

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

MUSANDAM ISRA

Western Indian Ocean Region

SUMMARY

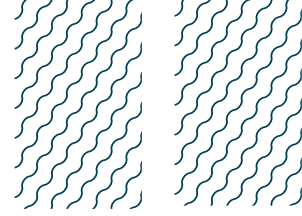
Musandam is located in northern Oman and is adjacent to the Gulf of Oman, the Strait of Hormuz and the Persian/Arabian Gulf. The area is characterised by hard corals, rocky shores, islands, coral gardens, sandy substrates, and deep drop-offs which create areas of nutrient-rich, cold-water upwelling. This area overlaps with the Musandam Islands Key Biodiversity Area. Within the area there are: **threatened species** (e.g., Whale Shark *Rhincodon typus*); **reproductive areas** (Indo-Pacific Leopard Shark *Stegostoma tigrinum*); and **undefined aggregations** (Whale Shark).

CRITERIA

Criterion A - Vulnerability; Sub-criterion C1 - Reproductive Areas; Sub-criterion C5 - Undefined Aggregations

—	—
OMAN	—
—	—
0-62 metres	—
—	—
2,054.59 km²	—
—	—





DESCRIPTION OF HABITAT

Musandam is located on the Oman coast. This area is met by the Gulf of Oman to the east and is fed by the Indian Ocean up to Lima Rock, while the west part is on the Persian/Arabian Gulf (hereafter referred to as 'the Gulf') coast and the north limit is the Strait of Hormuz (Sheppard & Salm 1988). The coastline is made up of steep cliffs that form intricate inlets. The area is dominated by hard corals in the shallow water with a mixture of soft and hard corals down to 30 m as well as rocky shores and islands, coral gardens, sandy substrates, and deep drop-offs which create areas of nutrient-rich, cold-water upwelling (Sheppard & Salm 1988; Salm 1993). This area has the highest coral cover in Oman (Burt et al. 2016) and many underwater caves carved out of the limestone rocks (Salm 1993). Currents in the area are strong, particularly influenced by tidal flow in and out of the Gulf (Salm 1993).

The area overlaps with the Musandam Islands Key Biodiversity Area (KBA 2023).

This Important Shark and Ray Area is benthopelagic and is delineated from inshore and surface waters (0 m) to 62 m based on the maximum depth range of the Qualifying Species and 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 Indo-Pacific Leopard Shark (Rigby et al. submitted).

SUB-CRITERION C1 - REPRODUCTIVE AREAS

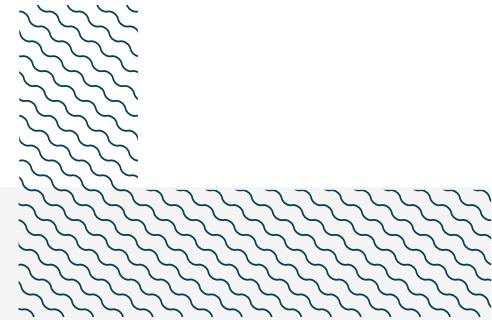
Musandam is an important reproductive area for one shark species.

Indo-Pacific Leopard Sharks of both sexes at different stages of maturity are regularly observed by divers visiting Musandam. Over multiple years (2015, 2022, 2023) observations have been made indicating pre-mating behaviours, including males chasing and biting females (R Jabado unpubl. data 2015; Freestyle Divers 2022; Nguyen 2023). Additionally, Indo-Pacific Leopard Shark egg cases have been observed, photographed, and filmed on multiple years in the area between May-June at depths of 30 m (Baverstock 2011; D Robinson in 2012; Henderson & Reeve 2014; Ras Musandam Divers 2018; Stevens 2018; Oman Aggressor 2020; D Robinson pers. obs. 2023; C Chellapermal pers. comm. 2023; Freestyle Divers pers. comm. 2023; Khawla Al Shehhi pers. comm. 2023). In addition, a neonate (based on size and coloration) was also photographed in the area (Al Marsa Musandam 2019). While Indo-Pacific Leopard Shark reproduction has been well studied in human care, knowledge of their reproduction in the wild is much scarcer. Specifically, mating sites or areas where eggs are found have not yet been identified for the species, highlighting the importance of this area.

SUB-CRITERION C5 - UNDEFINED AGGREGATIONS

Musandam is an important area for undefined aggregations of one shark species.

Based on records starting in 2004, 46 Whale Sharks have been identified by photo-identification from 95 encounters in Musandam (Robinson et al. 2016). Most sightings were recorded at Lima Rock (64 encounters) followed by Octopus Rock (19 encounters; Robinson et al. 2016). Based on density analysis of photo-identified individuals recorded between 2011-2014, Musandam was identified as the second regional (Persian/Arabian Gulf, Strait of Hormuz, and Gulf of Oman) hotspot of Whale Sharks, after Al Shaheen (249 individuals). Fishers have reported aggregations of up to 50 individuals and frequency reports were highest in July and October (Robinson et al. 2016; D Robinson unpubl. data 2023). This area could be used as a stopover point on their migrations or as a feeding area. More information is required to determine the nature and function of this aggregation.



Acknowledgments

David Robinson (Sundive Research), Simone Caprodossi (Sundive Research), Jenny R. Bortoluzzi (IUCN SSC Shark Specialist Group - ISRA Project), and Emiliano García-Rodríguez (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. Musandam ISRA Factsheet. Dubai: IUCN SSC Shark Specialist Group.

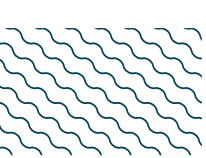
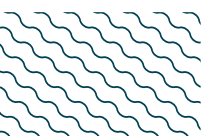
QUALIFYING SPECIES

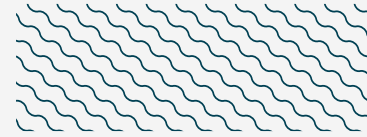
Scientific Name	Common Name	IUCN Red List Category	Global Depth Range (m)	ISRA Criteria/Sub-criteria Met								
				A	B	C1	C2	C3	C4	C5	D1	D2
SHARKS												
<i>Rhincodon typus</i>	Whale Shark	EN	0-1,928	X						X		
<i>Stegostoma tigrinum</i>	Indo-Pacific Leopard Shark	EN	0-62	X		X						

SUPPORTING SPECIES

Scientific Name	Common Name	IUCN Red List Category
SHARKS		
<i>Carcharhinus leucas</i>	Bull Shark	VU
<i>Carcharhinus melanopterus</i>	Blacktip Reef Shark	VU
RAYS		
<i>Mobula kuhlii</i>	Shorthorned Pygmy Devil Ray	EN
<i>Taeniurops meyeri</i>	Blotched Fantail Ray	VU
<i>Torpedo sinuspersici</i>	Gulf Torpedo	DD
<i>Urogymnus asperrimus</i>	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.





REFERENCES

- Al Marsa Musandam. 2019.** A baby leopard shark spotted in Umm Al Fayarin Musandam Oman with Al Marsa three nights liveboard trip! Available at: https://www.instagram.com/p/B15m4v_BOlp/?igshid=MzRIODBiNWFIZA%3D%3D Accessed August 2023.
- Baverstock W. 2011.** Photography adventures in the Musandam... with Whale Sharks. Available at: <https://warrenbaverstock.wordpress.com/2011/05/15/photography-adventures-in-the-musandam%E2%80%A6-with-whale-sharks/> Accessed August 2023.
- Burt JA, Coles S, Van Lavieren H, Taylor O, Looker E, Samimi-Namin K. 2016.** Oman's coral reefs: A unique ecosystem challenged by natural and man-related stresses and in need of conservation. *Marine Pollution Bulletin* 105(2): 498–506. <https://doi.org/10.1016/j.marpolbul.2015.11.010>
- Freestyle Divers. 2022.** Musandam top 10 dive sites series. Available at: <https://freestyledivers.me/musandam-top-10-dive-sites-series/> Accessed August 2023.
- Henderson AC, Reeve AJ. 2014.** Assessment of shark population, movements, delineations and breeding grounds in the Sultanate of Oman. Muscat: Sultan Qaboos University.
- Key Biodiversity Areas (KBA). 2023.** Key Biodiversity Areas factsheet: Musandam Islands. Available at: <https://www.keybiodiversityareas.org/site/factsheet/8215> Accessed September 2023.
- Nguyen R. 2023.** Dhow dive trip Musandam May 2023. Available at: https://www.youtube.com/watch?v=Os281leaikQ&ab_channel=RaymondNguyen Accessed August 2023.
- Oman Aggressor. 2020.** Diving logbooks 2018–2020. Available at: <https://www.aggressor.com> Accessed August 2023.
- Pierce SJ, Norman B. 2016.** *Rhincodon typus*. *The IUCN Red List of Threatened Species* 2016: e.T19488A291. <https://dx.doi.org/10.2305/IUCN.UK.2016-1.RLTS.T19488A2365291.en>
- Ras Musandam Divers. 2018.** An egg of leopard shark. Available at: <https://www.instagram.com/p/CsnisjVKKE6/> Accessed August 2023.
- Rigby C, Dudgeon C, Armstrong A, Bateman R, Jabado RW, Robinson D, Rohner C, Venables S. Submitted.** *Stegostoma tigrinum*. *The IUCN Red List of Threatened Species*.
- Robinson DP, Jaidah MY, Bach S, Lee K, Jabado RW, Rohner CA, March A, Caprodossi S, Henderson AC, Mair JM, et al. 2016.** Population structure, abundance and movement of whale sharks in the Arabian Gulf and the Gulf of Oman. *PLoS One* 11(6): e0158593. <https://doi.org/10.1371/journal.pone.0158593>
- Salm RV. 1993.** Coral reefs of the Sultanate of Oman. Washington DC: National Museum of Natural History Smithsonian Institution.
- Sheppard CRC, Salm RV. 1988.** Reef and coral communities of Oman, with a description of a new coral species (order Scleractinia, genus *Acanthastrea*). *Journal of Natural History* 22: 263–279. <https://doi.org/10.1080/00222938800770201>
- Stevens V. 2018.** Rays and Indo Pacific Leopard Shark at ras Morovi, Musandam Oman. Available at: <https://www.youtube.com/watch?v=iVoIRKJBEUI> Accessed August 2023.