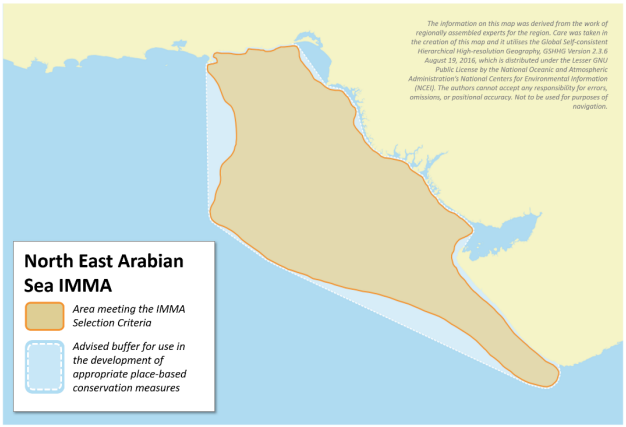

Area Size

147,200 km²

Qualifying Species and Criteria

Humpback whale – *Megaptera novaeangliae*
Criterion C1

Blue whale – *Balaenoptera musculus*
Criteria A, B2, C2

Dwarf sperm whale – *Kogia sima*
Criterion B2

Pygmy sperm whale – *Kogia breviceps*
Criterion B2

Indo-Pacific bottlenose dolphin – *Tursiops aduncus*
Criterion B2

Spinner dolphin – *Stenella longirostris*
Criterion B2

Marine Mammal Diversity (D2)

Megaptera novaeangliae, Balaenoptera musculus, Sousa plumbea, Physeter macrocephalus, Kogia sima, Kogia breviceps, Balaenoptera edeni, Tursiops aduncus, Stenella longirostris, Stenella attenuata, Steno bredanensis, Stenella coeruleoalba, Orcinus orca, Indopacetus pacificus, Ziphius cavirostris, Grampus griseus

North East Arabian Sea IMMA

Summary

The North East Arabian Sea IMMA includes the coastal and offshore waters from Ormara (Pakistan) to Kutch-Saurashtra (India). This area is known for the diversity of marine mammals, including Arabian Sea humpback whales (*Megaptera novaeangliae*), blue whales (*Balaenoptera musculus*) and Bryde's whales (*Balaenoptera edeni*). Arabian Sea humpback whales form a small, isolated subpopulation that is genetically distinct from other populations of humpback whales and remains in the Arabian Sea year-round. Illegal Soviet whaling in the 1960s, much of it concentrated in this IMMA, is thought to have greatly reduced this whale population, which is designated as Endangered on the IUCN Red List. Systematically reported observations by fishermen in Pakistan and India indicate that the area is still used by humpback whales today. In addition, large schools of spinner dolphins (*Stenella longirostris*) and Indo-Pacific bottlenose dolphins (*Tursiops aduncus*) are frequently observed in the area.

Description

The North East Arabian Sea Important Marine Mammal Area is located in the northeastern part of the Arabian Sea from Ormara along the Balochistan (Pakistan coast) and extending to Kutch-Saurashtra coasts of India. The northern part of the IMMA lies along the drylands of the Balochistan coast, which is known for its headlands and bays. The rocky headland of the areas off Malan, Kund Malir, and Ormara have a prominent tombolo bay on both sides. It has a small island (Churna Island) which is known to be rich in coral and invertebrate diversity. The transboundary waters of Pakistan and India, where the river Indus empties its sediment load every monsoon, are highly productive and important fishing grounds. The Indus plume reaches across the coastal and offshore waters of Balochistan in Pakistan and Kutch-Saurashtra coasts of India. The area hosts several commercially important fisheries, with a large

fleet of Indian and Pakistani fishing vessels, along the entire stretch of the IMMA.

The area also includes the Indus Canyon (also known as the Swatch), which is a fissure in the continental shelf of Pakistan facing the Indus River delta. It includes a continental shelf and slope area of the northern Arabian Sea and has a maximum depth of 1800 m. Because of its physiographic and oceanographic features, the Indus Canyon is known for its biological productivity and diverse marine fauna. The Murray Ridge, located in the northern Arabian Sea, forms the extension of the Owen Fracture Zone and comprises part of the boundary between the Indian and Arabian plates. The area where the Owen Fracture Zone changes direction to an easterly trend marks the southern end of the Murray Ridge. The northern end of the Murray Ridge, the Indian-Arabian plate boundary, terminates at a triple junction near Karachi. The Murray Ridge has a maximum relief of about 2500 m in the middle part and a relief as large as 3500 m in its southern part. The depth range is between 650 m to 3,500 m making it an ideal habitat for deep sea dwelling cetacean species.

The most significant feature of the IMMA is the high diversity of cetacean fauna. This area is specifically important for large whales-including Arabian Sea humpback whales (which are genetically distinct from other populations of humpback whales), blue whales and Bryde's whales. While no systematic surveys have been carried out here, it is known from whaling data that Soviet factory ships took 164 humpback whales in this area in November 1966 (Mikhalev 1997).

Criterion A: Species or Population Vulnerability

The blue whale has been assessed as an Endangered (EN) species on the IUCN Red List while the Arabian Sea humpback whale sub-population is considered Endangered. Arabian Sea humpback whales are present throughout the year and are seen more commonly in the area during post-winter months, making them prone to entanglement in gillnets which are used in the area throughout the year (Moazzam and Nawaz, 2018).

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

Presence of large whales, including Arabian Sea humpback whales (*Megaptera novaeangliae*) and blue whales (*Balaenoptera musculus*) have been documented through crew-based observer programme of WWF-Pakistan. Records of 42 sightings of Arabian Sea humpback whales and 13 sightings of blue whales (Moazzam and Nawaz, 2018) were reported. In addition, in 2018 a total of 13 new sightings of Arabian Sea humpback whales and 2 sightings of blue whales were made in the same area (Moazzam and Nawaz, 2019). In India, through the work of a participatory sightings network, aggregations of Arabian Sea humpback whales were mainly sighted on the continental shelf and slope area along the coasts of Jakhau and Veraval (Sutaria et al 2017, Sutaria 2018).

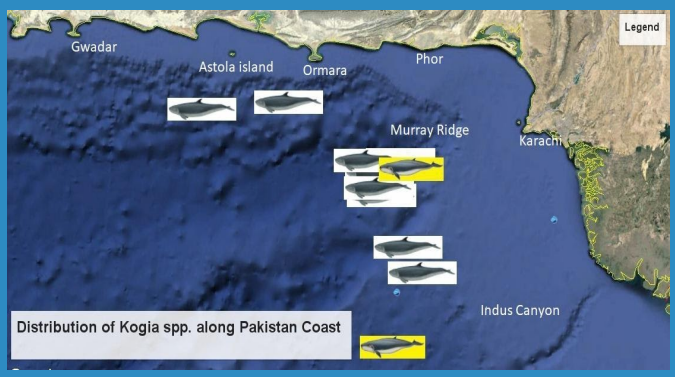

Figure 1: Distribution of Kogia spp. along the Murray ridge area (Moazzam and Sutaria, unpublished data).

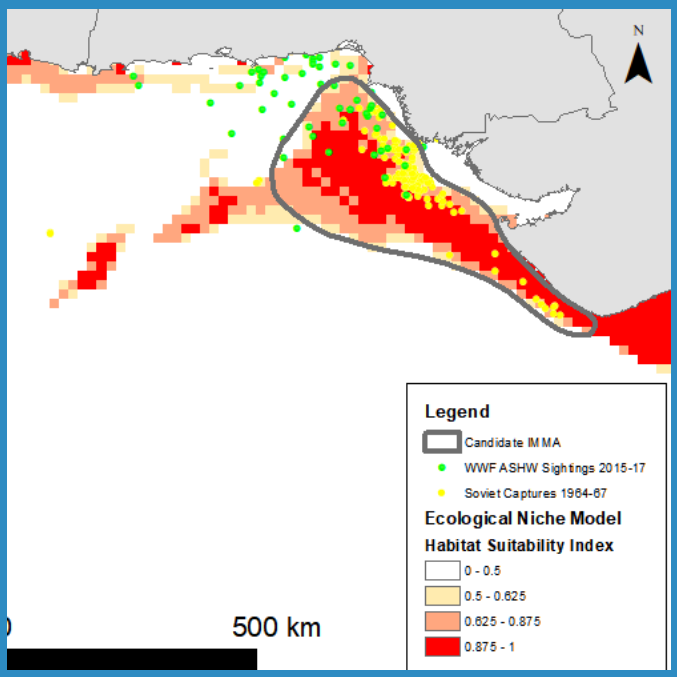

Figure 2: Habitat suitability niche model for Arabian Sea humpback whales. Yellow dots represent Pakistani sightings from fisheries reports between 2015 and 2017. Green dots represent a subset of Soviet catch records between 1964 and 1967.

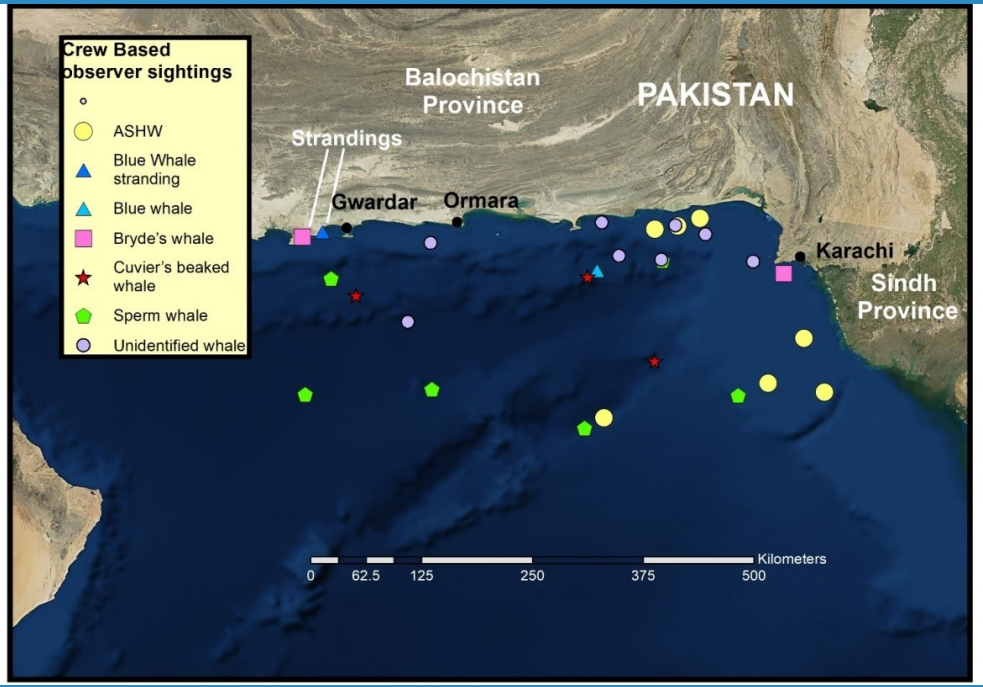

Figure 3: Cetacean sightings in the northern Arabian Sea along the Coast of Pakistan in 2019 based on the information obtained through the Fisheries Crew-Based observer programme. (From: Moazzam et al., 2020).

Large schools of dolphins are frequently observed in the area including pods of spinner dolphin *(Stenella longirostris)* and Indo-Pacific bottlenose dolphin (*Tursiops aduncus*) recorded over shelf and up-sloping bathymetry (M. Khan, unpublished data; Gore et al., 2012; Iqbal, 2014; Kiani, 2014; Kiani and Waerebeek, 2015). Entanglements of dwarf sperm whale and pygmy sperm whale have also been reported, with the main aggregation of such events occurring on shelf/slope boundary waters.

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

Moazzam and Nawaz (2017; 2018) reported feeding of Arabian humpback and blue whales on planktonic shrimp and sardinillas in the coastal waters in the IMMA. These whales were hunted by the Russian fleets in 1966, who also observed similar foraging in the area. Fishermen today further describe foraging behaviour in aggregations of more than 10 whales in these waters (Khan. M., Unpublished; Sutaria. D., unpublished). The area is also known for dense concentrations of purpleback flying squids (*Sthenoteuthis oualaniensis*). This large squid lives in open waters from the surface of the ocean down to depths of around 1,000 m. It exhibits diurnal vertical migration and moves to deeper layers in the day and to surface or shallower waters during night.

Japanese Research vessel "R/V Shoyo Maru" located dense concentration of this squid in the area during surveys in 1975 (Yatsu, et al., 1998). Presence of sperm whale, pygmy sperm and dwarf sperm whales in the area may be attributed to their feeding on *Sthenoteuthis oualaniensis*.

Criterion D: Special Attributes Sub-criterion D2: Diversity

This IMMA is specifically known for populations of large whales, including Arabian Sea humpback whale *(Megaptera novaeangliae)*, blue whales (*Balaenoptera musculus*) and Bryde's whale (*Balaenoptera edeni*). Large school of dolphins can also be frequently located in the area, and individuals or small groups of Indian Ocean humpback dolphin (*Sousa plumbea*) and Indo-Pacific finless porpoise (*Neophocaena phocaenoides*) are also commonly observed. Pods of spinner dolphin (*Stenella longirostris*) and Indo-Pacific bottlenose dolphin (*Tursiops aduncus*) are frequently reported from the area, and rough-toothed dolphin (*Steno bredanensis*) and striped dolphin (*Stenella coeruleoalba*) reports are from offshore of the Indus Delta. There are also rare occurrences of Cuvier's beaked whale (*Ziphius cavirostris*), Risso's dolphin (*Grampus griseus*), and killer whale (*Orcinus orca*). A few entanglements of dwarf sperm whale (*Kogia sima*) and pygmy sperm whale (*K. breviceps*) have

also been reported (Gore et al., 2012; Iqbal, 2014; Kiani, 2014; Kiani and Waerebeek, 2015; Moazzam and Nawaz, 2018; Moazzam and Nawaz, 2019).

Supporting Information

Gore, M.A., Kinai, M.S., Ahmad, E., Hussain, B., Ormond, R. F., Siddiqui, P.J.S., Waqas, U., and Culloch, R. 2012. 'Occurrence of whales and dolphins in Pakistan with reference to fishers' knowledge and impacts'. Journal of Cetacean Research and Management 12: 235–247.

Iqbal, P., 2014. 'Distribution and Diversity of Organisms Along Pakistan Coast'. PhD thesis. Karachi : University of Karachi.

Kiani, M.S. 2014. 'Studies on Marine Cetaceans in Coastal Waters of Pakistan'. PhD thesis. Karachi : University of Karachi.

Kiani, M.S., and Waerebeek, K.V. 2015. 'A review of the status of the Indian Ocean humpback dolphin (*Sousa plumbea*) in Pakistan'. In: T.A. Jefferson and B.E. Curry (eds.) Advances in Marine Biology, Vol. 72, pp. 201-228. Oxford: Academic Press.

Mahanty, M.M., Latha, G. and Thirunavukkarasu, A. 2015. 'Analysis of humpback whale sounds in shallow waters of the Southeastern Arabian Sea: An indication of breeding habitat'. Journal of Biosciences 40: 407-417.

Marine Mammal Research and Conservation Network of India Database – www.marinemammals.in

Mikhalev, Y.A. 1997. 'Humpback whales *Megaptera novaeangliae* in the Arabian Sea'. Marine Ecology Progress Series 149: 13-21.

Mikhalev, Y.A., 2000. 'Whaling in the Arabian Sea by the whaling fleets Slava and Sovetskaya Ukraina'. In Tormosov, D Mohanty., Mikhalev, Y.A.B., Zemsky, V.A., Sekiguchi, K. and Brownell. R.L. Jr, (eds.). Soviet Whaling Data [1949-1979], pp. 141-181. Moscow: Center for Russian Environmental Policy, Marine Mammal Council.

Moazzam, M., Nawaz, R., Khan, B., and Ahmed, S. 2020. Whale Distribution in the Northern Arabian Sea Along the Coast of Pakistan in 2019 Based on the Information Obtained Through the Fisheries Crew-Based Observer Programme. IWC Scientific Committee.

Moazzam, M. and Nawaz, R. 2017. 'Arabian humpback and baleen whale sightings along the Pakistan coast: information generated through WWF Pakistan's fishing crew observer programme'. International Whaling Commission. SC/67A/CMP/05: 1-14.

Moazzam, M., and Nawaz, R., 2018. 'Using a crew-based observer programme as a platform of opportunity for understanding the distribution of whales in the Northern Arabian Sea. Results of the 2017 fishing season'. International Whaling Commission. Bled.

Moazzam, M. and Nawaz, R. 2019 .The distribution of whales in the Northern Arabian Sea along the coast of Pakistan obtained through Crew-Based Observer Programme - Results of the 2018 fishing season SC/68A/CMP/07-International Whaling Commission. Nairobi.

Pomilla, C., Best, P.B. Findlay, K.P., Collins, T., Engel, M.H., Minton, G., Ersts, P.J., Barendse, J., Kotze, P.J.H., Razafindrakoto, Y. et al., 2006. 'Population structure and sex-biased gene flow in humpback whales from Wintering Regions A, B, C, and X based on nuclear microsatellite variation. International Whaling Commission. SC/A06/HW38; 1-22.

Sutaria, D. 2018. 'Update on Baleen whale records from India'. Submitted as a report to the IWC CMP Sub-Committee.

Sutaria D., Sule M., Jog K., Bopardikar I., Panicker D. 2017. 'Baleen Whale Records from the Arabian Sea, India'. A Note Submitted to the IWC Sub-Committee. SC/67a/CMP/03.

Willson, A., Leslie, M., Baldwin, R., Cerchio, S., Childerhouse, S., Collins, T., Findlay, K., Genov, T., Godley, B. J., Al Harthi, S., Macdonald, D.W., Minton, A.G., Zerbini, A. And Witt, M.J. 2018. 'Update on satellite telemetry studies and first unoccupied aerial vehicle assisted health assessment studies of Arabian Sea humpback whales off the coast of Oman'. Report presented to the Scientific Committee of the International Whaling Commission. Bled.

Yatsu, A., Katto, F., Kakizoe, F., Yamanaka K. and Mizuno, K. 1998. 'Distribution and biology of *Sthenoteuthis oualaniensis* in the Indian Ocean-preliminary results from the research cruise of the R/V Shoyo-Maru in 1995'. In: T. Okutani, R.K. O'Dor and T. Kubodera (eds.). Recent Advances in Cephalopod Fisheries Biology. pp. 145-153.Tokyo: Tokai University Press.

Acknowledgements

We would like to thank 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-Marine Mammal Protected Areas Task Force, 2021. North East Arabian Sea IMMA Factsheet. https://www.marinemammalhabitat.org/ wp-content/ uploads/imma-factsheets/ WesternIndianOcean/north-east-arabian-sea-WesternIndianOcean.pdf. Downloaded on (day month year).

PDF made available for download at https://www.marinemammalhabitat.org/wp-content/ uploads/immafactsheets/ WesternIndianOcean/north-east-arabian-sea-WesternIndianOcean.pdf