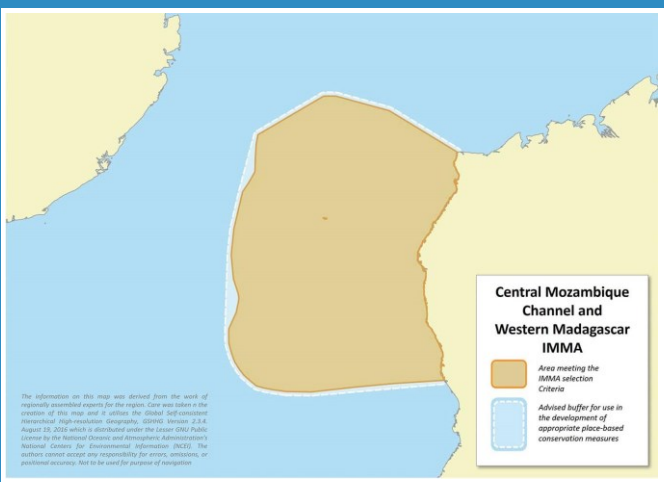
Central Mozambique Channel and Western Madagascar IMMA



Area Size

106 947 km²

Qualifying Species and Criteria

Sperm whale – *Physeter macrocephalus*

Criterion A

Blue whale – *Balaenoptera musculus*

Criterion A; C (3b)

Indian Ocean humpback dolphin – *Sousa plumbea*

Criterion A

Dugong – *Dugong dugon*

Criterion A

False killer whale – *Pseudorca crassidens*

Criterion A

Indo-Pacific bottlenose dolphin – *Tursiops aduncus*

Criterion B (2); C (2)

Common bottlenose dolphin – *Tursiops truncatus*

Criterion B (2); C (2)

Criterion D (2) – Marine Mammal Diversity

Balaenoptera musculus, Dugong dugon, Globicephala macrorhynchus, Grampus griseus, Feresa attenuata, Kogia sima, Lagenodelphis hosei, Megaptera novaeangliae, Mesoplodon densirostris, Peponocephala electra, Physeter macrocephalus, Pseudorca crassidens, Stenella attenuata, Stenella longirostris, Sousa plumbea Tursiops aduncus, Tursiops truncatus, Ziphius cavirostris

Summary

The Central Mozambique Channel and Western Madagascar IMMA includes coastal waters of Madagascar as well as continental shelf waters, the shelf break and deep oceanic habitats in the Mozambique Channel up to the island of Juan de Nova. At least 20 species of marine mammal are known to occur in this region. Aerial survey data highlight the importance of this area with recorded cetacean density and diversity higher in this IMMA than all other surveyed areas in the SW Indian Ocean. Threatened species recorded include blue whales (*Balaenoptera musculus*), sperm whales (*Physeter macrocephalus*), and Indian Ocean humpback dolphins (*Sousa plumbea*). The region is also a migratory corridor for humpback whales (*Megaptera novaengliae*) during the austral winter.

Description:

The Central Mozambique Channel IMMA includes the coastal and continental shelf waters of the central west coast of Madagascar, the shelf break and deep channel waters. It also includes islands and seamount habitat around Juan de Nova, Europa and Bassas da India atolls. This area includes a locally managed MPA around the Barren Islands, designed for its globally important biodiversity (marine turtle, sharks, cetaceans, and seabirds). Both anticyclonic and cyclonic eddies occur within this area and play a major role in enhancing primary productivity (Cooke et al., 2022).

Figure 1: Sperm whales (*Physeter macrocephalus*). Photo credit: Jeremy Kiszka / FIU

Figure 2: Blue whale (*Balaenoptera musculus*) in Seychelles. Photo credit: Jeremy Kiszka / FIU

Figure 3: Indian Ocean humpback dolphins (*Sousa plumbea*) in Nosy Be, Madagascar. Photo credit: Jeremy Kiszka / FIU

The central Mozambique Channel meets several of the IMMA selection criteria, including as an area supporting vulnerable species such as sperm whales (*Physeter macrocephalus*), blue whales (*Balaenoptera musculus*) and Indian Ocean humpback dolphins (*Sousa plumbea*), it is an important area of aggregation for several species of toothed cetaceans and and an important reproductive and migratory area for humpback whales (*Megaptera novaeangliae*). In addition, these diverse marine habitats host a high diversity of marine mammals with 20 species recorded so far.

Criterion A: Species or Population Vulnerability

This IMMA is a breeding and feeding ground for several threatened marine mammal species, particularly vulnerable sperm whales and the endangered Indian Ocean humpback dolphin (Cerchio et al., 2012b, 2015), as well as a migratory corridor for endangered blue whales (Best, 2007; Branch et al., 2007; Cerchio et al., 2018). Passive acoustic monitoring suggests that pygmy blue and Antarctic blue whales occur in the central Mozambique Channel from April to July (Siret, 2016). Aerial survey data collected during summer 2009-2010 estimated a density of 0.03 sperm whales per 100 km² (Laran et al., 2017). Dugongs listed as Vulnerable on the Red List and Critically Endangered in East Africa occurred here historically and may also occur occasionally in coastal areas (Cerchio et al., 2012a; Davis et al., 2022). False killer whales, listed as Near Threatened on the Red List also occur regularly.

Figure 4: Dugong (*Dugong dugon*) in Mayotte. Photo credit: Jeremy Kiszka / FIU

Criterion B: Distribution and Abundance Sub-criterion B2: Aggregations

Aerial survey data collected at numerous locations across the south west Indian Ocean during summer 2009-2010 recorded the highest densities of cetaceans in the entire region in this IMMA (Laran et al., 2017). Including a correction for availability bias, densities of all cetaceans combined peaked at 1 individual per km² in the central part of the IMMA. Because much of the data from aerial surveys does not allow for individual species identification, although this area clearly is important habitat that supports exceptionally high cetacean densities the data is lacking sufficient detail for this criteria to be

satisfied for most individual species. However, the most abundant species recorded during aerial surveys were delphinids (mostly *T. truncatus* and, to a lesser extent, *T. aduncus*, lumped as *Tursiops* sp.) with a relative density of 0.36 individuals km-^{2} (CV: 23%, availability bias corrected), primarily in deep oceanic waters and over the shelf (Laran et al., 2017a). Dorémus et al. (2009) also noted large groups of *T. truncatus* during vessel-based surveys offshore, near to, and south of, Juan de Nova, and there is evidence that this IMMA contains habitat important for supporting concentrations of both *Tursiops truncatus* and *Tursiops aduncus*. Small delphinids (likely *Stenella* spp.) were estimated at a density of 0.26 (CV: 27%, availability bias corrected), while all large delphinids (subfamily Globicephalinae) represent about 0.35 individuals.km-^{2}, availability bias corrected).

Figure 5: Common bottlenose dolphin (*Tursiops truncatus*) in Seychelles. Photo credit: Jeremy Kiszka / FIU

Criterion C: Key Life Cycle Activities
Sub-criterion C2: Feeding Areas

The high densities of cetaceans, particularly both species of *Tursiops* that occur in this IMMA are likely to be present because the habitat, including the eddies, slope, and oceanic islands create productive habitat supporting abundant prey for these species.

Sub-criterion C3: Migration Routes

C3b – Migration / Movement Area

The region is a known migratory corridor for humpback whales belonging to the Breeding stock C3 and C2 (Rosenbaum & Choux, 2022) during the austral winter. Among eight tagged whales in the Comoros, five travelled through or stopped along the west coast of Madagascar, within the IMMA (Fossette et al., 2014). A boat-based line-transect survey between Toliara and Mahajanga during Sept-Oct 2010 recorded 40 humpback whale sightings for an estimated density of 0.017 individuals km-2 (95% CI: 0.009 – 0.032) and estimated abundance of 554 individuals (CV: 31.8%); these sightings were primarily south of the IMMA, but it was assumed that these were late-season southbound migrants (Cerchio et al., 2012b). This is also a migratory corridor for blue whales and possibly other baleen whales (Branch et al., 2007). Passive acoustic monitoring suggest that pygmy blue and Antarctic blue whales occur in the central Mozambique Channel from April to July (Siret, 2016).

Criterion D: Special Attributes
Sub-criterion D2: Diversity

A high diversity of cetaceans is found in the Malagasy waters of the central Mozambique Channel with at least 20 species documented for north and south Mozambique waters, including six Mysticetes (Cerchio et al., 2022). A total of 13 different species were encountered during about 10 000 km of aerial

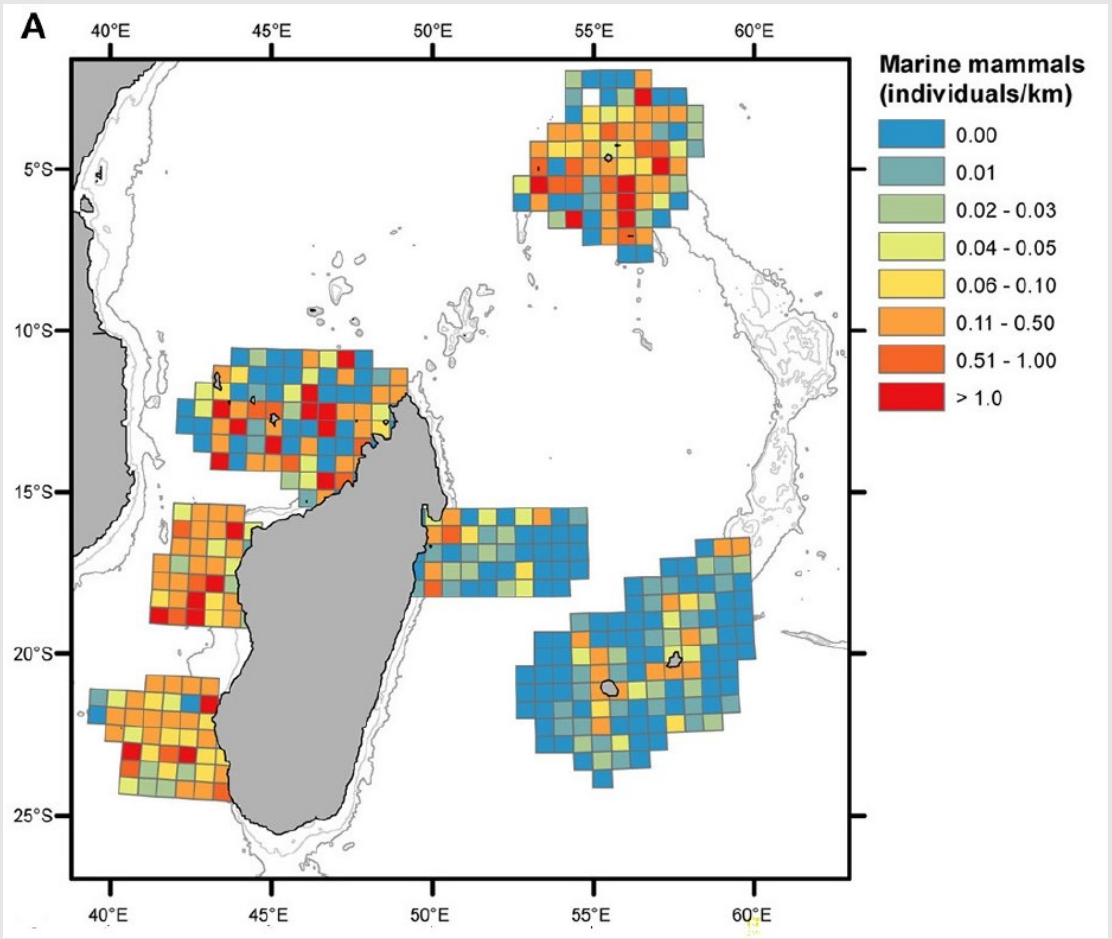


Figure 6: Spatial distribution of marine mammals during REMMOA survey in the SW Indian Ocean. Each pooled on 60 × 60 km grid cell and given in individuals per kilometer. Cells accounting for a minimum effort of 50 km. Excerpt from Laran et al. (2017).

transects during the REMMOA survey conducted between January to the beginning of February 2010 (Laran et al., 2017). The cetacean species richness predicted from occupancy analysis of marine mammals shows the highest value in the entire southwest Indian Ocean was for the waters inside this IMMA. In addition to small delphinids (*Stenella* spp. and *Tursiops* spp.), larger delphinids such as melon-headed whales, beaked whales (Cuvier's and Mesoplodon beaked whales), short-finned pilot whales, false killer whales, sperm whales and Risso's are also abundant in the area (Van Canneyt et al., 2010; Laran et al., 2017).

Dugongs were common in the Barren islands in the past, but based upon socio-ecological interviews with local fishers in the region its thought this species has most likely been extirpated due to hunting and bycatch (Cerchio et al., 2012a). At the time of writing no dugong sightings were recently reported in the area (Davis et al., 2022), but dugongs were reported by aerial survey REMMOA (Van Canneyt et al., 2010; Laran et al., 2017) north of the IMMA, and there are sightings reported by fishers less than 300 km to south of the IMMA (Davis et al., 2022) so it is possible dugongs occasionally occur.

There are a few sightings of Indian Ocean humpback dolphins that have been documented along this coast, along with a high incidence of reports in interviews with fishers in the Barren Islands and on the coast at its south border (Cerchio et al., 2012b, 2015; Laran et al., 2017), and the IMMA includes significant areas of potential humpback dolphin habitat; it is likely that this species occurs regularly in the IMMA.

Supporting Information

Cerchio, S., Andrianarivelo N. and Andrianantenaina, B. 2012a. Sightings, incidental by-catch, and hunting of dugongs (*Dugong dugon*) on the west coast of Madagascar, as Inferred from Interviews with Local Fishers. Report to the Convention on Migratory Species. 17pp.

Cerchio, S., Gruden, P., Andrianarivelo, N., Strindberg, S. 2012b. Assessment of cetacean diversity, distribution and population status on the west coast of Madagascar and Mozambique Channel. Report to the International Union for Conservation of Nature, Species Survival Commission. 31pp.

Cerchio, S., Andrianarivelo, N. and Andrianantenaina, B. 2015. Ecology and conservation status of Indian Ocean humpback dolphins (*Sousa plumbea*) in Madagascar. *Advances in Marine Biology*, 72: 163-199.

Cerchio, S., Rasoloarijao, T. and Cholewiak, D. 2018. Acoustic monitoring of Blue Whales (*Balaenoptera musculus*) and other baleen whales in the Mozambique Channel off the northwest coast of Madagascar. Paper SC/67B/SH/14 presented to International Whaling Commission Scientific Committee. Available from: https://archive.iwc.int/?r=9333&k=ba10d84e2a.

Cerchio, S., Laran, S., Andrianarivelo, N., Saloma, A., Andrianantenaina, B., and Van Canneyt, O. 2022. Marine and Coastal Ecosystems Cetacean Species Diversity in Malagasy Waters, *in* The new natural history of Madagascar. Goodman, A. , Cooke A. (Eds). Princeton University Press.

Cooke, A., Wells, S., Oates, J., Bouchet, P., H. Gilchrist, Leadbeater, H., et al. 2022. Marine and coastal biodiversity and conservation. *in* The new natural history of Madagascar. Goodman, A. , Cooke A. (Eds). Princeton University Press.

Davis, P., Cerchio, S., Cooke, A., and Andrianarivelo, N. 2022. *Dugong dugon*, Dugong, *Lambohara*. *in* The new natural history of Madagascar. Goodman, A. , Cooke A. (Eds). Princeton University Press.

Dorémus, G., Van Canneyt, O., Pusineri, C., Samaran, F., and Le Corre, M. 2009. Mission Eparses 2009: Distribution et Abondance des oiseaux et mammifères marins tropicaux (NAOMI). CRMM-Université de La Rochelle.

Dulau, V., Estrade, V. and Fayan, J. 2017. Identifying key demographic parameters of a small island–associated population of Indo-Pacific bottlenose dolphins (Reunion, Indian Ocean). *PloS one*, *12*(6), p.e0179780.

Findlay, K.P., Cockcroft, V.G. and Guissamulo, A.T. 2011. Dugong abundance and distribution in the Bazaruto Archipelago, Mozambique. *African Journal of Marine Science* 33(3), 441-452. doi: 10.2989/1814232X.2011.637347.

Fossette, S., Heide-jørgensen, M.P., Villum Jensen, M., Kiszka, J., Berube, M., Bertrand, N., and Vely, M. 2014. Humpback whale (*Megaptera novaeangliae*) post breeding dispersal and southward migration in the western Indian Ocean. *Journal of Experimental Marine Biology and Ecology*, 450: 6-14.

Kiszka, J., Simon-bouhet, B., Gastebois, C., Pusineri, C., and Ridoux, V. 2012. Habitat partitioning and fine scale population structure among insular bottlenose dolphins (*Tursiops aduncus*) in a tropical lagoon. *Journal of Experimental Marine Biology and Ecology*, 416-417: 176-184.

Laran, S., Authier, M., Van Canneyt, O., Dorémus, G., Watremez, P., and Ridoux, V. 2017. A Comprehensive

Survey of Pelagic Megafauna: Their Distribution, Densities, and Taxonomic Richness in the Tropical Southwest Indian Ocean. *Frontiers in Marine Science*, *4*, p.139.

Laran, S., Dorémus, G., Van Canneyt, O., and Ridoux, V. 2017b. Synthèse des campagnes aériennes : REMMOA et SAMM. Rapport pour l'AAMP. (www.observatoire-pelagis.cnrs.fr/wp-content/uploads/2021/05/2017_REMMOA_SAMM_Synthese.pdf).

Plön, S., Thakur, V., Parr, L., and Lavery, S.D. 2019. Phylogeography of the dugong (*Dugong dugon*) based on historical samples identifies vulnerable Indian Ocean populations. PLOS ONE 14(9), e0219350. doi: 10.1371/journal.pone.0219350.

Rosenbaum, H.C. and Choux, E. 2022. *Megaptera novaeangliae*, Humpback whale, Trozona *in* The new natural history of Madagascar. Goodman, A., Cooke, (Eds). Princeton University Press. 430-433.

Siret, C. 2016. Analyse des sons biologiques et du bruit ambiant sous-marin enregistrés aux abords des îles de Tromelin et de Juan de Nova. Master en Sciences-Technologies-Santé, Université des Antilles Guyane, 34pp.

Van Canneyt, O., Dorémus, G., Laran, S., Ridoux, V., and Watremez, P. 2010. Distribution et abondance de la mégafaune marine dans le sud-ouest de l'océan Indien. Marine Mammal Research Centre, AAMP. 70pp.

Acknowledgements

The participants of the 2019 IMMA Regional Expert Workshop held in Salalah, Oman for the Identification of IMMAs in the Western Indian Ocean and Arabian Seas. Funding for the identification of this IMMA was provided to the Global Ocean Biodiversity Initiative by the International Climate Initiative (IKI). The German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) supports this initiative on the basis of a decision adopted by the German Bundestag. Support was also provided by Whale and Dolphin Conservation and the Tethys Research Institute.

Suggested Citation: IUCN-MMPATF (2024) Central Mozambique Channel and Western Madagascar IMMA Factsheet. IUCN Joint SSC/WCPA Marine Mammal Protected Areas Task Force, 2024.

PDF made available for download at ***https://www.marinemammalhabitat.org/factsheets/central-mozambique-channel-and-western-madagascar-imma/***