

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

## ALDABRA ATOLL ISRA

### Western Indian Ocean Region

#### SUMMARY

Aldabra Atoll is part of the Aldabra Group of the Outer Islands, Republic of Seychelles. The area is characterised by a large, raised coral atoll and includes a large semi-enclosed shallow lagoon with a maximum depth of 30 m. The surrounding continental slope drops quickly to greater depths. The area encompasses extensive mangrove, seagrass, coral reef, deep sea, and pelagic habitats and its fish biomass is among the highest within Seychelles. Within this area there are: **threatened species** (e.g., Blacktip Reef Shark *Carcharhinus melanopterus*); **reproductive areas** (e.g., Sharptooth Lemon Shark *Negaprion acutidens*); **feeding areas** (e.g., Reef Manta Ray *Mobula alfredi*); **resting areas** (Tawny Nurse Shark *Nebrius ferrugineus*), and **undefined aggregations** (Scalloped Hammerhead *Sphyrna lewini*).

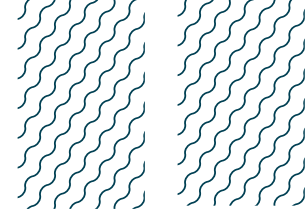
#### CRITERIA

**Criterion A - Vulnerability; Sub-criterion C1 - Reproductive Areas; Sub-criterion C2 - Feeding Areas; Sub-criterion C3 - Resting Areas; Sub-criterion C5 - Undefined Aggregations**

## SEYCHELLES

0-1,043 metres

693.4 km<sup>2</sup>



## DESCRIPTION OF HABITAT

Aldabra Atoll is part of the Aldabra Group of the Outer Islands in the southwestern Seychelles archipelago. The area is comprised of a raised coral atoll with four main islands, a semi-enclosed large lagoon, a surrounding continental slope, and a submarine canyon in the southeast of the atoll (Harris et al. 2014).

Aldabra Atoll's seaward reefs are characterised by lagoonal reefs, shallow forereef slopes, deep forereef slopes, and the reef platform (Haupt 2019). The area is subject to a tidal range of 2-3 m, which creates rapid currents, especially in the 12 channels (Stoddart 1968; Farrow & Brander 1971). The tidal amplitude results in large expanses of the lagoon being exposed during low tide and creates daily water temperature variations of up to 5°C (Koester et al. 2020).

Two distinct seasons govern Aldabra's climate: the southeast monsoon during the austral winter (April to October), creating a dry and cooler climate, and the northwest monsoon during summer (November to March), which generates wet and warmer conditions. The northeastern, eastern, and southeastern parts of Aldabra Atoll's seaward coast are exposed to strong winds and high wave-energy, whilst the northwestern and western coastlines are relatively sheltered (Haupt 2019; Koester et al. 2020). Previous research identified increased chlorophyll- $\alpha$  concentration off Aldabra Atoll's northwest coast, caused by flow disturbance and eddy formation (Heywood et al. 1990, 1994, 1996), whilst recent work indicates potential upwelling at the southwest of the atoll (J Appoo unpubl. data 2023).

Aldabra Atoll's shallow marine ecosystem is composed of seagrass beds, coral reefs, and mangrove forests (Seychelles Island Foundation [SIF] unpubl. data 2012; Constance et al. 2021). The seawards reefs are characterised by areas of dense seagrass beds, hard corals, soft corals, macroalgae, and non-living substratum, whilst the lagoon encompasses the entire mangrove forest, sparse seagrass beds, sparse and dense hard coral communities, and mixed macroalgae communities (Hamylton et al. 2012; Haupt 2019; Koester et al. 2020; Constance et al. 2021).

This area overlaps with the Northern Mozambique Channel Ecologically or Biologically Important Marine Area (CBD 2023), the Aldabra Special Reserve Key Biodiversity Area (KBA 2023), and the Aldabra Atoll Ramsar Site (Wetland of International Importance; Ramsar 2023).

This Important Shark and Ray Area is benthopelagic and is delineated from inshore and surface waters (0 m) to 1,043 m based on the global depth range of Qualifying Species.

## ISRA CRITERIA

### CRITERION A - VULNERABILITY

Six Qualifying Species considered threatened with extinction according to the IUCN Red List of Threatened Species™ regularly occur in the area. Threatened sharks comprise one Critically Endangered species, one Endangered species, and two Vulnerable species; threatened rays comprise one Endangered species and one Vulnerable species (IUCN 2023).

### SUB-CRITERION C1 - REPRODUCTIVE AREAS

Aldabra Atoll is an important reproductive area for two shark and one ray species.

Evidence of regular and predictable reproductive activities of Spotted Eagle Rays includes the presence of courting behaviour throughout the year (AJ Burt pers. obs. 2015-2022; A Koester pers.

obs. 2016–2022; J Latsha pers. obs. 2023; J Brice pers. comm. 2016–2022; C Sanchez pers. comm. 2017–2022). Spotted Eagle Rays displaying this behaviour have been reported during daytime, every year from 2015 to 2023, on the surface of calm, shallow water (~0.1–0.5 m depth) along Settlement Beach, whereby groups of 2–10 males follow a (usually larger) female, attempt to push her towards shallower water, and are seen biting or attempting to bite the female’s pelvic fin, following which the female slaps her fins vigorously. This sequence repeats itself several times and is interspersed with male rays circling each other and/or the female. Occasionally, observers can see bite marks on the female. This observed behaviour is similar to courting and pre-copulatory behaviour of wild Whitespotted Eagle Rays *Aetobatus narinari* observed in shallow near-shore environments (Tricas 1980; McCallister et al. 2020).

Young-of-the-year (YOY) Blacktip Reef Sharks, distinguished by their small sizes (size-at-birth for this species is 30–50 cm total length [TL; Stevens 1984b; Mourier et al. 2013] and size-at-maturity of both males and females is 90–134 cm TL; Chin et al. 2013; Ebert et al. 2021), are observed daily at Settlement Beach in ~0.1–0.5 m deep water and in lagoon mangrove areas every time work is undertaken in these areas (AJ Burt pers. obs. 2015–2022; A Koester pers. obs. 2016–2022; J Latsha pers. obs. 2023; J Brice pers. comm. 2016–2022; C Sanchez pers. comm. 2017–2022). Shallow, sandy habitats like these are typically utilised by Blacktip Reef Shark neonates and YOY (Papastamatiou et al. 2009). Young-of-the-year can be sighted throughout the year, but most abundantly during the northwest monsoon, which matches the records of a mark-recapture study done at Aldabra (Stevens 1984b). Sightings of YOY are usually in groups (>10 individuals), that include larger juveniles.

Sharptooth Lemon Shark YOY (size-at-birth, 60 cm TL; size-at-first-maturity of both males and females, 220–240 cm TL; Ebert et al. 2021) are regularly (nearly every time work is undertaken in these areas; once/twice per month) observed in mangrove areas inside the lagoon, and frequently seen at Settlement Beach, solitary, in groups, or in assemblages with YOY and juvenile Blacktip Reef Sharks (AJ Burt pers. obs. 2015–2022; A Koester pers. obs. 2016–2022; J Latsha pers. obs. 2023; J Brice pers. comm. 2016–2022; C Sanchez pers. comm. 2017–2022). Young-of-the-year Sharptooth Lemon Sharks can be seen throughout the year, but sightings of particularly small individuals are more frequent during the northwest monsoon (see also Stevens 1984b). Like in other areas in Seychelles (Weideli et al. 2023), juvenile Sharptooth Lemon Sharks and Blacktip Reef Sharks utilise overlapping habitats at Aldabra Atoll, however, a mark-recapture study identified Aldabra Atoll’s silty southern half of the lagoon as a particularly important habitat for Sharptooth Lemon Sharks (Stevens 1984b).

## SUB-CRITERION C2 – FEEDING AREAS

Aldabra Atoll is an important feeding area for at least two shark and one ray species.

Aldabra Atoll hosts one of the two largest Green Turtle *Chelonia mydas* populations in the Western Indian Ocean (Sanchez et al. 2023), with >15,000 clutches laid annually (Pritchard et al. 2022). At Settlement Beach, Blacktip Reef Sharks and Sharptooth Lemon Sharks are regularly observed feeding on Green Turtle hatchlings. They predictably do so when hatchlings enter the water at a sufficient tide height (AJ Burt pers. obs. 2015–2022; A Koester pers. obs. 2016–2022; J Latsha pers. obs. 2023; J Brice pers. comm. 2016–2022; C Sanchez pers. comm. 2017–2022). During 2010–2019, 2,000–4,500 clutches were laid annually at Settlement Beach (Pritchard et al. 2022), equalling ~120,000–810,000 eggs per year (~60–180 eggs per clutch; Mortimer et al. 2022). It is reasonable to suggest that turtle hatchlings at Aldabra constitute a significant part of the diet of sharks, particularly juveniles (see also Bashir et al. 2020). In addition, Blacktip Reef Sharks at Aldabra Atoll show high site fidelity (average 0.75–0.9 km Maximum Linear Movement over 12 months; Talma 2015) and earlier research showed high site fidelity for Sharptooth Lemon Sharks (Stevens 1984b). Restricted

movements of Blacktip Reef Sharks and Sharptooth Lemon Sharks have also been observed in other coral reef environments (e.g., Papastamatiou et al. 2010; Chin et al. 2013), including Saint Joseph Atoll in Seychelles (Filmalter et al 2013; Lea et al. 2016, 2020; Weideli et al. 2019). The high site fidelity of these sharks implies that feeding and reproduction occurs within the area.

Reef Manta Rays are regularly observed feeding in plankton-rich waters (AJ Burt pers. obs. 2015–2022; A Koester pers. obs. 2016–2022; J Latsha pers. obs. 2023; J Brice pers. comm. 2016–2022; C Sanchez pers. comm. 2017–2022). During the northwest monsoon, feeding is seen along the west and southwest coasts. The southwest coast is not visited during the southeast monsoon due to rough seas and is only visited once or twice during the northwest monsoon. However, between 2019–2023, there were sightings each time the southwest coast was visited (i.e., sightings once/twice per year). The visibility in this location is always poor (A Koester pers. obs. 2016–2022) and recent research revealed elevated nitrogen values in the water at this locality (J Appoo unpubl. data 2023), suggesting upwelling. During the southeast monsoon, Reef Manta Rays are observed regularly (minimum once per month) feeding predominantly along the west coast but also the north coast.

### SUB-CRITERION C3 – RESTING AREAS

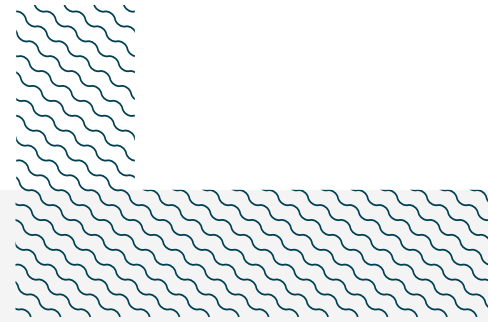
Aldabra Atoll is an important resting area for one shark species.

The Tawny Nurse Shark is regularly observed resting (i.e., laying still) solitary, in pairs, or small groups (3–4 individuals) on sandy substrates, underneath coral crevices and outcrops in lagoonal channels, mangrove areas, and at the seaward reefs. Frequency of sightings is tied to the number of trips to these areas for snorkelling and diving, however, a resting individual is seen at least every other snorkel/dive trip (AJ Burt pers. obs. 2015–2022; A Koester pers. obs. 2016–2022; J Latsha pers. obs. 2023; J Brice pers. comm. 2016–2022; C Sanchez pers. comm. 2017–2022).

### SUB-CRITERION C5 – UNDEFINED AGGREGATIONS

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

Predictable and regular aggregations of various group sizes (4–75 individuals) of Scalloped Hammerhead at Aldabra Atoll’s northwest coast can be observed predominantly, but not exclusively, during the southeast monsoon (AJ Burt pers. obs. 2015–2022; A Koester pers. obs. 2016–2022; J Latsha pers. obs. 2023; J Brice pers. comm. 2016–2022; C Sanchez pers. comm. 2017–2022). Records and images of opportunistic sightings are available from February 2013 (~50 individuals at Main Channel), August 2020 (two sightings: ~75 individuals at Settlement Reef and ~40 individuals at Anse Var), August 2021 (12 individuals at Settlement Reef), January and July 2022 (10 individuals at Anse Mais, 10 individuals at West Channels) and July and August 2023 (six sightings: six individuals at Anse Var, 10 individuals at Settlement Reef, four individuals seen twice at West Channels, 10 individuals at Settlement Reef). Groups are typically observed cruising alongside the reef edge. Since 2021, the number of sightings has drastically increased with the use of drones for photography/videography.



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### **Suggested citation**

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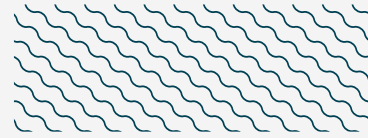
## QUALIFYING SPECIES

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	D2	
<b>SHARKS</b>													
<i>Carcharhinus melanopterus</i>	Blacktip Reef Shark	VU	0-75	X		X	X						
<i>Nebrius ferrugineus</i>	Tawny Nurse Shark	VU	0-70	X				X					
<i>Negaprion acutidens</i>	Sharptooth Lemon Shark	EN	0-90	X		X	X						
<i>Sphyrna lewini</i>	Scalloped Hammerhead	CR	0-1,043	X						X			
<b>RAYS</b>													
<i>Aetobatus ocellatus</i>	Spotted Eagle Ray	EN	0-40	X		X							
<i>Mobula alfredi</i>	Reef Manta Ray	VU	0-711	X			X						

## SUPPORTING SPECIES

Scientific Name	Common Name	IUCN Red List Category
<b>SHARKS</b>		
<i>Carcharhinus albimarginatus</i>	Silvertip Shark	VU
<i>Carcharhinus amblyrhynchos</i>	Grey Reef Shark	EN
<i>Carcharhinus falciformis</i>	Silky Shark	VU
<i>Carcharhinus leucas</i>	Bull Shark	VU
<i>Galeocerdo cuvier</i>	Tiger Shark	NT
<i>Hexanchus griseus</i>	Bluntnose Sixgill Shark	NT
<i>Rhincodon typus</i>	Whale Shark	EN
<i>Sphyrna mokarran</i>	Great Hammerhead	CR
<i>Sphyrna zygaena</i>	Smooth Hammerhead	VU
<i>Triaenodon obesus</i>	Whitetip Reef Shark	VU
<b>RAYS</b>		
<i>Aetomylaeus vespertilio</i>	Ornate Eagle Ray	CR
<i>Bathytoshia lata</i>	Brown Stingray	VU
<i>Himantura uarnak</i>	Coach Whipray	EN
<i>Mobula kuhlii</i>	Shorthorned Pygmy Devil Ray	EN
<i>Myliobatis aquila</i>	Common Eagle Ray	CR
<i>Pastinachus ater</i>	Broad Cowtail Ray	VU
<i>Pateobatis fai</i>	Pink Whipray	VU
<i>Pateobatis jenkinsii</i>	Jenkins' Whipray	VU
<i>Rhynchobatus djiddensis</i>	Whitespotted Wedgefish	CR
<i>Taeniurops meyeri</i>	Blotched Fantail Ray	VU
<i>Torpedo fuscomaculata</i>	Blackspotted Torpedo	DD
<i>Torpedo panthera</i>	Panther Torpedo	EN
<i>Urogymnus asperrimus</i>	Porcupine Ray	EN
<i>Urogymnus granulatus</i>	Mangrove Whipray	EN

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.



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