

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

COCOS-GALÁPAGOS SWIMWAY ISRA

Central and South American Pacific Region

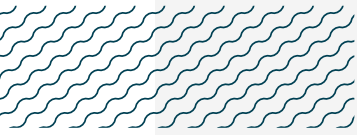
SUMMARY

Cocos-Galápagos Swimway encompasses a large area of oceanic waters of the Eastern Tropical Pacific linking Cocos Island (Costa Rica) and the Galápagos Islands (Ecuador). The Cocos part of this area includes Cocos Island National Park and Bicentenario Marine Managed Area, a World Marine Heritage Site. The Galápagos part of this area includes Ramsar sites, the Hermandad Marine Reserve, a World Marine Heritage Site, a UNESCO Biosphere Reserve, and an Ecologically or Biologically Significant Marine Area. This area is an important marine biological corridor given the high levels of connectivity observed between these islands and a significant overlap in the migratory movements of several shark species. Within this area there are: **threatened species** (e.g., Pelagic Thresher *Alopias pelagicus*); **reproductive areas** (e.g., Scalloped Hammerhead *Sphyrna lewini*); areas important for **movement** (e.g., Whale Shark *Rhincodon typus*); and **undefined aggregations** (Oceanic Manta Ray *Mobula birostris*).

CRITERIA

Criterion A - Vulnerability; Sub-criterion C1 - Reproductive Areas; Sub-criterion C4 - Movement; Sub-criterion C5 - Undefined Aggregations

— —
COSTA RICA
ECUADOR
 — —
0-1,928 metres
 — —
431,156 km²
 — —





DESCRIPTION OF HABITAT

Cocos-Galápagos Swimway is an area that connects Cocos Island of Costa Rica and the Galápagos Islands of Ecuador through waters in Areas Beyond National Jurisdiction (ABNJ). The extreme north is the boundary of the Cocos Island National Park, while the southern boundaries are the border of the Galápagos Marine Reserve. The Cocos-Galápagos Swimway lies principally on the Cocos Plate and Nazca Plate. This region is structurally connected via the Cocos Ridge, that originates on the coast of Costa Rica, and connects it with Cocos Island and the Galápagos Islands (Peñaherrera-Palma et al. 2018; Kimley et al. 2022). This area includes several coastal and oceanic seamounts along the ridge (Cambra et al. 2021).

There are two important upwelling processes in this area: (1) the Humboldt Current brings nutrient rich cold waters from the coasts of Peru north-westwards and washes the southern limit of this area along the equator (January-March) (Montecino & Lange 2009; Fiedler & Lavín 2017); and (2) the Galápagos primary upwelling increases the primary productivity mainly to the west of Isabela and Fernandina Islands on the Galápagos platform. These two upwelling processes boost the productivity of the Equatorial Front towards the west along the equator (Karnauskas et al. 2007). The confluence of marine surface currents (such as the Humboldt, Panama, and Equatorial Currents), in interaction with these two upwelling processes, creates a unique oceanographic setting that favors multiple warm and cold-water habitats (Fiedler & Lavín 2017).

The Galápagos part of this area includes Wetlands of International Importance (Ramsar sites), Hermandad Marine Reserve (a World Marine Heritage Site), a UNESCO Biosphere Reserve, and an Ecologically or Biologically Significant Marine Area (EBSA). The Cocos part of this area includes Cocos Island National Park and Bicentenario Marine Managed Area (a World Marine Heritage Site), and area that connects these marine protected areas. Together, these comprise part of the Marine Corridor Eastern Tropical Pacific EBSA.

This Important Shark and Ray Area is delineated from surface waters to a depth of 1,928 m based on the maximum depth range of the 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 this area. Threatened sharks comprise one Critically Endangered species, two Endangered species, and two Vulnerable species; threatened rays comprise one Endangered species (IUCN 2022).

SUB-CRITERION C1 – REPRODUCTIVE AREAS

Cocos-Galápagos Swimway is an important reproductive area for two shark species. The area has been described as critical nursery grounds for Blacktip Shark and Scalloped Hammerhead (Whitney et al. 2004; Salinas-de-León et al. 2017; Acuña-Marrero et al. 2018).

A Scalloped Hammerhead nursery has been documented at San Cristobal Island, Galápagos Archipelago. Sixty-six recently pupped, and young-of-the-year Scalloped Hammerheads (mean size = 52 cm total length) were identified across 15 gillnet surveys over two years (2017–2019) (Chiriboga 2018; Páez & Córdova 2020; Chiriboga et al. 2022). Immature (neonate and young-of-the-year) are



also regularly and predictably recorded around Cocos Island, Costa Rica (Zanella et al. 2016; UnderseaHunter tour-operators pers. comm. 2018; Espinoza et al. 2020).

Immature Blacktip Sharks are regularly and predictably recorded in this area. Across two years of surveys (2010–2012), 972 individuals were recorded at Santa Cruz, Galápagos Archipelago. Approximately 60% of these were classed as neonates (based on an open umbilical scar) or young-of-the-year (based on a semi-enclosed umbilical scar; Database-DPNG 2008–2022; Llerena et al. 2015). Large groups of juveniles were also observed at San Cristobal Island in 2009 (Llerena 2009). This species uses mangrove bays within this area (Hirschfeld 2013; Goodman 2020). Neonates are also regularly and predictably recorded around Cocos Island, Costa Rica (Zanella et al. 2012; UnderseaHunter tour-operators pers. comm. 2018; Espinoza et al. 2020).

SUB-CRITERION C4 - MOVEMENT

Cocos-Galápagos Swimway is important for the movement of six shark and one ray species. Satellite and acoustic telemetry studies have shown sharks display high levels of residency within the Eastern Tropical Pacific region, moving between coastal and oceanic areas. Specifically, this area is a marine corridor for many migratory species. It is functionally connected through seasonal and year-round migrations of shark species between their nursery grounds, found in coastal Galápagos, to their aggregation sites, found in oceanic seamounts and islands, and to offshore feeding grounds within this area.

Scalloped Hammerheads predictably migrate between Galápagos and Cocos (Muñoz-Pérez & Tacle 2017; Peñaherrera-Palma et al. 2018; Kimley et al. 2022), and use Cocos Island and its surrounding seamounts as a layover between other oceanic islands, including directly between Malpelo Island, Cocos Island, and the Galápagos Archipelago (Bessudo et al. 2011; Nalesso et al. 2019). For example, 35 Scalloped Hammerheads were satellite-tagged in Galápagos with eight following the Cocos Ridge on their migration to Cocos Island and five using Paramount Seamount as a navigation point (Hearn et al. 2010; Nalesso et al. 2014; Ketchum et al. 2014; Hearn et al. 2017). Scalloped Hammerheads aggregate in large numbers (>80 individuals) in this area (Sibaja-Cordero 2008; Friedlander et al. 2012; White et al. 2015; Nalesso et al. 2019; Espinoza et al. 2020). This behaviour has been regularly documented by tour operators over the past 30 years (UnderseaHunter tour-operators pers. comm. 2018). Aggregations have also been observed during ongoing Baited Remote Underwater Surveys (BRUVS) research since 2017 (Espinoza et al. 2020; Espinoza et al. unpubl. data 2022), including recently at seamounts surrounding Cocos Island (Cambra 2018; Cambra et al. 2021; Espinoza et al. unpubl. data 2022). Scalloped Hammerhead aggregations are observed at nine seamounts between the Galápagos Island and Cocos Island. In 2018, West Cocos Seamount and Paramount Seamount were highlighted as important due to aggregations of 170 and 130 individuals observed, respectively. Further research found aggregations of 294 Scalloped Hammerheads at Paramount Seamount (Cambra et al. 2021). These aggregations can be considered a function of their movement in this area.

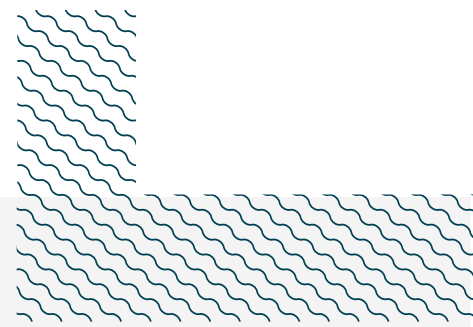
Both adult and juvenile Whale Sharks have been tagged and tracked over numerous years, particularly from the Galápagos Archipelago (including Darwin Island) and off Panama, showing they migrate through this area (Ryan et al. 2017; Guzman et al. 2022). Their movement is driven by oceanographic conditions, and around Darwin Island, Galápagos, are typically found in highest abundance between July and December before moving away (Acuña-Marrero et al. 2014). As part of the migratory route of Whale Shark between oceanic island in this region, they are known to spend approximately one or two days around the Galápagos Island before continuing their large-scale movement (Acuña-Marrero et al. 2014).



Silky Shark, Blacktip Shark, Galápagos Shark, Pelagic Thresher, and Oceanic Manta Ray all regularly occur in this area and predictably move to and from their feeding, resting, and/or breeding areas in coastal and oceanic habitats around Ecuador and Costa Rica (Muñoz-Pérez & Tacle 2017; Peñaherrera-Palma et al. 2018).

SUB-CRITERION C5 - UNDEFINED AGGREGATIONS

Oceanic Manta Ray aggregates in large numbers in this area for undefined purposes. These aggregations are recorded particularly around the Galápagos Archipelago at Isabela, Floreana, Pinzon, Santa Cruz, and Santiago islands (Hearn et al. 2014; López et al. 2022). Further investigation is required to understand the function of these aggregations.



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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	
SHARKS													
<i>Alopias pelagicus</i>	Pelagic Thresher	EN	0-300	X						X			
<i>Carcharhinus falciformis</i>	Silky Shark	VU	0-500	X						X			
<i>Carcharhinus galapagensis</i>	Galápagos Shark	LC	0-285							X			
<i>Carcharhinus limbatus</i>	Blacktip Shark	VU	0-140	X		X				X			
<i>Rhincodon typus</i>	Whale Shark	EN	0-1,928	X						X			
<i>Sphyrna lewini</i>	Scalloped Hammerhead	CR	0-1,043	X		X				X			
RAYs													
<i>Mobula birostris</i>	Oceanic Manta Ray	EN	0-1,000	X						X	X		

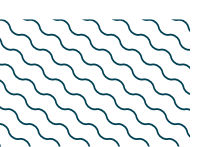
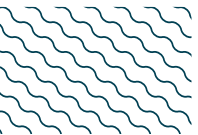


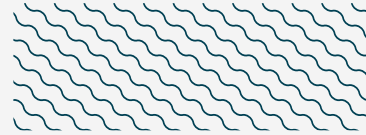
SUPPORTING SPECIES

Scientific Name	Common Name	IUCN Red List Category
SHARKS		
<i>Alopias superciliosus</i>	Bigeye Thresher	VU
<i>Alopias vulpinus</i>	Common Thresher	EN
<i>Bythaelurus giddingsi</i>	Galápagos Catshark	LC
<i>Carcharhinus albimarginatus</i>	Silvertip Shark	VU
<i>Carcharhinus brachyurus</i>	Copper Shark	VU
<i>Carcharhinus longimanus</i>	Oceanic Whitetip Shark	CR
<i>Carcharhinus melanopterus</i>	Blacktip Reef Shark	VU
<i>Carcharhinus obscurus</i>	Dusky Shark	EN
<i>Centrophorus squamosus</i>	Leafscale Gulper Shark	EN
<i>Galeocerdo cuvier</i>	Tiger Shark	NT
<i>Heterodontus quoyi</i>	Galápagos Bullhead Shark	LC
<i>Isurus oxyrinchus</i>	Shortfin Mako	EN
<i>Isurus paucus</i>	Longfin Mako	EN
<i>Mustelus mento</i>	Speckled Smoothhound	CR
<i>Nasolamia velox</i>	Whitenose Shark	EN
<i>Negaprion brevirostris</i>	Lemon Shark	VU
<i>Notorynchus cepedianus</i>	Broadnose Sevengill Shark	VU
<i>Odontaspis ferox</i>	Smalltooth Sand Tiger	VU
<i>Sphyrna mokarran</i>	Great Hammerhead	CR
<i>Sphyrna tiburo</i>	Bonnethead Shark	EN
<i>Sphyrna zygaena</i>	Smooth Hammerhead	VU
<i>Triaenodon obesus</i>	Whitetip Reef Shark	VU
<i>Triakis maculata</i>	Spotted Houndshark	CR
RAYS		
<i>Aetobatus laticeps</i>	Pacific Eagle Ray	VU
<i>Aetomylaeus asperrimus</i>	Roughskin Eagle Ray	DD
<i>Hypanus dipterus</i>	Diamond Stingray	VU
<i>Hypanus longus</i>	Longtail Stingray	VU
<i>Mobula mobular</i>	Spinetail Devil Ray	EN
<i>Mobula munkiana</i>	Munk's Pygmy Devil Ray	VU

<i>Mobula tarapacana</i>	Sicklefin Devil Ray	EN
<i>Mobula thurstoni</i>	Bentfin Devil Ray	EN
<i>Myliobatis peruvianus</i>	Peruvian Eagle Ray	VU
<i>Pseudobatos planiceps</i>	Pacific Guitarfish	VU
<i>Rajella eisenhardti</i>	Galápagos Skate	LC
<i>Rostroraja velezi</i>	Rasptail Skate	VU
<i>Styracura pacifica</i>	Pacific Chupare	VU
<i>Taeniurops meyeri</i>	Blotched Fantail Ray	VU
CHIMAERAS		
<i>Hydrolagus alphus</i>	Whitespot Ghostshark	LC
<i>Hydrolagus mccoskeri</i>	Galápagos Ghostshark	LC

IUCN Red List categories: *CR*, Critically Endangered; *EN*, Endangered; *VU*, Vulnerable; *NT*, Near Threatened; *LC*, Least Concern; *DD*, Data Deficient.





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