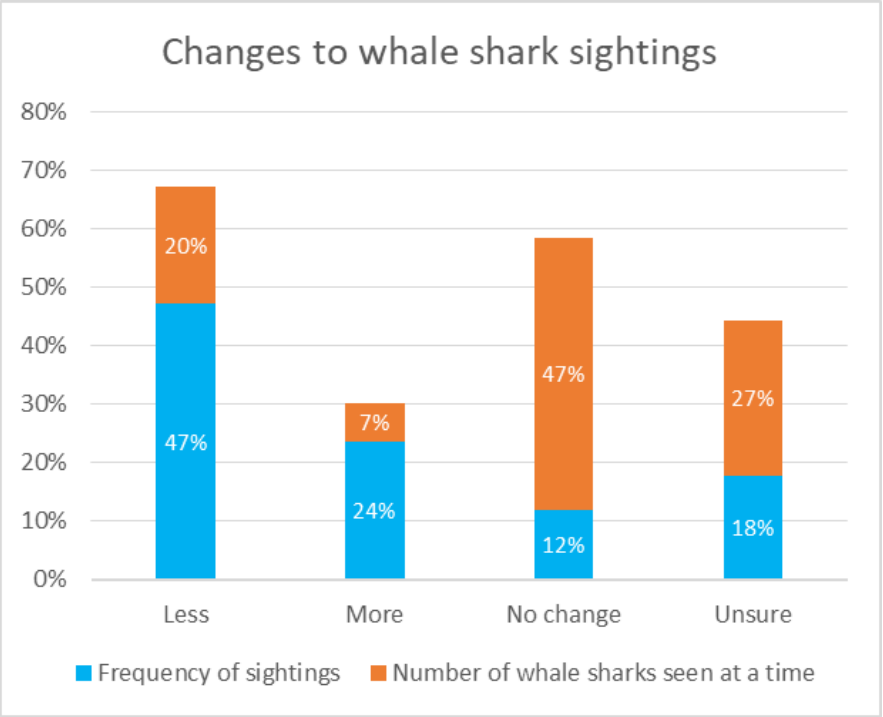

Figure 9. Perceived changes (if any) by fishers and divers to whale shark sightings over the years in terms of frequency of sightings and number of whale sharks seen at a time

Threats

When asked about threats, one of the divers and three of the fishers were aware of the historical hunting of manta rays in the Maldives. In the case of whale shark hunting, three divers and four fishers were aware they were historically hunted. According to the respondents who were aware of this, mantas were hunted for medicinal purposes (n=1) as well as to export their gill plates (n=2). Whale sharks were said to be primarily hunted to extract their liver oil (n=4) as this was used as a water sealant and to fend off termites (n=1). It was also mentioned that other large sharks were also hunted for liver oil at the time. One respondent mentioned the meat of the whale sharks were consumed to some extent (n=2) and that the skin or dermal denticles were used as sandpaper due to its rough texture. The liver oil was also said to be exported to neighbouring Sri Lanka alongside fins of the shark (n=2).

At present there is no direct fishing pressure on either whale sharks or mantas according to participants. However, 57% of fishers acknowledged there is still accidental entanglement of oceanic manta rays while *kattelhi* fishing. They stated the mantas often get fishing line entangled in their cephalic lobes - locally referred to as *'dhalhu'*. Upon entanglement, they become evasive and speed up, dragging the fishing line that's still attached to their bodies, as they try to escape. This further exacerbates the entanglement. In

the instance where this happens, fishers either cut the line, or hold the line steady until the line comes loose. The interview process revealed this threat has been present throughout the careers of fishers. Historically when fishing boats were non-motorized, the mantas were said to tow the boats (via the fishing line) behind them for long distances, and the fishers were unable to keep the boat in position, given the manta's strength. Mortality of manta rays with such entanglements remains in question.

Mantas were also said to get inside bait nets (n=2), however in these cases, fishermen are able to push the manta off the net gently, without any harm being inflicted on the mantas. However in some instances, the fishermen have reported losing their bait nets (n=2). One of these respondents recalls an instance many years ago, where a large manta ray got inside the bait net and got its cephalic lobe entangled in the rope connecting the buoys to the net. This manta then sped off, with the bait net still attached through the entanglement, towing the ~14m non-motorized boat behind as it moved fast, until the fishers eventually let go. Two days later, they spotted a very weak manta from a distance, and were able to instantly recognise it as the same manta, as the net was still attached.

One fisher also reported two instances where a manta was entangled in a mooring line, about 40 years ago. The particular mooring line was made with metal wire at the bottom, and had ~3m of rope at the top with a buoy attached. The metal wire had cut through the manta's body leaving open wounds when the fishers had found the individual.

Another fisher stated two instances where he remembers an oceanic manta ray being opportunistically caught and used for meat. In one instance, the manta was entangled when his brothers found it. He recalls the manta being hauled on a wheel barrow onto land to be cooked, and that the manta meat had a texture similar to turtle meat. The meat of the manta was said to be so plentiful that they were able to share with 20 other households. This happened approximately over 60 years ago, at the time the respondent was a little boy.

Perception and awareness of conservation

Knowledge of local conservation efforts

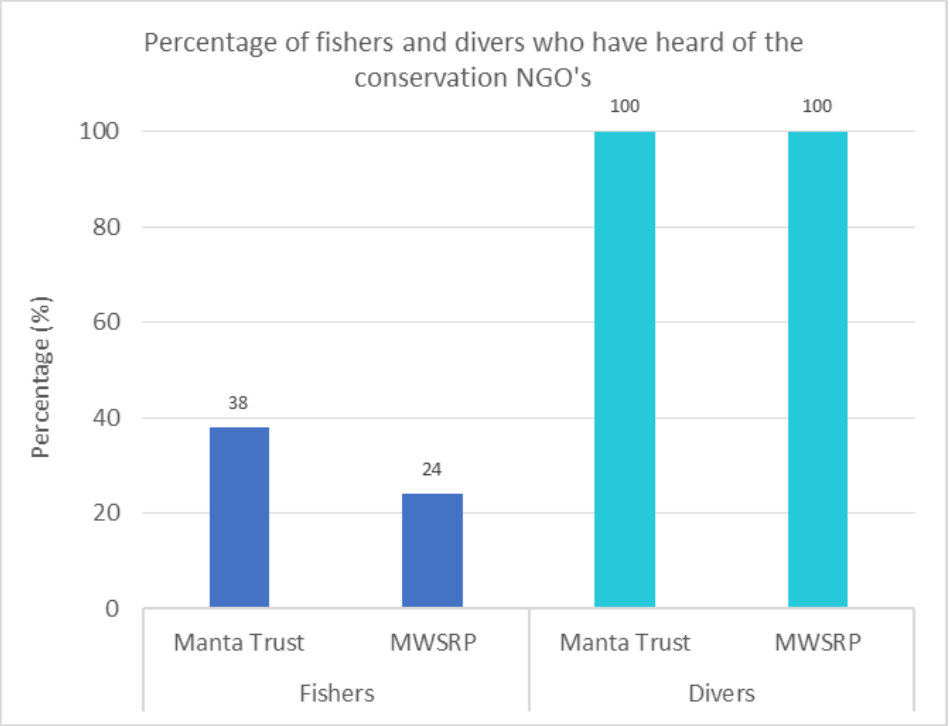

Figure 10. The percentage of divers and fishers who have heard of the conservation organisations Manta Trust and MWSRP

When respondents were questioned on their knowledge of organisations Manta Trust and MWSRP, 100% of divers were seen to have heard of both the organisations. However, from the fishers interviewed, only 38% had previously heard of Manta Trust, and only 24% had heard of the MWSRP (figure 10).

When asked about the work of these organisations, divers responded with the 'Photo Identification' (n=2), 'Awareness sessions' (n=2), 'Manta/whale shark and reef studies' (n=1) and ' Education and conservation' (n=1) as well as 'Business' (n=1).

In contrast, fishers responded with 'research' (n=1), 'don't know' (n=3), 'don't pay attention' (n=1), 'big surveys, trying to find what's going on' (n=1), 'take manta samples' (n=2), 'take photos and check which individuals are seen' (n=1).

Perception of divers on the work of researchers

Divers mentioned the word *'baraabaru'* or 'perfect' (n=1), and 'it is needed' (n=1) was identified. 2 of the 4 participants had mixed feelings about research work. However, one

participant mentioned that they are willing to, and already give as much support as possible to visiting and resident researchers through their dive center. The second participant with mixed feelings stated:

> *concerns regarding the approach of and execution of certain researchers and research projects, (especially those of some foreign researchers), however, do not have any issues of what they set out to do and realise the importance of research.*

Three out of the four of divers stated they are interested in learning about the work of researchers. Two of the participants are already involved to some extent with research and conservation related projects on tiger sharks. One of them also expressed interest in learning more about manta research, while the other elaborated that he is interested in getting involved in advanced research. Another participant further elaborated that:

> *Research needs to be continuous - - should be taught/trained to locals rather than (outsiders) coming every so often*

Perception of fishers on the work of researchers

All fishers surveyed have positive perception on research work and are happy to lend support and share their expertise. They identified the need for research 'for future generations' (n=3), to 'enhance species understanding' (n=7). Further, that research was 'important' (n=2), *'rangalhu / varah rangalhu*' translating to'good / very good' (n=19) (figure 11).

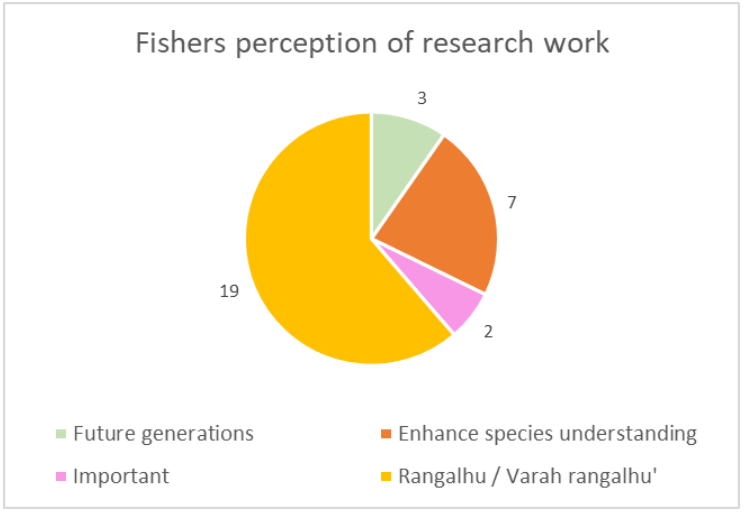

Figure 11. Fishers perception of research work

Perception of fishers and divers on benefits of conservation of manta rays and whale sharks

From the divers interviewed, all participants agree that they benefit from the conservation of manta rays and whale sharks in the Maldives. Participants used the phrases 'tourism' (n=3), 'economy' (n=1), and 'future generations' (n=2) to explain the benefits. However, one participant stated that he does not believe the animals are truly conserved.

From the fishers, 16 out of 21 or 76% agree that there are benefits (either personal /direct benefits or indirect benefits) to conservation of mantas and whale sharks, while 2 out of 21 maintain that there's neither a benefit nor a loss.

The participants identified 5 main areas for benefits (figure 12). These include tourism growth (mainly from dive tourism) (n=6), economic growth and island development (n=4) and extrinsic value of the satisfaction from seeing these animals alive (n=2) and conservation benefits (n=1). Participants also noted there are fishery benefits (n=3) from the conservation of these species. They stated that there are direct links between bait availability and presence of large megafauna, and mentioned the role of megafauna as 'bait herders'. They further stated that fishing is overall better when these filter feeding megafauna are around.

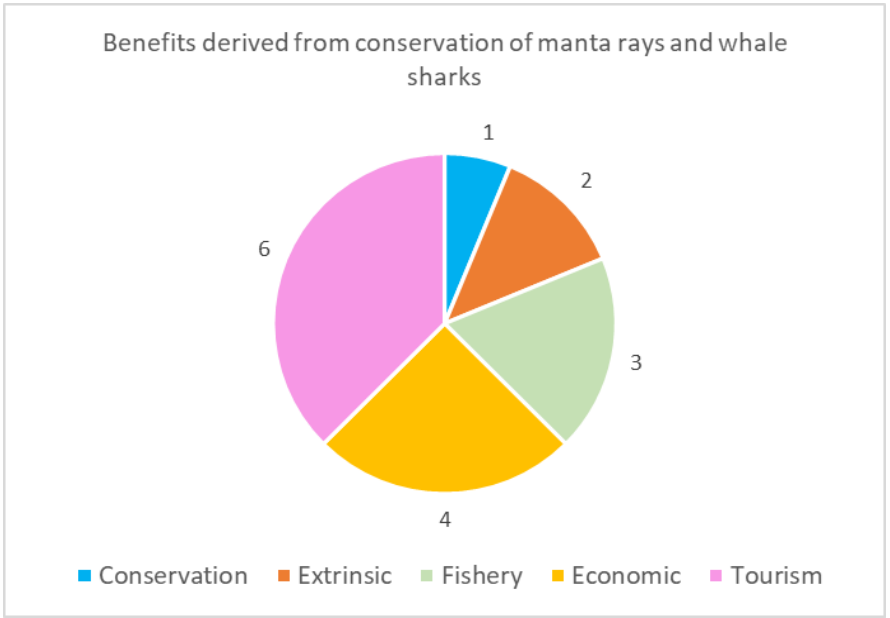

Figure 12. Fishers perceived benefits from conservation of whale sharks and manta rays

Furthermore, 71% of fishers (n=15) and 75% of divers (n=3) want to learn more about the work of researchers. From the rest of the fishers, two stated they were too old to

learn and so did not want to go through the trouble, and four expressed a lack of interest. Although, for some fishers, the interview process was seen as an opportunity to ask questions, clarify doubts and raise concerns regarding species sightings. The interview which was initially designed to last forty five minutes, in practice, lasted about one and a half hours on average, as the fishers were so keen to share their knowledge and discuss the megafauna.

Section 7: Discussion

Background information and experience

Fishers were shown to possess great levels of experience and built knowledge with an average of over 28 years of fishing experience. This wealth of information and knowledge is a good tool to utilise in understanding perceived past conditions and sighting patterns with regards to the effect of 'shifting baselines' that is expected with the newer generations of seafarers. However, some level of concern exists in the fact that fishers may not be able to identify between the different species within the mobulidae family. Therefore, there could be times where species had been misidentified if ever a smaller bodied oceanic manta ray or a large bodied reef manta ray were to be seen.

Fishermen were reported to take advantage of both oceanic manta rays and whale sharks' ability to act as natural FAD's while fishing. These megafauna were stated to act as good herders of target catch species, as well as bait. This indicates there is a degree of dependency and importance given to the presence of these large megafauna during fishing.

Additionally in the Fuvahmulah dialect, the oceanic manta rays are given a local name *'Raah'dhigathu madi'*. In the Male' dialect, they are called *'kandu en'madi'* , only distinguished from the smaller reef manta rays with the addition of 'kandu'. As oceanic manta rays are seen in the Maldives primarily in Fuvahmulah and Addu, having a separate local name indicates the significance and interconnectedness the older generations have had with oceanic manta rays, and indicates that the locals were communicating about oceanic manta rays often enough to give it a name. However, this name is no longer commonly used within the younger generations.

There was only a limited number of divers who had fit the criteria for participation in the study. Scuba diving and dive tourism in its early days were primarily concentrated in central Maldives, especially near the capital. It was only after the prevalence of scuba diving on liveaboards that the North and South of Maldives started being visited by divers more

frequently. In 2017, Fuvahmulah Dive School was the first professional diving facility to be opened on the island (Discover Fuvahmulah, 2019). Therefore only a limited number of scuba divers were available to interview.

LEK on species and threats to species

In terms of time of sightings, for whale sharks, and manta rays, both divers and fishers identified that Northeast monsoon was the best time for sightings. This was also reflected in scientific data, with only slight differences in peak timings between those acknowledged by LEK for manta rays and those shown by Manta Trust data. Thus LEK sighting data can be considered reliable in terms of time of sightings. In the case of both whale sharks and manta rays, LEK indicates sightings occurring (although in less numbers) throughout the year, while this is not the case of sighting data from Manta Trust, the data shows rare occurrences of whale sharks outside of the peak months. However, both research organisations have only been visiting the site since 2018, and then too, have only been based on the island during March and April, and as such, consistent year round scientific data collection efforts are lacking.

The sightings recorded from the rest of the years from Manta Trust data and MWSRP data are opportunistic sightings that have been recorded by citizen scientists diving in Fuvahmulah. The search effort through these dives are dependent on diver demand and varies throughout the year, increasing towards December, as can be seen from figure 5 and figure 6. When there is little to no tourism demand, these dives do not take place and as such, search effort is halted.

Similarly whale shark sighting locations identified by LEK and sighting data from MWSRP both overlap (figure 7). Adding to the reliability of LEK as a source of knowledge to fill historical gaps in data.

Participants have identified that sightings of manta rays and whale sharks have both decreased over the years. Sawers (2014) study on TEK of fishers in Baa atoll also show perceived decrease of whale shark sightings from LEK, and suggests a variety of possible reasons, including continued possibility of illegal fishing, global climate change (Sequeira et al., 2014) as well as a host of other threats outside of Maldives waters (Bradshaw et al., 2008). A decrease in whale shark numbers and frequency of sightings have also been reported in South Ari atoll by Harvey-Caroll et al., (2021) and has been associated with tourism growth related increase in boat traffic. On a similar note, some fishers have also

suggested the decrease in sightings may potentially be a result of megafauna choosing to spend time in deeper depths, possibly due to an increase in motorised boats and presence of divers, and therefore they are no longer able to see the animals in the shallows, close to the surface as often as they used to.

The neighbouring country Sri Lanka has one of the largest ongoing manta and devil ray fisheries in the world, with thousands of rays being landed annually (MMRP, 2019). As the Maldives and Sri Lanka are only 1000 km apart, the close proximity has been suggested as a potential threat to the aggregation of manta rays in the Fuvahmulah area (MMRP, 2019), especially as the rays are capable of long migrations.

In the Maldives, whale sharks have been protected since 1995 and all mobulid species have been protected since 2014 (MMRP, 2014). While there has been reported evidence of injuries inflicted on whale sharks (Riley et al., 2009), at present there is no evidence indicating whale sharks or manta rays are being targeted for fishery or export purposes in the Maldives. However, the data from this study report injury and possible mortality due to anthropogenic causes.

A persistent threat identified is that of accidental entanglement of oceanic manta rays during *kattelhi* fishing. As the fish is popular with Fuvahmulah locals and considered a delicacy in many parts of the Maldives, this type of fishing can be expected to increase in popularity with the growing tourism interest in Fuvahmulah. In which case, it is also predicted that entanglement risk can be expected to worsen, in the case of no intervention. *Kattelhi* being a source of income and livelihood for fishers, it is expected to be a difficult subject to navigate when discussing possible interventions or solutions, and thus, should be approached with caution, in a way that suits both conservation and community needs.

This threat has not previously been identified or quantified by previous research and thus, opens up for further research to look at injuries present on oceanic manta rays in the region.

Perception and awareness of conservation and research

Divers in the study are aware of and involved in different research projects, either as citizen scientists or by providing assistance in person to ongoing research. However, less than 40% of the fishers are aware of the research organisations Manta Trust and MWSRP and only three of the fishers had directly been involved with the organisations at some capacity. This

indicates a large disconnect between most fishers participants and researchers. To some extent, this could be due to factors relating to age or language barriers.

Nonetheless, 71% of fishers showed interest in learning more about the work of researchers, particularly with the behaviour and lives of manta rays and whale sharks, indicating that they are supportive and cooperative of such efforts. Additionally this indicates a need for future research and conservation efforts to be more inclusive of local communities outside of the dive communities and formal education centres. At the same time, divers highlighted a significant need for foreign researchers to train willing locals in order to grow local expertise. Having more locals involved could also minimise concerns regarding the approach of certain research projects that some divers brought up in the interview- which usually stem from foreign organisations having a lack of or skewed understanding of the local context and systems in place.

In general both sets of participants understand the need for research and conservation efforts and have positive connotations regarding the matter. Both sets of participants also agree there are several benefits that stem from the conservation of manta rays and whale sharks. Benefits are also linked to the livelihoods of the participants; and those such as tourism income and fishing benefits were highlighted by the participants. Furthermore, the intricate balance of these large filter feeding megafauna on fishing is something that the fishers were seen to value and appreciate.

Limitations

As the first half of the data collection period coincided with the month of Ramadan, there were limitations in finding appropriate times slots to conduct the interviews between the fishing times and prayer times.

While most of the interview participants (fishers) were keen on participating in the survey upon initial contact (both at the local fish landing site and over phone), there were several challenges in getting the participants to follow through with the arranged appointments. The age demographic of the fishers (predominantly senior) also meant that they were not generally available via phone for rescheduling or to follow up with, and therefore, proved difficult to reach. Most of the interview process required a lot of flexibility to be available whenever an opening showed up.

Even with the limited number of fishers interviewed, the project succeeded in collecting valuable fisher knowledge. In the case of divers, since the numbers interviewed were so limited, care should be taken while generalising the views of just four divers. Perhaps collecting diver knowledge from both Addu and Fuvahmulah might seem to be beneficial as the two sites are close by and the chances of experienced divers diving in both reefs are also high, increasing the gathered pool of knowledge.

Another limitation which was later recognised during data analysis was that the gridded maps used for understanding these locations had quite a large grid size in comparison to the size of Fuvahmulah, and thus, the identified areas have little accuracy, and thus, future studies could use smaller grids to gain better location accuracy.

Section 8: Conclusion

The increased level of tourism interest being given to oceanic manta rays and the whale sharks in Fuvahmulah atoll offers opportunities to study the species further in a unique and understudied setting. Local Ecological Knowledge offers a base for understanding the population of both these species and the temporal changes to sighting patterns. The study shows that there is a perceived decrease in sightings of oceanic manta rays and whale sharks. It also indicates a potential threat to the oceanic manta ray population in Fuvahmulah from fishery related entanglements. Lastly, it offers an opportunity for researchers to utilise the interest and support of a previously uninvolved group - that of experienced fishers, in growing the existing body of knowledge of whale sharks and oceanic manta rays around the island. This knowledge and support can be used to focus on ways to reduce the local threats to species and supplement conservation and management efforts.

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Section 10: Appendices

Appendix A: Original questionnaire from the Manta Trust, focusing on LEK of fishers on mobulidae species

އިންޓަވިއު ކޯޑް: ________ ރަށް: ________ ތާރީޚް: ________

ދިރާސާ ސުވާލު

ތައާރަފު:

[illegible] ________. [illegible]

[illegible]

[illegible] 2005 [illegible]

[illegible]

[illegible] 45 [illegible] 1 [illegible]

[illegible]

ތިމާއަށްފުރި ގެއްލުން:_____ ތަނުން:_____ ދުވަސް: _____

ފަސްވަނަދުވަހުގެ ތަކުރާރު

ތިމާގެ ކަންތައް ކިހާވަރަށްހެދިފައިތަ؟

ފަސްވަނަދުވަހުގެ ތެދުވެގެންދާ ކަންތައް ކިތަންމެ ހާސިލުކުރަން ބޭނުންވާ؟

ފަސްވަނަދުވަހުގެ ކަންތައް ކިހާ ބޮޑަށް ކުރަން ބޭނުންވާ؟

ފަސްވަނަދުވަހުގެ ކަންތައް ކިހާ ބޮޑަށް ކުރަން ބޭނުންވާ؟

ފަސްވަނަދުވަހުގެ ކަންތައް ކިހާ ބޮޑަށް ކުރަން ބޭނުންވާ؟

ފަސްވަނަދުވަހުގެ ކަންތައް ކިހާ ބޮޑަށް ކުރަން ބޭނުންވާ؟

ފަސްވަނަދުވަހުގެ ކަންތައް ކިހާ ބޮޑަށް ކުރަން ބޭނުންވާ؟

ފަސް ދުވަށް ތަކުރާ:

ދެ ބަދަލު ތަކެއް ހުންނަންވާ؟

ދެ ބަދަލު ތަކެއް ހުންނަންވާ؟

ފަސްވަނަދުވަހުގެ ކަންތައް ކިހާ ބޮޑަށް ކުރަން ބޭނުންވާ؟ ކަންތައް ކުރަން ބޭނުންވާ ތަނެއް ހުންނަންވާ؟

ފަސް ދުވަށް ތަކުރާ ފަސްވަނަދުވަހުގެ ކަންތައް ކުރަން ބޭނުންވާ ތަނެއް ހުންނަންވާ؟

އިންޓަވިއު ކޯޑް:________ ތަން:________ ތާރީޚް:________

މި ސުވާލުގެ ޖަވާބު ރަނގަޅަށް އަންގާރާކުރުމަށްބަޔަކަށް ފޯމު ދެއްކުމަށްފަހު ކިޔައިދީ ގެންދާށެވެ.

ތާރީޚު މަޢުލޫމާތު

މިއީ އަންހެނާއި އަންހެނާގެ އާއިލާގައި ހިމެނޭ އަނެއް މެމްބަރު. - ފޯމު ދައްކާށެވެ.

އަންހެނާ ފެނުނީ ކިހާދުވަސް ކުރިންތޯ؟

ތިޔަ ފަރާތުން މަސްއޫލިއްޔަތު ކަމަށް ފެނުނީ އަންހެނާގެ ކިހިނެއް އެއްވެސް ބައެއް އަހަރެމެން އެއްކަލަ ކުރެވުނުތޯ؟

އާނ ނުވަތަ ނޫން، މި ބައެއް ކަމެއް ހިނގާފައިވޭތޯ؟

މަހުގެ ދުވަހު އުޅެނީ އަންހެނާ ފެނުނީ ކިހާވަރަކަށް ކުރެވޭތޯ؟

އާއިލީ މަޢުލޫމާތު

ބައެއް ފަހަރު އަންހެނާ ފާޑުން ކިޔާ އަހަރުމެން އަންހެނާ ޖަވާބު ދިނުމެވެ.

އަންހެނާ ފާޑުން ކިޔާ ބުނެފައިވާ ކަމެއް ކުރެވޭތޯ؟

ފެނުނީ ކޮންބައެއްކަން ކުރެވޭތޯ؟

އަންހެނާ ފެނުނީ ކޮން އަހަރެއްގައި ކުރެވޭތޯ؟

ތިޔަ ފަރާތުން މަސްއޫލިއްޔަތު ކަމަށް ފެނުނު އަންހެނާގެ އަހަރެމެން އެއްކަލަ ކުރެވުނުތޯ؟

އާނ ނުވަތަ ނޫން، މިހާރު ފެނުނީ އަހަރު އާއި މިހާރު ބައެއް ހިނގާފައިވޭތޯ؟

ތިޔަ ފަރާތުން މަސްއޫލިއްޔަތުކަމަށް ފެނުނީ އަންހެނާ ފެނުނު ކިހާދުވަހެއް ކުރެވޭތޯ؟

މިހާރު މަސްވެރިކަންކުރާއިރު އެންމެ ފެންނަނީ ކިހާ އާންމުކޮށް ހެއްޔެވެ؟

އެންމެ އަޅަން މަސްދަތުރުގައި ގެއްލޭ އެއް ފެނުނީ ހެއްޔެވެ؟

އާނ އެކީ ނަމަ، ކޮން ވައްތަރެއްގެ މަސްދަތުރުގައި ގެއްލުނު އެއްޗެއް ހެއްޔެވެ؟

އެންމެ މާ ކަނޑު ތެރެއިން ފެނޭ ހެއްޔެވެ؟

އާނ އެކީ ނަމަ،

ކާ ބޮޑުކަން ހެއްޔެވެ؟

ކޮން ތަނުކަން ހެއްޔެވެ؟

ތިޔަ ފާހަގަ ފެނުނީ ކިހާ މުއްދަތެއް ހެއްޔެވެ؟

ދުވަހު އެންވިރޮން ކުރާއިރު އެންމެ ފެންނަނީ ހެއްޔެވެ؟

އާނ އެކީ ނަމަ،

އެއީ ކޮންބާއެއްކަން ހަނދާން އެބަހުރި ހެއްޔެވެ؟

ގޮނޑުހަނ

އެންމެގެ މަސްވެރިކަން އެއްވެސް އިޚްތިޔާރެއް ދިވެހިރާއްޖޭގައި ކޮންފަދަ ކަމެއް ހެއްޔެވެ؟

އާނ އެކީ ނަމަ،

އެންމެގެ މަސްވެރިކަން ކޮންފަދަ ކޮންކަމަކަށް ހެއްޔެވެ؟

ބޮޑަށް ހިތާމަ އެންމެ ހެއްޔެވެ؟

އިންޓަވިއު ކޯޑް:________ ރަށް:________ ތާރީޚް: ________

މަސްވެރިކަން ކޮށް އުޅޭ އިރު ގަސްތުގައި ނުވަތަ އޮޅިގެންވެސް [illegible] ބޭނޭ ހެއްޔެވެ؟

އާން، އެހެން ނަމަ: [illegible] [illegible] [illegible] [illegible] ހެއްޔެވެ؟

މި [illegible] މަސްވެރިކަން [illegible] [illegible] [illegible] [illegible] [illegible] ހެއްޔެވެ؟

މި މަސްވެރިކަން ކުރާ އިރު ބޭނުން ކުރާ އިރު [illegible] [illegible] ހެއްޔެވެ؟

[illegible] [illegible] މި [illegible] [illegible] [illegible] ހެއްޔެވެ؟

[illegible] [illegible] [illegible] [illegible] [illegible] ހެއްޔެވެ؟

[illegible] އާއި [illegible] [illegible] ހިސާބު

މި [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] ހެއްޔެވެ؟

އާން، އެހެން ނަމަ [illegible] [illegible] [illegible] [illegible] މި [illegible] [illegible] ހެއްޔެވެ؟

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] ހެއްޔެވެ؟

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] ހެއްޔެވެ؟

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]؟

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] ހެއްޔެވެ؟

ތާރީޚް: _____ ނަން: _____ ސޮއި: _____

ތިއަށް ފެނުނީ ކާބަފާ ކުރި ގޮތަށް ކަންކަން ހިނގައްޖެނަމަ ކުށްވެރިވާނެ ފަރާތް ކާކުހެއްދެ؟

ފަރާތްތަކުގެ ދެމެހެއްޓުން

ކާބަފާ ކަމާ ގުޅުންހުރި ފަރާތްތަކާ ދެމެހެއްޓުމަށް ކުރިއަރާ ގޮތް، ކަންކަމުގައި ބައިވެރިވާ ގޮތް ކިހާ ދުރަކަށް ހިނގާ؟

ކުށް ވެސް ނުކުރާ، ތިއަށް ފެނުނީ ކަމެއްގައި ހައްގު ލިބިގެންވާ ފަރާތަކަށް ކިހާ ގޮތަކަށް ދަންނަވާ؟

ކުށްވެރިކަމާ ފަރާތްތަކުގައި ދެމެހެއްޓުމަށް ދަށް ތަކެއްޗަކަށް ކިހާ ގޮތަކަށް ދަންނަވާ؟

ތިއަށް ފެނުނީ ތަކެއްޗަކަށް ތަކެއްޗަކާ ދެމެހެއްޓުމަށް ލަދުވެތި ކަންކަން ދެކެ ކިހާ ގޮތަކަށް ދަންނަވާ؟

ތިއަށް ކިހާ ގޮތަކަށް ދަންނަވާ؟_____

އިންޓަވިއު ކޯޑް:________ ތަން:________ ތާރީޚް:________

<u>ފަރު ކޮލިންޒް</u>

އިތުރަށް ލިޔަ ފެށުމަށް ކިޔާ ދުވަސް އެއްވެސް އެއްޗެއް އުނދަގޫ ހުއްޓޭތޯ؟

ލިޔަ ފެށުމުން އަވަސްކޮށް ކިޔުން ސިފަވެއް އުނދަގޫ ހުއްޓޭތޯ؟

މި ދިރާސާގައި ބައިވެރިވުމުން މި ދިރާސާގައި ބައިވެރިވާން އެދުނު މީހެއް އަށްދެހުއްޓޭތޯ؟

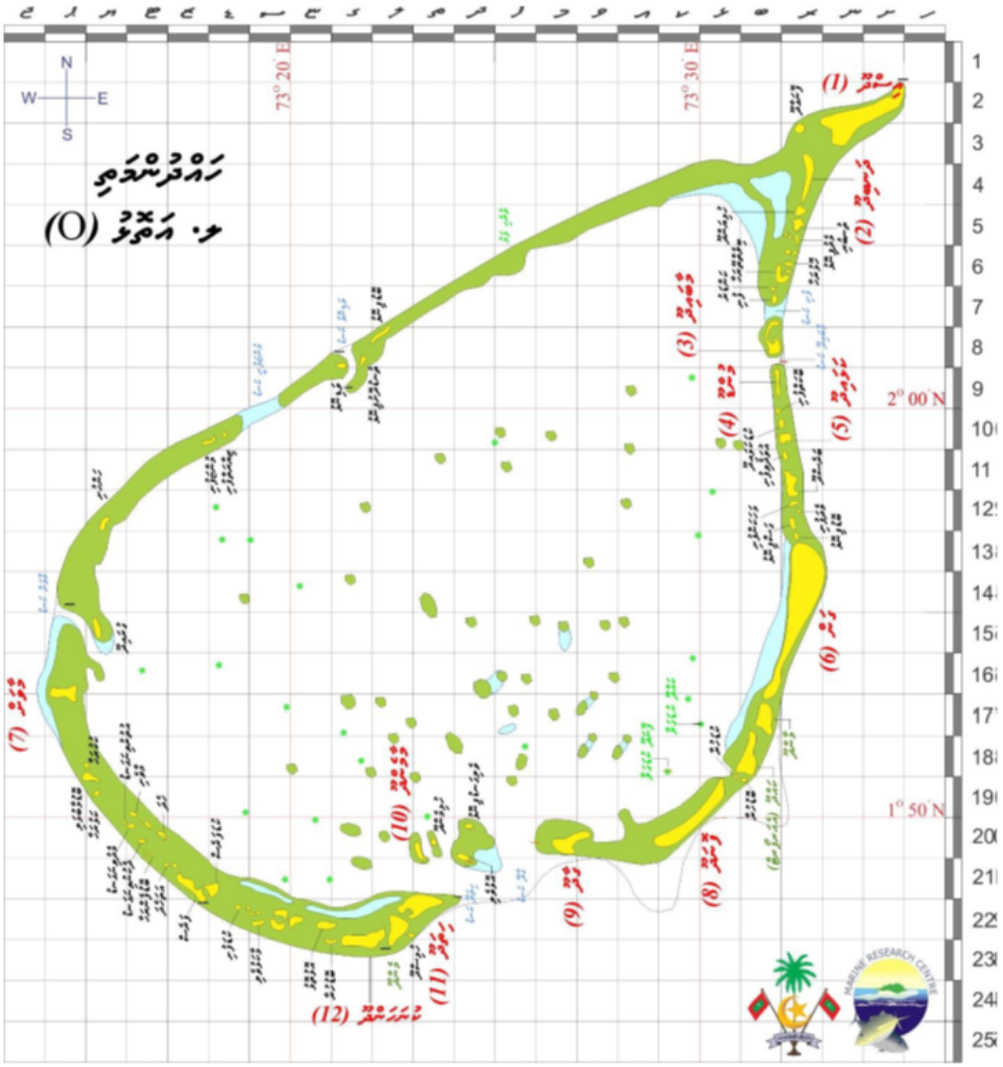
މި ސުވާލުތަކަށް ޖަވާބު ދިނުމަށްޓަކައި ހުރި ކޮންމެ ފަރުވާ ކޮށްދެއްވި ބޮޑު ޝުކުރިއްޔާ! މި އިންޓަވިއު ފައިބަރުން އަދުގަނޑު ބަހައިގެން ލިޔަ ފެށުން ދެއްވާ ހުރިހާ މައުލޫމާތު އެއްވެސް ފަރާތަކާ ހިއްސާ ކުރާނުވާނެ ސިއްރުކޮށް ބަލަހައްޓާނެއެވެ. މި ދިރާސާގައި ބައިވެރިވުމަށް ލިޔަ ފަރާތުގެ އެއްވެސް އިއުތިރާޒެއް ނެތްކަމަށް ފާހަގަކުރަމެވެ.

ސޮއި

ތާރީޚް

____________ ____________

އަންގަވައިދީ ބައި އެއްވެސް ސުވާލެއް އޮތްނަމަ މަސައްކަތް ބޭނުންވެއްޖެ ކުރިއަށް ގެންދާ މަސްއޫލުވެރި ބައި އެއްވެސް ކަމަކާ ސުވާލެއް އޮތްނަމަ ފޯމު އަތުގައި މަސައްކަތް ބޭނުންވާ ލިޔާ ގުޅުއްވުން އެދެމެވެ.


N
W
E
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73° 20 E
73° 30 E
2° 00 N
1° 50 N
(1)
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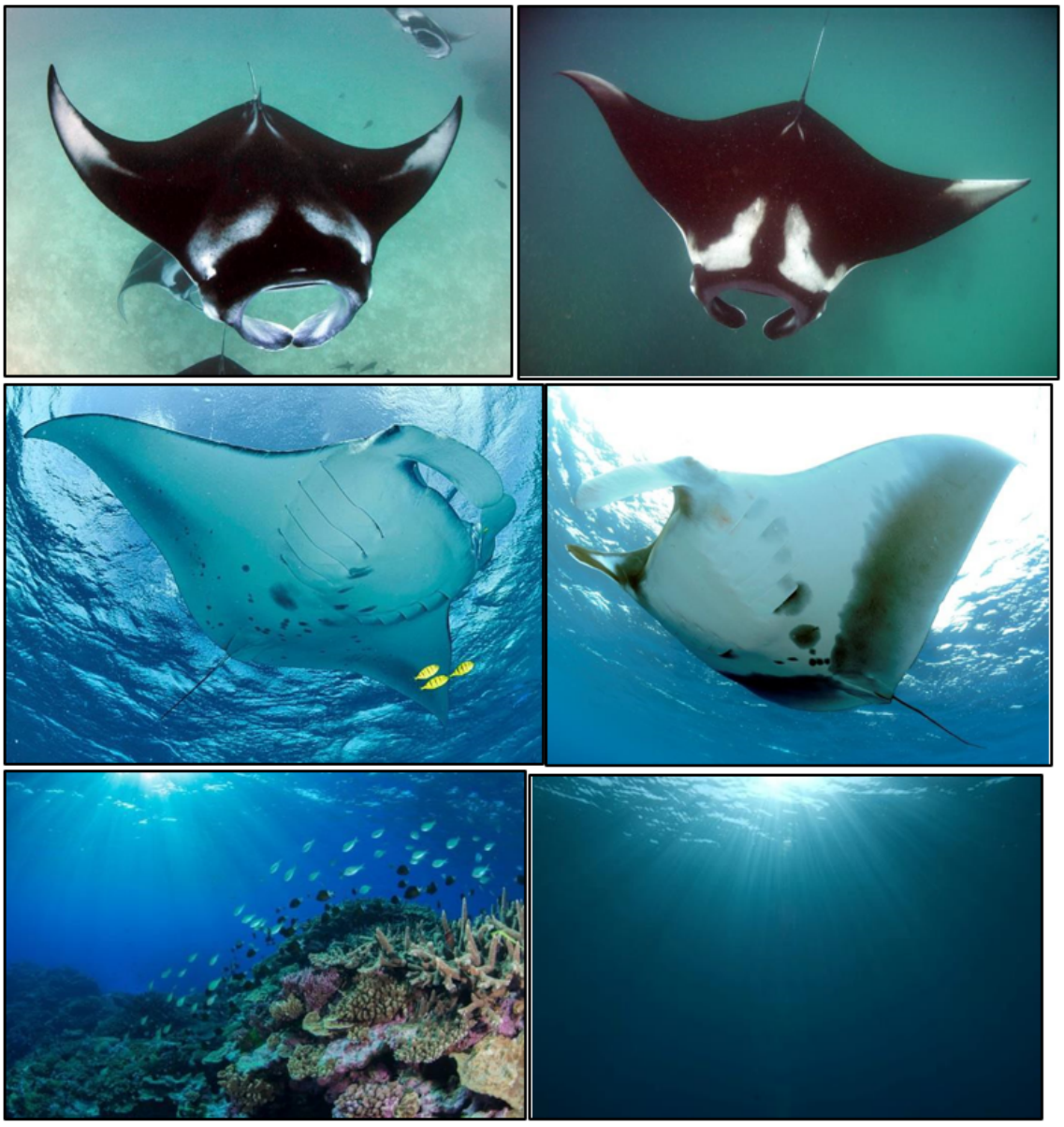
(5)
(6)
(7)
(8)
(9)
(10)
(11)
(12)

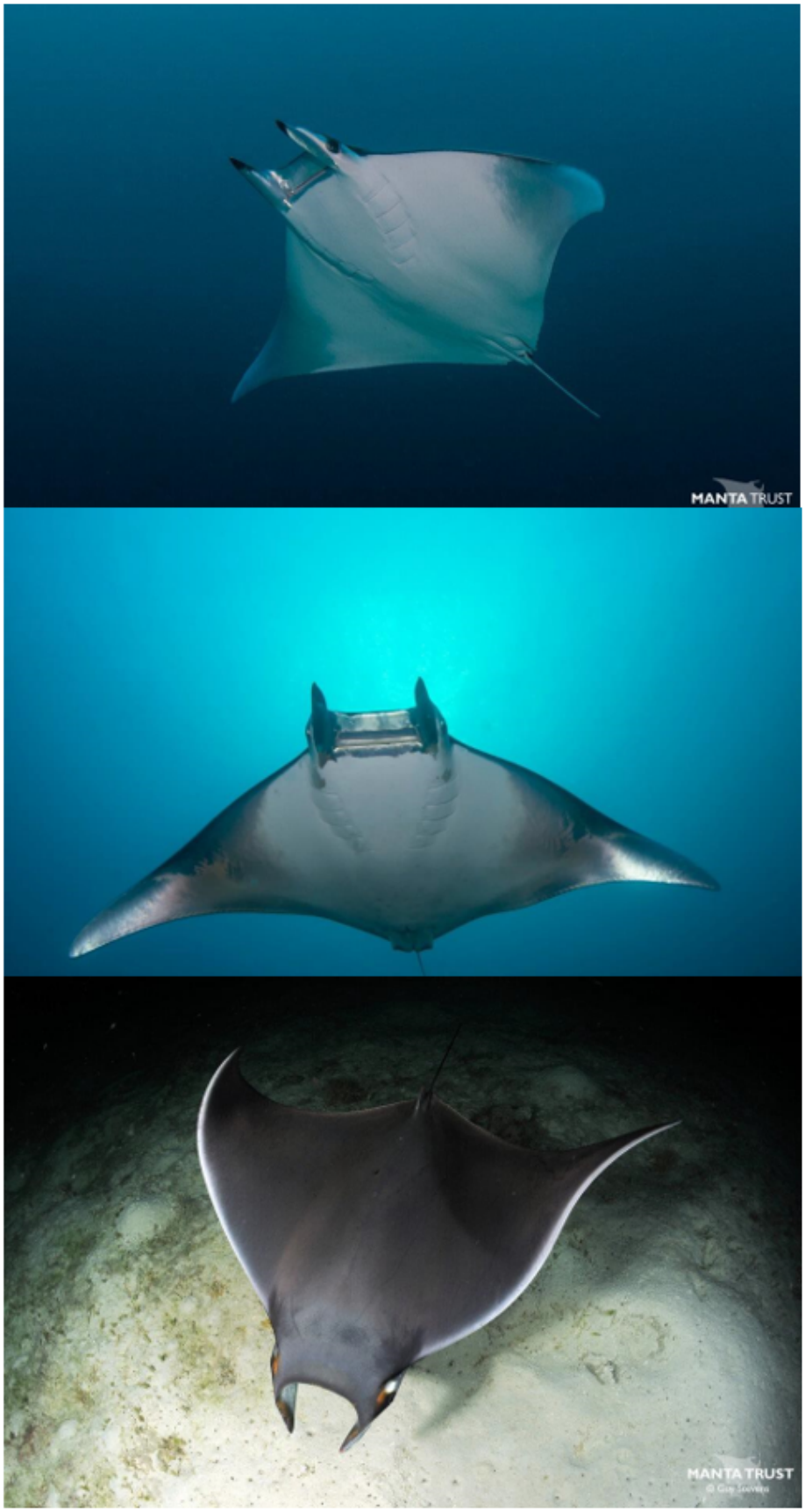
ކަނޑު ތުންފަށ

ފުޅާ ދިގުމިން 4.5

ކަނޑު ތުންފަށ

ފުޅާ ދިގުމިން 6.8

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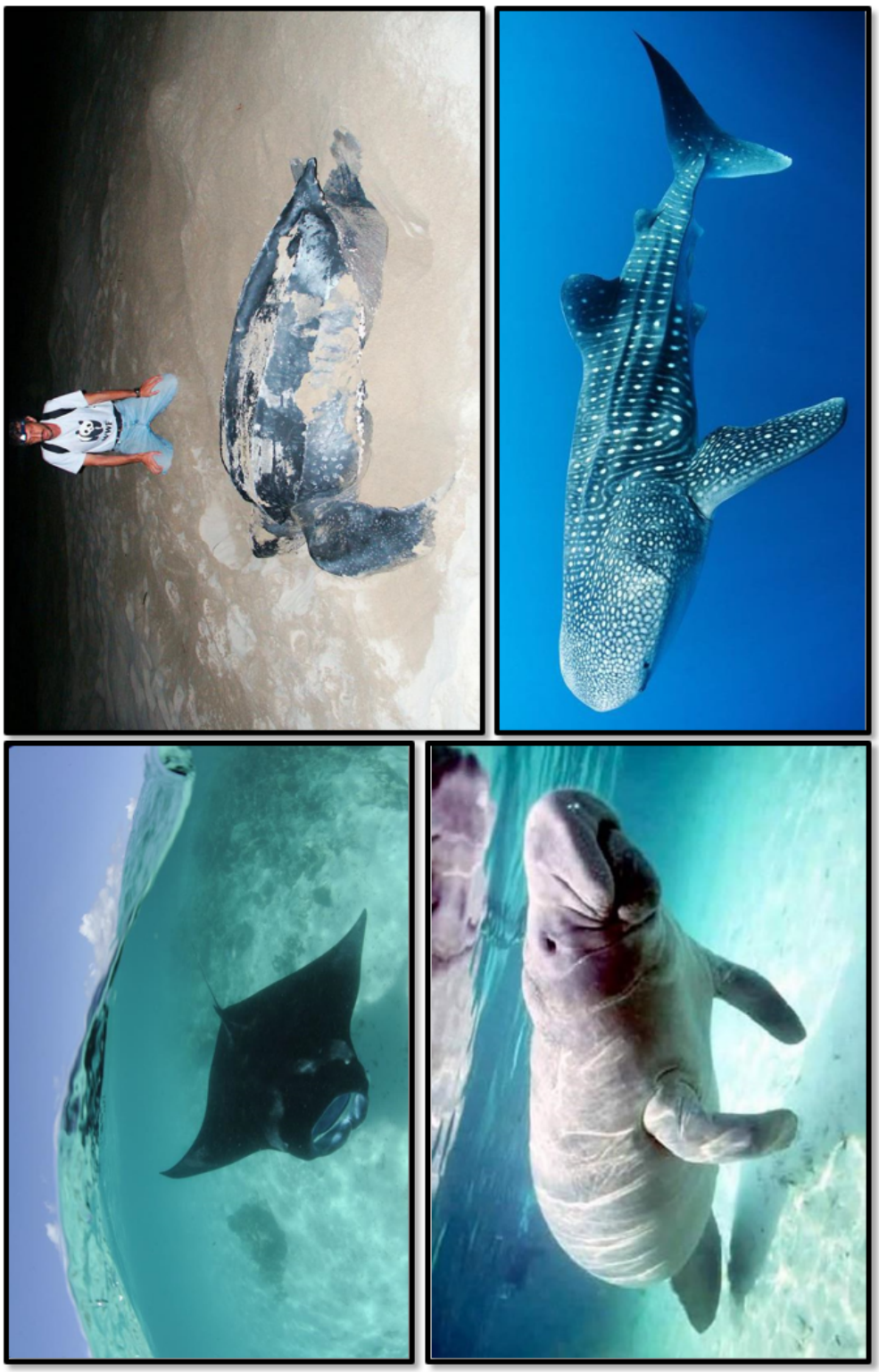


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Appendix B: Questionnaire used in present study, focusing on LEK of both fishers and divers on whale sharks and oceanic manta rays

ތާރީޚް: _____ ތަން: _____ ތިރީގައި: _____

ގަސްތުވެރަދުގެ ތަފްސީލު

ތުދުނުން ކިހާވަރުވެގެންތަ؟

ގަސްތުވެރަދުގައި/ ހެދިފުގަ ތުއްތަ ތަނަކުން ހަނގުރާމަ ހެދިއްޖެތަ؟

ފާހަގަކުރާ ގަސްތުވެރަދުގަ/ހެދިފުގަ ތުދުން ކިހާވަރުތަ؟

ތުންދުގައި ގަސްތުވެރަދުގެ / ހެދުގެ ކުރިން ކިހާ ތަނަކަށް ދާތަ؟ (ތަކުދު)

ގަނޑުގެ ތެދުގަ ކަނޑަގެ ތުންދުގައި ތުދުން ކިހާ ތަނަކަށް ދާތަ؟ (ފިނގަ / ހެދު ކުރިން)

5-10

10-20

+20

ތުންދުގައި ކަނަ ކަންތައް ގަސްތުވެރަދުން ކިހާ ތަނަކަށް ދާތަ؟

ތުންދުގައި ބޮޑު ގަދަ ގަސްތުވެރަކުންގެ ފަރާތުން ތަކުލީފު ތަދުވާ ތަނަކަށް ދާތަ؟

ތުސ ތުއްތ ތަނަ:

ފ ތަނުގ ތަކ ކަންތައް ކިހާ ތަނަކަށް ދާތަ؟

ފ ތަނުގ ތަކ ތެދުގ ކިހާ ތަނަކަށް ދާތަ؟

ގަސްތުވެރަކުންގެ ތަކުލީފު ގަސްތުވެރަދުގ ތަތުގ ތުދުން ތުއްތ ތަނަކުން ތަކުލީފު ތަދުވާ ތަނަކަށް ދާތަ؟

ތުސ ތުއްތ ތަނ ގަސްތުވެރަދުގ ތަތުގ ތުދުން ތަކ ތަނ ކަންތައް ކިހާ ތަނަކަށް ދާތަ؟

ލ ގުދާގެ ތެދުވ ތަނަވަހަށ ތަކުރީގައިވާ ފަދައިން ހަދައިގެން ދާނެ ގޮތް ބަޔާންކުރައްވާ.

ތަކުރާރު ކުރުމުގެ ގޮތް

ލިޔެ ހުށަހެޅުމުގެ ކުރިން ހަނދާންކުރަންވީ ކަންތައް. (ފަސް ފަރާތްތެރި)

ހުށަހެޅުމުގެ/ފުރިހަމަ ކުރުމުގެ ކުރިން ކުރަންޖެހޭ ކަންތައް ކޮބައިކަމަށް ދަންނަވަންތޯ؟ (ތަކެއް)

ކަނޑައެޅުނު ތާރީޚު / ގަޑިއިން ބޭނުންކުރަން ހުށަހެޅުމުގެ /ފުރިހަމަ ކުރުމުގެ ކުރިން ކުރަންޖެހޭ ކަންތައް ކޮބައިކަމަށް ދަންނަވަންތޯ؟

(ތަނަވަސްކުރުން/ ފާސްކުރެވޭނެ ގޮތަށް ބަދަލުކުރުން / ބަލައިގަތުން / ވަކިކުރުން / ލަދުކުރުން / ހުށަހެޅުމުގެ ތާރީޚު ދުވަހު ފާހަގަ ކުރުން.)

ފާސްކުރެވޭ ހުށަހެޅުމުގެ/ފުރިހަމަ ކުރުމުގެ ކުރިން ކުރަންޖެހޭ ކަންތައް ކޮބައިކަމަށް ދަންނަވަންތޯ؟ (ލިޔުންތަކާ ގުޅިގެން ކަންތައް ކުރަންޖެހޭ ގޮތް ބަޔާންކުރައްވާ.)

ބަލައިގަތުން ހުށަހެޅުމުގެ /ފުރިހަމަ ކުރުމުގެ ކުރިން ހަދަންޖެހޭ ކަންތައް ބަލައިގަންނަވާ.

ހުށަހެޅުމުގެ/ފުރިހަމަ ކުރުމުގެ ކުރިން ހަދަންޖެހޭ ކަންތައް ކޮބައިކަމަށް ދަންނަވަންތޯ؟

ފުރިހަމަ ކުރުމުގެ ކުރިން ކުރަންޖެހޭ ކަންތައް

ފުރިހަމަ ކުރުމުގެ ކުރިން ކުރަންޖެހޭ ކަންތައް ކޮބައިކަމަށް ދަންނަވަންތޯ؟

ހުށަހެޅުމުގެ ފުރިހަމަ ކުރުން

ހުށަހެޅުމުގެ ކުރިން ކުރަންޖެހޭ ކަންތައް ކޮބައިކަމަށް ދަންނަވަންތޯ؟

ތާރީޚު ދުވަހު ފާހަގަ ކުރުން

ތާރީޚު ދުވަހު ފާހަގަ ކުރުމުގެ ކުރިން ކުރަންޖެހޭ ކަންތައް ކޮބައިކަމަށް ދަންނަވަންތޯ؟

ތާރީޚު ދުވަހު ފާހަގަ ކުރުމުގެ ކުރިން ކުރަންޖެހޭ ކަންތައް

ތާރީޚު ދުވަހު ފާހަގަ ކުރުމުގެ ކުރިން ކުރަންޖެހޭ ކަންތައް ކޮބައިކަމަށް ދަންނަވަންތޯ؟

ތާރީޚު ދުވަހު ފާހަގަ ކުރުމުގެ ކުރިން ކުރަންޖެހޭ ކަންތައް

ތިބަ ފަރާތުގެ ފަސޭފަރާތަކުން / ޢާއިލާ ތެރެއިން ތާށިވެ/ތާށިވެރި ވިސްނަވަރެއް ހޯދުމަށް ހުށަހަޅާ ލިޔުން ހުށަހަޅާ ތާރީޚު

ފާހަގަ ފަސޭފަރާތުގެ ނަން / ޢާއިލާ ތާށިވެ /ތާށިވެރި ވިސްނަވަރެއް ލިބުމަށް ހުށަހަޅާ ތާރީޚު

ތާށިވެ/ތާށިވެރި ތާށިކަމުގެ ސަބަބު ދެނެގަތުމަށް ކުރިން ކުރެވުނު ބަދަލުތައް

ތާށިވެ/ތާށިވެރި ފ ކަމަށް ބަލައިގަތް ތާރީ

ތާށިވެ/ތާށިވެރި ގެ ކަމަށް ބަލައިގަތް ތާރީ

ތާށިވެ/ތާށިވެރި ގެ ކަމަށް ބަލައިގަތް ތާރީ

ތިބަ ފަރާތުގެ ވިސްނަވަރެއް ލިބުމަށް ހުށަހަޅާ ތާރީޚު

ތާށިވެ/ތާށިވެރި ތާށިކަމުގެ ސަބަބު / ޢާއިލާ / ތަފާތުވާ ފަރާތުން ތާށިވެ/ތާށިވެރި ވިސްނަވަރެއް ލިބުމަށް ހުށަހަޅާ ތާރީޚު

ތާށިވެ/ތާށިވެރި ތާށިކަމުގެ ސަބަބުން ދުއްވި ސަފަރީ ތާށިވެ/ތާށިވެރި ފަރާތަކުން ކަނޑައެޅި ދުވަސް ގުނާ ގޮތުގެ ތެރެއިން ތާށިވެ/ތާށިވެރި ގެ ކަމަށް ބަލައިގަތް ތާރީ

ތާށިވެ/ތާށިވެރި ތާށިކަމުގެ ސަބަބުން ދެވުނު ބަދަލުތަކުގެ ތެރެއިން ތާށިވެ/ތާށިވެރި ގެ ކަމަށް ބަލައިގަތް ތާރީ

ތާށިވެ/ތާށިވެރި ތާށިކަމުގެ ސަބަބުން ދެވުނު ބަދަލުތަކުގެ ތެރެއިން ތާށިވެ/ތާށިވެރި ގެ ކަމަށް ބަލައިގަތް ތާރީ

ފ ކަމަށް ބަލައިގަތް ތާރީ

ތާށިވެ/ތާށިވެރި ތާށިކަމުގެ ސަބަބުން ތާށިވެ/ތާށިވެރި ވިދާލާ ދުވަސް ތާށިވެ/ތާށިވެރި ފަރާތަކުން ދެވުނު ބަދަލު

ގެ ކަމަށް ބަލައިގަތް ތާރީ

ތާށިވެ/ތާށިވެރި ކަންކަން ކުރެވުނު ގޮތް ތާށިވެ/ތާށިވެރި ވިދާލާ ތާރީ

ތާށިވެ/ތާށިވެރި ވިދާލާ /ތާށިވެރި ތާށިކަމުގެ ސަބަބު ދެނެގަތުމަށް ކުރެވުނު ބަދަލު

ތާށިވެ/ތާށިވެރި ދެމެހެއްޓުމަށް ކުރެވުނު ބަދަލު (ކާރު، ދަނޑު، ފާރުގަނޑު، ތަކެތި)

ލިބުނު ހިދުމަތް/ ހިންގި ކަންކަން ހާލުގައި؟

ކާފަރުން އަންހެނުން އަދި ފިރިހެނުން ބޭނުން ކުރަނީތޯ؟

މަސްވެރިކަން ކުރާ އުޅޭ އިރު ގަސްތުގައި ނުވަތަ ޙާދިސާއެއްގައި އަންހެނުން/ފިރިހެނުން   ބޭނުން ކުރައްވަނީ؟

އާން، އެކި ނަމަ: ކޮންވައްތަރެއްގެ މަސްބާނަން ގެންގޮސް އާލާތެއްގައި ހުއްޓުވީ؟ މިކަމަށް ބޭނުންކުރި ސާމާނު އަދި ވެސް އެބަ ހުރިތޯ؟ ދައްކާލެވޭނެތޯ؟ (ފޮޓޯ)

މި ވައްތަރުގެ މަސްވެރިކަން ކުރުމުގައި ތަފާތު ވައްތަރުގެ އާލާތް ބޭނުން ކުރަންހުއްޓުވީ؟

މި މަސްވެރިކަން ކުރާ އިރު ބޭނުން ކުރާ އިރު ކޮންވައްތަރެއްގެ އެއްޗެ ހުއްޓުވީ؟

އާންމުކޮށް އަންހެނުން /ފިރިހެނުން   މި ވައްތަރުގެ އާލާތްގައި ބޭނުން ހުއްޓުވީ؟

އަންހެނުން/ފިރިހެނުން   އެއް ބޭނުމެއްގައި އަމަލު ކުރަނީ ކިހިނެއްހެއްޓުވީ؟ (މަސް، ވާ، އުރަހަ ބޭނުން ކުރާ އުޅަނދު ކިހިނެއްތޯ؟)

އަންހެނުން އާއި ބައްޓަންވުން އާންމުކުރުގެ ހިއްސާ

މި ދިރާސާގެ ކުރިން މަސްވާ ޕްރޮސެސިންގ / މާލީ ޚިދުމަތް ދިނުމަށް ހިތްވާ ސްޓޯރު މަސައްކަތް ކުރާ ތަރުތީބުކުރުން ގޮތުގައި /ފިރިހެނުން މަސައްކަތްތަކަކުން އެހީވެދެއްވީ؟

އާން، އެކި ނަމަ ތިޔަ ފައިސާ އާމްދަނީ ވަރަކަށް މި ތަރުތީބުން ކުރަނީ ކިހިނެއްތޯ؟

ދިރާސާ ކުރާ ފައިސާތަކަށް ކުރާ މަސައްކަތުގައި ދެމުން ތިޔަ ފައިސާގެ ހިއްސާ ކިހާ ވަރެއްތޯ؟

ސަރުކާރުންނާއި ދިރާސާކުރާމީހުން މަސައްކަތުގެ ވެރި ބަޔަކު ދީފައިވާ ހިސާބު ވަރަކަށް ހުއްޓުވީ؟

ދިރާސާ ކުރާމީހުން ކުރާ މަސައްކަތުގެ ބައި ގޮތުން އިތުރަށް ދަސްކުރަން ބޭނުންތަ؟

ތަރައްޤީގައި އަންހެނުން/ފިރިހެނުން   ހިއްސާ ކުރާ މަސައްކަތްތަކުން ތިޔަ ފައިސާ ވަކި ކޮންފަދައެއް ހުއްޓުވީ؟

ތިޔަ ފައިސާގެ އާމްދަނީ އާއި އެކު އަންހެނުން/ފިރިހެނުން   އާއި އެކު ވަނަން ލިބިފައިވަނީ ކިހިނެއްތޯ؟

މަސްވެރިންގެ/ ދަނޑުވެރިންގެ ހިއްސާ

ރާއްޖޭގައި އެއްވެސް ކަހަލަ ގާނޫނެއް ނުވަތަ ގަވާއިދެއް، އުސޫލު/ފުލުސީ ބާރުލާ ބައިވެރިވުން ހިފަހައްޓާކަށް އަންގައިދެއްވާތޯ؟

އާނ އެކޭ ނަމަ، ކިހާ ފަރާތަކުން އެކުލަވާލާ ގޮތުގައި މި ގާނޫނާ ގުޅިގެން ބަޔާން ކޮބާ ހުށަހެޅޭތޯ؟

އަންގުވާން މަސްވެރިން އެންމެ ގިނައިން/ފުލުހުން ގެން ދުވަސްބައި ކޮބާ ހުށަހެޅޭތޯ؟ (ކާރިގައި)

(އެންމެގާތް/ ބިރުގަނޑު/ އިހުތިރާމް ކުރުން/ އަމަލު ނުވާ/ ނުކުރޭ)

އަންގުވާން މަސްވެރިން އެންމެ ގިނައިން/ފުލުހުން ގެން ދުވަސްބައި ކޮބާ ހުށަހެޅޭތޯ؟ (މިހާރު)

(އެންމެގާތް/ ބިރުގަނޑު/ އިހުތިރާމް ކުރުން/ އަމަލު ނުވާ/ ނުކުރޭ)

ކިހާ ފަރާތުން ދުވާ ގޮތުގައި އެންމެ /ފުލުހުން ހިމާޔަތް ކުރަން ޖެހޭ ހުށަހެޅޭތޯ؟

އެހެ ކިއްސެ ހުށަހެޅޭތޯ؟________________________

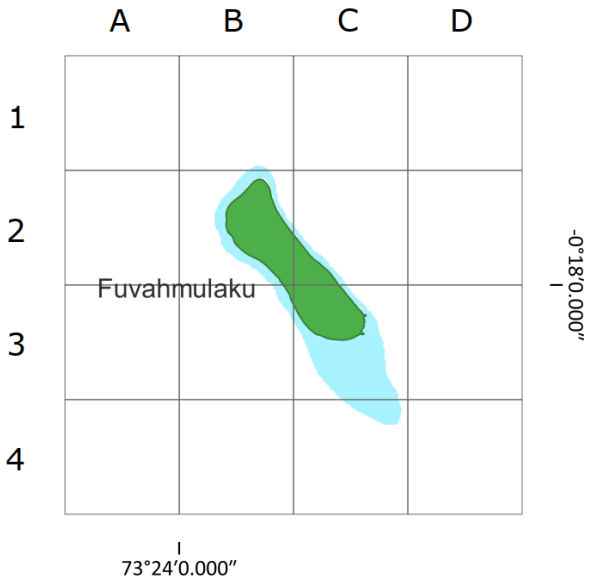
ފަރު ކަނޑުން

ރިޕޯޓް ކިހާ ފަރާތުން ކިޔާ ދުވަ އެއްވެސް އެއްޗެއް ދެކެނީތީ ހުށަހެޅޭތޯ؟

ކިހާ ފަރާތުން އަދުގަނޑަކަ ކުރާ ސާފުވާނެ ދެކެނީތީ ހުށަހެޅޭތޯ؟

މި ދިރާސާގައި ބައިވެރިވުމަށް މި ދިރާސާގައި ބައިވެރިވާން އެދޭ މިހާރު އަންގައިދެއްވާތޯ؟

މި ސާފުކުރުމަށް ޖަވާބު ދިނުމަށްޓަކައި ކަށަވަރުކޮށް ވަގުތު ކަފުން ވަރަށް ބޮޑަށް ޝުކުރިއްޔާ! މި ދިރާސާއަށް ފައިދާވާނެ އަދުވަހަށް ބޭނުންވާ ކިހާ ފަރާތުން ދުވާ ހުރިހާ މައުލޫމާތު އެއްވެސް ފަރާތަކާ ހިއްސާ ނުކުރާނެ މައުލޫމާތެއް ނޫނެވެ. މި ދިރާސާގައި ބައިވެރިވުމަށް ކިހާ ފަރާތުގެ އެއްވެސް އިއުތިރާޒެއް ނެތްކަމަށް ޤަބޫލުކުރަމެވެ.



Map reference: GN
Grid cell Size: 0.025 degrees
Projection: WGS84
Date: 28/02/2022

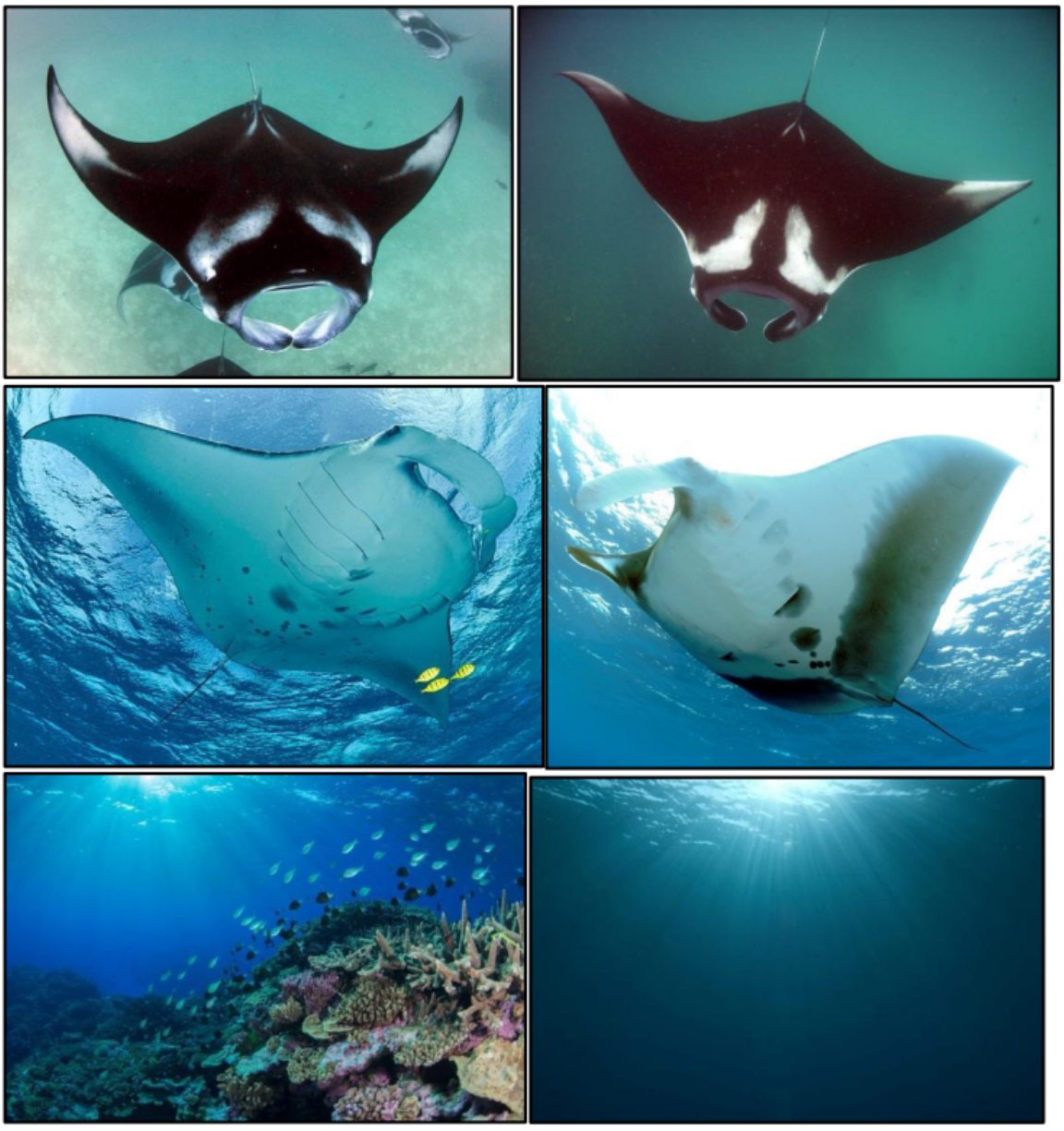
[NOT FOR DISTRIBUTION]

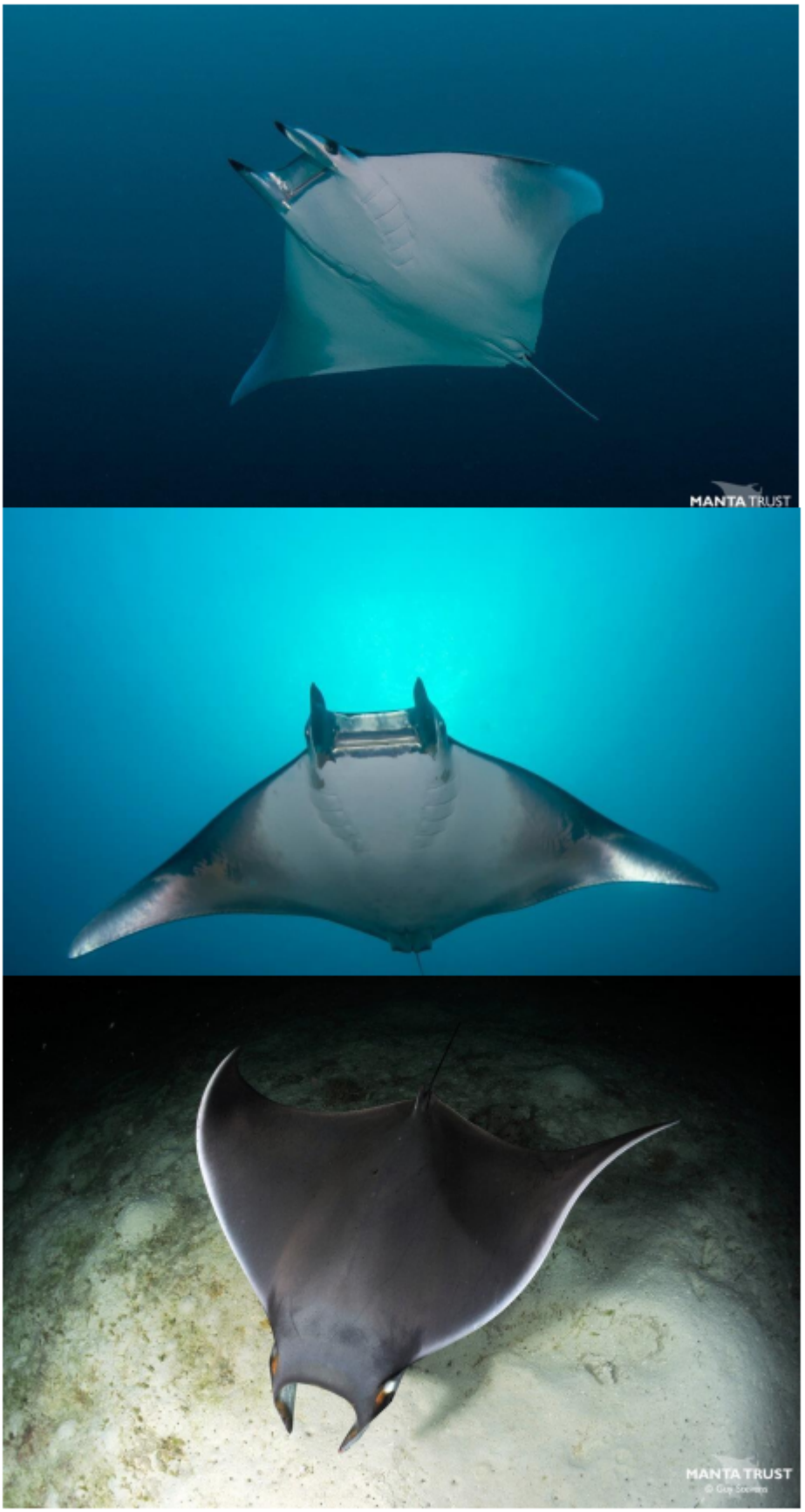
ގަނޑު ތުންފަށ

ފުށުމިނަތަކާ 4.5 ދިގާނ

ގަނޑު ތުންފަށ

ފުށުމިނަތަކާ 6.8 ދިގާނ

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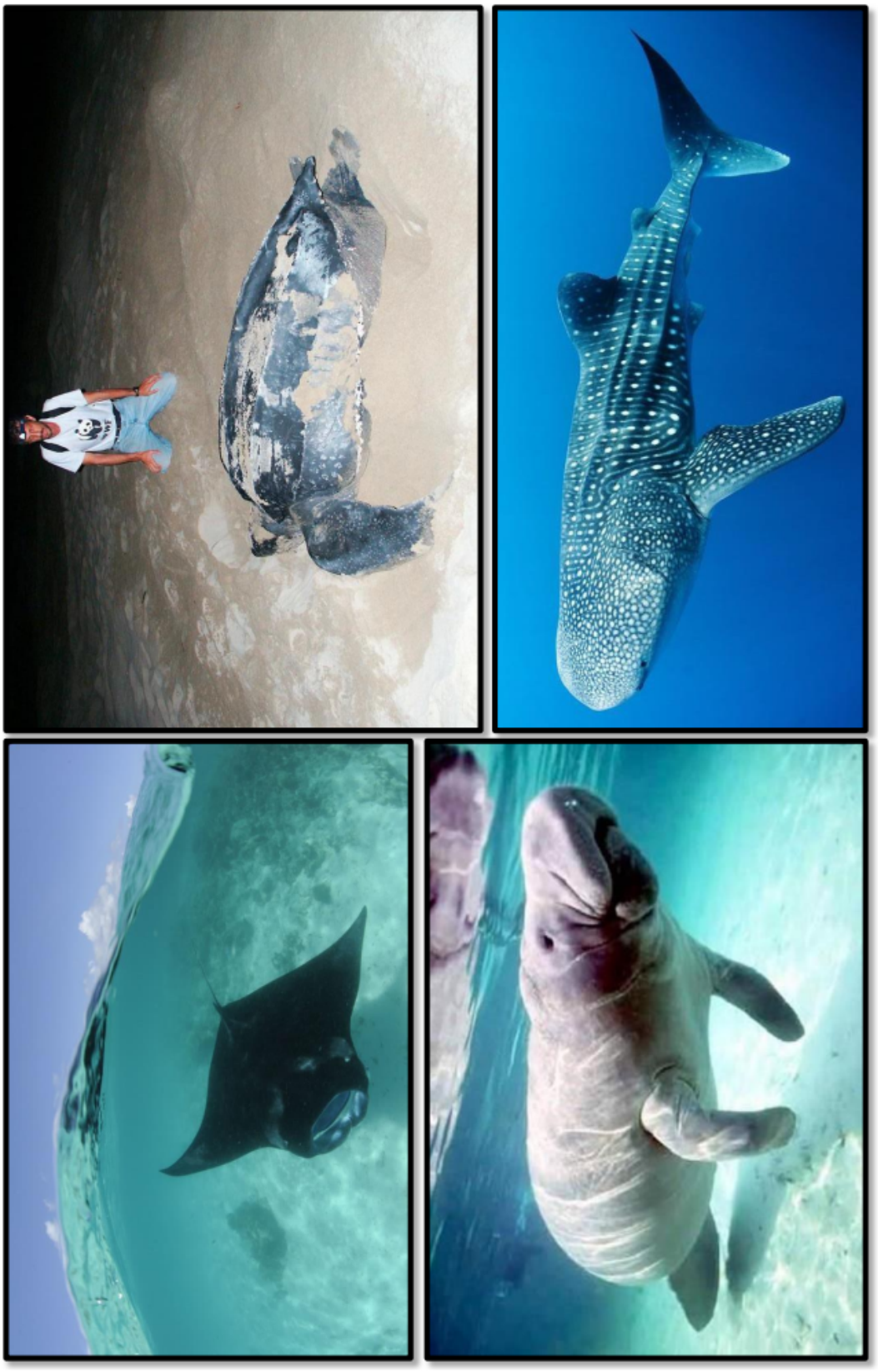


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