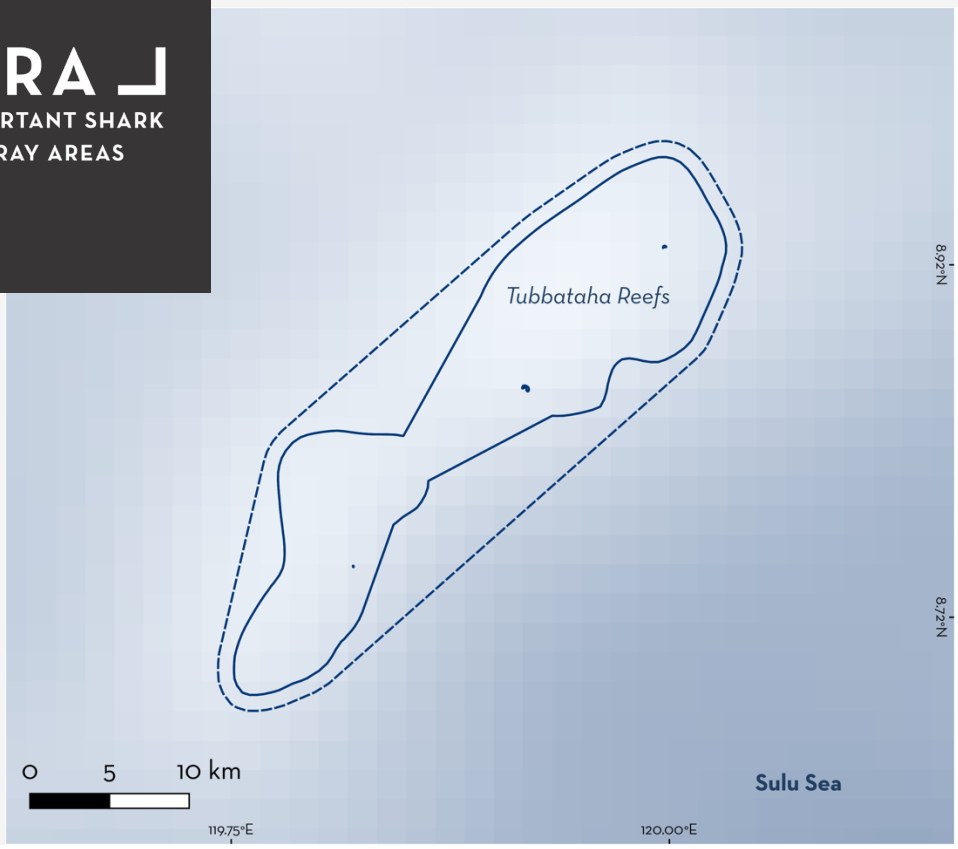
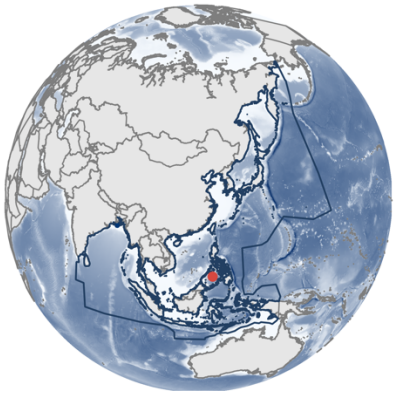
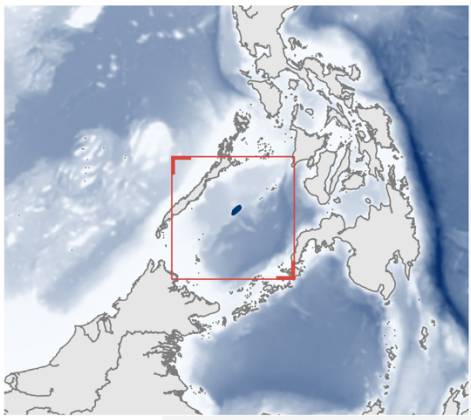
ISRA
IMPORTANT SHARK AND RAY AREAS







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

TUBBATAHA REEFS ISRA

Asia Region

PHILIPPINES

0–150 metres

319.1 km²

SUMMARY

Tubbataha Reefs is located in the middle of the Sulu Sea, in the western Philippines. This area is one of the few coral atolls in the Philippines, and within the Sulu Sea it represents one of the few pristine locations. The area consists of two large atolls, separated by an 8 km channel. Both atolls are characterised by shallow fringing reefs (<15 m deep) and steep reef walls. It sits within the Sulu-Sulawesi Marine Ecoregion Ecologically or Biologically Significant Marine Area, and partly overlaps with Tubbataha Reef National Marine Park Key Biodiversity Area. Within this area there are: **threatened species** (e.g., Whitetip Reef Shark *Triaenodon obesus*); and **undefined aggregations** (e.g., Grey Reef Shark *Carcharhinus amblyrhynchos*).

CRITERIA

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

DESCRIPTION OF HABITAT

Tubbataha Reefs is located in the middle of the Sulu Sea, ~170 km southeast of Puerto Princesa City, Palawan, and ~100 km south of Cavili Island, Cagayancillo, which is the closest human settlement. The area sits atop the middle of Cagayan Ridge which spans the centre of the Sulu Sea longitudinally. This area is one of the few coral atolls in the Philippines (Claudino-Sales 2019). Within the Sulu Sea, this area represents one of the few pristine locations with live coral cover exceeding 75% (CBD 2024).

This area consists of two large atolls, the north atoll and south atoll (Claudino-Sales 2019). The north atoll is ~ 16.8 km in length and 6.6 km in width at its widest point, whereas the south atoll is smaller at ~ 8.5 km in length and 3.9 km at its widest point (Murray et al. 2019). The north and south atolls are separated by an 8 km channel where depths exceed 1,600 m. Both atolls are characterised by shallow fringing reefs (<15 m deep) and steep reef walls extending to a slope that, from 60 to 120 m, rapidly descends to >1,000 m (Gordon et al. 2011). The north and south atolls contain lagoons. The dominant habitats located in this area are coral reefs (~ 100 km^2) with scattered seagrass beds.

The Sulu Sea has a tropical monsoon climate with only two seasons each year: the dry (boreal winter) season that prevails from November to April, and the rainy (summer) season, extending from May to October (Wang et al. 2006). The surface wind of the Sulu Sea is strongly influenced by the East Asian Monsoon System: northeasterly in winter, southwesterly in summer, and highly variable during the transitional periods (Wyrtki 1961). Vertical upwelling and cold nutrient-rich waters are caused by the northeast winds (winter season) increasing marine productivity and causing phytoplankton blooms (Wang et al. 2006).

This area sits within the Sulu-Sulawesi Marine Ecoregion Ecologically or Biologically Significant Marine Area (EBSA; CBD 2024), partially overlaps with the Tubbataha Reef National Marine Park Key Biodiversity Area (KBA 2024), and overlaps with the Tubbataha Reefs Natural Park.

This Important Shark and Ray Area is benthopelagic and is delineated from surface waters (0 m) to 150 m based on the depth range of the Qualifying Species in 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

Tubbataha Reefs is an important undefined aggregation area for two shark species.

Between March–June 2015 (n = 47) and April–June 2016 (n = 66), 113 Baited Remote Underwater Video Surveys (BRUVS) were undertaken in this area (Murray et al. 2019; R Murray unpubl. data 2023). BRUVS were deployed 500 m apart from each other and were left to record for 1–4.5 hours. Surveys were carried out in shallow (3–30 m) and deep reef habitats (40–100 m). For each species, cumulative Max N (i.e., maximum number of individuals appearing in a video frame at the same time). MaxN values were divided by survey length to generate catch-per-unit-effort (CPUE) metrics (sharks/hour).

Underwater Visual Census (UVC; n = 20) were also undertaken in May 2015 (n = 10) and June 2016 (n = 10) covering an area of 0.2067 km^2 in 2015 and 0.2238 km^2 in 2016 (Murray et al. 2019). The survey began when the SCUBA divers, experienced in shark and ray identification, reached a depth of 15 m, whereby the two observers, located on each side of the scribe, swam for 40 min, 5 m from the substrate, surveying a transect strip 30 m wide (15 m on either side of the scribe). Sharks that exited and re-entered the survey area were omitted from the count to avoid repeated encounters. Overall, Tubbataha Reefs had the highest CPUEs compared to seven other study sites in the Philippines (R Murray unpubl. data 2023).

For Whitetip Reef Sharks, BRUVS results showed that Whitetip Reef Sharks form large aggregations (R Murray unpubl. data 2023). Sharks were present in 71.7% of surveys with an overall CPUE of 0.87 (± 0.84) sharks/hour (Murray et al. 2019). The UVC results showed that this species was the most abundant in this area, among the eight species of sharks recorded, with an average density of 3.66 ± 2.14 individuals/hectare (Murray et al. 2019). No significant difference in abundance was detected between years (Murray et al. 2019).

For Grey Reef Sharks, BRUVS results showed that this shark was the most abundant species, among the fourteen species of sharks recorded. Grey Reef Sharks formed large aggregations (R Murray unpubl. data 2023) and were present in 54.8% of surveys, with an overall CPUE of 0.91 ± 1.64 sharks/hour (Murray et al. 2019). The UVC results showed that this species had an average density of 3.34 ± 2.9 individuals/hectare (Murray et al. 2019). No significant difference in abundance was detected between years (Murray et al. 2019).

Both survey methods reported one of the highest densities of Grey Reef Sharks and Whitetip Reef Sharks documented in the Philippines year-around (Murray et al. 2019). Due to the life-history of both species and the isolated and healthy condition of this area, sharks are most probably feeding and resting in this area. This is further supported by a preliminary analysis of acoustic data from 17 tagged Grey Reef Sharks in this area which showed high residency and no confirmed movements of tagged sharks outside of the park (e.g., these sharks were not detected on acoustic receivers at Cagayancillo, Cavili, and Arena Islands - the closest islands in the region) (LAMAVE unpubl. data 2024).

Liveaboards that frequently come to this location have been reporting these aggregations regularly and predictably, as these species are a main attraction for recreational divers. Other previous studies have also recorded high densities for Grey Reef Sharks and Whitetip Reef Sharks (Walker & Palomar-Abesamis 2005; Alava 2010). A mean density of 5.5 Whitetip Reef Sharks/hectare with densities reaching as 13 individuals/hectare in some areas (WD Robbins unpubl. data 2008).

Further information is needed to understand the nature and function of these aggregations.

Acknowledgments

Ariana Agustines (Large Marine Vertebrates Research Institute Philippines), Andrew Chin (James Cook University), Jessica Labaja (Large Marine Vertebrates Research Institute Philippines), Ryan Murray (Large Marine Vertebrates Research Institute Philippines; Met Éireann Dublin Ireland), Alessandro Ponzo (Large Marine Vertebrates Research Institute Philippines), Ma. Theresa R Aquino (Marine Wildlife Watch of the Philippines), Angelique M Songco (Marine Wildlife Watch of the Philippines; Tubbataha Management Office), Retchie P Alaba (Tubbataha Management Office), Arnel Andrew Yaptinchay (Marine Wildlife Watch of the Philippines), 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 2024 ISRA Region 9 – Asia 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. 2024. Tubbataha Reefs 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
SHARKS												
Carcharhinus amblyrhynchos	Grey Reef Shark	EN	0–280	X						X		
Triaenodon obesus	Whitetip Reef Shark	VU	0–330	X						X		

SUPPORTING SPECIES

Scientific Name	Common Name	IUCN Red List Category
SHARKS		
Alopias pelagicus	Pelagic Thresher	EN
Carcharhinus albimarginatus	Silvertip Shark	VU
Carcharhinus amblyrhynchoides	Graceful Shark	VU
Carcharhinus falciformis	Silky Shark	VU
Carcharhinus longimanus	Oceanic Whitetip Shark	CR
Carcharhinus melanopterus	Blacktip Reef Shark	VU
Galeocerdo cuvier	Tiger Shark	NT
Nebrius ferrugineus	Tawny Nurse Shark	VU
Rhincodon typus	Whale Shark	EN
Sphyrna lewini	Scalloped Hammerhead	CR
Sphyrna mokarran	Great Hammerhead	CR
Stegostoma tigrinum	Indo-Pacific Leopard Shark	EN
RAYS		
Aetobatus ocellatus	Spotted Eagle Ray	EN
Mobula alfredi	Reef Manta Ray	VU
Mobula birostris	Oceanic Manta Ray	EN
Mobula kuhlii	Shorthorned Pygmy Devil Ray	EN
Mobula thurstoni	Bentfin Devil Ray	EN
Neotrygon orientalis	Oriental Bluespotted Maskray	LC
Pateobatis fai	Pink Whipray	VU
Rhina ancylostomus	Bowmouth Guitarfish	CR
Rhynchobatus australiae	Bottlenose Wedgefish	CR
Taeniurops meyeni	Blotched Fantail Ray	VU
Taeniura lymma	Bluespotted Lagoon Ray	LC
Urogymnus asperrimus	Porcupine Ray	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.

SUPPORTING INFORMATION

There are additional indications that Tubbataha Reef is important for feeding purpuses of Reef Manta Rays. It is one of the three key sites with 8% (n = 32) of the total records of Reef Manta Ray in the Philippines, with a total of 16 sites identified (n = 392 individuals), according to in-water photographs and videos gathered through citizen science and dedicated research efforts between 2004 and 2020 (Rambahiniarison et al. 2023). Tubbataha Reefs showed an average resighting rate of 66% (n = 21/32). Moreover, no movement between Philippine sites has been reported and no international match has been recorded (Rambahiniarison et al. 2023). Fishery-related injuries (~25%) were reported in the other sites but there was no evidence of interactions with fishing activities for Reef Manta Rays sighted at Tubbataha Reefs. These results suggest evidence of long-term philopatric behaviour. No evidence of connectivity between aggregation sites surveyed, and philopatry has been well documented elsewhere for Reef Manta Rays (Deakos et al. 2011; Couturier et al. 2014; Braun et al. 2015). Cleaning and feeding behaviour have been documented at this area (Rambahiniarison et al. 2023). However, further information is needed to understand the nature and function of this area and if aggregations occur.

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