

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

BIYAADHOO KANDU ISRA

Western Indian Ocean Region

SUMMARY

Biyaadhoo Kandu is located in South Male Atoll in central Maldives. This area encompasses Cocoa Corner, an outer atoll reef edge, and Kandooma Thila, a submerged pinnacle reef. This area is exposed to strong currents and characterised by soft corals, caves, and overhangs. This area overlaps with environmentally sensitive areas declared by the Maldivian government. Within the area there are: **threatened species** (e.g., Grey Reef Shark *Carcharhinus amblyrhynchos*) and **undefined aggregations** (e.g., Whitetip Reef Shark *Triaenodon obesus*).

CRITERIA

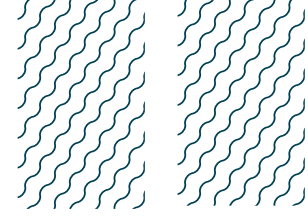
Criterion A - Vulnerability; Sub-criterion C5- Undefined Aggregations

MALDIVES

0-30 metres

0.52 km²





DESCRIPTION OF HABITAT

Biyaadhoo Kandu is located in South Malé Atoll in the central Maldives. The Maldives archipelago sits centrally upon the Chagos-Laccadive Ridge (Stevens & Froman 2019). Channels, locally known as kandu, are reef passes that connect the open ocean to the atoll lagoon. This area encompasses Cocoa Corner and Kandooma Thila.

Cocoa Corner is an outer atoll reef edge with caves and overhangs located on the northeastern side of Biyaadhoo Channel. This section descends steeply to the channel bottom. During incoming currents, an abundance of marine life is found in this area (Godfrey 2023).

Kandooma Thila, a teardrop-shaped pinnacle reef, is located ~50 m from Cocoa Corner. Thila is the local name for underwater pinnacles where the top of the reef is completely submerged, even during low tide. The top of the reef is at 16 m and descends to 18–30 m depth depending on the reef side. The northwestern side has several outcrops of reef at depths of 25–30 m. The northern and eastern sides of Kandooma Thila have several overhangs and a variety of soft corals. The northern side also has several loose blocks of reef (Godfrey 2023).

The weather in the Maldives is strongly influenced by the South Asian monsoon, especially the northern and central atolls as these are closer to the Indian subcontinent (Anderson et al. 2011). Therefore, two monsoons occur annually in Maldives. The southwest monsoon (locally known as Hulhan'gu), from May to November, and the northeast monsoon (locally known as Iruvai), from January to March, with transitional periods in December and April (Anderson et al. 2011; Shankar et al. 2002). The southwest monsoon increases average rainfall, and wind speeds, causing rougher seas and reduced visibility; in contrast, the northeast monsoon usually brings clear waters (Stevens & Froman 2019).

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 (Sasamal 2006). The strongest lunar currents can overcome the prevailing monsoonal currents through the tidal suction mechanism along the channel's outer edges (Stevens 2016).

This Important Shark and Ray Area is benthopelagic and is delineated from the surface (0 m) to 30 m based on the depth range of Qualifying Species in this area and 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 Grey Reef Shark (Simpfendorfer et al. 2020a) and the Vulnerable Whitetip Reef Shark (Simpfendorfer et al. 2020b).

SUB-CRITERION C5 - UNDEFINED AGGREGATIONS

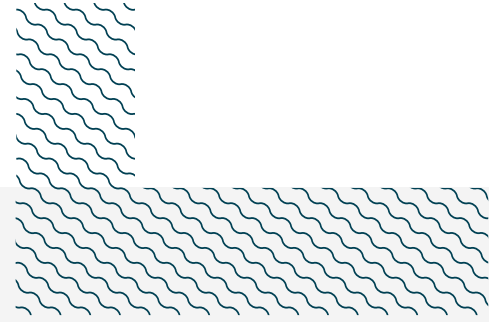
Biyaadhoo Kandu is an important aggregation area for two shark species.

Data were collected from a citizen-science program known as the Sharkwatch project which was a government-led initiative between 2009–2019 (Maldives Marine Research Institute [MMRI], unpubl.

data 2023). Data were reported by experienced dive guides using the roving diver technique where surveyors can swim in any direction and count the number of individuals encountered by species during 1-hour dive surveys. From the ~1,110 sites surveyed in the Maldives, this area has been identified as one of the most important aggregations for Grey Reef Shark and Whitetip Reef Shark (MMRI unpubl. data 2023).

Sharkwatch surveys conducted in Kandooma Thila site (n = 502) estimated a mean encounter rate of ~25 for Grey Reef Sharks/hour in a 10-year survey period (2009–2019) (MMRI unpubl. data 2023). During six years (2011–2013, 2016, 2018–2019), aggregations of 50–100 Grey Reef Sharks/hour were recorded in 73 surveys, and aggregations of >100 Grey Reef Sharks/hour were recorded in 11 surveys (MMRI unpubl. data 2023). Compared to Kandooma Thila, survey effort in Cocoa Corner were lower (n = 51). In Cocoa Corner, surveys between 2014–2019 showed a mean encounter rate/hour of 2–3 Grey Reef Sharks, but during strong currents, high numbers of Grey Reef Sharks have been recorded. Grey Reef Sharks are observed in both monsoon seasons. For example, in 2016, at least 30 Grey Reef Sharks/hour were observed on a single survey during the northeast monsoon and 40 Grey Reef Sharks/hour were observed on a single survey during the southwest monsoon (MMRI unpubl. data 2023). This area might be used as resting ground for the Grey Reef Shark. In channels with strong currents in French Polynesia, Grey Reef Sharks use current-induced updraft zones to reduce energy expenditure (Papastamatiou et al. 2021). In Kandooma Thila, divers report a mix of both juvenile and adult Grey Reef Sharks. They also report that this area could be both a nursery and a cleaning station for Grey Reef Sharks (M Ushan pers. comm. 2023). Further information is needed to determine the nature and function of these aggregations.

Sharkwatch surveys conducted from 2009–2019 in Kandooma Thila (n = 502) recorded aggregations of >40 Whitetip Reef Sharks/hour over three years in five surveys (MMRI unpubl. data 2023). In 25 surveys, >20 Whitetip Reef Sharks/hour were recorded during seven years. From these 502 surveys, the mean encounter rate was eight Whitetip Reef Sharks/hour at this site (MMRI unpubl. data 2023). Whitetip Reef Sharks are observed in both monsoon seasons. In 2016, at least 25 Whitetip Reef Sharks/hour were observed on a single survey during the northeast monsoon and 60 Whitetip Reef Sharks /hour were observed on a single survey during the southwest monsoon (MMRI unpubl. data 2023).



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Khadeeja Ali (Maldives Marine Research Institute) 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.

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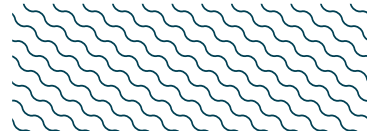
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QUALIFYING SPECIES

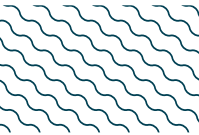
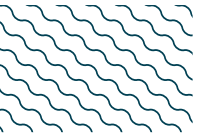
Scientific Name	Common Name	IUCN Red List Category	Global Depth Range (m)	ISRA Criteria/Sub-criteria Met								
				A	B	C1	C2	C3	C4	C5	D1	D2
SHARKS												
<i>Carcharhinus amblyrhynchos</i>	Grey Reef Shark	EN	0-280	X						X		
<i>Triaenodon obesus</i>	Whitetip Reef Shark	VU	0-330	X						X		

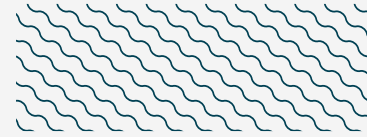
SUPPORTING SPECIES



Scientific Name	Common Name	IUCN Red List Category
SHARKS		
<i>Carcharhinus melanopterus</i>	Blacktip Reef Shark	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.





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