

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

## SOUTHEAST MISOOL ISRA

### Asia Region

### SUMMARY

Southeast Misool is located in West Papua, Indonesia and is part of the Raja Ampat archipelago. The area includes several small islands and is characterised by the presence of coral reefs, mangroves, and seagrass beds. The area overlaps with the Raja Ampat and Northern Bird's Head Ecologically or Biologically Significant Marine Area and with two marine protected areas. Within the area there are: **threatened species** (e.g., Blacktip Reef Shark *Carcharhinus melanopterus*); **range-restricted species** (e.g., Raja Ampat Epaulette Shark *Hemiscyllium freycineti*); **reproductive areas** (e.g., Reef Manta Ray *Mobula alfredi*); **feeding areas** (Longhorned Pygmy Devil Ray *Mobula eregoodoo*); **undefined aggregations** (e.g., Oceanic Manta Ray *Mobula birostris*); and the area sustains a **high diversity of sharks** (32 species).

### CRITERIA

**Criterion A - Vulnerability; Criterion B - Range Restricted;**  
**Sub-criterion C1 - Reproductive Areas; Sub-criterion C2 - Feeding Areas;**  
**Sub-criterion C5 - Undefined Aggregations; Criterion D2 - Diversity**

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<b>INDONESIA</b>	
—	—
<b>0-100 metres</b>	
—	—
<b>527.5 km<sup>2</sup></b>	
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## DESCRIPTION OF HABITAT

Southeast Misool is located in West Papua, Indonesia and is part of the Raja Ampat archipelago. It sits within the Bird's Head Seascape, recognised as a global hotspot of coral reef biodiversity and for marine megafauna (Allen & Erdmann 2009). The area includes several small islands and is characterised by the presence of coral reefs, mangroves, and seagrass beds (Cleary et al. 2018).

It is mainly influenced by monsoon seasons. The northwest monsoon occurring from November to April is characterised by warm sea surface temperatures. In contrast, the southeast monsoon (May to October) is characterised by cooler temperatures and strong and continuous southeast winds that produces upwellings, resulting in an increase of primary productivity in coastal areas (Mangubhai et al. 2012).

The area overlaps with the Raja Ampat and Northern Bird's Head Ecologically or Biologically Significant Marine Area (EBSA; CBD 2024). In addition, it overlaps with two marine protected areas: KKPD Misool Timur-Selatan and Teluk Lelintah Wildlife Sanctuary.

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

## ISRA CRITERIA

### CRITERION A - VULNERABILITY

Thirty Qualifying Species considered threatened with extinction according to the IUCN Red List of Threatened Species regularly occur in the area. Threatened sharks comprise two Critically Endangered species, four Endangered species, and eight Vulnerable species; threatened rays comprise three Critically Endangered species, seven Endangered species, and six Vulnerable species (IUCN 2024).

### CRITERION B - RANGE RESTRICTED

Southeast Misool holds the regular presence of Raja Ampat Epaulette Shark and Indonesian Wobbegong as resident range-restricted species. These species occur year-round in the area and are regularly encountered, though the Indonesian Wobbegong is significantly less common (MV Erdmann pers. obs. 2022).

Raja Ampat Epaulette Shark has been reported in the area since 2007 from diving observations with many individuals sampled for taxonomic studies (Allen et al. 2016; Dudgeon et al. 2020; MV Erdmann unpubl. data. 2023). A total of 58 individuals, ranging from 20–70 cm total length (TL) were found mostly on coral reefs with rocky and sandy substrates as well as near mangroves (Widiarto et al. 2020). An intensive daytime search under coral heads in the 8–20 m depth range on the seamount 'Magic Mountain' in 2022 uncovered nine individuals in a single dive (M Erdmann unpubl. data 2022). This species is found predominantly on shallow reef flats with seagrass beds and scattered coral bommies, though it is also found in mangroves and on coral reefs (Allen et al. 2016). Although the species is found throughout Raja Ampat, Southeast Misool is unique in that there are very few intertidal reef flats, and the abundant Raja Ampat Epaulette Sharks found in this region are found under coral heads at depths of 5–30 m, compared to the intertidal habitat observed for this species in Dampier Strait and Northwest Waigeo (MV Erdmann pers. obs. 2024). This species has been observed on coral reefs around Misool Resort and at four other islands (Ya Pale, Ya Ganan, Yefgag,

dan Ginvommat) in the area during surveys in 2020. Raja Ampat Epaulette Shark has a very limited distribution, highlighting the global importance of the area for this species.

Indonesian Wobbegong has been regularly reported in the area between 2008–2023 based on underwater visual census and diving operations (M Erdmann unpubl. data 2023). It is found on coral reefs frequently exposed to upwelling at depths between 3–30 m. It has been reported three times in the past 10 years by scientific divers. Prior to 2014, it was recorded from data collected from shark finning boats operating in Southeast Misool, with over 20 landed individuals observed (Purwanto pers. comm. 2017; M. Erdmann unpubl. data 2024). Due to the protection of sharks in the area, this species is no longer caught by fisheries and its presence can only be confirmed by the rare sightings by divers. Indonesian Wobbegong is a rare species and Southeast Misool is one of the few areas where larger numbers of individuals have been reported in eastern Indonesia along with Kaimana.

These two species are restricted to the Indonesian Seas Large Marine Ecosystem.

## SUB-CRITERION C<sub>1</sub> – REPRODUCTIVE AREAS

Southeast Misool is an important reproductive area for two shark and one ray species.

At Batbitim Island, the owner of the resort reports that since building it in 2005, she has observed the continuous presence of at least 15 neonate/young-of-the-year (YOY) and juvenile (based on their size) Blacktip Reef Sharks on the reef flats and lagoon surrounding their water bungalows year-round (M Miners pers. comm. 2024). Batbitim offers some of the most extensive reef flat, sand flat, and lagoon habitats in the region making it suitable habitat for neonates. Similarly, three homestays in the area and the Kalig Island patrol have observed the continuous presence of neonate/YOY and juvenile Blacktip Reef Sharks (M Erdmann pers. obs. 2015–2024).

Raja Ampat Epaulette Shark courtship and mating has been observed by dive operators in shallow seagrass beds at night at Misool Resort (M Miners pers. comm. 2023). Juveniles are also observed on night dives in the area (M Erdmann pers. obs. 2005–2024). This is the only site where mating has been filmed for this species.

Between 2009 and 2023, from 820 female Reef Manta Ray photo-identified in all of Raja Ampat, 217 were recorded as heavily pregnant based on extended abdomens (Setyawan et al. 2020). Of these pregnant females, 57.6% (n = 125) were recorded in Southeast Misool, with the majority observed at the Magic Mountain cleaning stations (Setyawan et al. 2020). In addition, in the same period, 72 YOY and juvenile Reef Manta Ray were observed at Magic Mountain and southwest Batbitim (E Setyawan unpubl. data. 2024). YOY were defined as individuals <200 cm disc width (DW) and juveniles as individuals between 200–240 cm DW, as previously reported for other sites in Indonesia (Germanov et al. 2019). Known size-at-birth for this species is 130–150 cm DW (Last et al. 2016). In addition, Reef Manta Rays regularly aggregate at cleaning stations within the area and courtship behaviour has also been observed since 2009, in particular the formation of mating trains. In Southeast Misool, courtship behaviour is mostly observed in October–December (Setyawan et al. 2020). These courtship behaviours also involved interspecific interactions when an Oceanic Manta Ray male and a Reef Manta Ray female engaged in this behaviour at Magic Mountain cleaning stations (S Heinrich pers. obs. 2016).

## SUB-CRITERION C<sub>2</sub> – FEEDING AREAS

Southeast Misool is an important feeding area for one ray species.

Aggregations of Longhorned Pygmy Devil Rays have been reported in the area in 2014 and 2016

feeding on large shoals of baitfish (Notarbartolo di Sciara et al. 2019) and have been observed since then by diving operators in the area (M Erdmann pers. obs. 2023). These feeding aggregations are composed of between 6-30 individuals and due to their regularity have attracted filmmakers and photographers. Southeast Misool is one of the few areas in the world where feeding aggregations have been regularly observed, highlighting the global importance of this area.

## SUB-CRITERION C5 - UNDEFINED AGGREGATIONS

Southeast Misool is an important area for undefined aggregations of two ray species.

Regular monitoring between 2011 and 2022 found that this area hosts 11 cleaning stations for Reef Manta Rays and 13 cleaning stations for Oceanic Manta Rays, including 10 cleaning stations that were used by both species (Setyawan et al. 2020). These cleaning stations are used mostly between October and March and aggregations range from 3 to 10 individuals.

## SUB-CRITERION D2 - DIVERSITY

Southeast Misool sustains a high diversity of Qualifying Species (32 species). This exceeds the regional diversity threshold (31 species) for the Asia Region. The regular presence of Qualifying Species has been documented by frequent observations in diving operations and visual census by scientists, through citizen science, and from illegal fisheries operating in the area (Allen & Erdmann 2009, 2024; Erdmann et al. unpubl. data 2002-2024).

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### Suggested citation

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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
<b>SHARKS</b>											
<i>Carcharhinus albimarginatus</i>	Silvertip Shark	VU	0-800	X							X
<i>Carcharhinus amblyrhynchos</i>	Grey Reef Shark	EN	0-280	X							
<i>Carcharhinus amboinensis</i>	Pigeye Shark	VU	0-60	X							
<i>Carcharhinus falciformis</i>	Silky Shark	VU	0-1,112	X							
<i>Carcharhinus leucas</i>	Bull Shark	VU	0-256	X							
<i>Carcharhinus limbatus</i>	Blacktip Shark	VU	0-140	X							
<i>Carcharhinus melanopterus</i>	Blacktip Reef Shark	VU	0-75	X		X					
<i>Hemipristis elongata</i>	Snaggletooth Shark	EN	0-130	X							
<i>Hemiscyllium freycineti</i>	Raja Ampat Epaulette Shark	NT	0-30		X	X					
<i>Nebrius ferrugineus</i>	Tawny Nurse Shark	VU	0-70	X							
<i>Orectolobus leptolineatus</i>	Indonesian Wobbegong	NT	0-100		X						
<i>Rhincodon typus</i>	Whale Shark	EN	0-1,928	X							
<i>Sphyrna lewini</i>	Scalloped Hammerhead	CR	0-1,043	X							
<i>Sphyrna mokarran</i>	Great Hammerhead	CR	0-300	X							
<i>Stegostoma tigrinum</i>	Indo-Pacific Zebra Shark	EN	0-62	X							

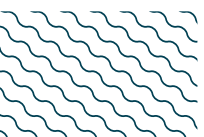
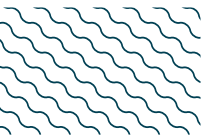
Scientific Name	Common Name	IUCN Red List Category	Global Depth Range (m)	ISRA Criteria/Sub-criteria Met									
				A	B	C1	C2	C3	C4	C5	D1	D2	
<i>Triaenodon obesus</i>	Whitetip Reef Shark	VU	0-330	X									
<b>RAYS</b>													
<i>Aetobatus ocellatus</i>	Spotted Eagle Ray	VU	0-40	X									X
<i>Glaucostegus typus</i>	Giant Guitarfish	CR	0-100	X									
<i>Himantura uarnak</i>	Coach Whipray	EN	0-50	X									
<i>Mobula alfredi</i>	Reef Manta Ray	VU	0-711	X		X					X		
<i>Mobula birostris</i>	Oceanic Manta Ray	EN	0-1,246	X							X		
<i>Mobula eregoodoo</i>	Longhorned Pygmy Devil Ray	EN	0-50	X			X						
<i>Mobula kuhlii</i>	Shorthorned Pygmy Devil Ray	EN	0-50	X									
<i>Mobula mobular</i>	Spinetail Devil Ray	EN	0-1,112	X									
<i>Pastinachus ater</i>	Broad Cowtail Ray	VU	0-60	X									
<i>Pateobatis fai</i>	Pink Whipray	VU	0-200	X									
<i>Pateobatis jenkinsi</i>	Jenkins' Whipray	VU	0-90	X									
<i>Rhina ancylostomus</i>	Bowmouth Guitarfish	CR	0-70	X									
<i>Rhynchobatus australiae</i>	Bottlenose Wedgefish	CR	0-60	X									
<i>Taeniurops meyeri</i>	Blotched Fantail Ray	VU	0-439	X									

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	
<i>Urogymnus asperrimus</i>	Porcupine Ray	EN	1-30	X									
<i>Urogymnus granulatus</i>	Mangrove Whipray	EN	0-85	X									

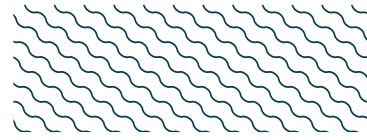
## SUPPORTING SPECIES

Scientific Name	Common Name	IUCN Red List Category
<b>SHARKS</b>		
<i>Carcharhinus sorrah</i>	Spottail Shark	NT
<i>Chiloscyllium punctatum</i>	Grey Carpetshark	NT
<i>Eucrossorhinus dasypogon</i>	Tasselled Wobbegong	LC
<b>RAYS</b>		
<i>Taeniura lymma</i>	Bluespotted Lagoon Ray	LC

*IUCN Red List of Threatened Species Categories are available by searching species names at [www.iucnredlist.org](http://www.iucnredlist.org). Abbreviations refer to: CR, Critically Endangered; EN, Endangered; VU, Vulnerable; NT, Near Threatened; LC, Least Concern; DD, Data Deficient.*

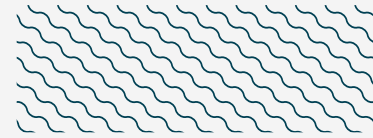






## SUPPORTING INFORMATION

There is additional information that the area may be an important reproductive area for one ray species. Based on monitoring of Oceanic Manta Rays, courtship behaviour has been observed between February-May. More information is needed to confirm the reproductive importance of the area.



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