

# Recent records of marine mammals in Tanzanian waters

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## ABSTRACT

Marine mammal species diversity off Zanzibar and Tanzania, East Africa, has been recorded by the Marine Mammal Education and Research Group at the Institute of Marine Sciences, Zanzibar, Tanzania since 1998. The data presented in this report reflect the efforts of 10 years collection of information from marine mammals stranded and incidentally caught in Tanzanian waters. Additional information from dedicated surveys of cetaceans (whales and dolphins) and incidental sightings reported by the general public are also provided. From 1992 through 2008 a total of 235 specimens of 13 cetacean species and the dugong were recorded. 214 (90.7%) records referred to specimens from bycatch in drift and bottom-set gillnets and 22 (9.3%) referred to specimens from strandings. Based on incidental catch and sightings records, Indo-Pacific bottlenose, spinner and Indo-Pacific humpback dolphins, observed year-round, and humpback whales, observed seasonally during July to November, were the most common species in Tanzanian coastal waters.

KEYWORDS: STRANDINGS; BYCATCH; INDO-PACIFIC BOTTLENOSE DOLPHIN; INDO-PACIFIC HUMPBAC DOLPHIN; SPINNER DOLPHIN; HUMPBAC WHALE; SPERM WHALE; DUGONG; ZANZIBAR; TANZANIA

## INTRODUCTION

Cetaceans (whales and dolphins) and dugongs are an integral part of the marine and coastal fauna of tropical and subtropical waters of the East African region (Berggren, 2009). For many species, these waters serve as key habitat for a range of primary activities including feeding, mating and calving (Amir *et al.*, 2005b; Stensland *et al.*, 2006). However, there is a lack of information about the distribution, ecology and abundance for most species due to limited coverage by dedicated research programmes (Berggren *et al.*, 2007; Kiszka *et al.*, 2008). This lack of information is significant, as the East African region is located within the Indian Ocean Sanctuary established by the International Whaling Commission (IWC) to encourage conservation and research of cetaceans in the region (IWC, 1980).

In 1998 a project was launched in Zanzibar, Tanzania with the objective to assess the status of cetaceans and build capacity for their conservation and management. This was facilitated through collaboration between the marine mammal research group at Stockholm University, Sweden (between 1998 and 2010) and since 2010 by Newcastle University, UK, and the Institute of Marine Sciences, University of Dar es Salaam, based in Zanzibar, Tanzania. The activities have focussed on two research areas; vessel based surveys to collect data for cetacean distribution, abundance, genetic population structure, ecology and behaviour and documentation of strandings and incidental catches of marine mammals occurring in Tanzanian coastal waters. A number of scientific papers and reports have been published documenting the results of these activities (see e.g. Amir *et al.*, 2002; Amir *et al.*, 2005a; Amir *et al.*, 2005b; Berggren, 2009; Berggren *et al.*, 2007; Christiansen *et al.*, 2010; Mwevura *et al.*, 2010; Sarnblad *et al.*, 2011; Stensland and Berggren, 2007; Stensland *et al.*, 2006). However, to

date there have been no scientific papers published documenting the diversity of marine mammals present in Zanzibar and Tanzanian waters. Therefore, the aim of this paper is to summarise and present information on the diversity of marine mammal species known to occur in Zanzibar and Tanzania waters using stranding and bycatch data supplemented by available sighting records. This paper also updates information on bycatch of marine mammals documented by Amir *et al.* (2005a)

## MATERIALS AND METHODS

### Study area

Most of the information on marine mammals was collected in the coastal waters around Unguja Island located at 06°2'S, 39°2'E about 40km off the central coast of the Tanzania mainland (Fig. 1). Unguja Island is often referred to as Zanzibar although the latter also includes Pemba Island.

### Samples and sampling procedures

Since 2000, strandings and bycatch of marine mammals have been documented and collected by the Marine Mammal Education and Research Group based at the Institute of Marine Sciences, Zanzibar (Amir *et al.*, 2005b). The group coordinates and records all reported animals around Zanzibar with the help of a network of observers (beach recorders from Department of Fisheries Development, Zanzibar and the general public). Where possible, the reported carcasses are then necropsied, sampled and preserved at the Institute of Marine Sciences for further biological and ecological studies.

### Strandings

The group often receives reports from beach recorders, fishermen or the general public stating that an animal has been found stranded. In most cases, members of the group

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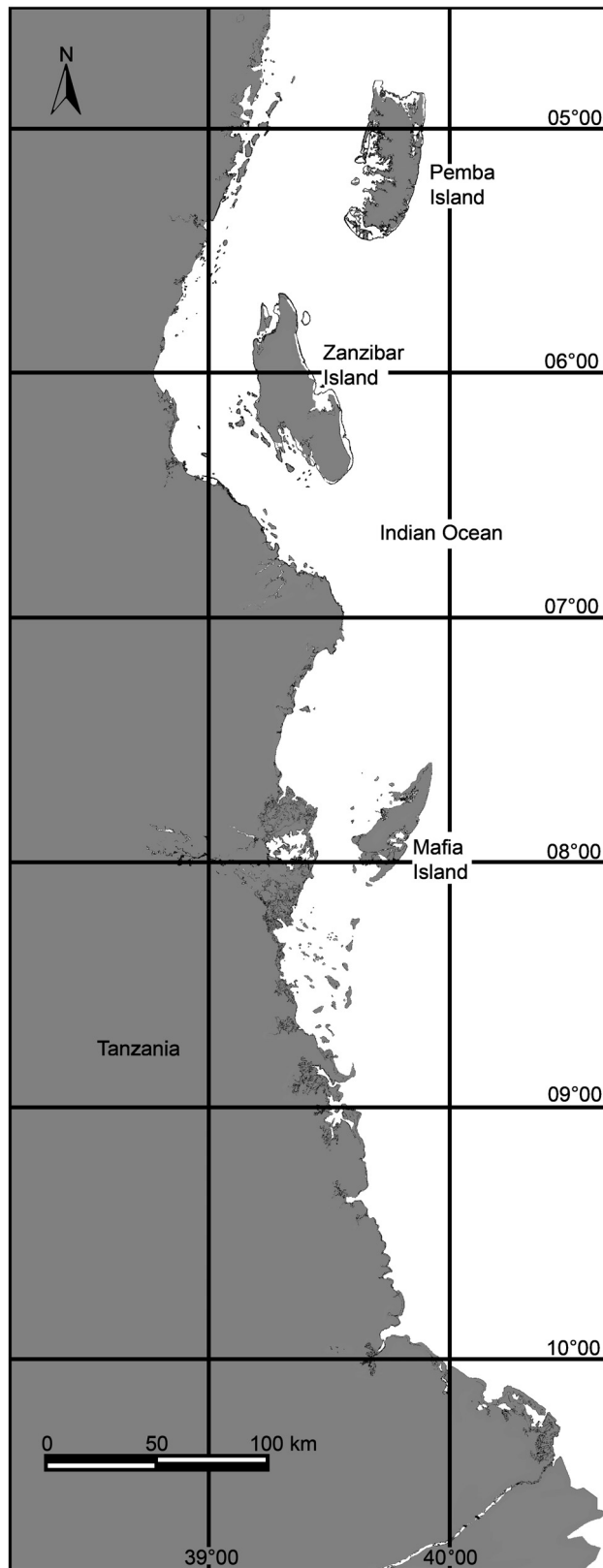


Fig. 1. Map of Zanzibar (Unguja and Pemba Island) showing the study area.

respond by going to the location of the event to examine the animal. A few records of stranded marine mammals exist from 1992 and 1993 collected during a sea turtle survey conducted in 1994. During this survey fishermen were also asked to answer questions regarding stranding of marine mammals (Fiona Clark and Asha Khatib, pers. obs.). These records were accepted into this study only if the information

provided allowed verification of species identification. All stranded animals were identified, measured and photographs taken. When possible, stranded dead animals were collected by the group members for further analyses.

#### *Bycatches*

Since fishermen's cooperation is on a voluntary basis, in order to encourage them to report and bring carcasses a nominal financial compensation has been paid (\$5 for small specimens and \$10 for larger animals) for the delivery of the carcass. This compensation was paid to cover fishermen's time and expenses to transport the fresh specimens to the location of the beach recorder or to Zanzibar central market (Amir *et al.*, 2005b). The respective authorities were advised of the importance of collecting and documenting all bycatches that occur in fisheries. Fishermen hand over any bycaught animal to the fisheries beach recorders of the landing site in the village or to a contact person in Zanzibar central market. These beach recorders or contact person then provide a report of the event to the member of the research group at the Institute of Marine Sciences. The incidentally caught animals were measured, weighed and photographed and later necropsied when possible.

## RESULTS

### Strandings

From 1992 to 2008, 22 marine mammals were reported stranded (Table 1). All of the strandings were found dead. Two species comprised the majority of stranding events; humpback whales (*Megaptera novaeangliae*) with 50% of the total strandings followed by sperm whale (*Physeter macrocephalus*) with 36.4%. The majority of the strandings (85.7%) occurred during the second half of the year between July and November (Fig. 2). Many of the stranded animals were found dead and exhibiting various stages of decomposition. For small cetaceans there were only single records of strandings for shortfinned pilot whale (*Globicephala macrorhynchus*), pygmy sperm whale (*Kogia breviceps*) and killer whale (*Orcinus orca*). However, two mass strandings have occurred on Zanzibar. In 1933, 44 false killer whales (*Pseudorca crassidens*) stranded along the Mtoni seashore on the west coast of Zanzibar (Zanzibar Natural History Museum collection) and on the night between 27-28 April 2006 a group of approximately 600 common bottlenose dolphins (*Tursiops truncatus*) stranded and died on the northwest coast of Zanzibar (Berggren, 2009).

### Bycatches

From January 2000 to December 2008, 213 bycatches of cetaceans and one dugong were reported (Table 2). All the reported animals had been entangled in artisanal (drift- and bottom set) gillnets. Drift gillnet fishing is almost exclusively carried out during night-time, where nets are set in the evening and retrieved before moonrise. Bottom-set gillnets are usually set in the evening and hauled in the morning, soak time seldom exceeding 24 hours. Fishing takes place over about three weeks during the dark moon phase for both type of gillnets. A detailed description of these fishing methods can be found in Amir *et al.* (2002).

Table 1  
Species and occurrence of marine mammals stranded off the Zanzibar coast between 1992 and 2008.

Scientific name	Body length range (cm)	1992	1993	1999	2000	2001	2002	2003	2004	2006 <sup>1</sup>	2007	2008	Total	%
<i>M. novaeangliae</i>	415–1,040	1	1	1	1	1	2	1	2	0	0	1	11	45.5
<i>P. macrocephalus</i>	900–1,520	1	0	1	1	1	1	0	0	0	3	0	8	36.4
<i>K. breviceps</i>	210	0	0	0	0	1	0	0	0	0	0	0	1	4.5
<i>G. macrorhynchus</i>	–	0	0	0	0	0	0	0	0	1	0	0	1	4.5
<i>O. orca</i>	–	0	1	0	0	0	0	0	0	0	0	0	1	4.5
Total		2	2	2	2	3	3	1	2	1 <sup>1</sup>	3	1	22	100

<sup>1</sup>Approximately 600 common bottlenose dolphins stranded and died on the night between 27–28 April 2006 on the NW coast of Zanzibar (Unguja Island).

Indo-Pacific bottlenose dolphin (*Tursiops aduncus*) was the most frequently reported species, with 45.8% of the total bycatch, followed by spinner dolphin (*Stenella longirostris*) with 32.7%, Indo-Pacific humpback dolphin (*Sousa chinensis*) with 7.5% and Risso's dolphin (*Grampus griseus*) with 7.0%. Other species that were only occasionally bycaught included: pantropical spotted dolphin (*Stenella attenuata*), humpback whale (*Megaptera novaeangliae*), common bottlenose dolphin (*Tursiops truncatus*), Fraser's dolphin (*Lagenorhynchus hosei*) and the dugong (*Dugong dugon*). The high percentages of bycatch for Indo-Pacific bottlenose and spinner dolphins do not reflect the abundance of the respective species (although only limited data is available for spinner dolphins). These species maybe more vulnerable to entanglement in gillnets or the species' distributions could have greater overlap with the distribution of gillnet fishing effort compared to other dolphin species in the area.

## DISCUSSION

The result of these studies show that humpback and sperm whales are the most frequently stranded marine mammals (excluding the two incidences of mass strandings) on the coasts of Zanzibar and mainland Tanzania. This indicates that these two species are the most regularly occurring large whale species in Tanzanian waters. All of the stranding events ( $n = 19$ ) reported for these species occurred between the months of July and November. These strandings thus

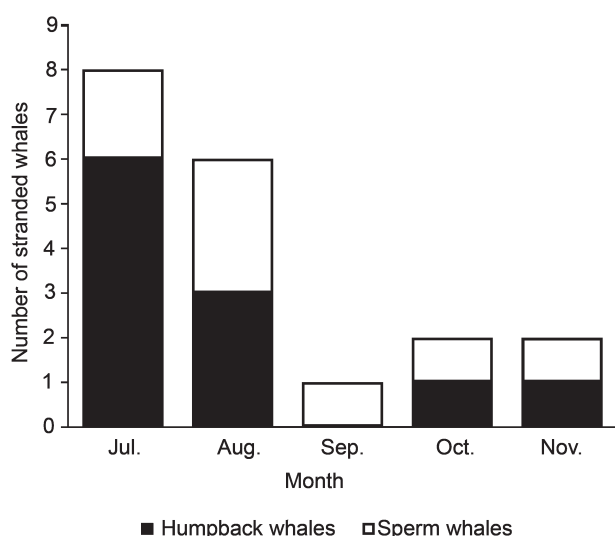


Fig. 2. Monthly distribution of humpback and sperm whales stranded off Zanzibar between 1992 and 2008.

support the idea of seasonal occurrence of these species in the area. All of these documented strandings involved single dead animals (excluding the mass strandings) for which cause of death has not been determined. Some of the humpback whales may have died from net entanglement in drift and bottom-set gillnets. Fishermen usually try to disentangle the whales by cutting the ropes and nets but often fail to remove the whole net. It is difficult to establish either the cause of these strandings or cause of death as in most cases when we arrive at the site there are many people around that have already started to cut-up the stranded animal for consumption. This usually happens when the animals are fresh. However, even when the carcass is in an advanced stage of decomposition people use the meat and blubber for making oil which is used as medicine. There were few reported strandings for small cetaceans and it is not clear if these represent the total number of animals stranded or if strandings are not being reported because they are being used locally for bait and other products.

The seasonal occurrence (July–November) of strandings and bycatch of humpback whales is also supported by sightings records from vessel based surveys carried out off the south coast of Zanzibar (P. Berggren, pers. obs.). This may indicate that the humpback whales encountered off Zanzibar are part of the migrating stocks from the Antarctic Ocean that have their breeding grounds off South and East Africa (Ersts and Rosenbaum, 2003). However, the relationship between the humpback whales found off Zanzibar and Tanzania and those in neighbouring areas, and the discreet breeding stock in the northern Indian Ocean still needs to be investigated. Zanzibar fishermen complain that they lose their nets when humpback whales are entangled. There are a few incidences when bycaught humpback whales have been killed by fishermen. For example, in four cases involving bycaught humpback whales, only two were released from the nets alive in 2003 and 2004 due to the quick response of the Department of Fisheries Development. The other two animals were killed by villagers in 2002 and 2004 and the meat was distributed for consumption in the local villages.

The results of this study show that sperm whales are the second most frequently recorded stranded cetacean species. Despite the high frequency of strandings, sightings of this species in Tanzanian waters are rare and no survey efforts have been done for this species in the area. Carcasses of sperm whales have been found washed up on beaches between July and December, usually of animals which have already died at sea. Most of the sperm whale strandings

Table 2  
Species and occurrence of marine mammals bycaught in gillnet fisheries between 2000 and 2008.

Scientific name	Body length range (cm)	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total	%
<i>T. aduncus</i>	103.5–238	32	12	14	15	9	5	1	2	9	98	45.8
<i>S. longirostris</i>	101–213.5	20	18	0	10	1	2	10	8	1	70	32.7
<i>S. chinensis</i>	128–250	1	5	1	4	0	4	0	0	1	16	7.5
<i>G. griseus</i>	164–251	1	11	0	1	1	0	1	0	0	15	7.0
<i>S. attenuata</i>	173–228	0	4	0	2	1	0	0	0	0	7	3.3
<i>T. truncatus</i>	167–230	0	0	1	1	0	0	0	0	0	2	0.9
<i>L. hosei</i>	158	0	0	0	0	1	0	0	0	0	1	0.5
<i>M. novaeangliae</i>	415–1,040	0	0	1	1	2	0	0	0	0	4	1.9
<i>D. dugon</i>	235	0	0	0	0	0	1	0	0	0	1	0.5
Total		54	50	17	34	15	12	12	10	11	214	100

occurred on the east coast of Unguja Island which is very close to deep water (>1,000m within 10 n.miles).

The number of incidental catches of (mostly) small cetaceans varied from year to year but there has been a notable decrease in the number reported during the survey period. The decrease in incidental catch could be due to depletion of populations, the decrease in effort by beach recorders or increased awareness of fishermen to the conservation issues of marine mammals and fear that reports of incidental catch may lead to fisheries restrictions.

The results of this study show that Indo-Pacific bottlenose dolphins are the most widespread of all dolphins and occur all around the coast of Zanzibar. The species occurs in small resident populations, e.g. in the inshore waters of Menai Bay, south coast of Unguja with an estimated population size of between 136–179 bottlenose dolphins (Stensland *et al.*, 2006).

The bycatch data indicate that spinner dolphins are distributed in all coastal waters of Unguja Island except off the west coast where no specimens were retrieved from fisheries bycatch. This area is relatively shallow (maximum depth <50m) and may not meet the habitat requirements for the species. However, most of the spinner dolphin bycatch was reported from northwest of Unguja Island and in the area between Unguja Island and along the coast of Tanga, Tanzania mainland. Few bycatches of spinner dolphins have been reported from the south of Unguja Island. Sightings of spinner dolphins have been reported off Unguja Island along the coast of Nungwi and Matemwe (N. Ortland, pers. obs.) and on the west coast of Pemba Island (L. Karczmarski, pers. comm.).

Bycatch of Indo-Pacific humpback dolphins have been reported mainly from southwest and northwest of Unguja Island especially in the inshore areas and bays. This species is also known as resident in Menai Bay, off the south coast of Unguja with population estimates of about 58–65 animals (Stensland *et al.*, 2006).

Pantropical spotted, Risso's and Fraser's dolphins have only been reported as bycatch off the northeast coast of Unguja Island. This indicates that these species are rare in the coastal waters of Zanzibar. However, Pantropical spotted dolphins have been observed in mixed groups with spinner dolphins off the coasts of Nungwi and Matemwe on the north coast of Unguja Island (O. Amir and P. Berggren, pers. obs.). No Fraser's dolphin sightings have been recorded in the waters of Tanzania.

The two common bottlenose dolphins recorded were bycaught off the southwest and northwest coasts of Unguja Island. This gives an indication that this species is rare in the coastal waters of Tanzania, though it may be common offshore. The mass stranding of about 600 common bottlenose dolphins in April 2006 shows that the species can be present in the region in relatively large numbers. These animals were live stranded and died on the beaches. The cause of the mass stranding could not be established although all of the 66 specimens sampled on site had empty stomachs indicating that the animals may have stranded on an unfamiliar shore in search for prey.

The bycatch of a dugong, which occurred in 2005, is the first case to be recorded in Zanzibar. Dugongs have also been recorded as bycatch off the Tanzanian mainland. For example, 26 dugongs were bycaught in the Rufiji Delta and off Kilwa, along the coast of the Tanzanian mainland from 2000 to 2004 (WWF Eastern African Marine Ecoregion (EAME), 2004). A single dugong was also found stranded on Pemba Island in 2006. These records indicate that dugongs are still present in Tanzanian waters although their status remains unclear.

A pilot aerial survey conducted in Zanzibar and Tanzanian coastal waters in February 2000 revealed the occurrence of several other cetacean species including; rough-toothed dolphin (*Steno bredanensis*), Cuvier's beaked whale (*Ziphius cavirostris*) and Longman's beaked whale (*Indopacetus pacificus*) (Berggren *et al.*, 2001).

## CONCLUSIONS

The results of this study demonstrate a relative high diversity of dolphin species present in the coastal waters of Tanzania. This information is important to the region since it demonstrates the potential for tourism based on whale and dolphin watching activities. The results are also cause for concern regarding the possible impact of the high mortality due to the gillnet fishery on local populations and this warrants further investigation. Hence, there is a need for more research in order to understand the ecology, abundance and conservation status of marine mammals in the region and to monitor their populations, especially for those species and geographical areas where no studies have been conducted. There is also a need for further cooperation and the building of trust between fishermen and Fisheries authorities in order to get precise information for the incidental catch to allow assessment of impact on populations.

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