

## Final Evaluation Report

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Your Details	
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<b>Project Title</b>	Net loss: Mitigating the impacts of artisanal fisheries on whale sharks in Mozambique
<b>Application ID</b>	18533-2
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<b>Date of this Report</b>	14th December 2018

**1. Please indicate the level of achievement of the project's original objectives and include any relevant comments on factors affecting this.**

Objective	Not achieved	Partially achieved	Fully achieved	Comments
a) Quantify the threat posed by current artisanal fishing practices on threatened marine species.				We successfully conducted interview-based surveys within key fishing communities, as represented by collectives known as CCPs (Community Fisheries Council). The surveys focused on identifying: (a) the fishing gear and techniques employed within that community; (b) whether whale sharks or other threatened fauna were being targeted or caught as bycatch; (c) if there was an established market for those species; (d) quantitative data on catches; and (e) fisher perceptions of the species.
b) Identify any other contemporary human threats.				While whale sharks were not reported to be specifically targeted in Inhambane, line and net fisheries present a significant entanglement risk. Locations of gill nets along the ~200 km of coastline between Závora to Pomene were recorded with a GPS during two aerial survey flights in May 2016 (Figure 5). A transect was flown along the coast in a Bat Hawk LSA at 244 m (800 ft) above sea level at 60 knots and ~300–500 m from the beach.
c) Identify three communities for priority intervention.				Based on the combined results, the three communities that would most benefit from priority intervention are Mahila (Rocha), Morrungulo and Chicuque
d) Collaboration with management authorities.				There were some challenges with inconsistency in the viewpoints of

			<p>senior officials within different government departments and institutions, which hindered both official collaboration opportunities and the project timeline itself. See Section 2 for a full discussion.</p>
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## Background

Whale sharks (*Rhincodon typus*) are sighted all through the year off Praia do Tofo village in the Inhambane province of southern Mozambique. Our first RSG-supported project identified this coast as a globally important feeding area for juvenile whale sharks, with over 700 individuals now documented.

The species was listed as Endangered on the IUCN Red List in 2016. This was partly based on declines documented in Mozambique, with whale shark sightings at Tofo decreasing by 79% between 2005 and 2011, factoring in variation in local environmental parameters. This decline continued from 2011 to the Red List assessment in 2016.

Although whale sharks are also seen in nearby Madagascar, Tanzania, and the Seychelles, our photo-identification has shown limited connectivity among those sites. Despite their well-documented ability to move long distances, as our own satellite-tagging work has demonstrated, juvenile whale sharks are rarely re-sighted in different countries within the Indian Ocean. This strongly suggests that local threats can have a disproportionate impact on their populations if they are at risk within aggregation areas.

Mozambique ranks towards the bottom (181st of 188 countries) of the global Human Development Index. Over two-thirds of Mozambique's population live within 150 km of the coast, and around 50% of their protein intake comes from fish. Gill net use has been increasing in Mozambique since the cessation of conflict in 1992, and nets have been actively distributed by fisheries officials in some areas of the country to move fishing effort away from sensitive inshore nursery habitats. Floating gill nets, extending from the beach to ~200 m offshore, pose a threat to marine megafauna species swimming along this coast. While few formal data have been available, these gill nets are routinely used off the Inhambane coast. At least two whale shark mortalities were observed in this area before 2015, both sighted opportunistically, and entanglements are commonly reported.

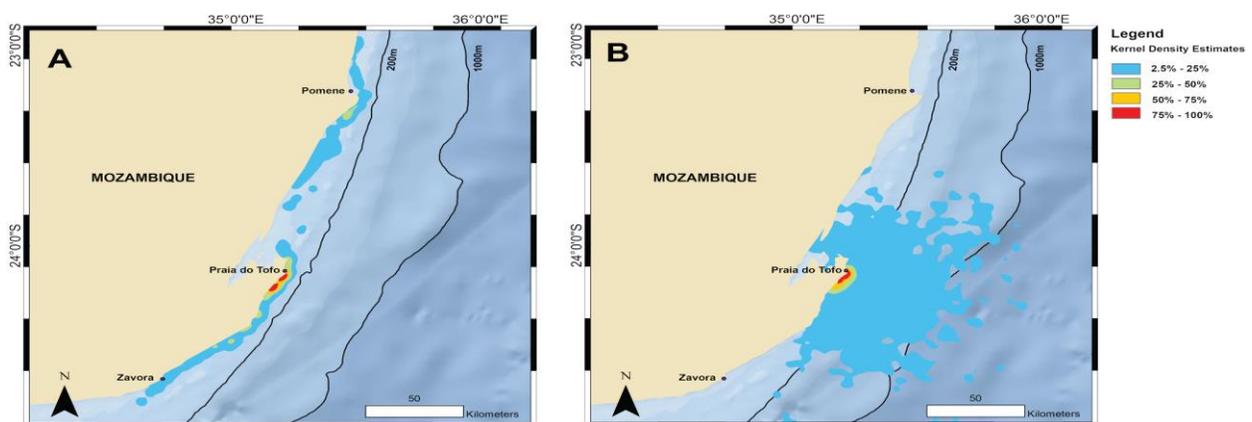
Whale sharks are a valuable focal species in marine tourism off Tofo and adjacent areas. The species received formal protection in Mozambique and, separately, were listed on Appendix I of the Convention of Migratory Species – which requires prohibition of take by signatory countries, including Mozambique – during 2017. This 2nd Rufford Small Grant project was developed to provide quantitative and qualitative information on whale shark catches and to assess the impact of coastal fisheries on other threatened marine species along this coastline.

**a) Quantify the threat posed by current artisanal fishing practices on threatened marine species.**

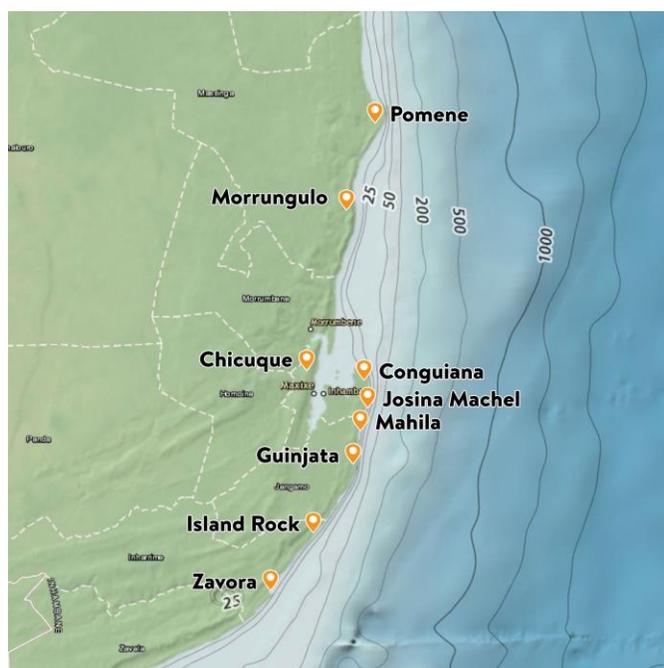
This objective was partially achieved. We successfully conducted interview-based surveys within key fishing communities, as represented by collectives known as CCPs (Community Fisheries Council). The surveys focused on identifying: (a) the fishing gear and techniques employed within that community; (b) whether whale sharks or other threatened fauna were being targeted or caught as bycatch; (c) if there was an established market for those species; (d) quantitative data on catches; and (e) fisher perceptions of the species.

**Location selection**

First, we identified areas of known high whale shark density based on our independent satellite-tagging results (see Figure 1). Figure 1A summarises the results from these tracks, which tested whale shark habitat preferences while correcting for the influence of tagging location. We then selected communities to survey based on: (1) whale shark density in the local area, as identified through satellite-tagging, aerial surveys, and initial 360 degree consultations; and (2) fishing pressure, as identified through aerial surveys and local knowledge. The accessibility of communities was also a consideration in this process, as it would be challenging for us to get interview teams to the most remote areas in the province. Good coverage of the core area was achieved.



**Figure 1.** Kernel density maps. Kernel density estimations from all satellite tag locations for (A) tracked whale sharks and (B) random model sharks. (From Rohner et al. 2018. Satellite tagging highlights the importance of productive Mozambican coastal waters to the ecology and conservation of whale sharks. PeerJ 6:e4161.)



**Figure 2.** Map of fishing survey locations within Inhambane province.

### **Methodology**

Initial 360 degree key informant interviews were conducted with dive centres, lodges and CCP leaders, and focus group discussions with fishers. This included 37 respondents from seven communities: Morrungulo (Bonito Bay), Conguiana (Barra), Mahila (Rocha), Pomene, Zavora, Guinjata and Island Rock. Table 1 summarises these efforts. These communities stretch from the north to the south of the Inhambane province (Figure 2).

These initial assessments allowed the survey team to gather basic data on presence of whale sharks, whale shark catch, fishing practices and perceptions of marine conservation. The results were also useful for identifying challenges and further refining the questionnaire. To prioritise potential communities for direct conservation initiatives we also needed to gather more information on the communities' concerns related to fisheries management, their willingness to engage in marine conservation activities, and to solicit their ideas for improved marine conservation outcomes.

Detailed surveys were then carried out in five communities: Morrungulo, Conguiana (Barra), Chiquque, Josina Machel (Tofo) and Mahila (Rocha). Three complimentary surveys were performed, each tailored to the role of the community member being interviewed (fishers, fish merchants, or community leaders). Survey questions focused on obtaining: (1) a description of fishing gears in use, primary activities and target species; (2) the perceived condition of marine habitats and species' abundance; (3) marine megafauna presence and threats; (4) a description of a typical fishing day for each gear type; (5) the marketing and supply chain for catches; (6) existing management

structures; and (7) current marine conservation problems, their causes and potential solutions.

A snowball approach was used to identify survey participants. We first interviewed the CCP leader of each community, who then directed our staff to fishers and fish merchants. Following interviews, other community members were also asked to introduce our staff to other fishers and merchants. Teams surveyed a total of 71 respondents from the five communities. Fishers made up the majority of respondents, with 6-10 interviews per community. Three to five fish traders were interviewed from each area, and 1-4 community leaders. Table 2 summarises these efforts.

**Table 1. Number of communities and list of respondents during Key Informant interviews and Focus Group Discussions**

	Community Key Informant (CCP, Leader or Fisherman)
	Fisher FGD
	Tourism Business Staff (Dive Centre, Lodge or Hotel)

Province	District	Community	# of Key Informants
Inhambane	Massinga	Pomene	5
			1
		Pomene total	6
	Massinga	Morrungulo	2
			4
		Morrungulo total	6
	Inhambane	Conguiana (Barra)	2
			4
		Conguiana total	6
	Jangamo	Mahila (Rocha)	5
		Mahila total	5
	Jangamo	Guinjata	2
		Guinjata total	2
	Jangamo	Island Rock	8
		Island Rock total	8
	Inharrime	Zavora	2

			2
		Zavora total	4
<b>Total Respondents</b>			37

**Table 2. List of communities and number of respondents during November 2018 surveys, sorted by Province, District, Community, and colour-coded respondent type**

	Community Leader
	Fisher
	Fish Trader

Province	District	Community	# of Respondents		
Inhambane	Inhambane	Conguiana	2		
			9		
			3		
			Conguiana Total	14	
	Inhambane	Josina Machel		4	
				6	
				4	
			Josina Machel Total	14	
	Jangamo	Mahila		1	
				10	
				4	
				Mahila Total	15
		Massinga	Morrungulo		3
					6
				5	
		Morrungulo Total	14		
Maxixe	Chicuque		2		
			9		
			3		
		Chicuque Total	14		
<b>Total Respondents</b>			<b>71</b>		

We chose our focal marine species based on: (1) their threatened status (IUCN classification); (2) their identifiability, to minimise concerns over correct identification; and (3) their known contemporary or historic presence in Inhambane province. We surveyed for catches of whale shark (*Rhincodon typus*), manta ray (*Mobula birostris* and *M. alfredi*), hammerhead sharks (*Sphyrna* spp. combined), bull shark (*Carcharhinus*

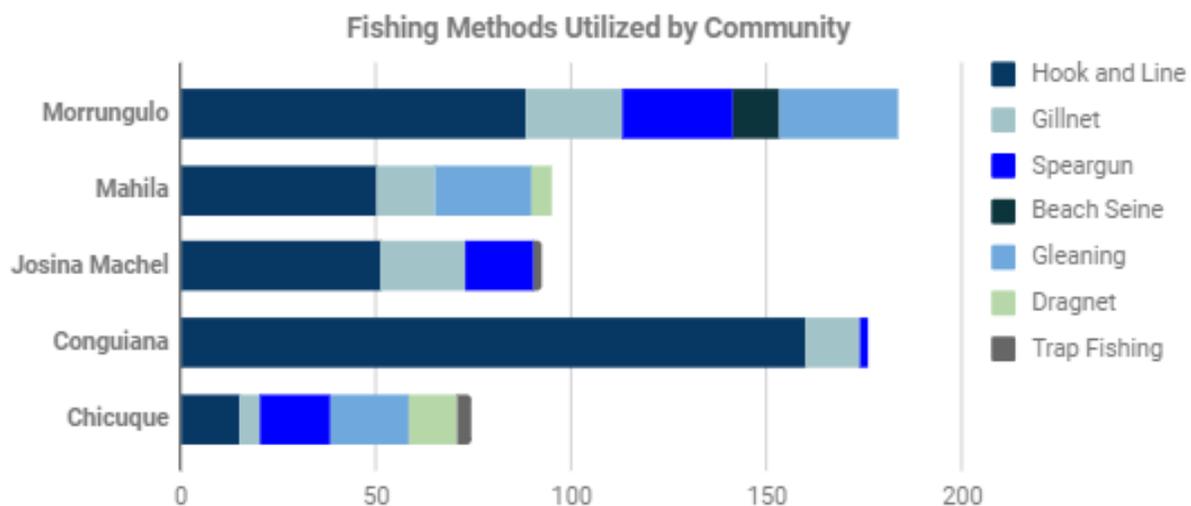
*leucas*), smalleye stingray (*Megatrygon microps*), mobula rays (other *Mobula* spp.), leopard shark (*Stegostoma fasciatum*), sawfish (*Pristis* spp. combined), sea turtles (chelonid species combined), dolphins (delphinid species combined), dugongs (*Dugong dugon*), 'other sharks', and 'other rays'. Results are reported in Table 3.

## Results

Bycatch of whale sharks were reported from all five surveyed communities, when asked directly. There were no reports of whale shark catch during initial key informant interviews in Pomene, Guinjata or Island Rock. In Zavora, the dive centre had never heard of whale sharks being caught. The CCP leader said it has happened in the past, as a result of accidental entanglement in nets, but is rare. These results informed the selection of communities for the second round of surveys.

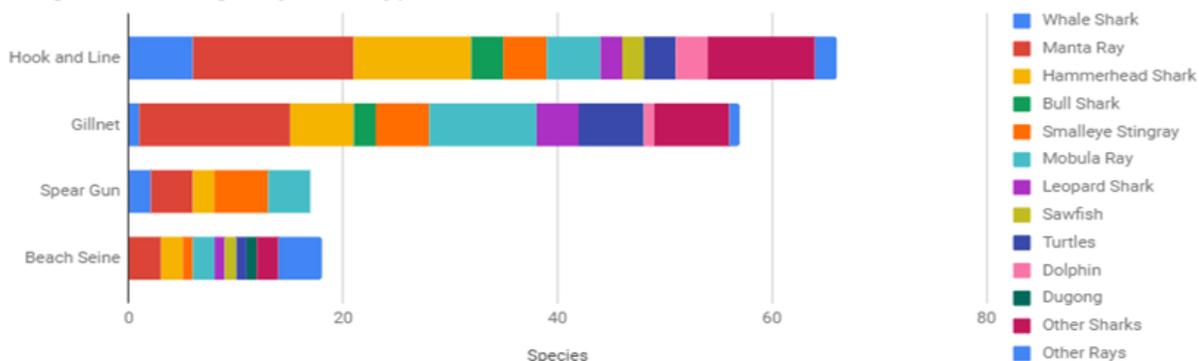
Interviews identified hook and line, gill nets, and spearguns as the most frequently used fishing methods overall (See Figure 3). Whale sharks were not targeted by fisheries, but were reported as an incidental catch using gill net (one), hook and line (six), and spear gun (two). The number in parentheses indicates the number of communities reporting bycatch in the respective gear type.

The gear type most frequently associated with megafauna catch overall was hook and line, closely followed by gill nets. Although gill nets were not reported to catch a large number of whale sharks, they caught significant numbers of manta rays, mobula rays, turtles and 'other' sharks (see Figure 4). Communities reported that manta rays (36) were the most frequently-caught marine megafauna, followed by hammerhead shark (21), mobula rays (21) and other sharks (19).



**Figure 3.** Artisanal fishing pressure by community and by fishing method, as reported by the CCP leaders.

Mega fauna Caught by Gear Type



**Figure 4.** Mega fauna catch by type of fishing method. Note that many reported that mega fauna caught on hook and line were subsequently released.

Species	Community				
	Chicuque	Conguiana	Morrungulo	Josina Machel	Mahila
Whale Shark	0	0-1; med. 0	0-12; med. 0	0-52; med. 0	0-4; med. 0
Manta Ray	0-52; med. 2-4	0-52; med. 0	0-4; med. 0-4	0-52; med. 1	0
Hammerhead Shark	0-12; med. 0	0-1; med. 0	0-12; med. 1	0-12; med. 0-4	0-1; med. 0
Bull Shark	0-4; med. 0	0-4; med. 0	0-4; med. 0	0	0
Smalleye Stingray	0-12; med. 12	0-12; med. 0	0-4; med. 0	0-1; med. 0	0
Mobula Ray	0-52; med. 2-4	0-4; med. 0	0-4; med. 0-4	0-1; med. 0	0
Leopard Shark	0-1; med. 0	0	0-4; med. 0	0	0-1; med. 0
Sawfish	0	0	0	0-1; med. 0-1	0
Turtles	0-12; med. 0	0-1; med. 0	0-4; med. 0	0-12; med. 0	0-1; med. 0
Dolphins	0-4; med. 0	0-1; med. 0	0-4; med. 0	0	0-1; med. 0
Dugong	0-1; med. 0	0	0	0	0
Other Sharks	0-12; med. 0	0-4; med. 0	0-4; med. 0	0-12; med. 1-4	0
Other Rays	0-12; med. 2-12	0-12; med. 0	0-4; med. 0	0-1; med. 0	0

**Table 3.** Mega fauna catches per community per annum, as reported by interviewees. Results are reported as range; median response. 'Don't knows' were excluded from results.

Whale sharks were frequently sighted at Mahila (Rocha), south of Tofo. Focus group participants noted that whale sharks are strong fish, and that if they were accidentally entangled in gill nets they would typically tear the net and escape.

Chicunque reported relatively low sightings of whale sharks with an annual range of sightings from 0-4 and a median annual sighting rate of 0 (Table 3), whereas Morrungulo, Mahila, and Conguiana reported an annual sighting range of 0-364 with a combined median annual sighting rate of 4. Chicunque is located in the Inhambane estuary system, where sightings of whale sharks are low due to lack of appropriate habitat, however Conguiana and Mahila reported that Chicunque fishers travelled to their region to fish (hence their inclusion in surveys).

With an annual sighting range of 0-52 and a median annual sighting rate of 4, Josina Machel (Tofo) respondents reported a lower number of sightings than expected based on their location close to the higher densities of whale sharks. This could be due to limited mobility at sea, as aerial survey results showed higher whale shark densities around Mahila (Rocha) to the south of Tofo, and no fisher respondents in Josina Machel indicated use of a motorised vessel for fishing. Observation shows that there are only one to two outboard motors used by artisanal fishers in Tofo, both exclusively by line fishermen.

Focus group discussions in Conguiana, where megafauna were commonly reported to be encountered, noted that megafauna were targeted in the past but now are only caught incidentally. Previously, smaller whale sharks were taken by gill net and spear fishermen. The change reportedly occurred as a result of the CCP now enforcing prohibitions on the catch of megafauna species as required by law. The group noted that protections for turtles, dolphins and dugongs have been in place for a long time but catch of sharks and rays was only prohibited in 2016. In Conguiana, those who violate these rules are fined (5,000 MZN) by the CCP and prohibited from fishing (15 days).

Similarly, in Morrungulo slightly north, the focus group commented that outside fishermen had indicated they would catch and eat megafauna if it was not prohibited. A general feeling among participants was that the laws and rules that protect megafauna species are not well understood by the community. However, participants indicated that the prohibitions in place and the severe penalties imposed by the Coastal Police are, in effect, working to control the catch of megafauna species.

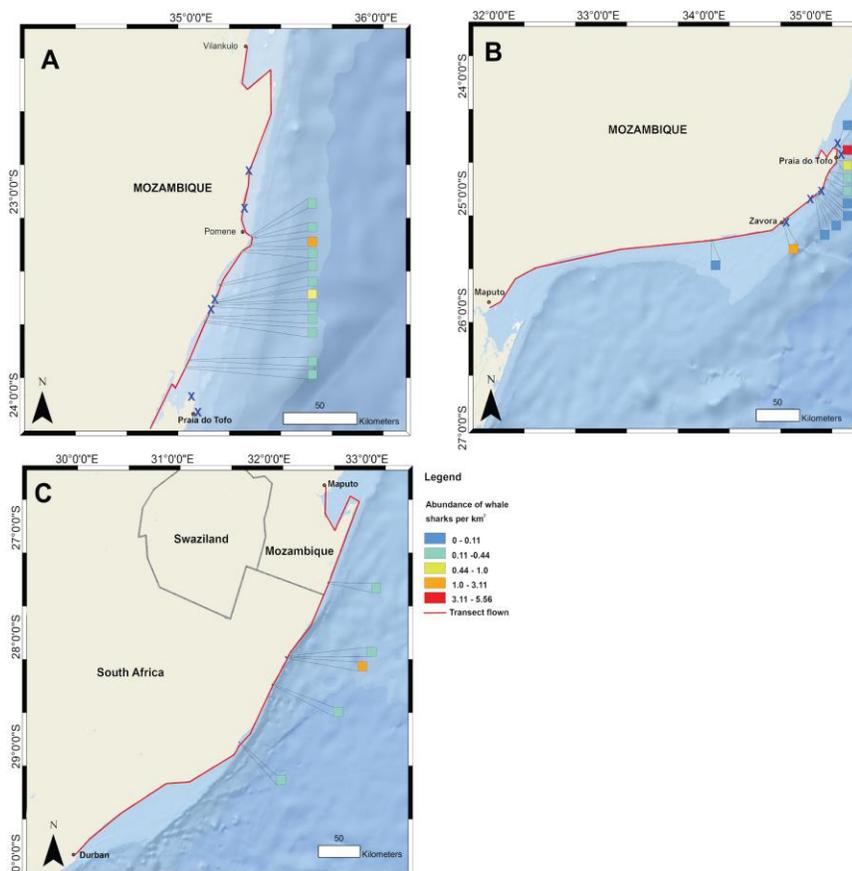
No trade was identified in whale shark products. Local fish traders mentioned that if marine megafauna, such as sharks or rays, were accidentally caught the meat would mostly be sold and consumed locally, however there were also buyers available in larger fish markets. There are large markets located in Chicunque and Massinga which provide suppliers from around the country. Many of the communities are also served by buyers with refrigerated vehicles, which, reportedly, transport fish as far as South Africa.

There was no clear indication that marine megafauna is traded and transported this way at present.

**b) Identify any other contemporary human threats.**

This objective was fully achieved within the priority region. While whale sharks were not reported to be specifically targeted in Inhambane, line and net fisheries present a significant entanglement risk. Locations of gill nets along the ~200 km of coastline between Zavora to Pomene were recorded with a GPS during two aerial survey flights in May 2016 (Figure 5). A transect was flown along the coast in a Bat Hawk LSA at 244 m (800 ft) above sea level at 60 knots and ~300–500 m from the beach.

Gill nets in the study area were set and drifting at the surface perpendicular to the beach. Net dimensions varied among fishing communities in the region, but were typically 20–200 m long, 5–8 m deep, and had a mesh size of 5–20 cm. Nets were made from monofilament or thin rope.



**Figure 5.** Whale shark and gill net locations from aerial surveys (conducted in 2004–2008 and in 2016, respectively). Density of whale shark sightings along (A) the northern and (B) southern stretch of the southern Mozambique coast and (C) along the northern South Africa coast. The red line shows the flight path of whale shark surveys and a cross

indicates gill nets in use. (From Rohner et al. 2018. Satellite tagging highlights the importance of productive Mozambican coastal waters to the ecology and conservation of whale sharks. PeerJ 6:e4161.)

To assess the trend in gill net use over time, we used survey data from the Praia do Tofo area itself. Pre-2012, gill nets were not counted because they were rarely in use. We conducted 1,323 boat-based surveys from 2012 to 2015, during which gill nets were counted on the way to dive sites located along a 40 km stretch of coast. Surveys were on average 21.3 km long. We calculated the number of gill nets per 1,000 km of survey track for each year over the 4-year period. In the immediate area around Praia do Tofo, boat-based surveys showed that gill net usage increased ~7 times, from 0.95 to 6.44 nets per 1,000 km survey track, from 2012 to 2015.

The presence of industrial fishing vessels, specifically trawlers, was identified as a concern during key informant interviews with dive centre staff in Zavora, Conguiana (Barra) and Morrungulo, and concerns raised about industrial longlining by communities in Chicuque and Mahila (Rocha). These are locations where industrial fishing vessels come in closer to shore. MMF currently has no information on whale shark or other megafauna catches from industrial fishing taking place in Mozambique waters.

**c) Identify three communities for priority intervention.**

Based on the combined results, the three communities that would most benefit from priority intervention are Mahila (Rocha), Morrungulo and Chicuque for the reasons listed below.

Aerial and satellite tracking results from Mahila (Rocha) showed the highest density of whale shark sightings were located in this community. According to the CCP, 50% of fishermen used hook and line and 15% used gill nets. However, 5 of 10 fisher survey respondents indicated that they used gill nets as a means of fishing. Mahila was the community with the highest overall potential for direct interaction between fishers and whale sharks. Additionally, all survey respondents from the community indicated that overfishing was a problem and listed the solution as developing alternative livelihoods (which MMF has capacity in) or increasing the tourism industry within their community. However, only one fisher respondent and two fish merchant respondents indicated that they were in support of implementing some form of fisheries closure.

Morrungulo was the most northerly site where the second round of surveys was carried out and showed a mixed reaction that warrants further study and research. Aerial surveys showed a second, less dense aggregation of whale sharks centered around the headland of Pomene and extending south to Morrungulo. Morrungulo also reported the highest number of fishers in their community, an indication of high fishing pressure, with migrant fishers also using the area. Community surveys showed respondents were receptive to the idea of fisheries closures but had major issues with outside

spearfishermen entering the community in search of fish and felt frustrated with their ineffective CCP and lack of law enforcement.

Chicuque, despite low sightings of whale sharks, also appears to warrant further investigation. The only respondent which indicated that gill nets incidentally caught whale sharks was interviewed in Chicuque. Other communities, both north and south of Chicuque, specifically mentioned that Chicuque fishers frequently migrate to fish within their waters, locations with higher densities of whale sharks. The Chicuque respondents mentioned that they migrate due to large declines in fish stock in their locality. Managing and regulating the practices of migratory fishers is one major challenge identified by the CCPs, because currently there is open access fisheries throughout the Mozambique coastline. The location of Chicuque was unique among the study communities in that it is close to an estuary, as opposed to Open Ocean, and that it is the closest to Maxixe City, the largest population centre in the province. Its location gives the fishers access to a larger market and Chicuque itself has a large fish market. While no market for whale shark was directly identified, multiple respondents stated that manta ray, mobula ray, and other rays were sold in Maxixe or within the community for between 100-300 MZN (£1.5 - 4). These indicators show that further investigation into a discrete megafauna market in this community may be warranted.

**d) Collaboration with management authorities.**

This objective was only partially achieved. There were some challenges with inconsistency in the viewpoints of senior officials within different government departments and institutions, which hindered both official collaboration opportunities and the project timeline itself. See Section 2 for a full discussion.

In the meantime, we continued to engage with the national government on shark and ray conservation issues. On 11 May, 2017, the Government passed an amendment to the Law for the Protection, Conservation and Sustainable Use of Biological Diversity (5/2017 and 16/2014). The amendment to article 62 expanded its definition of punishable activities to include the capture of animals listed in the CITES Annex I and II, which includes whale sharks and other marine megafauna. However, the law is not clear on whether this applies outside areas of recognised national protection. During the development of regulations for the application of this law, clarification on this article within the law was removed at the final stage. The current regulations are insufficient to establish effective enforcement of this law. On 6-8 December, 2017, MMF presented findings at a national workshop for the development of a national plan of action for the protection of sharks and was able to successfully defend the idea of including rays within this action plan for increased protection. This workshop was organised by WWF and the fisheries research institute (IIP) within the Ministry of Fisheries. This was in line with the activities of WCS and TRAFFIC, currently working on developing a regional roadmap for the conservation and management of sharks and rays in the southwest Indian Ocean. The document produced at the workshop was presented to a technical council of IIP. As of October 2018, according to IIP, the process for developing the

action plan has stalled. MMF will be looking at ways to continue supporting this initiative in 2019 and will continue to monitor the progress of protective legislation and regulations for whale sharks and other threatened marine megafauna.

The local authorities, notably the Provincial Fisheries Department, the District Administration and the Coastal Police, have demonstrated a willingness to engage with MMF in the establishment of locally managed marine conservation areas, sustainable fisheries management and alternative livelihoods projects at the community level. MMF is already working in collaboration with government technicians and extension officers to this end in Josina Machel and Conguiana communities.

Although national legislation exists to regulate fisheries practices and conservation of protected species, compliance is not well monitored, and enforcement is weak. For this reason, the local community, and specifically the CCP, play an important role in the management of artisanal fisheries and marine conservation through the establishment of local regulations and the enforcement of local and national regulations. The ability of the CCP to establish and enforce regulations is related to the strength of their governance and management structures, their personal passion (they are unpaid), as well as their relationship with the Coastal Police and the support they receive from other governmental bodies. This varies widely between communities. For this reason, surveys included questions on CCP governance, challenges faced by the CCP in managing and regulating local fisheries, and the support they receive from the government and other stakeholders. This information allowed us to identify in which communities whale sharks, and other vulnerable species, potentially face increased anthropogenic threats as a result of weak CCP governance structures. Conversely, this information allows us to identify communities with strong governance structures and a passion for marine conservation, implying higher potential for success for improvement in the local protection for whale sharks and other threatened species.

**2. Please explain any unforeseen difficulties that arose during the project and how these were tackled (if relevant).**

This expands on the challenges mentioned above. Significant and unforeseen administrative hurdles arose during the project.

We obtained a research permit to conduct an aerial survey and completed those in May 2016. Following this, when we began working with the provincial government to prepare for the interview surveys, a request was made to MMF to delay the start date for the interview-based portion of the project. In January 2017, the Provincial Fisheries Department agreed to support the surveys and offered to provide their data on fishing methods from the last 10 years. However, in February 2017, officials decided that a different research permit was required to conduct the project surveys. However, because we were working outside any national park boundaries (within which clear processes apply), there are no official guidelines for permit requirements. The

Government informed us that, to solve this quandary, MMF needed an organisational permit rather than official clearances on a project by project basis. MMF then spent the next 20 months in communication with the Government, trying to understand which permit was required and the application process. It transpired that such a research permit had never been issued by the Government to any non-governmental organisation, and there was no clear process to do so.

Organisation-level permits are largely reserved for Government research institutes and universities and there is little experience within the government on how to issue these permits for NGOs. In order to begin the process of applying for such a permit, MMF's national registered NGO, the Associação Megafauna Marinha, was required to legally change from an association to a research centre. After 13 months, and with support from a lawyer, MMF achieved this. Our application for a research permit has now been approved by the Provincial Governor and is about to be submitted to the Department of Science and Technology, which issues these permits.

In the interim, to fulfil the main objectives of this project we chose to scale down the original work plan to focus on a programmatic assessment and community consultation survey, for which no research permissions are required. This allowed us to gather information on the concerns, challenges and proposed solutions that community leaders and fishers have in relation to marine conservation in general, and megafauna in particular.

Our modified approach meant that we had to focus more on coastal fisheries and less on sensitive issues related to the catch and sale of whale shark and other threatened species, several of which are legally protected in the country. We were unable to visit large fish markets as planned to directly investigate trade in these species. This is also why we chose to conduct the assessment in nine rather than 12 communities – we chose locations where we had pre-existing contacts with the community.

A separate, though anticipated challenge involved accessing accurate information from the communities related to megafauna catches. The communities are aware that some of these species are protected by law, notably sea turtles and marine mammals. Legislation around whale sharks and manta rays are less clear, but many fishers also believe that these species are legally protected. This complicated the interviews, as many fishers avoided questions about species catch and numbers. This also impacted their willingness to acknowledge targeted catch of these species, and most answered that the animals were caught accidentally as bycatch (which is not illegal). Few specific incidents of megafauna catches were recounted.

Our survey-based approach to data collection allowed significant new data to be gathered in a timely and cost-effective manner. However, we were not able to directly observe catches over sustained periods of time. The most robust way to ensure accurate information on numbers and trends in the catch of whale sharks and other

threatened species will be to implement ongoing catch-monitoring and market observations. MMF is discussing a shark and ray catch monitoring project with the fisheries research institute (IIP), but we are awaiting receipt of our organisational research permit to carry this out.

Obtaining more accurate information could be possible through gaining the confidence and trust of the communities and making assurances that catches of threatened species will not be reported. However, if we were to partner with the fisheries department, that would require some additional discussions. We are also considering using local fishers to collect the data on our behalf using a mobile app. This is an approach which has been tried and tested in other locations in Mozambique and regionally. Some challenges have been encountered in other areas, relating to disclosure of sensitive information and potential for corruption and exploitation, but it is a methodology which we are continuing to investigate to see if these issues can be overcome.

### **3. Briefly describe the three most important outcomes of your project.**

- We have built strong relationships with multiple fishing communities that interact with threatened marine species on a regular basis, and have obtained substantial information on current fishing practices.
- We have trained a team of local Mozambican staff in marine conservation and fisheries, research techniques, and data management. This puts us in an excellent position for implementing further conservation initiatives during the next phase of this work.
- We have established a baseline understanding of the impact of artisanal fisheries on whale sharks and other megafauna species in southern Mozambique.

### **4. Briefly describe the involvement of local communities and how they have benefited from the project (if relevant).**

We achieved our planned objectives for community engagement in this project. All nine communities were willing to continue engaging with us to deepen our relationship, working towards greater understanding of the ocean and its fragility. Four communities have been selected for ongoing (Josina Machel and Conguiana) and new engagement (Mahila and Morrungulo). We will seek further means and funds to continue engaging with Chicuque. We built relationships with key leaders within the four communities and identified local ambassadors for marine conservation and sustainable fisheries management.

Our approach allowed us to listen to the interests and concerns of fishers, CCP and community leaders. This project has allowed us to establish and strengthen our relationship with these key fishing communities. We have used the results to identify locations to establish community-led conservation and livelihood projects and have

already secured support from the local communities for these initiatives. Once analysis has been completed, the results of the assessment will be summarised and presented to the community with a view to sensitising fishers to the lack of sustainability surrounding some current practices and potential for improvement. Questions around solutions, including alternative livelihoods, were also discussed with the communities. The answers will be analysed and discussed during participatory coastal livelihood assessments in each of the locations where we plan to establish conservation projects.

### **5. Are there any plans to continue this work?**

We are spending additional time to analyse the extensive data that has been collected to help inform the development of our conservation and marine resource management projects. These data also provide us with a baseline from which to assess changes over time and the impact of our conservation and resource management efforts.

We will use these data to improve the design and management of our community-led conservation work in Josina Machel (Tofo) and Conguiana (Barra) and we will extend our activities to Morrungulo and Mahila (Rocha). We will look for ways and means to continue and expand our engagement with the community in Chicique, including through the use of these findings to apply for additional funds.

We have started discussions with Zavora Labs and African Parks with the aim to extend the survey to new communities in the far south and far north of the province, where those organisations have existing relationships.

Once we have secured our organisational permit we will augment these findings with additional, targeted research that will provide deeper insights into the market for threatened species products, as well as more detailed information on catch numbers and trends.

### **6. How do you plan to share the results of your work with others?**

Our immediate focus is to complete our analysis of the most important results and discuss these topics with the communities we consulted. Once we have received our research permit and have had the opportunity to augment the data relating to spatial mapping we will discuss those results with the provincial and national government. We will continue to engage in discussions for the development of a national plan of action for the protection of sharks and rays, and will use these findings to inform these discussions and the plan itself.

**7. Timescale: Over what period was The Rufford Foundation grant used? How does this compare to the anticipated or actual length of the project?**

The original anticipated timeframe was 12 months. Our 2nd RSG grant was received in April 2016, and the project was completed in December 2018. Fieldwork time was similar to our original plan, but initiation of this work was delayed by the challenges discussed earlier.

**8. Budget: Please provide a breakdown of budgeted versus actual expenditure and the reasons for any differences. All figures should be in £ sterling, indicating the local exchange rate used.**

Item Description	Amount Budgeted £	Actual Spent £	Difference £	Comment
Stakeholder Engagement				
Stakeholder engagement (pre-project - Maputo)	244	211	-33	This includes the costs for attending the workshop for the national plan of action for sharks and rays, meetings with stakeholders in Maputo and contributions towards research permit processing.
Stakeholder engagement (Inhambane)	8		-8	Stakeholder engagement did take place in Inhambane, however this was done without incurring costs against the RSG.
Stakeholder engagement (post project - Maputo)	244		-244	Our post-project stakeholder engagement will take place in 2019. A grant from the Shark Conservation Fund will help cover these costs
Surveys (North, Central, South)				
Subsistence	320	240	-80	We were able to save money on this budget line as food costs were

				lower than originally budgeted.
Travel	280	1053	+773	Travel costs were higher than anticipated. The original budget covered only the cost of fuel. However, in November 2018 we were also required to cover the cost of vehicle rental. The original budget underestimated the amount of travel required to conduct comprehensive surveys in nine communities that required 4x4 vehicles to access. The Shark Conservation Fund contributed USD 200 additional co-funding to support these costs. The total was GBP 1209.
Accommodation	360	151	-209	We received in-kind contributions from Bonito Bay Lodge which provided free accommodation and thus helped us save money on this budget line.
Printing		14	+14	The cost of printing the paper surveys was excluded from the original budget.
Food for community meetings	300		-300	This was not required.
Aerial Surveys	1200	876	-324	We collected enough information for the purpose of this study in fewer flying hours than expected.
Translation services	1950	1829	-121	
Project Management		532	+532	This was not included in the original budget. However, due to the extension of the project timeline we had to allocate (minimal) costs to support project management. This included support for two managers: Project Manager

				accommodation costs for 2 months and Conservation Programme Manager 20% of salary for 2 months.
<b>Total</b>	<b>4906</b>	<b>4906</b>		FX rate: 1 GBP = 71.22 MZN, this was the exchange rate at the date funds were received.

## 9. Looking ahead, what do you feel are the important next steps?

This project has excellent momentum and interest within our focus communities. We aim to capitalise on this through the implementation of catch monitoring, in partnership with the fisheries research institute, and to discuss bycatch mitigation measures with the communities concerned.

We will be working with the CCPs in priority communities to establish areas for local marine conservation, as well as improved sustainable fisheries management strategies. This will involve training on sustainable fisheries, scientific and technical advice to identify reefs and approaches to marine management, capacity building to strengthen CCP governance, demarcation and support to local enforcement of closed reefs or regulations.

With the exemption of Josina Machel, every community we surveyed was highly reliant on fisheries for income and subsistence. Community livelihood dependence upon fisheries ranged from 40% in Josina Machel to 76% in Chicuque. Josina Machel relies largely on tourism, whereas Chicuque, with the highest dependence on fisheries, has little to no alternative employment choices. Fishers from this community were also commonly accused of fishing outside their designated area, entering the waters managed by surrounding CCPs.

We have several livelihood support projects operating in fishing communities around the Tofo area, which have successfully provided new employment and business opportunities to fishers that wished to transition out of fishing. There may be potential to expand on these successes in other communities now that we have improved information on their current activities and attitudes. All communities expressed a frustration with their reliance on fishing, and a desire for alternatives.

Several of our focus group discussions noted that marine megafauna are important to the community because of the economic benefits they bring as a tourism attraction. Sustainable tourism can be further developed along this coast, and care should be taken to ensure that this provides local opportunities and employment.

**10. Did you use The Rufford Foundation logo in any materials produced in relation to this project? Did the RSGF receive any publicity during the course of your work?**

Analysis of the full results of surveys is ongoing. Once this completed, and we receive our organisational research permit, we will be producing materials to explain the results to our community and government partners. We will then use the Rufford Foundation logo in all reports and presentations that follow.

**11. Any other comments?**

We greatly appreciate your patience with the delayed receipt of this final report. Despite challenges and delays this project was a success. Significant knowledge has been gained on the threats facing whale sharks and other marine megafauna along this coast, and we are well-placed to begin dedicated bycatch reduction and sustainable fisheries projects in our priority communities.

