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**MARINE MAMMAL DIVERSITY IN THE REMOTE WATERS OF ALDABRA
ATOLL, SOUTHERN SEYCHELLES**

BY

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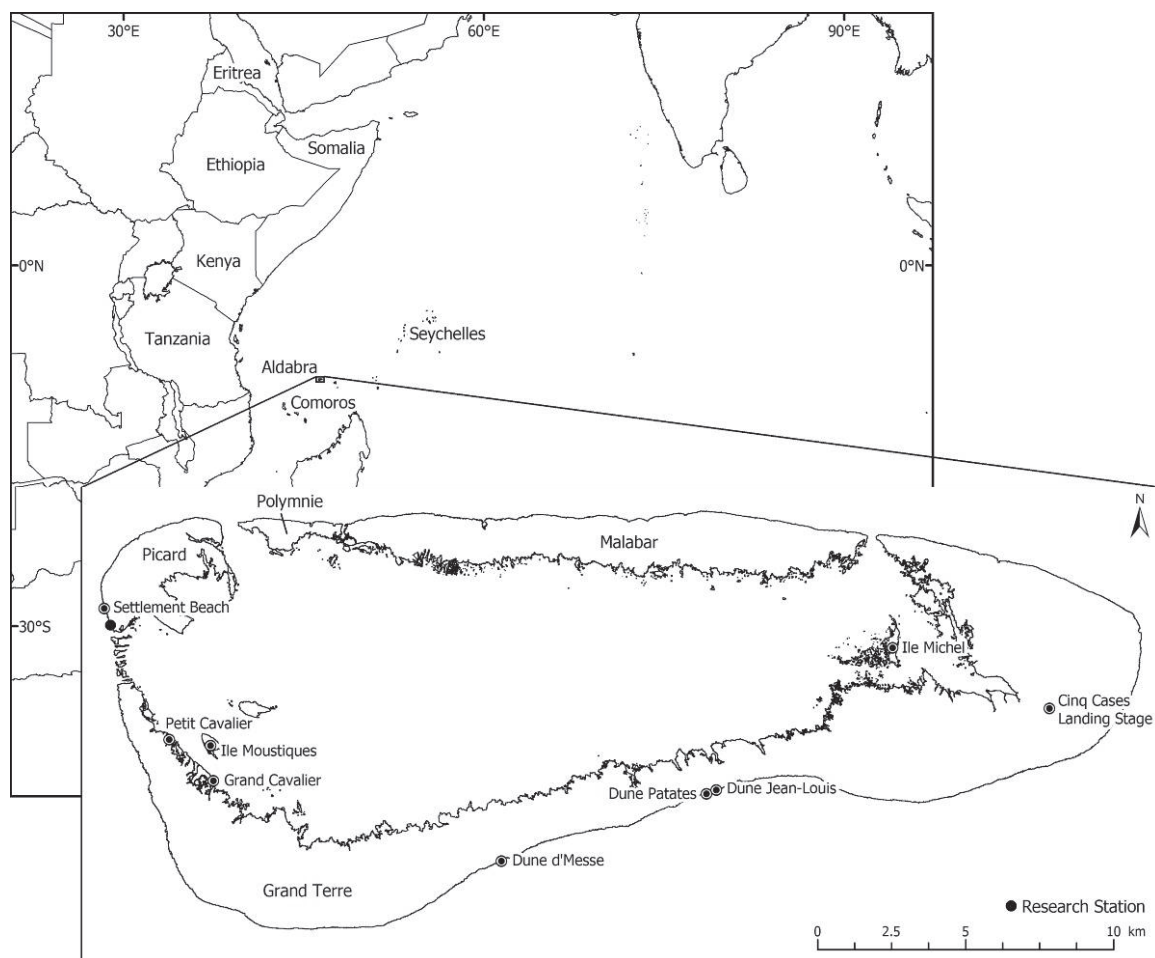


Figure 1. The location of Aldabra in the Western Indian Ocean.

MARINE MAMMAL DIVERSITY IN THE REMOTE WATERS OF ALDABRA ATOLL, SOUTHERN SEYCHELLES

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AURELIE HERMANS¹ AND PIERRE A. PISTORIUS²

ABSTRACT

Aldabra atoll forms the furthest outer islands of the Seychelles archipelago. It is included in the large sanctuary for the Indian Ocean whales and due to its remote location is difficult to access. Few scientific investigations on marine mammals have been conducted here and we consequently still have a poor understanding of their dynamics and diversity. In the current study we report on marine mammal sightings that have been collected for the period 1973-2007 by field workers based at the Aldabra research station. These sightings were largely opportunistic and were both shore- and boat-based. In order to assess the diversity of marine mammals, either resident or transient, in Aldabra waters we compiled and quantified these records. Over the study period, 14 species of marine mammals have been reported (n=348 sightings). Among the more numerous sightings have been humpback whales (*Megaptera novaeangliae*, n=215), which are commonly seen during the months July-to-November and spinner dolphins that are seen year round. Throughout the study period, dugongs (*Dugong dugon*, n=28) have been seen at irregular intervals, mostly within Aldabra's large lagoon. We briefly report on a dedicated effort during the 2007 humpback whale season to gain information on abundance and group characteristics.

INTRODUCTION

The Seychelles archipelago is a rich site in terms of marine mammal biodiversity, with over 28 species of Cetaceans and one species of Sirenia having been recorded from these waters (Racey and Nicoll, 1984; Keller et al., 1982; Robineau, 1991; Eyre, 1995; Balance and Pitman, 1998). Despite this, and the fact that the Seychelles are located in the Indian Ocean Whale Sanctuary, which was established by the International Whaling commission in October 1979 (Leatherwood and Donovan, 1991; Eyre, 1995), studies on cetaceans in this region have been few. Furthermore, when cetacean-focused scientific campaigns have been carried out in the Seychelles (Keller et al., 1980; Eyre 1993; Ballance and Pitman, 1995; Payne, et al., 2002), brief or no passage through the remote waters proximate to Aldabra was made. Our current knowledge of cetaceans as well as other marine mammals in the Western Indian Ocean region surrounding Aldabra is consequently still severely limited.

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Aldabra, designated a UNESCO World Heritage site in 1982, is a raised atoll located in the Western Indian Ocean (9°24'S , 46°20' E; Fig. 1), with a land area of 155 km² (34 km long, 14.5 km wide). The atoll consists of four main islands around a central lagoon containing several smaller islands. It is situated 1066 km southwest of Mahé, the main island of the Seychelles archipelago, and 420 km north of Madagascar. Due to its geographical isolation, rough terrain and scarcity of fresh water, marine resources surrounding Aldabra have largely escaped significant levels of human impact.

In 1971, the Royal Society established a research station on Aldabra which allowed for much research into the terrestrial and marine ecology of the atoll. Marine mammal sighting records by the field workers began in 1973. In 1981, the Seychelles Island Foundation took over the management of Aldabra to conserve resources here and initiate ecological research. Marine mammal sightings continued to be recorded by scientists working on Aldabra and this has been continued up to the present day. The aim of this study is to compile observational data on marine mammals at Aldabra for the period 1973-2007 in order to assess the diversity of marine mammals found in the near-shore waters of Aldabra.

METHODS

Sightings of marine mammals were largely opportunistic and not a result of dedicated surveys. Most sightings were shore-based and within the vicinity of the research station on Picard due to a regular presence of staff and researchers there. Picard lies on the northwestern end of the atoll, and cetaceans are seen regularly beyond the 460 m reef flat (Barnes et al., 1971). A number of shore-based sightings were also reported from other localities around the atoll from personnel engaged in field work. Since the establishment of the research station on Aldabra, there has been regular monthly boat movement between Picard and the other main islands making up the atoll. A large part of the sightings database is made up of reported observations while commuting between islands. These are complemented by marine mammal sightings while undertaking subsistence fishing. An unknown number of dedicated searches were made for dugongs (*Dugong dugon*) in the lagoon by both boat and micro-light aircraft.

Cetacean and dugong sightings were recorded initially on event cards which are standard forms that were used during the Royal Society administration of the atoll with fields for date, time, observer/s, species, location and notes. Subsequent to this (from 2002 onwards) a range of additional forms were used, incorporating characteristics such as minimum and maximum number of individuals sighted, estimated size range, the presence of juveniles, behavior and interaction with the boat if approached. During the use of the event card system, observers generally recorded much of this information under notes. For the purpose of the present study all of this data collected over the past 34 years was compiled into a single Excel spreadsheet.

RESULTS AND DISCUSSION

Between February 1973 and 2007, a total of 14 species of marine mammals were encountered at Aldabra (Table 1). This species composition consists of both observations of live individuals as well as of individuals that were observed washed up on shore. This is just under half of the 28 species of marine mammals that have been recorded within the entire Seychelles waters (Racey and Nicoll, 1984; Keller et al., 1982; Robineau, 1991; Eyre, 1995; Balance and Pitman, 1998). A total of 348 sightings were reported during the study period (Table 1) with humpback whales (*Megaptera novaeangliae*) making up over 60% of the sightings (n=215) and spinner dolphins (*Stenella longirostris*) and dugongs following in terms of number of sightings (Table 1).

Aldabra is the only locality within the Seychelles from which multiple sightings of dugongs have been reported (Muir et al., 2004). The first time a dugong was observed here was in February 1970 when a pair feeding off the north coast was seen, and again on the south coast two days later (Racey and Nicoll, 1984). Dugongs were seen again in 1976 swimming on the reef edge. The next record of a dugong was 25 years later in 2001 when an adult was observed in the lagoon during routine monitoring. Eight further sightings were confirmed during that year and, as with all subsequent sightings, these were in the lagoon. No sightings were reported in 2002, seven in 2003, six in 2005, and two in both 2006 and early 2007. Dugongs were mostly seen in numbers of one or two. The largest group reported consisted of four individuals and this was in 2005. The group included a juvenile estimated to be less than half the size of the accompanying adult.

With little anthropogenic disturbances, the atoll appears to provide excellent future prospects for undisturbed dugong population growth in a region where populations are believed to be either decimated or decreasing rapidly (Marsh et al., 2001). It is therefore surprising that dugongs are so seldom encountered on Aldabra, despite a regular presence throughout large parts of the lagoon. In all likelihood, Aldabra probably hosts less than a handful of individuals. Dugongs have the potential to move large distances (up to 600 km) between sites (Marsh et al., 2001) and it is uncertain whether the dugongs that have been sighted at Aldabra are resident. Dugongs are found at Ile de Mayotte (380 km), Comoros (390 km), Madagascar (430 km), and East Africa (630 km; Muir et al., 2004). Based on prevailing oceanic currents, the most likely source of the Aldabra population is Northern Madagascar, which would have made for relatively easy passage for dugongs during the southeast monsoon.

There is no doubt that spinner dolphins are the most abundant marine mammals around Aldabra and because of their frequent presence, observations are generally not recorded. Their presence has only been recorded 60 times, despite the fact that they are seen during most long boat trips along the coast. They are seen throughout the year in large numbers, which suggest that they are resident. Aldabra is an ideal location for research on this species as they are regularly seen and easily approached.

Bottlenose dolphins (*Tursiops truncatus*) have been seen on several occasions and are most often associated with spinner dolphins. The first sighting of this species was in 1988 when a school of about 50 individuals was reported. They were recorded again on three occasions in 1988 and then again in 1997 and 1999.

The first record of a blainville's beaked whale (*Mesoplodon densirostris*) dates back to January 1981 when a dead whale was found washed up on shore at Picard with

Table 1. Marine mammal sightings and group size characteristics at Aldabra Atoll (February 1973 – February 2007).

Species	No. sightings	Mean group size	Group size range
Sireninans			
Dugong (<i>Dugong dugon</i>)	29	1.25	1-4
Cetaceans			
Odontocetes			
Spinner dolphin (<i>Stenella longirostris</i>)	60	69.32	100-500
Bottlenose dolphin (<i>Tursiops truncatus</i>)	9	32.14	15-50
Blainville's beaked whale (<i>Mesoplodon densirostris</i>)	8	3	1-8
Short-finned pilot whale (<i>Globicephala macrorhynchus</i>)	8	23.06	4-50
Sperm whale (<i>Physeter macrocephalus</i>)	5	1.8	1-2
Killer whale (<i>Orcinus orca</i>)	4	3	3
Curvier's beaked whale (<i>Ziphius cavirostris</i>)	3	1.67	1-2
Common dolphin (<i>Delphinus delphis</i>)	2	250	100-400
Spotted dolphin (<i>Stenella attenuata</i>)	2	7	6-8
False killer whale (<i>Pseudorca crassidens</i>)	2	200	200
Risso's dolphin (<i>Grampus griseus</i>)	1	3	-
Melon-headed whale (<i>Peponocephala electra</i>)	1	9	-
Mysticetes			
Humpback whale (<i>Megaptera novaeangliae</i>)	215	2.34	1-10
Total	348	-	-

numerous shark bites. Twenty years later in 2001, the species was again sighted during seven consecutive days in February off the Settlement reef at Picard station.

The first sighting of short-finned pilot whales (*Globicephala macrorhynchus*) was in 2000 and four individuals were seen offshore at Picard. All subsequent sightings were of larger groups.

Sperm whales (*Physeter macrocephalus*) were first reported in 1980 at a distance of 1.5 km offshore. Most sightings of this species have been at a distance of 2-to-10 km offshore.

Killer whales (*Orcinus orca*) were sighted on four occasions in January and February 2001. They were observed from a distance of 1-1.5 km offshore. Each time a group of three individuals was estimated.

A beaked whale was reported washed up on the east coast of Aldabra in September 1973 which was subsequently identified as Cuvier's beaked whale (*Ziphius cavirostris*). The species was again sighted in September 1994 and in March 2006. Both observers that recorded the latter sightings did, however, specify that they were unsure of the species identity of the individuals seen.

Common dolphins (*Delphinus delphis*) were first reported in 1988 and again in 1997 and risso's dolphins (*Grampus griseus*) were sighted in December 1999 off the Malabar coast. A group of three individuals was estimated but the recorder once again noted that there was some uncertainty regarding species identification.

Two large groups of false killer whales (*Pseudorca crassidens*), associated with spinner dolphins, were sighted on two occasions off the station in 1999.

Nine small whales that were stranded on Aldabra in May 1975 were later identified by their skulls as melon-headed whales (*Peponocephala electra*) as reported in Racey and Nicoll (1984). There were no further reports of this species around the atoll.

In addition to the above records reported by field workers on Aldabra, spotted dolphins (*Stenella attenuate*), two sightings of eight and six individuals, were seen four km north-east of Aldabra, identified during a pelagic survey in May 1980 (Keller et al., 1982).

The first record of humpback whales from field workers on Aldabra dates back to as recently as 1986. As with the spinner dolphins, the humpback whales are also often seen although their occurrence is seasonal. With the event card system in the Royal Society days (i.e., pre-1981) it was generally only unusual sightings that were recorded. This may be a reason why the relatively abundant humpback whales were not recorded earlier than 1986. In 2002, a cetaceans' observer network in Seychelles was set up and increased effort was made by station staff to report cetacean and particularly humpback whale sightings. The annual number of humpback whale records consequently increased and became more regular since 2002. Based on all recorded sightings, humpback whales occur in the Aldabra waters from early July-to-November with the latest reported sighting during a season being November 15, 2006.

During the 2007 humpback whale season, a great deal of effort was made to record all humpback whale sightings by staff while moving around the atoll in near-shore waters for monitoring activities or fishing trips. During an estimated 104 hours at sea accrued from 51 boat trips and covering an undetermined distance, humpback whales were seen on 26 occasions. Combined with shore-based observations, a total of 256 individual sightings were reported during the season (90 seen in July, 70 in August, 71 in September and 25 in October). It is important that a measure of effort is included in future observations of this species to allow for meaningful temporal monitoring. This not only applies to sea-based, but also shore-based observations, which could be an effective means of monitoring cetaceans as has been demonstrated elsewhere (Pistorius et al., 2002).

Different group compositions of whales were recorded as follows: single whale (n=62), mother and calf (n=30), with escort (n=26), without escort (n=4), pairs (n=47), two whales that are not a mother-calf pair and a group of three or more whales (N=9). On two occasions humpback whales were seen entering a few hundred meters into the main channel of the lagoon, which is roughly between 15-25 m deep, before turning around. For this species, pigmentation patterns on the ventral surface of the tail fluke, shape of the dorsal fin, and pigmentation and scarring patterns on the sides of the whale can be used to identify individuals uniquely (Friday et al., 2000; Blackmer et al., 2000). Recent attempts to get photographic coverage of humpback whales on Aldabra to allow for such individual recognition are ongoing. In the southwestern Indian Ocean, termed wintering ground C by the International Whaling Commission (IWC), the migratory destinations, routes and interrelationships between the three wintering grounds for humpback whales of Mozambique (C1), the Central Mozambique Channel Islands (C2) and Madagascar (C3) are becoming better known through a number of completed and current studies in the region (Best et al., 1998; Rosenbaum, 2003). The humpback whales sighted on Aldabra may belong to the C2 population. However, humpback whales are also seen on a seasonal basis in the Northern Seychelles Islands. Sightings are during the same period as observed at Aldabra and most whales migrate in a southwest direction from Mahe. These animals are unlikely to be from the group C population and as such the animals at Aldabra may similarly be from another stock. Only through photographic coverage or DNA sampling will the origin and movement patterns of these populations become more apparent.

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