

Blue lines indicate the area meeting the ISRA Criteria; dashed lines indicate the suggested buffer for use in the development of appropriate place-based conservation measures

DHIKKUREDHDHOO & MADIVAAFARU ISRA

Western Indian Ocean Region

SUMMARY

Dhikkuredhdhoo & Madivaafaru is located in central Raa Atoll in the northern Maldives. This area comprises four islands, one sand bank, and multiple underwater reef pinnacles of various sizes. During the southwest monsoon (May to November) productivity increases, enhancing zooplankton abundance. Within this area there are: **threatened species** and **feeding areas** (Reef Manta Ray *Mobula alfredi*).

CRITERIA

Criterion A - Vulnerability; Sub-criterion C2 - Feeding Areas

MALDIVES

0-60 metres

24.18 km²





DESCRIPTION OF HABITAT

Dhikkuredhdhoo & Madivaafaru is located in central Raa Atoll in the northern Maldives. The area comprises four islands, one sand bank, and multiple underwater reef pinnacles, locally known as *thilas*, of various sizes.

This area is influenced by the South Asian Monsoon (Gischler et al. 2013). Productivity in this region peaks during the southwest monsoon (May to November) (J Haines pers. obs. 2019-2022), when the weather is typically characterised by more rain and cloud cover, along with reduced underwater visibility and stronger wind speeds resulting in rougher seas (Stevens & Froman 2019). The strong monsoonal winds create oceanic currents that flow from the southwest towards the northeast during the southwest monsoon. The central reefs of this area act as a barrier to these currents, displacing the water as it flows through and around the atoll, creating deepwater upwellings that bring nutrient rich water into the euphotic zone and phytoplankton blooms, therefore, increasing zooplankton abundance (Anderson et al. 2011; Stewart et al. 2019).

Dhikkuredhdhoo is the southernmost part of the area, comprised of a large sand bank surrounded by a shallow lagoon and oval shaped reef, sloping down to a sandy bottom of ~10 m, with a finger shaped underwater reef pinnacle that reaches depths of ~20 m. To the west is Dhikkuredhdhoo Island and several small rounded underwater reef pinnacles with maximum depths of ~40 m between them.

Madivaafaru describes the northernmost part of the area, which is comprised of three islands and multiple underwater reef pinnacles. Muravandhoo Thila is a deeper underwater reef pinnacle with a top of ~15 m and steep edges reaching depths of ~40 m. In the centre is Madivaafaru Island surrounded by a shallow top reef of ~3 m that reaches depths of ~40 m on the outside. To the eastern side of the area is Boduhaiykodi Island and Kudahaiykodi, a very shallow reef pinnacle that protrudes the surface of the water. These two reefs are the smallest in the area with varying depths of ~5-50 m. Separating the northern and southern parts of the area is a more open ocean area, reaching depths of ~60 m.

This Important Shark and Ray Area is benthopelagic and is delineated from inshore and surface waters (0 m) to 60 m based on the bathymetry of the area.

ISRA CRITERIA

CRITERION A - VULNERABILITY

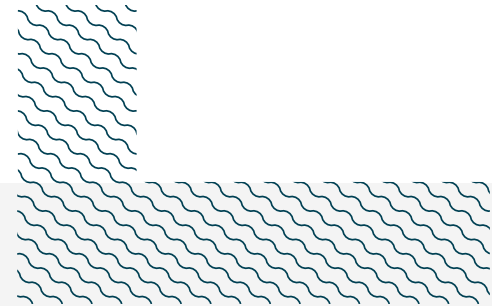
The one Qualifying Species within the area is considered threatened with extinction according to the IUCN Red List of Threatened Species™. The Reef Manta Ray is assessed as Vulnerable (Marshall et al. 2022).

SUB-CRITERION C2 - FEEDING AREAS

Dhikkuredhdhoo & Madivaafaru is an important feeding area for one ray species.

This area holds regular and predictable aggregations of feeding Reef Manta Rays. Between 2019-2023, 111 underwater visual census surveys were conducted by snorkellers and divers. A total of 370 sightings of 248 individuals were observed using five feeding strategies (straight, surface, chain, piggyback, and cyclone) to strain zooplankton prey over their specialised gill plates (Stevens 2016; J

Haines unpubl. data 2019–2022). The largest aggregation of feeding Reef Manta Rays comprised 56 individuals, although aggregations of 15–20 individuals were more regular. These feeding aggregations are observed predictably during September to November, as the productivity of the area is strongly influenced by the southwest monsoon. Between 2019–2022, this area was considered the most important feeding area in Raa Atoll due to the highest number of feeding Reef Manta Rays sighted (IDtheManta unpubl. data 2022).



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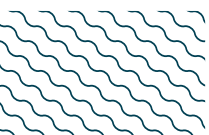
QUALIFYING SPECIES

Scientific Name	Common Name	IUCN Red List Category	Global Depth Range (m)	ISRA Criteria/Sub-criteria Met									
				A	B	C1	C2	C3	C4	C5	D1	D2	
RAYs													
<i>Mobula alfredi</i>	Reef Manta Ray	VU	0-711	X			X						

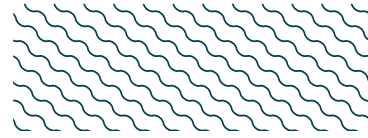
SUPPORTING SPECIES

Scientific Name	Common Name	IUCN Red List Category
SHARKS		
<i>Galeocerdo cuvier</i>	Tiger Shark	NT
<i>Nebrius ferrugineus</i>	Tawny Nurse Shark	VU
RAYS		
<i>Aetomylaeus vespertilio</i>	Ornate Eagle Ray	EN
<i>Taeniurops meyeri</i>	Blotched Fantail Ray	VU

IUCN Red List of Threatened Species Categories are available by searching species names at www.iucnredlist.org. Abbreviations refer to: CR, Critically Endangered; EN, Endangered; VU, Vulnerable; NT, Near Threatened; LC, Least Concern; DD, Data Deficient.



SUPPORTING INFORMATION



There are additional indications that this area might also be an important reproductive and aggregation area for Reef Manta Rays. There may be regular and predictable aggregations of pregnant female Reef Manta Rays (IDtheManta unpubl. data 2022). Further information is required to determine if this area is important for reproduction.

This area holds regular aggregations of cleaning adult Reef Manta Rays (J Haines pers. obs. 2019-2022). Research shows that Reef Manta Rays use cleaning stations to thermoregulate and socialise (Stevens 2016) which is an important aspect of their resting behaviour. These sightings are regular and predictable during the months June through November. Further information is required to determine the nature of these aggregations.



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