

SIGNIFICANCE OF 55°S IN THE "INDIAN OCEAN SANCTUARY OF WHALES" IN RELATION TO THE DISTRIBUTION OF MARINE MAMMALS

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Abstract: The Symposium on Marine Mammals of the Indian Ocean was held at Colombo, Sri Lanka, 1983. At this symposium it was recommended that the Indian Ocean Sanctuary of Whales, which was established by the International Whaling Commission in 1979, should be extended as far as Antarctica over 55°S. Under such circumstances, the author has re-examined the distribution of all kinds of marine mammals. The baleen whales are distributed over 55°S, while most of smaller toothed whales are distributed in the waters north of 55°S. Pinnipeds like the baleen whales are found in the waters on both sides of 55°S, and sirenians never appear in colder waters. Therefore, the only groups which are substantially affected by the new expanded sanctuary are the baleen whales, sperm whales, medium-sized toothed whales and pinnipeds. Concerning these animals, some conservation agents such as the International Convention for the Regulation of Whaling and the International Convention for Conservation of Antarctic Seals, have taken some measures for their conservation which are already working effectively. If the requirement for the expanded sanctuary increases, the conservation measures ought to be systematized.

1. Introduction

The International Whaling Commission (IWC), at its annual meeting of 1979, specified a sanctuary for cetacean species in the Indian Ocean. According to the definition of the boundary of the Indian Ocean Sanctuary of Whales, the southern boundary is along latitude 55°S, which applies not only to the Indian Ocean but also to the Red Sea and the Persian Gulf (Fig. 1).

At the Symposium on Marine Mammals of the Indian Ocean held in Colombo, Sri Lanka on 22–25 February 1983, a recommendation supported by the majority of the participants was that all marine mammal species should be included in the sanctuary. Two other recommendations discussed at the symposium were that the boundary of the sanctuary should be extended as far as the coast of Antarctica beyond 55°S, and that for protection of the dugong (Sirenia), the eastern boundary should be extended as far as longitude 160°E.

The present paper discusses the significance of the latter recommendations, the distribution of all marine mammal species in the Indian Ocean Sanctuary of Whales,

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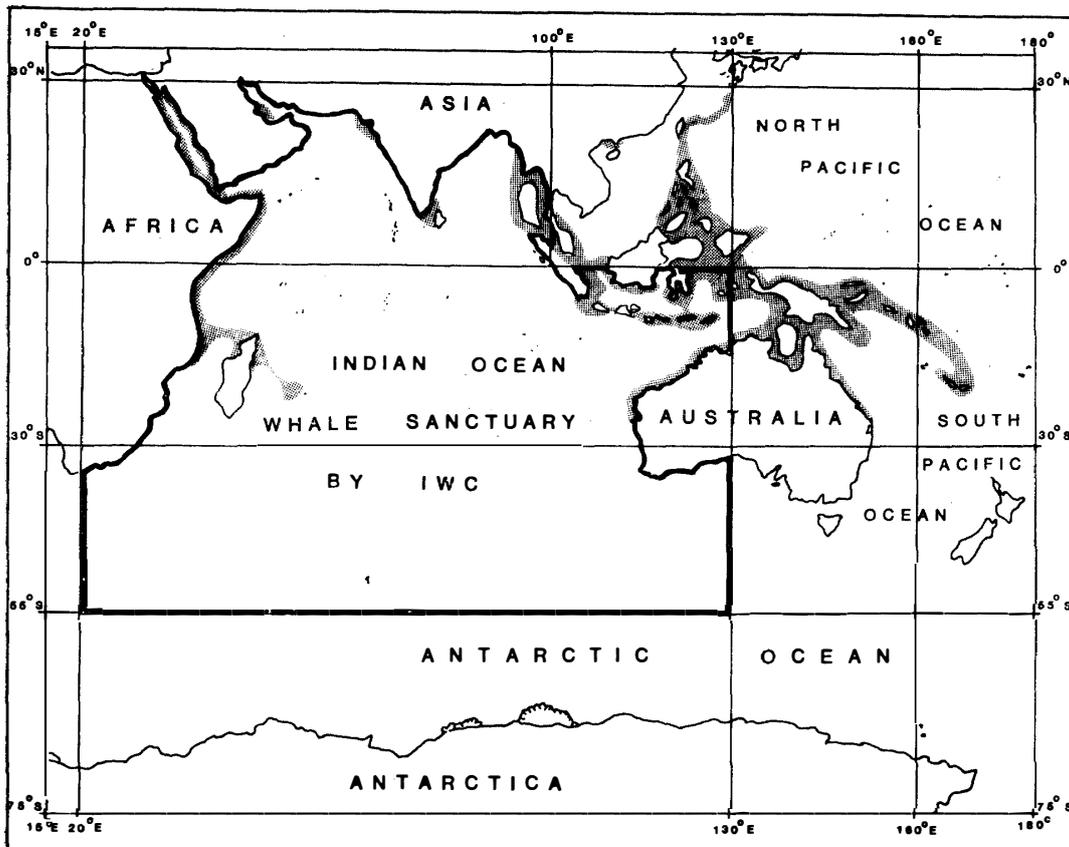


Fig. 1. Distribution of the dugong and the boundary of the Indian Ocean Sanctuary of Whales.

and of those in the Antarctic Ocean between 20°E and 130°E in longitude in relation to the 55°S boundary.

2. Distribution of the Marine Mammals in the Indian Ocean and the Antarctic Ocean

The species of marine mammals reported (IWC) from the Indian Ocean Sanctuary of Whales and from the Antarctic Ocean between 20°E and 130°E are shown in Table 1 in which +marks indicate their latitudinal migration (NISHIWAKI, 1983).

2.1. Mysticeti (Mystacoceti)

According to the reviewed catch of balaenopterids (OHMURA, 1973), their north-south or longitudinal distribution is expanded as they had been caught in the further south of 55°S. However, the pygmy blue whale, *Balaenoptera musculus brevicauda*, which is considered a subspecies of *B. musculus*, is distributed mainly in the waters north of 55°S (ICHIHARA, 1966). BEST (1960) reported *B. edeni* from the waters north of 55°S in the Indian Ocean. The minke whale (*B. acutorostrata bonaerensis*) is the only objective of the antarctic whaling at present, and this species is considered to be distributed mainly in higher latitudes (KASUYA and ICHIHARA, 1965; OHSUMI *et al.*,

Table 1. A list of marine mammal species distributed in the southern waters between longitude 20°E and 130°E divided by latitudinal migrating extensions.

Name of species	Latitudinal migrating extensions		
	Higher latitude than 55°S	Vicinity of 55°S	Lower latitude than 55°S
Cetacea			
Mysticeti (Mystacoceti)			
Balaenopteridae			
<i>Balaenoptera physalus</i>	+	+	+
<i>B. musculus musculus</i>	+	+	+?
<i>B. musculus breviceuda</i>			+
<i>B. borealis</i>			+
<i>B. edeni</i>			+
<i>B. acutorostrata bonaerensis</i>	+	+	+
<i>Megaptera novaeangliae</i>	+	+	+
Balaenidae			
<i>Balaena glacialis</i>		+	+
<i>Caperea marginata</i>			+
Odontoceti			
Physeteridae			
<i>Physeter catodon</i> male	+	+	+
<i>Physeter catodon</i> female			+
<i>Kogia breviceps</i>			+
<i>K. simus</i>			+
Ziphiidae			
<i>Ziphius cavirostris</i>			+
<i>Berardius arnuxii</i>	+	+	
<i>Hyperoodon planifrons</i>	+	+	+
<i>Indopacetus pacificus</i> (<i>Mesoplodon pacificus</i>)			+
<i>Mesoplodon mirus</i>			+
<i>M. ginkodens</i>			+
<i>M. layardi</i>			+
<i>M. hectori</i>			+
<i>M. grayi</i>			+
<i>M. bowdoini</i>			+
<i>M. densirostris</i>			+
Platanistidae			
<i>Platanista gangetica</i>			+
(<i>P. indii</i>)			(+)
Phocoenidae			
<i>Neophocoena phocoenoides</i>			+
Delphinidae			
<i>Delphinus delphis</i>			+
<i>D. capensis</i>			+
<i>D. tropicalis</i>			+
<i>Lagenodelphis hosei</i>			+
<i>Lagenorhynchus obscurus</i>			+
<i>L. cruciger</i>		+	+
<i>Cephalorhynchus commersoni</i>		+	+
<i>Lissodelphis peronii</i>		+	+
<i>Stenella attenuata</i>			+

Table 1. Continued.

Name of species	Latitudinal migrating extensions		
	Higher latitude than 55°S	Vicinity of 55°S	Lower latitude than 55°S
<i>S. coeruleoalba</i>			+
<i>S. longirostris</i>			+
<i>Steno bredanensis</i>			+
<i>Sousa chinensis</i>			+
<i>Tursiops aduncus</i>			+
Globicephalidae			
<i>Globicephala melaena</i>			+
<i>G. macrorhynchus</i>			+
<i>Feresa attenuata</i>			+
<i>Grampus griseus</i>			+
<i>Orcaella brevirostris</i>			+
<i>Peponocephala electra</i>			+
<i>Pseudorca crassidens</i>			+
<i>Orcinus orca</i>	+	+	+
Pinnipedia			
Otariidae			
<i>Neophoca cinerea</i>			+
<i>Arctocephalus gazella</i>	+	+	+
<i>A. pusillus</i>			+
<i>A. tropicalis</i>		+	+
<i>A. forsteri</i>			+
Phocidae			
<i>Lobodon carcinophagus</i>	+		
<i>Ommatophoca rossi</i>	+		
<i>Hydrurga leptonyx</i>	+	+	
<i>Leptonychotes weddelli</i>	+	+	
<i>Mirounga leonina</i>	+	+	
Sirenia			
Dugongidae			
<i>Dugong dugon</i>			+

1970). *Megaptera novaeangliae* which belongs to Balaenopteridae is known as a longitudinal migrator, and in the Indian Ocean sector it is distributed in both south and north across 55°S (CHITTLEBOROUGH, 1958, 1959; BROWN, 1962; DAWBIN, 1966).

The baleen whale, *Balaena glacialis* belonging to Balaenidae, is found in the south and north of 55°S in the Indian Ocean. A rare species of *Caperea marginata* is also distributed in the Indian Ocean, but the number seems to be small and this species has never been an objective of whaling, and so very little is known about this whale. The whale may not go far south over 55°S, but it has not been proven yet (ROSS *et al.*, 1975).

2.2. Odontoceti

Toothed whales belonging to Odontoceti tend to adapt themselves to a narrower range of water temperature than that for baleen whales. This family includes the

sperm whale (*Physeter catodon*), the pygmy sperm whale (*Kogia breviceps*), and the dwarf sperm whale (*Kogia simus*). BEST (1979) and GASKIN (1982) reported that sperm whale males are segregated latitudinally by the growth stages (or by the groups mentioned above) in the southern hemisphere, and that the southern limits of migration for the small- and the medium-sized bachelors are about 35°S and 45°S, respectively, while large bachelors migrate to the Antarctic region. Although the studies on the pygmy and dwarf sperm whales are based on the records of stranding only, it seems they do not enter into the southern waters beyond 55°S.

Species of Ziphiidae are medium-sized whales. They have not been the aim of whalers, so the species were judged by the records of stranding. Stranded *Ziphius cavirostris* has been recorded on the coasts of the Indian Ocean, but it is likely that they do not go beyond 55°S (BARNARD, 1954; GASKIN, 1968; BAKER, 1972; BROWNELL, 1974). BROWNELL (1974) recognized the distribution of two species of Ziphiidae, the beaked whale (*Berardius arnuxii*) and the southern bottlenosed whale (*Hyperoodon planifrons*), in the Antarctic waters. However, MCCANN (1975) restricted the distribution of *B. arnuxii* to the South Pacific and the South Atlantic between 30°S and Antarctica. It is still uncertain whether *B. arnuxii* is distributed in the Indian sector of the Antarctic. However, the stranded records of this whale are known in South Africa and South Australia (TIETZ, 1966; HALE, 1962). Therefore, it is possible that *B. arnuxii* and *H. planifrons* are distributed beyond 55°S, south of the Antarctic Convergence. Among the 12 species of the genus *Mesoplodon*, 8 are found in the Indian Ocean. These species prefer temperate or warm waters and do not go further south beyond 55°S.

Platanista gangetica, a dolphin, generally inhabits the Ganges and Brahmaputra Rivers. Sometimes when the rivers overflowed, the dolphins would be washed out into Bengal Bay. This species is found also in the Indus River system, and it is not at all related to the 55°S border.

Among the dolphins of Phocoenidae, a coastal species *Neophocoena phocoenoides* is distributed along the northern coast of the Indian Ocean, not related to 55°S. Reports tell that *Phocoena spinipinnis* and *Phocoena dioptrica*, little known dolphins in the world, have often occurred in the adjacent waters of South America, but there have been no reports of them in the Indian Ocean sector (BROWNELL, 1974; GASKIN, 1982).

Species of Delphinidae, belonging to such genera as *Delphinus*, *Stenella*, *Steno*, *Sousa*, *Lagenodelphis* and *Tursiops*, are inhabitants of warm and temperate waters, so they are scarcely related to 55°S. There are two species of *Lagenorhynchus* distributed in the Indian Ocean. *L. cruciger* is the southernmost inhabitant of the two and seems to appear in waters south of 55°S (FRASER, 1966; BROWNELL, 1974). *Cephalorhynchus commersoni* is distributed from the southern coast of South America to the Antarctic Ocean, and the east end of its distribution reaches the Kerguelen Islands (BROWNELL, 1974). This species may inhabit and migrate to the vicinity of 55°S, and never goes up north to the temperate waters.

Most species of Globicephalidae, represented by the genera *Globicephala*, *Pseudorca*, *Peponocephala*, *Feresa*, *Grampus* and *Orcaella*, are warm water inhabitants, except *Globicephala melaena* which is widely distributed in cooler waters (GASKIN,

1982) of South America, South Africa, Australia, Tasmania, New Zealand and many intermediate pelagic localities like the Kerguelen Islands (BROWNELL, 1974) and seems to occur in the south of 55°S. The killer whale, *Orcinus orca*, is a cosmopolitan species and is distributed all over the ocean across 55°S reach the pack ice area.

2.3. Pinnipedia

Four species of *Arctocephalus*, *A. gazella*, *A. tropicalis*, *A. pusillus* and *A. forsteri*, inhabit the southern islands within the sanctuary (BONNER, 1981). *Neophoca cinerea* is distributed on the southern coast of Australia. Of all Otariidae, only Antarctic fur seal, *A. gazella*, enters into colder waters to the south beyond 55°S between 20° and 130°E (BONNER, 1981).

Four species of the so-called "Antarctic seals" (Phocidae) are distributed abundantly in the Antarctic Ocean, south of 55°S. Among the 4 species, *Hydrurga leptonyx* occurs on the coast of South Africa. *Leptonychotes weddelli* goes up north over 55°S to reach the Kerguelen Islands, but the number of individuals is small (NISHIWAKI, 1973). Individuals of *Mirounga leonina* are occasionally seen in the islands scattered in the Indian Ocean, south of 30°S, the northern-most occurrence seems to be on Mauritius Island (CARRICK and INGHAM, 1962). Large populations of seals, 4 species of the Antarctic seals and *M. leonina*, in the south of 55°S are protected by the International Convention for Conservation of Antarctic Seals (NISHIWAKI, 1973).

2.4. Sirenia

A small population of *Dugong dugon* is found in the Comores. However, NISHIWAKI *et al.* (1979) reported that the habitat of this species is neither in the Seychelles, the Laccadives, the Maldives nor in the Chagos. It is distributed also in the Red Sea and Bahrain, but the number of individuals is small. A larger number of them is seen in the waters between Sri Lanka and India. Distribution of this species is reported also from the Andamans, through the Strait of Maracca to the Java Sea, but they are not abundant there. The distribution of the dugong continues to the Banda, Timor and Arafra Seas, then the population is increasing further eastward, but the distribution is entirely unrelated to 55°S (NISHIWAKI *et al.*, 1979).

3. Discussion and Conclusion

The present work has revealed the status of the marine mammal distribution in the Indian Ocean, and discussed the relationship between the distribution and the latitude 55°S, reaching the following conclusion:

- 1) Most of baleen whales (Mysticeti) migrate across 55°S, and this indicates no special meaning of 55°S for them.
- 2) Odontoceti, except sperm whales and ziphiids, do not migrate to the waters south of 55°S. Therefore, 55°S is a significant border for them.
- 3) The Antarctic seals (phocids) are distributed in the Antarctic waters except some wandering individuals, and fur seals (otariids) appear in the waters on both sides of 55°S. This means that 55°S is a significant border for these groups.

4) All sirenians are distributed in the waters far north of 55°S, having no significant relation to 55°S.

5) In terms of conservation of marine mammals, some conservation procedures or systems were already established for some of marine mammals which are distributed in the waters south of 55°S, like the International Convention for Conservation of the Antarctic Seals and the International Convention for Regulation of Whaling. It is strongly required to systematize these conservation procedures before the "Indian Ocean Sanctuary" was expanded.

6) Concerning the extension of the "Indian Ocean Sanctuary" to include all marine mammals, some species such as the dugong and the South African fur seal would not be conserved completely, simply because they are living outside the sanctuary. Further extension of the sanctuary is needed.

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