

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

HANIFARU BAY & ANGA FARU ISRA

Western Indian Ocean Region

SUMMARY

Hanifaru Bay & Anga Faru is located on the eastern edge of Baa Atoll in the central Maldives. This area comprises two sites. Hanifaru Bay is a lagoon, surrounded by shallow reef along all but a small section of its circumference, and bordered by a lagoon on its northern side. Anga Faru is a large lagoon enclosed by a shallow barrier reef. The two sites are connected by a large channel which includes several large pinnacles and sloping reefs. The area overlaps with Hanifaru and Anga Faru Marine Protected Areas and is within Baa Atoll Ecologically or Biologically Significant Marine Area and Baa Atoll UNESCO Biosphere Reserve. Within the area there are: **threatened species** (e.g., Whale Shark *Rhincodon typus*); **reproductive areas** (Reef Manta Ray *Mobula alfredi*); **feeding areas** (e.g., Whale Shark); and **areas with distinctive attributes** (Reef Manta Ray).

CRITERIA

Criterion A - Vulnerability; Sub-criterion C1 - Reproductive Areas; Sub-criterion C2 - Feeding Areas; Sub-criterion D1 - Distinctiveness

MALDIVES

0-40 metres

20.12 km²





DESCRIPTION OF HABITAT

Hanifaru Bay & Anga Faru is located on the eastern edge of Baa Atoll in the central Maldives. The area includes a variety of insular and benthic habitats, including coral reefs, sandy lagoons, and channels. The area comprises two sites: Hanifaru Bay and Anga Faru.

Two monsoons occur in the Maldives annually with the southwest monsoon (May–November), and the northeast monsoon (January–March), and transitional periods in December and April (Shankar et al. 2002; Anderson et al. 2011). The Maldives archipelago disrupts the flow of the monsoon-driven North Equatorial Current as it crosses the Indian Ocean (Schott & McCreary 2001) which creates a current flow through the Maldives' channels (Su et al. 2021). The strongest lunar currents can overcome the prevailing monsoonal currents through the tidal suction mechanism along the channel's outer edges (Stevens 2016).

Hanifaru Bay is a cul-de-sac reef inlet, 700 m in length, 200 m wide, and with a maximum depth of 24 m. The bay is surrounded by shallow (<1 m) reef along all but a small 75 m section of the bay's circumference, situated at the western end. Hanifaru Bay has a unique dynamic water circulation system driven by the southwest monsoon season where the geomorphology of the area acts as a zooplankton trap. Strong lunar tides overcome the force of the prevailing monsoonal current, sucking plankton rich water from ocean depths outside the atoll back into the shallow atoll channels (P Hosegood unpubl. data 2023). In the atoll pass adjacent to Hanifaru Bay (Dharavandhoo KanduoIhi), these currents form a back eddy, trapping and concentrating plankton (primarily copepods) in the shallow bay (Stevens 2016; Armstrong et al. 2021; Harris & Stevens 2021).

Anga Faru is a large lagoon with an inner basin 2.7 km in length, 1.3 km wide, and reaching a maximum depth of ~12 m. The lagoon is characterised by a benthic cover of fine sands and scattered coral blocks and is enclosed by a shallow barrier reef. The geomorphology of Anga Faru lagoon also acts as a zooplankton trap when coupled with the tidal movements and ocean currents, especially during the southwest monsoon season.

The channel area connecting Hanifaru Bay and Anga Faru has a maximum depth of ~40 m. Within this area are several large pinnacles and coral outcrops. There are sloping coral reefs surrounding Anga Faru lagoon, Hanifaru lagoon, and around the islands of Dharavandhoo and Dhonfanu.

This area overlaps with the Hanifaru Marine Protected Area (MPA) and Anga Faru MPA, and is located within Baa Atoll Ecologically or Biologically Significant Marine Area (EBSA; CBD 2023), and Baa Atoll UNESCO Biosphere Reserve (UNESCO 2019).

This Important Shark and Ray Area is benthopelagic and is delineated from the inshore and surface waters (0 m) to 40 m based on the bathymetry of the area.

ISRA CRITERIA

CRITERION A – VULNERABILITY

Two Qualifying Species considered threatened with extinction according to the IUCN Red List of Threatened Species™ regularly occur in the area. These are the Endangered Whale Shark (Pierce & Norman 2016) and the Vulnerable Reef Manta Ray (Marshall et al. 2022).

SUB-CRITERION C1 – REPRODUCTIVE AREAS

Hanifaru Bay & Anga Faru is an important reproductive area for one ray species.

Pregnant females, young-of-the-year (YOY) aggregations, and courtship behaviour of Reef Manta Rays occur regularly and predictably in the area, based on data from photo-identification conducted between 2008–2021 (n = 2,417 survey days in Baa Atoll, n = 2,069 survey days in this area) (IDtheManta unpubl. data 2022).

A total of 1,707 sightings of 206 pregnant Reef Manta Rays (based on distention of the abdominal and back region; Marshall & Bennett 2010; Deakos 2011) have been recorded. This accounted for 97% of individuals recorded as pregnant (n = 212) throughout Baa Atoll. A total of 350 separate pregnancies have been recorded, with females re-sighted 4.88 times on average per pregnancy period. Of the females recorded as pregnant, 40% (n = 83) were pregnant more than once, and 21% (n = 43) had at least one consecutive pregnancy (IDtheManta unpubl. data 2022). Repeated visitation to this area highlights its importance to pregnant females throughout the gestation period, likely due to availability of food as large amounts of zooplankton are trapped at various sites, especially within Hanifaru Bay.

Thirty-one percent (n = 18) of all YOY individuals identified in Baa Atoll (n = 59) were recorded in this area (IDtheManta unpubl. data 2022). All YOY were recorded during the southwest monsoon season. These were classified based on estimated size of 150–200 cm disc width (DW), length of tail, light ventral/spot pattern pigmentation, creases along pectorals, and often a light pink skin pigmentation on first sighting (Kashiwagi 2014; Stevens 2016). Size-at-birth for this species is 130–150 cm DW (Last et al. 2016).

Courtship behaviour has also been regularly and predictably recorded with individual photo-identification (IDtheManta unpubl. data 2022). Overall, 43 courtship events were recorded across 41 surveys days, accounting for 77% of courtship events documented in Baa Atoll (n = 56 events across 54 survey days). These courtship events included a total of 138 Reef Manta Ray sightings, accounting for 82% of courting Reef Manta Ray sightings in Baa Atoll (n = 168). Courtship occurs seasonally in the area, with the majority of events (n = 42) taking place during the southwest monsoon (May–November). Notably, locations within this area which experienced the highest number of courtship events were Hanifaru Bay (n = 20), Dharavandhoo Corner (n = 9), and Hanifaru Beyru (n = 7). Courtship events at Hanifaru Bay were recorded on 20 survey days and included a total of 62 sightings of 58 different individuals. Dharavandhoo Corner and Hanifaru Beyru both feature cleaning stations, which are thought to be focal points for manta ray socialisation and courtship (Stevens et al. 2018a). Courtship events at Dharavandhoo Corner were recorded on nine survey days and included a total of 29 sightings of 27 different individuals. Courtship events at Hanifaru Beyru were recorded on seven survey days and included a total of 29 sightings of 29 different individuals (IDtheManta unpubl. data 2022).

SUB-CRITERION C2 – FEEDING AREAS

Hanifaru Bay & Anga Faru is an important feeding area for one shark and one ray species.

Whale Sharks have been regularly and predictably recorded feeding when tides and monsoonal currents converge to trap large concentrations of zooplankton. Photo-identification conducted between 2011–2022 recorded 95 sightings of 53 individual Whale Sharks in this area. Feeding behaviour was documented on 36% of occasions (n = 34), and for 57% of individuals sighted (n = 30) (Big Fish Network unpubl. data 2022).

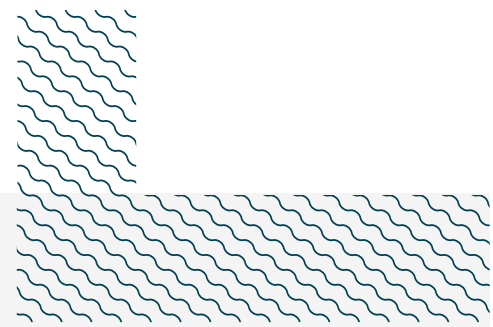
Hanifaru Bay is the largest known feeding aggregation of Reef Manta Rays in the world (Harris et al. 2020). Feeding in the bay occurs in a regular and predictable way when tidal movements trap large concentrations of zooplankton, especially during the southwest monsoon (May–November). Snorkel surveys with photo-identification conducted between 2008–2021 recorded Reef Manta Rays feeding on 1,056 survey days, or 44% and 62% of total survey days in Baa Atoll (n = 2,417) and Hanifaru Bay (n = 1,695), respectively. In total, 36,761 sightings of feeding Reef Manta Rays were recorded in this timeframe, with a mean aggregation size of 35 individuals. Mass feeding aggregations of 100 individuals or more have been recorded on 65 occasions, five of which were aggregations of more than 200 individuals in a single survey day (maximum = 245 individuals) (IDtheManta unpubl. data 2022). Of the 2,272 individual Reef Manta Rays recorded throughout Baa Atoll since 1996, 85% (n = 1,926) were observed feeding in Hanifaru Bay.

Anga Faru, Dhonfanu, and Dhigu Thila also hold regular and predictable feeding aggregations of Reef Manta Rays based on snorkel surveys using photo-identification (IDtheManta unpubl. data 2022). At Anga Faru (including the inner lagoon and outer reef), a total of 258 animals were recorded feeding across 13 survey days (mean aggregation size = 20 individuals). At Dhonfanu (including the sloping reef and pinnacles), a total of 393 animals were recorded feeding across 27 survey days (mean aggregation size = 15 individuals). At Dhigu Thila, a total of 340 animals were recorded feeding across 36 survey days (mean aggregation size = 9 individuals).

SUB-CRITERION D1 – DISTINCTIVENESS

Hanifaru Bay & Anga Faru is important for a distinctive behaviour of one ray species.

A unique feeding strategy for Reef Manta Rays has been described in Hanifaru Bay, known as ‘cyclone’ feeding. A feeding cyclone occurs when there is an exceedingly dense concentration of zooplankton in a limited space. A line of chain feeding Reef Manta Rays may begin to loop around itself until the lead animal joins the trailing animals to form a feeding circle (always turning anticlockwise when viewed from above). As the number of Reef Manta Rays joining the circle increases, the column of animals grows until they resemble a cyclone of manta rays of about 15–20 m diameter. A feeding cyclone can involve up to 150 individuals, and last up to 30 minutes (Stevens 2016). The rotating cyclone manipulates the water column creating a vortex that pulls plankton rich water inwards, concentrating their zooplankton food source to create an effective feeding environment (Stevens 2016; Stevens et al. 2018b). It is estimated that feeding cyclones occur on average 10 times every season (during the southeast monsoon; G Stevens unpubl. data 2023). During a seven-month study (May–November 2014) cyclone feeding was observed six times (accounting for 2.11% of the total observed feeding strategies sighted during this period [n = 285]; Stevens 2016).



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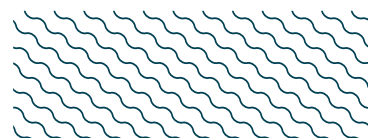
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QUALIFYING SPECIES

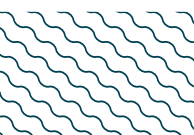
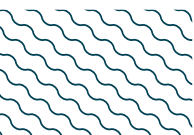
Scientific Name	Common Name	IUCN Red List Category	Global Depth Range (m)	ISRA Criteria/Sub-criteria Met									
				A	B	C1	C2	C3	C4	C5	D1	D2	
SHARKS													
<i>Rhincodon typus</i>	Whale Shark	EN	0-1,928	X			X						
RAYs													
<i>Mobula alfredi</i>	Reef Manta Ray	VU	0-711	X		X	X					X	

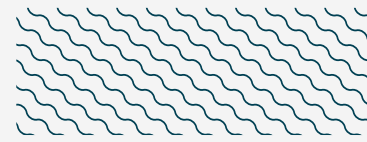
SUPPORTING SPECIES



Scientific Name	Common Name	IUCN Red List Category
SHARKS		
<i>Carcharhinus albimarginatus</i>	Silvertip Shark	VU
<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>Trienodon obesus</i>	Whitetip Reef Shark	VU
RAYS		
<i>Aetobatus ocellatus</i>	Spotted Eagle Ray	EN
<i>Mobula birostris</i>	Oceanic Manta Ray	EN
<i>Mobula kuhlii</i>	Shorthorned Pygmy Devil Ray	EN
<i>Mobula mobular</i>	Spinetail Devil Ray	EN
<i>Pastinachus sephen</i>	Cowtail Ray	NT
<i>Pateobatis fai</i>	Pink Whipray	VU
<i>Rhina ancylostomus</i>	Bowmouth Guitarfish	CR
<i>Rhynchobatus australiae</i>	Bottlenose Wedgefish	VU
<i>Urogymnus granulatus</i>	Mangrove Whipray	EN

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.





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