

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

## MAAMUNAGAU & FENFUSHI ISRA

### Western Indian Ocean Region

#### SUMMARY

Maamunagau & Fenfushi is located in southwestern Raa Atoll in the Maldives. This area encompasses two enclosed reef areas with internal lagoons extending from a single island. These two lagoons (Maamunagau and Fenfushi) are separated by a channel. The large, sheltered lagoons trap and concentrate zooplankton and are characterised by sandy substrates and randomly located coral bommies. This area overlaps with Villingilee Thila, a Marine Protected Area. Within this area there are: **threatened species**, **reproductive areas** and **feeding areas** (Reef Manta Ray *Mobula alfredi*).

#### CRITERIA

**Criterion A - Vulnerability; Sub-criterion C1 - Reproductive Areas; Sub-criterion - C2 Feeding Areas**

MALDIVES

0-30 metres

45.25 km<sup>2</sup>





## DESCRIPTION OF HABITAT

Maamunagau & Fenfushi is located in southwestern Raa Atoll in the northern Maldives. This area encompasses two enclosed reef areas with internal lagoons (called Maamunagau and Fenfushi) extending from a single island. Maamunagau is located south of Fenfushi.

Maamunagau & Fenfushi is influenced by the South Asian Monsoon (Gischler et al. 2014), which drives currents and deep water upwellings, bringing nutrient rich water into the euphotic zone on the leeward side of the atoll. This process enables photosynthetic phytoplankton to flourish, generating a bloom of predatory zooplankton that feed on the phytoplankton. The large, sheltered lagoons of Maamunagau & Fenfushi trap and concentrate the zooplankton, as the strong lunar currents flow through the channels (J Haines unpubl. data 2023). Productivity in the region peaks during the northeast monsoon (December to April) (J Haines pers. obs. 2019-2022).

The Maamunagau lagoon and enclosing reef extends ~7.5 km west from the island. The lagoonal area is comprised of sandy substrate, and randomly located coral bommies, reaching depths of ~20 m. Surrounding the entire lagoon lies a fringing reef, reaching maximum depths of ~5 m on top of the reef, and sloping to depths of ~30 m on the outside.

The Fenfushi lagoon and enclosing reef extends ~4.5 km west from the island. The lagoonal area is comprised of sandy substrate, and randomly located coral bommies, reaching depths of ~10 m. Surrounding the entire lagoon lies a fringing reef, reaching maximum depths of ~3 m on top of the reef, and sloping to depths of ~50 m on the outside.

Lying between Maamunagau and Fenfushi reefs is an open channel that reaches depths of ~60 m. Located within this channel, Villingilee Thila (also known as Fenfushi Giri) is a round shallow reef pinnacle reaching depths of ~30 m on the outer rim and depths of ~5 m on top.

The only existing Marine Protected Area of Raa Atoll, Villingilee Thila, falls within this area.

This Important Shark and Ray Area is benthopelagic and is delineated from the inshore and surface waters (0 m) to 30 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 C1 – REPRODUCTIVE AREAS

Maamunagau & Fenfushi is an important reproductive area for one ray species.

Data from 2,349 field surveys conducted between the years 2019-2023 revealed that 7% (n = 32) of identified Reef Manta Rays (n = 464) are young-of-the-year (YOY), based on sizes of 150-180 cm disc width (DW) (Stevens 2016; N Froman unpubl. data 2023). Size-at-birth for this species is 130-150 cm DW (Last et al. 2016). The YOY sightings occur regularly, between December and April, and the individuals remain in the area for repeated years following their birthing year. This location is the main YOY aggregation location in Raa Atoll (75% of the YOY sighting in Raa atoll are reported in this

area) (J Haines unpubl. data 2023). Large lagoons are known to offer a sheltered environment, protection from predatory risk, and an abundance of food (Setyawan et al. 2022).

## SUB-CRITERION C2 - FEEDING AREAS

Maamunagau & Fenfushi is an important feeding area for one ray species.

This area holds regular and predictable aggregations of feeding Reef Manta Rays. Based on 1,865 underwater visual census (UVC) surveys conducted by snorkellers between 2019–2023, a total of 3,393 sightings of 429 individuals have been observed using four feeding strategies (straight, surface, chain, and piggyback) (Stevens 2016; J Haines unpubl. data 2019–2022). In all observations, the Reef Manta Rays swam with their cephalic fins unfurled and mouths agape as the zooplankton was funnelled and strained through their gill plates (Stevens 2016). The largest aggregation of feeding Reef Manta Rays comprised 45 individuals, although aggregations of 10–15 individuals are more regular. These feeding aggregations are observed predictably during December to April, as the productivity of the area is strongly influenced by the northeast monsoon (Gischler et al. 2014).

---

### Acknowledgments

Jessica L.A. Haines (Manta Trust), Meral Hafeez (Manta Trust), Annabel Kemp (University of Exeter), Amanda Batlle-Morera (IUCN SSC Shark Specialist Group - ISRA Project), and Adriana Gonzalez-Pestana (IUCN SSC Shark Specialist Group - ISRA Project) contributed and consolidated information included in this factsheet. We thank all participants of the 2023 ISRA Region 7 - Western Indian Ocean workshop for their contributions to this process.

This factsheet has undergone review by the ISRA Independent Review Panel prior to its publication.

This project was funded by the Shark Conservation Fund, a philanthropic collaborative pooling expertise and resources to meet the threats facing the world's sharks and rays. The Shark Conservation Fund is a project of Rockefeller Philanthropy Advisors.

### Suggested citation

**IUCN SSC Shark Specialist Group. 2023.** Maamunagau & Fenfushi ISRA Factsheet. Dubai: IUCN SSC Shark Specialist Group.

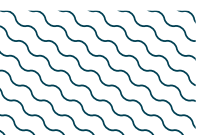
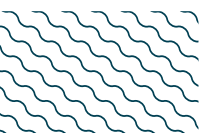
## QUALIFYING SPECIES

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	X						

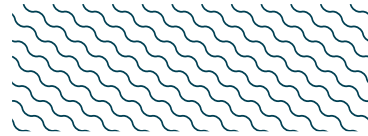
## SUPPORTING SPECIES

Scientific Name	Common Name	IUCN Red List Category
<b>SHARKS</b>		
<i>Carcharhinus amblyrhynchos</i>	Grey Reef Shark	EN
<i>Carcharhinus melanopterus</i>	Blacktip Reef Shark	VU
<i>Nebrius ferrugineus</i>	Tawny Nurse Shark	VU
<i>Negaprion acutidens</i>	Sharptooth Lemon Shark	EN
<i>Stegostoma tigrinum</i>	Indo-Pacific Leopard Shark	EN
<i>Triaenodon obesus</i>	Whitetip Reef Shark	VU
<b>RAYS</b>		
<i>Aetobatus ocellatus</i>	Spotted Eagle Ray	EN
<i>Pastinachus sephen</i>	Cowtail Ray	NT
<i>Pateobatis fai</i>	Pink Whipray	VU
<i>Rhynchobatus australiae</i>	Bottlenose Wedgefish	CR
<i>Taeniurops meyeri</i>	Blotched Fantail Ray	VU
<i>Urogymnus asperrimus</i>	Porcupine Ray	EN
<i>Urogymnus granulatus</i>	Mangrove Whipray	EN

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



## SUPPORTING INFORMATION



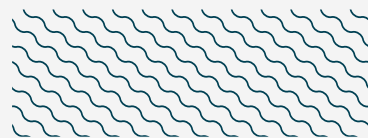
There are additional indications that the area may be important for several other species of sharks and rays.

This area might function as an important reproductive area for neonate Blacktip Reef Sharks and Sharptooth Lemon Sharks with small animals reported each year from April to June (J Haines pers. obs. 2019-2022).

This area might function as an important feeding area for Spotted Eagle Rays. Most sightings (65%) were of solitary Spotted Eagle Rays, though as many as eight individuals were observed feeding on the shallow sandy substrate (J Haines pers. obs. 2019-2022).

This area might function as an important resting area for Pink Whiprays and Bottlenose Wedgefish. Aggregations can consist of up to 10 individuals in which Pink Whipray rest in the sandy substrate at 2-15 m depth throughout the lagoon (IDtheManta unpubl. data 2019-2023). Solitary adult Bottlenose Wedgefish are usually seen resting in the shallow sandy substrate (J Haines pers. obs. 2022).

Further information is needed to determine the nature and function of these potential aggregations, and to establish the importance of this area.



## REFERENCES

**Gischler E, Storz D, Schmitt D. 2014.** Sizes, shapes, and patterns of coral reefs in the Maldives, Indian Ocean: the influence of wind, storms, and precipitation on a major tropical carbonate platform. *Carbonates and Evaporites* 29: 73–87. <https://doi.org/10.1007/s13146-013-0176-z>

**Last PR, White WT, de Carvalho MR, Séret B, Stehmann MFW, Naylor GJP. 2016.** *Rays of the world*. Clayton South: CSIRO Publishing.

**Marshall A, Barreto R, Carlson J, Fernando D, Fordham S, Francis MP, Herman K, Jabado RW, Liu KM, Pacoureau N, et al. 2022.** *Mobula alfredi* (amended version of 2019 assessment). *The IUCN Red List of Threatened Species* 2022: e.T195459A214395983. <https://dx.doi.org/10.2305/IUCN.UK.2022-1.RLTS.T195459A214395983.en>

**Setyawan E, Erdmann MV, Mambrasar R, Hasan AW, Sianipar AB, Constantine R, Stevenson BC, Jaine FRA. 2022.** Residency and use of an important nursery habitat, Raja Ampat's Wayag Lagoon, by juvenile Reef Manta Rays (*Mobula alfredi*). *Frontiers in Marine Science* 9: 815094. <https://doi.org/10.3389/fmars.2022.815094>

**Stevens G. 2016.** Conservation and population ecology of manta rays in the Maldives. Unpublished PhD Thesis, University of York, York.