



Somaliland Marine Megafauna Scoping Trip: Report

5th January – 16th January

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1. Trip Rationale and Background

The marine waters off the coasts of Somalia, including the Gulf of Aden and a large oceanographic feature called the ‘Great Whirl’ are among the most productive seas in the world due to upwelling driven by seasonal monsoons that support rich fisheries and high marine biodiversity. Despite this, the marine waters around Somali and Somaliland are among the least studied in the world. The country is beset by frequent droughts, the land is over-grazed by domestic livestock and armed conflict (linked to piracy, militant groups and war) and political instability have dominated the region for much of the last three decades. Somalia is ranked as the third poorest nation in the world by the OECD.

Very little research on marine mammals has been conducted in the region (Small & Small, 1991). The majority of available information is associated with whaling, including pre-industrial catches of sperm whales (Townsend, 1935; Wray & Martin, 1983; Smith et al. 2012) and Soviet whaling in the 1960’s (Mikhalev, 2000), broader multi-taxa surveys (e.g. Van der Elsts & Salm 1998) or regional modelling efforts (Redfern et al., 2017, Willson et al., 2017). Collectively these sources suggest wide species diversity and abundance (Schleyer & Baldwin, 1999), and it is clear that the region is extraordinarily important for large whales (baleens and sperm), at least two of which, the blue and humpback whale, appear to be regionally distinct and threatened (Mikhalev, 1998, 2000; Pomilla et al. 2014; Cerchio et al. 2020). A wide variety of odontocetes (toothed whales) have also been recorded, as well as the dugong (Marsh et al. 2002). The IUCN Marine Mammal Protected Area Task Force identified the region as an Area of Interest for designation as an Important Marine Mammal Area. Much remains to discover, ranging from baseline assessments of marine species diversity, distribution and abundance to the assessment of threats to these populations, including those associated with the region’s extensive fisheries.

As the security situation steadily improves, particularly a dramatic reduction in piracy events (now considered rare), and stability has been established in the autonomous states of Somaliland and Puntland for a number of years, there is now an opportunity to initiate work to fill important knowledge gaps on threatened marine megafauna in Somaliland and for this to feed into national development plans for sustainable marine resource use, as well as to support the proposals for marine protected areas.

2. Overall Goal

Evaluate the potential, and identify future collaborators, for marine science and marine conservation work in Somaliland.

3. Specific Objectives

3.1 Conduct meetings with stakeholders to gather information on the level of knowledge and expertise regarding marine megafauna research, and the interest and potential for establishing collaborations for future work.

Arrange to meet with potential stakeholders:

- Ministry of Livestock and Fisheries, Department of Fisheries Development Somaliland, National and Regional Offices
- Gollis University
- Berbera Maritime and Fisheries Academy
- Somaliland Coastguard
- Food and Agriculture Organisation
- GIZ
- Secure Fisheries
- Candlelight
- Fair Fishing

3.2 Conduct a data gathering exercise to collate existing information on marine mammals and turtles in Somaliland

Gather data on marine mammal strandings, sightings and skeletal material using the following sources of information:

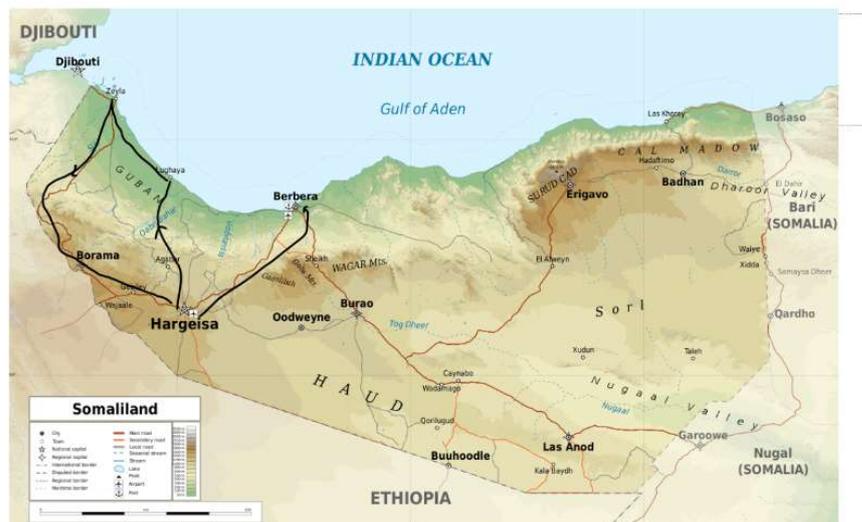
- local museums,
- interviewing fishers at fishing ports,
- gathering photographs of live or dead animals, and
- surveying accessible beaches to find and potentially collect marine mammal remains.

3.3 With identified partners and donors identify priorities for future engagement in marine research and conservation in Somaliland that can form the basis of funding proposals.

4. Itinerary

5th – 16th January 2022

Hargeisa	5	days
Berbera	4	days
Lughaya	0.5	days
Zeylac	3	days





5. Objective 1 - Meetings with key stakeholders to gather information on the level of knowledge and expertise regarding marine megafauna research, and the interest and potential for establishing collaborations for future work

5.1 Diary of Meetings

5.1.1 Ministry of Livestock and Fisheries, Department of Fisheries Development

Director General of Fisheries Development, Ismail Mire. +252 634457999
Advisor/Consultant: Abdikarim Hersi +252 633690174 and +252 631617184275

The Director explained that Somaliland is primarily a country of herders and fishing is a new activity that is now being promoted. Most fishing is small scale and artisanal, targeting tuna, yellow fin, and skipjack primarily. There is no recent information on marine megafauna, but they are legally protected.

Dr Gill introduced the goals of the visit, which included initiating marine mammal data collection along the coast of Somaliland. She explained that at least 20 species of marine mammal might routinely occur in the Gulf of Aden and evidence from whaling data suggests it may be one of the most important areas for whales in the western Indian Ocean. Species likely to occur included the Endangered Indian Ocean humpback dolphin, which occurs in coastal waters 10-20m deep, possibly the non-migratory population of humpback whales from the Arabian Sea and the Dugong, also known as the sea cow, a Sirenian that eats sea grass and occurs in shallow waters. She introduced the [Arabian Sea whale network](#), which would like to invite new members from Somaliland. She also introduced the marine mammal protected area task force and the [Area of Interest identified in the Gulf of Aden](#) (Annex A).

Gill explained that the team's interest in future work in Somaliland involved supporting Somali managers and researchers. Key areas of potential include:

- 1 Data collection on catches at fish landing sites
- 2 Monitoring of bycatch and reporting of bycatch to IOTC
- 3 Local sighting network coordinated with fishers (see report of similar Tanzania whale network attached)
- 4 Participation in Arabian Sea Whale Network events
- 5 Participation in CMS Dugong and Sea Turtle work
- 6 Baseline boat-based field research on dolphins
- 7 Establishment of land-based stranding network



The Director of Fisheries explained that marine mammals are legally protected in Somaliland, but there is almost no information on these species and this work is new to the department. They are very interested in collaborating but would require training. The department has several boats that it would be possible to use for surveys in the future. Documentation of bycatch is also something that it is important to do and of interest to the agency. They are open to collaborating and supporting future initiatives. Gill and Mr Mogeh from FAO explained that they would keep the Director informed of progress during this trip, and that they would feedback regarding any outcomes or possibilities for collaboration.

5.1.2 Gollis University

Dr Abdi Gaas, President of Gollis University

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Gollis University have started a new degree course in Fisheries and Natural Sciences during the last few years. They have a field station on the coast at El Sheikh 70km from Berbera. Work there has involved awareness campaigns on avoiding catching of threatened species.

5.1.3 Fish Market Development Agency in Bulahaar

Ahmed Apan

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The team met in their office in Hargeisa and met three people plus two Indian businessmen based in Dubai who are the fish marketing and sales experts from 'Snow Land Refrigeration Systems,' based in Abu Dhabi.

They are a fishing business, developing a commercial fishing operation in Bulahaar. It is just under construction. At present there is no fishing landing site or port, which is a problem for landing catches. They want financial support to build a pier. They also want to create a fisheries training center and as a priority want to include protection of threatened species, as well as training for monitoring.

5.1.4 Secure Fisheries / One Earth Future Foundation

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One Earth Foundation has two programmes in Somalia

1. Shuraako – job creation, microloans
2. Secure Fisheries – fisheries co-management

The foundation has the overall goal of reducing conflict and promoting peace.

They have programmes in three locations:

1. Puntland - Geruwa,



2. Mogadishu (1 student employee, Mr Jamal).
3. Zeyla - Somaliland. Community level work including fisheries co-management.

Somaliland MPAs

Secure Fisheries is supporting the implementation of a MPA in Zeyla, an area on the western boundary with Djibouti that has many islands with fringing mangroves and coral reefs. It is a very beautiful area and considered important to protect. Secure Fisheries have established a consortium which includes UNEP, Blue Ventures, the Somaliland Ministry of Environment, the Somaliland Ministry of Fisheries, and Secure Fisheries. The consortium will work together to identify appropriate limits for the MPA. The concept of an MPA is well received because most people are pastoralists and they are familiar with the concept of rotating grazing areas or setting areas aside.

Catch data collection

This project is conducted in association with the Ministries of Fisheries in Somalia and Somaliland, four universities and communities. In Somaliland it partners with the Berbera Maritime Academy and is part of their training to students, which includes practical lessons and lectures and protocols for fisheries monitoring in Berbera.

In Mogadishu monitoring of landed catches is conducted in association with the City University of Mogadishu. There are six sites that have been monitored since 2018. Catch monitoring is happening in Zeyla using four fishers and can be complicated because most fishers are illiterate, and there is no landing site to monitor as fishers sell their catches in Djibouti.

There are many foreign fishers in Somaliland waters including those from Egypt, Yemen, Iran and Djibouti. Some have licenses, others do not, and some are armed. In the past the Gulper shark, an oceanic species of that lives in deep water, was heavily targeted in Somaliland for its liver which produce oil which is in demand in China. The previous Director of Fisheries outlawed this activity, and it no longer occurs. The same is true of the shark fin trade [this requires verification].

5.1.5 Berbera Maritime Academy

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Vice Chairman: Mr Abdikadir Email: daffle99@hotmail.com
Fishery Lecturer: Jama Ahmed, Email: fishingfirmconsultant@gmail.com

A public university established 10 years ago. Now has 600 students, 24 lecturers, 20 supporting staff. The university has four focus areas:

- Marine engineering
- Nautical studies
- Port management
- Fisheries and natural resources



Degrees are limited to bachelors' courses of three and four years as well as short courses. Courses include oceanography, marine biology, marine ecosystem management, fish taxonomy, fishing methods and value chains. The University has not yet published any research, an area needing improvement. The University has commissioned a 27 m vessel for research and teaching which is being built in India and will be finished in 2022. It may be a suitable vessel for conducting marine mammal trainings and surveys.

5.1.6 Candlelight NGO

Dr Hassan Ali Buraale, Candlelight Project Manager

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Candlelight is implementing a few marine projects focused on teaching people to fish.

5.1.7 Berbera Fisheries Dept

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Dr Dolit, Deputy Coordinator

There is daily information gathered on fish catches at the Berbera landing site. Data collected is limited to total individuals and is not broken down by weight. Laws have stopped catches of the gulper shark, previously targeted for liver oil. If a marine mammal stranding network is organized it is important to organize stranding reporting via the Fishers Associations.

5.1.8 Berbera fish landing site and port area

Dr Shafi, Fisheries Officer for Berbera.

Fisheries department provide ice for freezing fish. The fish market was empty at all times it was visited by the team. Multiple small fish shops are set up close to the fish market and have individual freezers. We visited 6-7 and they all had skipjack tuna, a small number of yellowfin, kingfish and spiny lobsters. Many had turtle shells and turtle oil for sale.

The port is a large area with very few boats. During the visit there appeared to be about 20 skiffs and three boats that were slightly larger with small cabins.

Shafi says there are 200 fishing boats in Berbera and 600 fishermen. Most use single 15 hp engines and have fiberglass boats about 7m long donated by aid agencies. One fishermen used a Garmin GPS. People don't fish as much in the monsoon season or during Ramadan. The main species targeted are long-tailed and skipjack tuna, wahoo, YFT and kingfish.

There are only 3000 fishers in all of Somaliland.

Fishers estimate they catch 2-5 dolphins per month per boat.



5.1.9 Mansoor Hotel

Manager Abdur Razzaq.

The Mansoor Hotel is on the ocean front on the edge of Berbera and is used by a lot of international conferences. The mansoor hotel has many boats, including 115hp x 2, 75hp x 2, 40hp x 2. Each boat is around 7m in length. We rented one for an exploratory survey.

The hotel has a dive center, which mostly caters to international groups. The team examined the gear (only 6 BCDs) and it looks poorly maintained and little used. They have a compressor and tanks. Any future diving work would need to bring dive gear and experienced divers and not rely on the hotel.

5.1.10 Fair Fishing

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Fair Fishing was set up by the owner of one of the shipping lines who paid 10 million to hijackers of his ship. He collected it near Paassaso [Puntland] and asked the hijackers why they did it. They said that international fishing boats were taking all their fish and they felt angry about that. The owner set up Fair Fishing in 2011 to try to help this situation. The group did research to see what the fishers needed. They subsequently organized:

1. An ice making system and associated equipment
2. Provided fishing gear
3. Provided training on how to fish, including a five day course at-sea
4. Built fish markets in the cities and coastal towns
5. Taught people how to cook 10 fish dishes by giving them training with a chef

The status of 13 commercially valuable fish species has been evaluated. There is a lack of knowledge on which fish species are threatened nationally. Fair fishing were involved in data collection at fish landing sites from 2016 to 2018 and then handed over their facilities to the Ministry of Fisheries, but it seems that at that point the project stopped.

5.1.11 GIZ

Carola von Morstein, livestock specialist (5 year's experience in Hargeisa)
Mustafa Ahmed, working on livelihood projects around Berbera (5 years).

What GIZ does:

German government development agency. It is an implementing agency so uses its own resources to recruit and implement. As opposed to USAID who outsource and FAO who conceive projects and then search for agencies to implement them.

Specific Projects:

- In Kismayo they work with migrants from northern Kenya, on human well-being.



- Fish for nutrition – a project focusing on the value chain of fisheries, including storage, cooling, freezing, preparing.
- In 2014 in Somaliland, agricultural projects to promote crop growing in the western part of the country and around Berbera. Agriculture is a neglected sector. In Somaliland the livestock sector provides the majority of the foreign exchange, but they cannot export consistently so there is not a constant flow of income for the government. In addition, none of the agricultural products are processed in country so there is a loss of potential income and no added value.
- Climate change projects are also running to try to address over grazing in rural areas. Also, the desert locust is an issue they are attempting to address.
- Women’s empowerment projects.

GIZ Recommendations and suggestions

- The wise use of marine natural resources is something that we could use to sell the importance of gathering knowledge on marine megafauna, raising awareness and improving management
- There is a process to develop a national development plan 2023 with a vision to 2030. It is the overarching national document that guides development. It is a participatory process and NDP3 there are two FAO consultants working on this too. We might try to add value to this process by trying to include marine protection and zoning into the process. Somaliland is economically at risk, there is high kaat consumption that uses valuable household income (\$2-\$3/day)
- GIZ works in fisheries elsewhere, and so we might be able to connect at higher levels in the GIZ system.

5.1.12 Somaliland Coast Guard

Admiral Mohammad Hussain.

Captain Habane: habane441@gmail.com, whatsapp: 06364417638

The Admiral was trained by the British Navy at Portsmouth. The coast guard has 5 stations along the coast. Zeylac, Berbera and two further east. They also have a big commercial fishing boat. They agree that we could develop an MOU with the coast guard to ask them to document whale and dolphin sightings.

Zeylac Regional Fisheries Coordinator

Abdikadir Ismail Jama. Tel: 4447583

5.1.13 Zeylac Regional Coast guard

Commander: Omar Adu Aline

Information provided by the Commander included the following:



- Locals do not kill dolphins or whales.
- There are not many whales around Zeylac because there isn't any deep water. Most whales further east.
- The commander thinks that because of the value of ambergris some people are killing whales at sea because when the whales come to shore, they already have the stomach cut open. This requires confirmation as sometimes whales bloat and the stomach spills post mortem. The commander believes whales may be killed by fishers on big boats from other places including Yemen and Egypt.
- When the big war ships come into the Gulf of Aden there is an increase in whale strandings. Specifically the peace keeping, anti-piracy naval ships that sometimes enter the Gulf.
- Local people hang the flesh of whales to extract oil. They get 100s of litres from each whale. It is used to treat rheumatism and other diseases.

5.1.14 Zeylac Mayors office

Deputy Mayor: Daahir Barkhad Cali, Tel: 0634458857, Email: daahirbarkhadcali@gmail.com
Secretary of the Municipality: Email xoghayemohamed@gmail.com, Tel: 0634597840
Head of Planning, and previous Mayor.

In Zeylac people are arrested for catching turtles or gulper sharks.

5.1.15 Other Contacts

Christophe Hodde based in Nairobi for UNEP is the point person for UNEP in Somaliland. He was away and no meetings were possible at this time.

6. Objective 2 - Conduct a data-gathering exercise to collate existing information on marine mammals and turtles in Somaliland

6.1 Whales and Dolphins

Whales and dolphins are legally protected in Somaliland. In Berbera fishers report seeing large numbers of dolphins regularly. Fishers report that the bycatch of dolphins in drift gillnets was very common. Several fishers claimed dolphin bycatch rates of up to or beyond 10 dolphins per month. These rates are considered extremely high and would be expected to be causing declines of local populations.

Fishers in Berbera report whales singing in winter. They claim that whales come as a group in the winter and eat migratory fish. Group size can be several tens of animals 10-15 miles offshore. Many people are familiar with ambergris (sourced exclusively from sperm whales) and its high monetary value, and all stranded whales irrespective of species are butchered in order to look for this. Reports are that whales are common further east towards Puntland and especially so during



October / November. When whales strand the flesh is hung and oil is extracted.

In Zeylac the waters are shallow and fishers report few dolphin or whale sightings. The Zeylac coastguard report that when naval ships are in the Gulf of Aden whale strandings increase.

Species records compiled during this trip: Common dolphin (*Delphinus delphis*), spinner dolphin (*Stenella longirostris*) and Brydes whale (*Balaenoptera edeni*) (Figures 1,2,3,4).

6.2 Dugongs

Fishers in Berbera report that dugongs were seen near Hiis in the past. Fishers in Zeylac report seeing dugongs at Mushaikh Island about 5 miles from the port. They are also seen at Dawilad, Koomali, Sacadadin and Ebad, all locations/islands in the Zeylac archipelago. Reports are of sightings within the last few months and very regular sightings over a long period indicative of a sizeable population of dugongs. This may be one of the last remaining populations in East Africa therefore exploring the number, location and threats facing this isolated population is of high priority.

6.3 Turtles

Turtles are legally protected in Somaliland but in Berbera turtle oil was seen to be openly for sale in the fish vendor shops next to the fish market. Turtle shells are on display on the walls of the same shops (see images below). In Zeylac locals report that turtles are not captured and the Department of Fisheries enforces the law. Two species, the Hawksbill and Green Turtle were documented (Figure 6 & 7).



Figure 1 - Photograph of Bryde's whale stranded east of Berbera in Jan 2022. (received via whatsapp)[Species ID confirmed by Dr Robert Brownell Jr]



Figure 2 - Live sighting of 120 Common dolphins 2km off Berbera (Jan 2022)



Figure 3 - Live sighting of 10 spinner dolphins 3km off Berbera



Figure 4 - Whale mandible (lower right jaw) and vertebrae in village of Zeylac





Figure 5 - Whale mandible and vertebrae in Berbera maritime academy



Figure 6 - Green turtle brought to shore by fishers in Berbera (March 2022)



Figure 7 - Sea turtle shells on display in Berbera fish vendor shops (2 Hawksbill Turtles, 2 Green Turtles)



7. Objective 3 - With identified partners and donors identify priorities for future engagement in marine research and conservation in Somaliland that can form the basis of funding proposals.

7.1 Identified avenues for Future Engagement in Marine Megafauna conservation in Somaliland

1. Conduct a rapid marine mammal assessment (using e-DNA, visual observations and acoustics) to document distribution, abundance and hotspots that require protection;
2. Deploy long-term acoustic recorders to document the occurrence of whales year-round over wide areas;
3. Conduct baseline surveys of dugongs and dolphins in Zeylac to provide data on one of the last dugong populations in East Africa, and to support current MPA plans;
4. Support Berbera Maritime Academy by providing scientific support, and a course on marine megafauna, oceanography and sustainable management;
5. Contribute to National Development Plan III to embed marine protection and wise resource management within the national framework;
6. Set up a citizen science whale reporting network of fishers and coastal community members to engage local people and provide information on species occurrence and mortality;
7. Train members of the coast guard to systematically report whales and survey effort during their regular patrols to involve them in documenting Somaliland marine biodiversity.
8. Work with department of fisheries, communities and FAO to set up a system of documenting marine mammal bycatch and reporting of that data to IOTC.
9. Conduct awareness raising activities along the coast to provide information about endangered marine megafauna to local people.

7.2 Potential Partners

- FAO
- IUCN Shark specialist group
- IUCN Turtle specialist group
- IUCN Cetacean Specialist group
- Marine Mammal Protected Areas Task Force
- Berbera Maritime Academy
- Wildlife Conservation Society
- Future Seas
- Secure Fisheries
- Convention on Migratory Species
- Department of Fisheries, Somaliland



- The Regional Organization for the Conservation of the Environment of the Red Sea & Gulf of Aden

8. Acknowledgements

This work received funding from the MASTS pooling initiative (The Marine Alliance for Science and Technology for Scotland) and their support is gratefully acknowledged. MASTS is funded by the Scottish Funding Council (grant reference HR09011) and contributing institutions.



Annex A – Gulf of Aden and Socotra Archipelago Area of Interest – IUCN Marine Mammal Protected Area Task Force

cIMMA Title: Gulf of Aden and Socotra Archipelago

Point(s) of Contacts

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Abstract

The area broadly includes the Gulf of Aden, the Socotra archipelago and a portion of the north-eastern Somali coast. Regional oceanography is heavily influenced by reversing monsoon systems and intensive seasonal upwellings that are extremely productive, supporting very rich fisheries and high biodiversity. The area has a wide range of suitable marine mammal habitats, ranging from sheltered shorelines to deep oceanic trenches. Very little research on marine mammals has been conducted in the region but the available evidence indicates a wide diversity of species and extraordinary aggregations of some. The majority of data is associated with whaling. These include pre-industrial catches of sperm whales and Soviet whaling in the 1960's that took appreciable numbers of blue, brydes and sperm whales. Other records are associated with a limited number of research surveys, broader multi-taxa surveys and regional modelling efforts. It is clear that the region is very important for large whales from Arabian Sea baleen whale populations (blue, brydes, humpback and sperm), of which blue and humpback whales appear to be regionally distinct. Many other species of smaller odontocetes have also been recorded, as well as the dugong

Summary Table of cIMMA species

ID	Scientific Name	Common Name	Population/Sub-population Name	IUCN Status	IMMA Selection Criteria Met (x)							
					A	Bi	Bii	Ci	Cii	Ciii	Di	Dii
1	<i>Balaenoptera musculus breviceauda</i>	Pygmy Blue Whale	Arabian Sea blue whales	EN				x	x		x	X
2	<i>Balaenoptera edeni edeni</i>	Brydes whale		LC				x	x			
3	<i>Megaptera novaeangliae</i>	Humpback whale	Arabian Sea humpback whales	EN	x	x			x		x	
4	<i>Physeter macrocephalus</i>	Sperm whale		VU								
5	<i>Indopacetus pacificus</i>	Longmans beaked whale		DD								
6	<i>Ziphius cavirostris</i>	Cuviers beaked whale		LC								

7	<i>Orcinus orca</i>	Killer whale		DD									
8	<i>Feresa attenuata</i>	Pygmy killer whale		LC									
9	<i>Pseudorca crassidens</i>	False killer whale		NT									
10	<i>Globicephala macrorhynchus</i>	Short finned pilot whale		LC									
11	<i>Peponocephala electra</i>	Melon headed whale		LC									
12	<i>Grampus griseus</i>	Risso's dolphin		LC									
13	<i>Steno bredanensis</i>	Rough toothed dolphin		LC									
14	<i>Stenella longirostris</i>	Spinner dolphin		LC									
15	<i>Delphinus delphis tropicalis</i>	Indo-Pacific Common dolphin		LC									
16	<i>Stenella ceoruleoalba</i>	Striped dolphin		LC									
17	<i>Lagenodelphis hosei</i>	Fraser's dolphin		LC									
18	<i>Tursiops truncatus</i>	Common bottlenose dolphin		LC									
19	<i>Tursiops aduncus</i>	Indo-Pacific bottlenose dolphin		DD									
20	<i>Sousa plumbea</i>	Indian ocean humpback dolphin		EN		x							
22	** <i>Stenella attenuata</i>	Pantropical Spotted Dolphin		LC									

**Possible sightings, species documented on OBIS-SEAMAP. Species not verified.

Description of CIMMA

The area broadly includes the Gulf of Aden, the Socotra Archipelago and a portion of the eastern Somali coast, including the Strait of Guardafui. For the purposes of this proposal, these areas are considered elements of the same biogeographic region, and are believed to share common populations of some species, particularly blue and Brydes whales. The region's oceanography is heavily influenced by a reversing monsoon system and intensive seasonal upwelling that is extremely productive, supporting very rich fisheries and high biodiversity. This includes the region of the wide shelf between Ras Hafun and Socotra (Wyrteki, 1973). The region is also characterised by a broad diversity of marine habitats including deep waters (Tadjoura Trough, Alula-Fartak Trench, Cape Gardafui Strait), shallow shelf areas and mangroves.

Very little research on marine mammals has been conducted in the region. The majority of available information is associated with whaling, including pre-industrial catches of sperm whales (Townsend, 1935; Wray & Martin, 1983; Smith et al. 2012) and Soviet whaling in the 1960's (Mikhalev, 2000), broader multi-taxa surveys (e.g. Van der Elsts & Salm 1997) or regional modelling efforts (Redfern et al., 2017, Willson et al., 2018). Collectively these sources suggest wide species diversity and an abundance of some (Schleyer & Baldwin, 1999), and it is clear that the region is extraordinarily important for large whales in the Arabian Sea (baleens and sperm), at least two of which, the blue and humpback whale appear to be regionally distinct (Mikhalev, 2000; Pomilla et al. 2014; Cerchio et al. 2018). A wide variety of odontocetes has also been recorded, as well as the Dugong (Marsh et al. 2002).

Vessel reporting schemes



Brown (1957) provides information on large whale sightings recorded by merchant ships and other vessels in 1951 to the UK National Institute of Oceanography. Data for the Indian Ocean were limited to 133 reports, of which only 80 included adequate locality data. They suggest that the highest large whale encounter rates were recorded in the Gulf of Aden and its approaches. Slijper (1964) completed a review of global whale distribution using records provided by Dutch naval and merchant vessels during the 1950s (1954-1956) using a model adapted from Brown (1957) and yielding a dataset of almost 3,500 sightings. He states, "... within [the Indian Ocean] by far the greatest concentrations are found in the Gulf of Aden and Arabian Sea..." and is linked to the regions high productivity, but acknowledges that the pattern could have been influenced by the distribution of popular shipping routes (although sightings rates were effort corrected). Species reported from the region included humpback whales, sperm whales and "rorquals", including blue whales and others variously identified as fin, sei, little piked whales and brydes whales. These were most likely to have been limited to blue and brydes whales given later work and whaling data. Calves were noted among the records (rorquals- Fig 16; humpbacks – Fig 19; sperm whales – Fig 21). In the modern era the British Hydrographic office has collated sightings records from United Kingdom whaling vessels and made them available on the OBIS-SEAMAP data platform (Halpin et al. 2009). Records include humpback whale and sperm whales.

Whaling data

Nineteenth century sperm-whalers recorded blue whales on the 'Arabian grounds' between September and November, with one vessel reporting 'lots' off the Somali coast at 7°N 50°49'E in October 1888 (Wray and Martin, 1983). Mörzer Bruyns (1971: chart 14) recorded blue whales off the Horn of Africa and Socotra during September–November, as well as noting that he encountered them [during] several southern winters east of Socotra Island and also in the Gulf of Aden'.

Yukhov (1969) and Mikhalev (1997; 1998; 2000) provide independent accounts of the same Soviet whaling voyages through the Arabian Sea between 1963 and 1967 (the monthly range for all years spans 23rd October to 15th December). Yukhov provides little in the way of detail but reports over 600 whales sighted in the Gulf of Aden in 1964, with sperm whales being the most frequent, but also including blue and Brydes whales. He also notes blue and Brydes whales sighted along the coast southeast of Cape Gardafui (Somalia). Humpback whales were encountered east of Ras Fartak (eastern Yemen), an observation that is consistent with whaling data reported by Mikalev (1997) and later research, including satellite telemetry and associated distribution modelling (Willson et al. 2017).

Mikhalev (2000) provides much more detail on Soviet catches of blue, Brydes and sperm whales in the Arabian Sea. The data clearly demonstrate that the Gulf of Aden was the most rewarding region for the whalers in the Arabian Sea during the whaling period (October-December). For all species he surmises that Arabian Sea populations are likely distinct. Breeding cycles for blue, brydes and humpback whales are offset by six months to those of southern hemisphere animals. He also suggested that there were two different populations of Brydes whales in the Arabian Sea given disparities in foetal lengths. Some evidence for this division is seen in genetic analyses of north Indian Ocean Brydes whale tissue (Kershaw et al. 2013).



Cetacean surveys and multi-taxa surveys

Alling (1986) reports on small cetacean sightings recorded within the Gulf of Aden during the voyage of the 'Tulip' between November and February 1982. The vessels track included the Gulf of Tadjoura, ran close to the Yemeni coast as far as Ghubbat Ain and then traversed the Gulf in the general direction of Ras Gardafui before re-crossing the Gulf in the direction of Ras Fartak. Species sighted during the voyage included spinner dolphin, pantropical spotted dolphin, common dolphin, Risso's dolphin, bottlenose dolphins, pygmy killer whales and false killer whales. Data for large whales is not available in any of the reporting associated with this survey, but data exploration with the author is worth future consideration.

Small and Small (1991) reported on 398 opportunistic observations of cetaceans observed in Somalia during small 289 days of fisheries survey effort conducted between 1985 and 1997. They worked both within the Gulf of Aden and the on the Indian Ocean coast as far as 8°N (which coincides with the southerly extent of the IMMA). They reported 14 different species, 79 observations of large whales (occasionally of multi-animal groups), including blue whales, Brydes whales, sperm whales, killer whales, false killer whales, melon headed whales, short finned pilot whales, humpback dolphins, common dolphins, bottlenose dolphins, Rissos dolphin, striped dolphin, spotted dolphin and spinner dolphin. In a single line and photograph they also describe an observation of a 'Brydes whale' which had a "clearly visible chevron pointing posteriorly above the flippers." This is suggestive of an Omura's whale and needs further investigation.

Schleyer and Baldwin (1999) surveyed the Northern Somali coast in March 1999 between Berbera and Raas Khansir. A total of 35 sightings and five different species (common, spinner, spotted, Indo-pacific bottlenose and humpback dolphins) were recorded during a six day, boat-based survey. School sizes were occasionally large, including a common dolphin group estimated to include between 1 500 and 1 800 individuals. This is consistent with previous reports, including those of Morzer Bruyns (1971) and Yukhov (1969). Common and spinner dolphins were frequently observed in schools of between 300-1000 individuals. School sizes of bottlenose dolphins varied between 2-35 animals and one school of approximately 150 individuals. Indo-Pacific humpback dolphins were typically seen in groups of up to a maximum of 15 individuals. Mating was observed among spinner dolphins and calves of several species were recorded. These sightings were consistent with those provided by Van der Elst and Salm (1997), who survey much of the same coastline.

Anderson et al. (2006) summarise sightings of Longmans beaked whales (*Indopacetus pacificus*) in the Northern Indian Ocean. He includes two putative sightings from the region reported by Morzer Bruyns (1971); one of these from the Gulf of Aden and the other from the 'Socotra area'. Sightings for the Socotra area are in general less abundant in the available literature but do indicate wide species diversity and a firm connection to populations in the Gulf of Aden, particularly blue whales. Ballance et al. (1996) report on a survey of cetaceans in the Western Tropical Indian Ocean conducted in 1995. This included a suite of sightings off the northern coast of Somalia and Socotra, including pygmy killer whales, false killer whales, short finned pilot whales, rough toothed



dolphins, bottlenose dolphins, Risso's dolphins, striped dolphins, spinner dolphins and a suite of unspecified 'Stenella sp.' sightings. Richard Porter (pers comm to T. Collins) reports on 19 sightings of cetaceans recorded incidentally during bird surveys in coastal waters north of Socotra between 1999 and 2011. The majority of these are of Indo-pacific bottlenose dolphins, but also include a sighting of four killer whales at Erher (NE Coast) in February 2007.

Species distribution modelling

Modelling of putative blue whale habitats in the Northern Indian Ocean completed by Redfern et al. (2017) "predict blue whale habitat in the upwelling areas suggested by Anderson et al. (2012) during the Southwest Monsoon (i.e. off the Arabian Peninsula, southwestern India, and western Sri Lanka)...[the] models also predict that blue whale habitat occurs in these areas during the Northeast Monsoon. The habitat predicted in the western NIO during the Northeast Monsoon occurs farther offshore than the habitat predicted during the Southwest Monsoon, suggesting that localized movements may occur in this region". Modelling of humpback whale habitat using EENMs by Willson et al. (2017) also indicates that the Gulf of Aden provides suitable habitats for the Arabian Sea humpback whale, a finding consistent with whaling data and a handful of modern records, including satellite telemetry locations.

Criterion A – Species or Population Vulnerability

The IUCN Red list classifies humpback whales globally as Least Concern. In the northern Indian Ocean (NIO) however, they are recognised as geographically, demographically and genetically isolated (Baldwin et al. 1999; Mikhalev 2000; Minton et al. 2011; Pomilla, Amaral et al. 2014) and are referred to as the 'Arabian Sea humpback whale subpopulation' and are listed as 'Endangered' (Minton et al., 2008). Recent modelling of Arabian Sea humpback whale distribution also indicate suitable habitats in the Gulf of Aden, and is consistent with the limited information on regional sightings and whaling captures (Willson et al. 2017).

The Indian Ocean humpback dolphin (*Sousa plumbea*) is listed as 'Endangered' throughout its range by the IUCN Red List (Braulik et al., 2017). Sightings are reported for the Somali coast by various authors (Small & Small, 1991; Van der Elst & Salm 1997; Schleyer & Baldwin 1999).

Criterion Ci – Reproductive Areas

Blue and Brydes whales captured in the Gulf of Aden by Soviet whalers in the 1960's included substantial numbers of mature females that were pregnant. Of 384 females examined 129 were pregnant, and analyses of foetal lengths demonstrated that the animals were 6 months out of phase with those in the southern hemisphere, and out of phase with those in the 'Equatorial-Seychellois' aggregation. Brydes whales showed a similar pattern, but foetal lengths included evidence of two regional populations.

Criterion Cii – Feeding Areas



Blue and Brydes whales captured in the Gulf of Aden by Soviet whalers in the 1960's included substantial numbers of mature females that were pregnant. Of 384 females examined 129 were pregnant, and analyses of foetal lengths demonstrated that the animals were 6 months out of phase with those in the southern hemisphere, and out of phase with those in the 'Equatorial-Seychellois' aggregation. Brydes whales showed a similar pattern, but foetal lengths included evidence of two regional populations.

Criterion Dii – Distinctiveness

Blue whales sighted and captured in the Gulf of Aden, around Socotra and along the Somali coast are believed to be Arabian Sea pygmy blue whales. Mikhalev (2000) deduced that blue whales captured in the Arabian Sea were distinct from those captured in the southern hemisphere given an 'aseasonal' distribution (October to December), an aseasonal breeding cycle and an absence of other diagnostic features, including cookie-cutter shark bites. Many captured females were pregnant and fattened, findings that were at odds with those from other tropical regions.

More recent evidence includes the identification of a novel blue call type recorded from both northern Madagascar and the Southern Oman coast; the call type is distinct from those attributed to animals from the Sri Lanka, Madagascar and Antarctic populations, and the authors suggest that it could belong to the Arabian Sea population (Cerchio et al. 2018). Specifically they state "this song type was detected more extensively and during a more extended period of the year off Oman than off Madagascar. This suggests this population may be more associated with the North Indian Ocean and the Arabian Sea, and only an occasional visitor in the Southwest Indian Ocean and the Mozambique Channel....these observations suggest that there may be two NIO blue whale populations."

Criterion Dii – Diversity

At least 22 species of cetacean have been recorded in the cIMMA. This reflects the availability of a wide range of suitable habitats and the regions very high productivity associated with monsoon upwellings.

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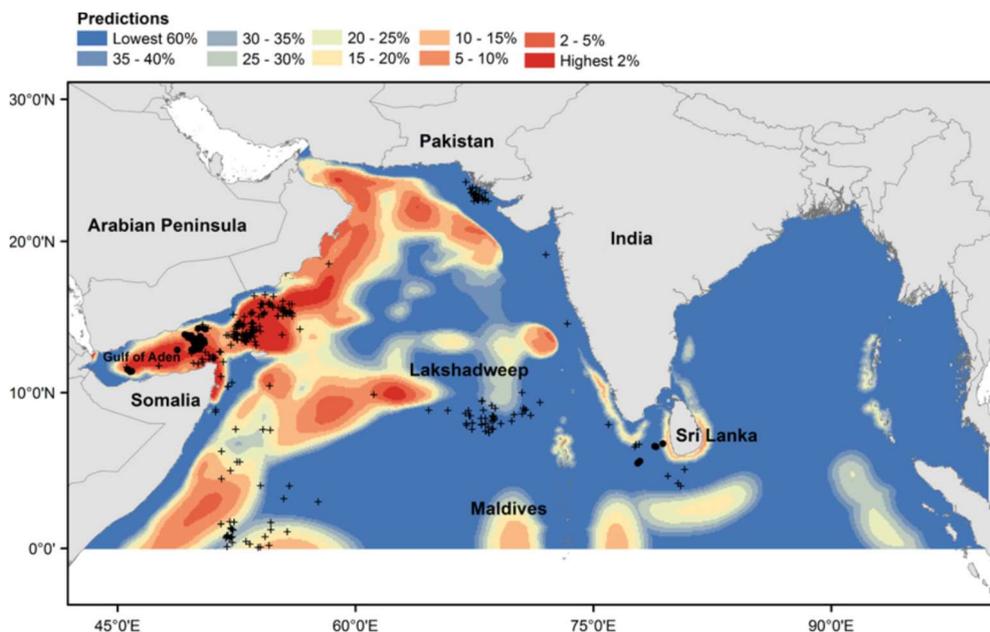
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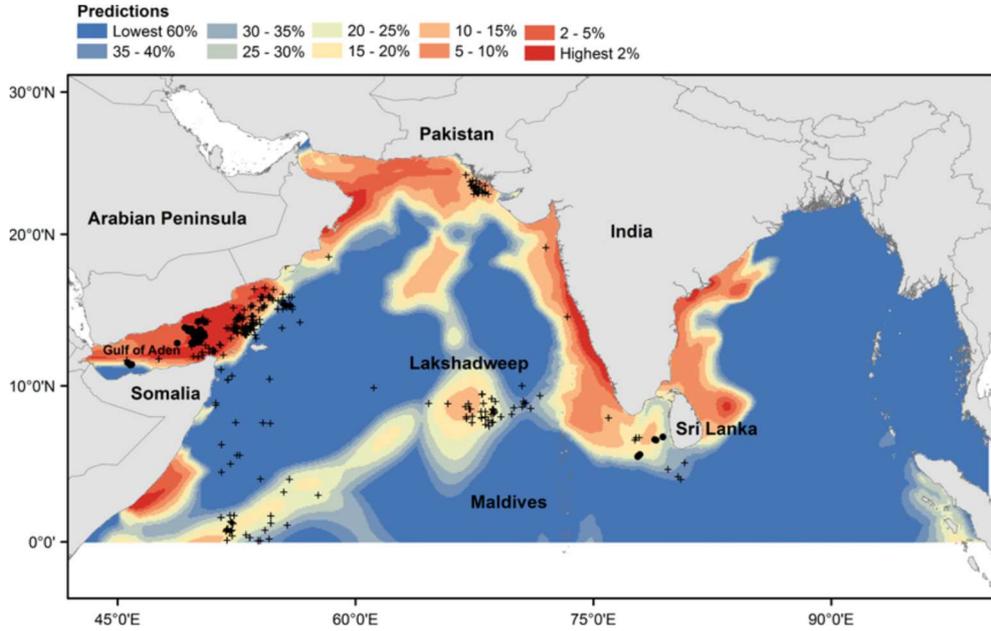
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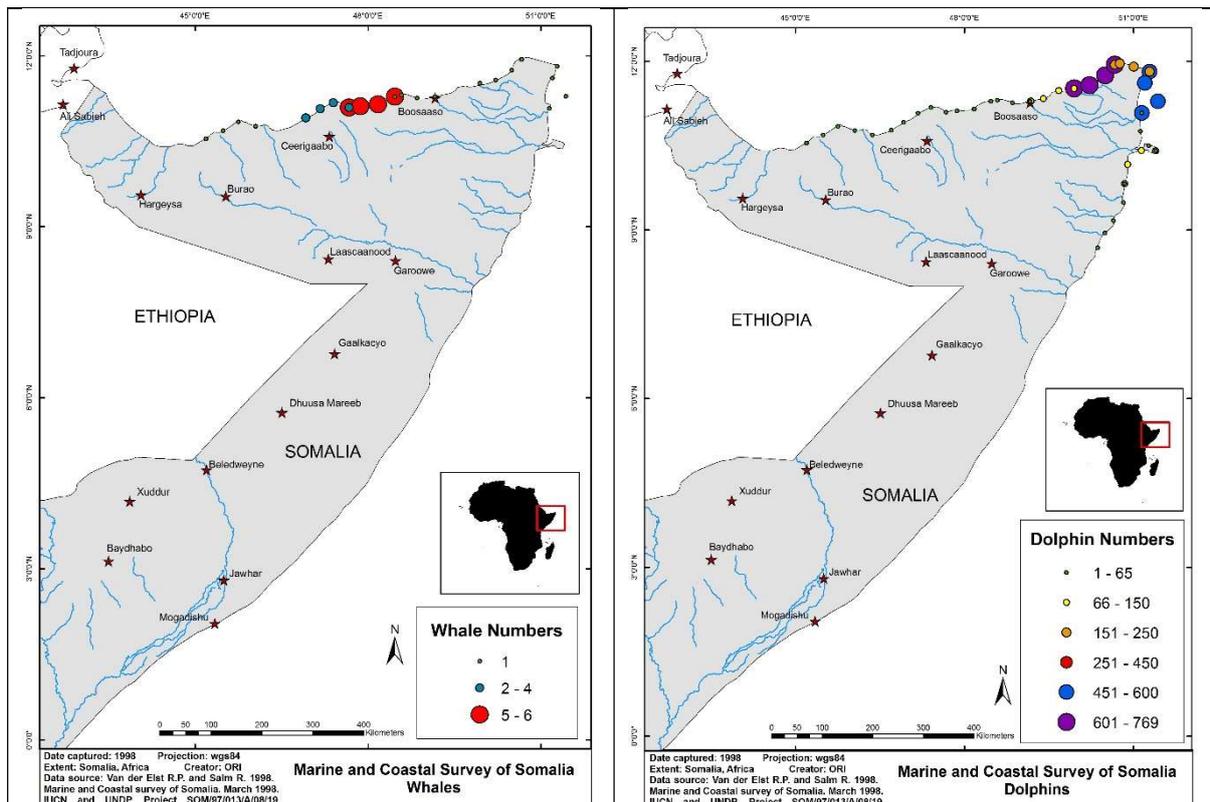
Supporting Figures or Maps



Northeast Monsoon



Southwest Monsoon



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