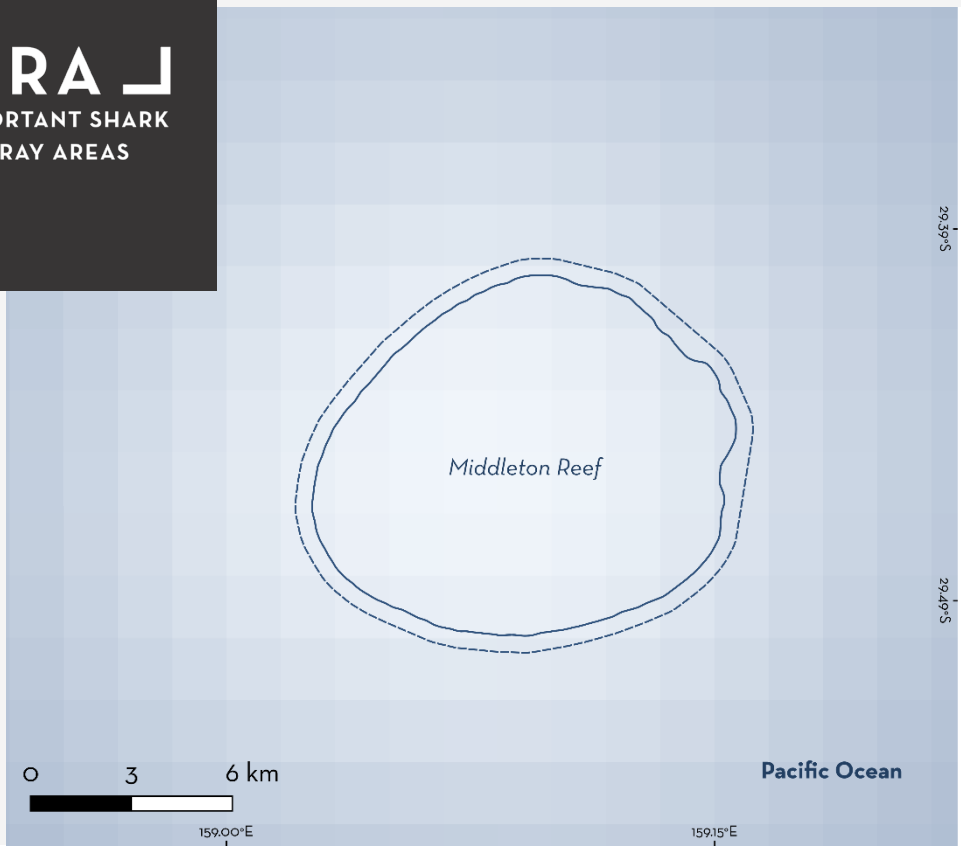
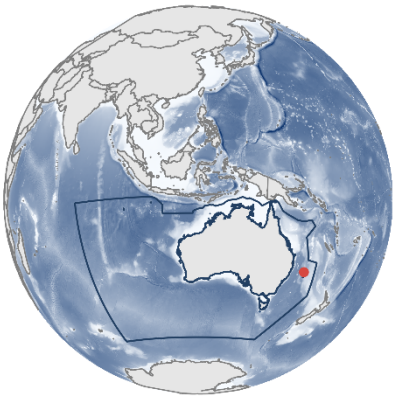
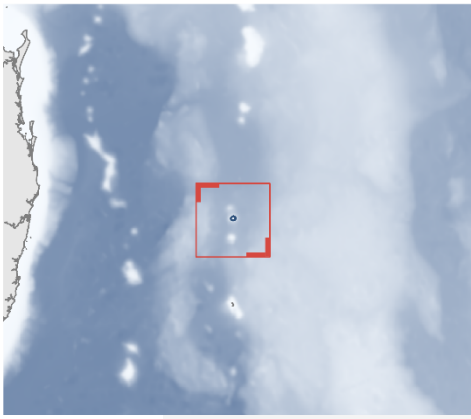
ISRA
IMPORTANT SHARK AND RAY AREAS







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

MIDDLETON REEF ISRA

Australia and Southeast Indian Ocean Region

AUSTRALIA

0–100 metres

101.7 km²

SUMMARY

Middleton Reef is located in the southwest Pacific, ~560 km from mainland New South Wales, Australia. This remote area encompasses an atoll-like reef structure upon a seamount. It is characterised by coral reefs and an inner lagoon with sandy and gravelly substrates. The area is influenced by the Eastern Australian Current and by seasonal variation in sea surface temperature, upwelling, and Chlorophyll-*a*. The area overlaps with Lord Howe Marine Park. Within this area there are: **reproductive areas** (Galapagos Shark *Carcharhinus galapagensis*).

CRITERIA

Sub-criterion C1 – Reproductive Areas

DESCRIPTION OF HABITAT

Middleton Reef is located in the southwest Pacific, ~560 km from mainland New South Wales, Australia. This remote area encompasses an atoll-like reef structure upon a seamount. It is one of the two southernmost platform reefs in the world (Carroll et al. 2021). The area includes exposed reef, inner lagoon, and back reef. This area is characterised by coarse sand and gravel substrates, becoming increasingly composed of pebbles at greater depths. The fine sandy substrate in the northern part of Middleton Reef is also characterised by bacterial mats between 31–50 m depth. There are also coral reefs and sponges in the area (Carroll et al. 2021).

Middleton Reef is influenced by moderate wave action: the mean tidal range is 2.6 m and the mean wave height is 2.0–2.5 m. The area is influenced by warm waters circulated to the area by the East Australian Current. It experiences seasonal upwelling in austral summer months, particularly on the east side of the reefs. In spring and winter, southeasterly winds dominate. There is also seasonal variation in Chlorophyll-α concentrations, which are highest in winter and early autumn. Seasonal variation in mean sea surface temperature peaks in February (24.6°C) and troughs in August (19.5°C) (Carroll et al. 2021).

This area overlaps with Lord Howe Marine Park (Parks Australia 2025).

This Important Shark and Ray Area is benthic and pelagic and is delineated from inshore and surface waters (0 m) to 100 m based on the bathymetry of the area.

ISRA CRITERIA

SUB-CRITERION C1 – REPRODUCTIVE AREAS

Middleton Reef is an important reproductive area for one shark species.

Galapagos Sharks have been recorded during scientific surveys in this area undertaken in 2006, 2011, 2014, and 2020 (Hoey et al. 2014; Carroll et al. 2021; GlobalArchive 2025; The Fish Collective 2025). Across five days in March 2014, underwater visual census field surveys using 250–500 m transects were undertaken in this area (Hoey et al. 2014). In total, 221 Galapagos Sharks were recorded, visually estimated to measure 61–180 cm total length (TL). Of these, at least 116 (52.5%) were neonate/young-of-the-year (YOY) measuring 61–100 cm TL (Hoey et al. 2014). The size-at-birth of this species is 57–80 cm TL (Ebert et al. 2021), and YOY individuals measure up to 110 cm TL (Morales-Serrano & Gonzalez-Pestana 2024).

Synthesised data from the Global Archive and The Fish Collective for Baited Remote Underwater Video System (BRUVS) surveys were extracted after quality control was undertaken using CheckEM (GlobalArchive 2025; The Fish Collective 2025; Gibbons et al. in press). In January and February 2020, 247 Galapagos Sharks measuring 65.5–293.4 cm TL were observed down to 98.3 m depth from 118 stereo-BRUVS deployed in this area (Carroll et al. 2021; GlobalArchive 2025; The Fish Collective 2025). Of these, 183 (74%) were neonate/YOY, visually estimated to measure 65.6–110.3 cm TL. Neonate/YOY individuals were recorded on every day (n = 5) of the surveys in 2020 (GlobalArchive 2025; The Fish Collective 2025).

This is one of the few known locations in the world where neonate/YOY Galapagos Sharks regularly and predictably occur across numerous years (Carroll et al. 2021; Morales-Serrano & Gonzalez-Pestana 2024; GlobalArchive 2025; The Fish Collective 2025). Middleton Reef has the largest number of observations in Australia; the second largest is Elizabeth Reef, ~50 km away. Further, genetic sampling of the Galapagos Shark population at Middleton Reef suggests that it is distinct

from the adjacent Lord Howe Island population (van Herwerden et al. 2009). Immature Galapagos Sharks have also been observed in aggregations and shared online by recreational snorkellers (e.g., Instagram 2024).

[redacted]

Acknowledgments

Neville Barrett (Institute for Marine and Antarctic Studies [IMAS], University of Tasmania), Victoria Camilieri-Asch (Shark Ethology Australia [SEA] Consulting; The University of Western Australia, Queensland University of Technology), Andrew Carroll (Geoscience Australia), Justin Gilligan (NSW Department of Primary Industries and Regional Development, Marine Parks), David Harasti (NSW Department of Primary Industries), Charlie Huveneers (Flinders University), Jonathan D Mitchell (The University of Western Australia), Jacquomo Monk (Institute for Marine and Antarctic Studies [IMAS], University of Tasmania), Victor Peddemors (Sea Predator Research Unit), Caitlin Woods (NSW Department of Primary Industries and Regional Development, Marine Parks), Marta D Palacios (IUCN SSC Shark Specialist Group – ISRA Project), and Ryan Charles (IUCN SSC Shark Specialist Group – ISRA Project) contributed and consolidated information included in this factsheet. We thank all participants of the 2025 ISRA Region 08 – Australia and Southeast Indian Ocean workshop for their contributions to this process.

We acknowledge the Traditional Owners of Country throughout Australia and recognise the continuing connection to land, waters, and culture. We pay our respects to Elders past, present, and emerging.

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. 2025. Middleton Reef 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 galapagensis	Galapagos Shark	LC	0–285			X						

SUPPORTING SPECIES

Scientific Name	Common Name	IUCN Red List Category
SHARKS		
Carcharhinus falciformis	Silky Shark	VU
Carcharodon carcharias	White Shark	VU
Galeocerdo cuvier	Tiger Shark	NT
Sphyrna lewini	Scalloped Hammerhead	CR
Sphyrna mokarran	Great Hammerhead	CR
RAYS		
Mobula birostris	Oceanic Manta 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.

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