

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

## NAYARIT CENTRAL COAST ISRA

### Central and South American Pacific Region

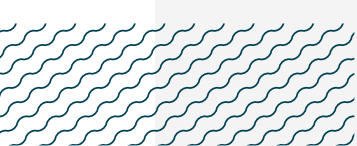
#### SUMMARY

Nayarit Central Coast is located at the entrance to the Gulf of California, Mexico. It contains remarkable biodiversity due to the variety of environments and geological features such as Isabel Island (an island of volcanic origin), mangroves, estuaries (e.g., Boca de Camichín), and sandy bays (e.g., Matanchen Bay located to the south of the port of San Blas). The area is influenced by three oceanic currents: the temperate water California Current, the warm high salinity Gulf of California Current, and the warm water Mexican Coastal Current. The seasonal changes in current and temperature produces a highly productive area. This area includes a Protected Area, Ramsar site, and Key Biodiversity Area. Within this area there are: **threatened species** (e.g., Pacific Sharpnose Shark *Rhizoprionodon longurio*); **reproductive areas** (e.g., Scalloped Hammerhead *Sphyrna lewini*); **feeding areas** (e.g., Whale Shark *Rhincodon typus*); and areas important for **movement** (Pacific Sharpnose Shark).

#### CRITERIA

**Criterion A - Vulnerability; Sub-criterion C1 - Reproductive Areas; Sub-criterion C2 - Feeding Areas; Sub-criterion C4 - Movement**

—	—
<b>MEXICO</b>	—
—	—
<b>0-200 metres</b>	—
—	—
<b>3,360.6 km<sup>2</sup></b>	—
—	—





## DESCRIPTION OF HABITAT

Nayarit Central Coast located in waters of the Mexican state of Nayarit and within the Pacific Central-American Coastal Large Marine Ecosystem. The area comprises Isla Isabel, Boca de Camichín, and Bahía de Matanchen. Isla Isabel, located 28 km from the coast, has a volcanic origin from ~3.5 million years ago, and is characterised by the presence of craters, cliffs, plains, depressions, and ridges (CONANP 2005). The island is relatively small (surface area = 0.82 km<sup>2</sup>, maximum length = 1.8 km, average width = 0.7 km) and is surrounded by a shallow continental platform that extends along Nayarit state, with the deepest waters to the west reaching depths of 200 m. Isla Isabel is a protected area (National Park Isla Isabel), a Ramsar site, and a Key Biodiversity Area (CONANP 2005, KBA 2022, Ramsar 2022).

The region is an oceanographic transitional zone, with marked seasonal influence of three water masses: (1) the temperate (subarctic) water California Current flowing equatorward from the northwest; (2) the warm water Mexican Coastal Current derived from the Costa Rica Current and flowing poleward close to the coast; and (3) the warm high salinity water mass coming out of the Gulf of California. The influence of these water masses is strongly altered by climatic anomalies such as El Niño and La Niña (Kessler 2006; Lavín et al. 2006). During the boreal winter and spring (December–May), the large-scale circulation is cyclonic, whereas during the boreal summer and autumn (June–November), the large-scale circulation is anticyclonic (Godínez et al. 2010; Kurczyn et al. 2012; Pantoja et al. 2012). The oceanic circulation around the islands of the area is also associated with other processes (Gómez-Gutiérrez et al. 2014), such as episodic current plumes from the continental margin (Martínez-Flores et al. 2011), benthic topography (Kurian et al. 2011), local wind-forcing (Pares-Sierra et al. 1993), coastal trapped waves of equatorial origin (Zamudio et al. 2001, 2007), and the previously mentioned oceanic currents. It is suspected that these oceanic processes affect phytoplankton biomass and primary production rates in this area in a similar way to other areas at the entrance of the Gulf of California. For example, Cabo Corrientes is characterised by three periods: a relatively intense upwelling period, with high chlorophyll-a (Chla) and primary production during the boreal spring; an upwelling relaxation period during late boreal spring-early summer, when the highest primary production values of the year are recorded; and a summer-fall period, with strong stratification and the lowest seasonal chlorophyll-a and primary production values (López-Sandoval et al. 2009).

This Important Shark and Ray Area is delineated from inshore and surface waters (0 m) to a depth of 200 m based on the bathymetry of the area.

## ISRA CRITERIA

### CRITERION A – VULNERABILITY

Three Qualifying Species considered threatened with extinction according to the IUCN Red List of Threatened Species™ regularly occur in the area. These are the Critically Endangered Scalloped Hammerhead (Rigby et al. 2019), the Endangered Whale Shark (Pierce & Norman 2016), and the Vulnerable Pacific Sharpnose Shark (Pollom et al. 2020).

According to Mexican legislation, Whale Shark is a protected species based on its vulnerability and is classified as ‘threatened’ (DOF 2007, 2010).



## SUB-CRITERION C1 – REPRODUCTIVE AREAS

Nayarit Central Coast is an important reproductive area for one shark species. Scalloped Hammerheads use coastal areas around Boca de Camichín and San Blas and the waters around Isla Isabel as nurseries, with neonates and young-of-the-year regularly captured in coastal areas (during the boreal summer and fall), and juveniles caught near the island (during the boreal spring) (Pérez-Jimenez et al. 2005; Tovar-Ávila et al. 2015, 2017). Around Isabel Island, 3,668 individuals were recorded from 2000–2001 with sizes between 55–135 cm total length (TL), while from 2007–2013 the majority of individuals ranged from 35.8–130.0 cm TL. Size-at-birth for this species is reported at 31–57 cm TL (Ebert et al. 2021).

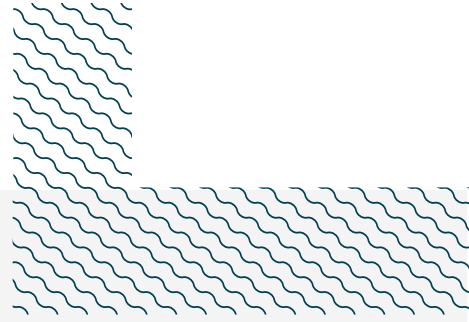
## SUB-CRITERION C2 – FEEDING AREAS

Nayarit Central Coast is an important feeding area for one shark species. Juvenile and adult Whale Sharks use this area for feeding purposes based on satellite telemetry and direct observation (Guzman & Ketchum 2012; Ramírez-Macías et al. 2016). Yearly feeding aggregations, from October to March, prompt tourist activities around them in the Boca de Camichín area. These seasonal aggregations have been observed for more than 20 years in the area with animals feeding mostly on copepods (Ramírez-Macías et al. 2016).

## SUB-CRITERION C4 – MOVEMENT

Nayarit Central Coast is an important movement area for one shark species. Juvenile and adult Pacific Sharpnose Sharks move to the Nayarit Central Coast during boreal winter and then move to northern areas of Sinaloa as indicated by seasonal landing patterns of artisanal fisheries along the east coast of the Gulf of California. The full migration pattern of the species remains unknown but there are clear indications of a seasonal shift in the occurrence of this species between these sites (Pérez-Jiménez et al. 2005; Furlong-Estrada et al. 2015; Tovar-Ávila et al. 2017). During January, this species is caught near Isabel Island (Pérez-Jiménez et al. 2005), and after that, during late winter and especially during spring, fishers in southern Sinaloa (near Playa Sur) target them (Bizzarro et al. 2009). Finally, adult females move to northern areas in Sinaloa (La Reforma) to give birth and are caught by artisanal fisheries during late spring and summer (Corro-Espinosa 2011; Corro-Espinosa et al. 2011).





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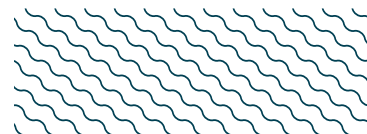
## **Suggested citation**

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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>Rhincodon typus</i>	Whale Shark	EN	0-1,928	X			X					
<i>Rhizoprionodon longurio</i>	Pacific Sharpnose Shark	VU	0-100	X					X			
<i>Sphyrna lewini</i>	Scalloped Hammerhead	CR	0-1,043	X		X						

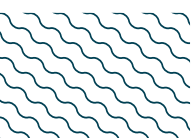
## SUPPORTING SPECIES

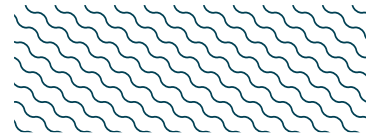


Scientific Name	Common Name	IUCN Red List Category
<b>SHARKS</b>		
<i>Carcharhinus altimus</i>	Bignose Shark	NT
<i>Carcharhinus brachyurus</i>	Copper Shark	VU
<i>Carcharhinus cerdale</i>	Pacific Smalltail Shark	CR
<i>Carcharhinus falciformis</i>	Silky Shark	VU
<i>Carcharhinus leucas</i>	Bull Shark	VU
<i>Carcharhinus limbatus</i>	Blacktip Shark	VU
<i>Carcharhinus obscurus</i>	Dusky Shark	EN
<i>Galeocerdo cuvier</i>	Tiger Shark	NT
<i>Ginglymostoma unami</i>	Pacific Nurse Shark	EN
<i>Isurus oxyrinchus</i>	Shortfin Mako	EN
<i>Mustelus lunulatus</i>	Sicklefin Smoothhound	LC
<i>Nasolamia velox</i>	Whitenose Shark	EN
<i>Negaprion brevirostris</i>	Lemon Shark	VU
<i>Prionace glauca</i>	Blue Shark	NT
<i>Sphyrna zygaena</i>	Smooth Hammerhead	VU
<b>RAYS</b>		
<i>Aetobatus laticeps</i>	Pacific Eagle Ray	VU
<i>Gymnura marmorata</i>	California Butterfly Ray	NT
<i>Hypanus dipterurus</i>	Diamond Stingray	VU
<i>Hypanus longus</i>	Longtail Stingray	VU
<i>Mobula birostris</i>	Oceanic Manta Ray	EN
<i>Mobula munkiana</i>	Munk's Pygmy Devil Ray	VU
<i>Narcine entemedor</i>	Cortez Numbfish	VU
<i>Narcine vermiculatus</i>	Vermiculate Numbfish	VU
<i>Pseudobatos glaucostigmus</i>	Grey-spotted Guitarfish	VU
<i>Pteroplatytrygon violacea</i>	Pelagic Stingray	LC
<i>Rhinoptera steindachneri</i>	Pacific Cownose Ray	NT
<i>Urobatis halleri</i>	Haller's Round Ray	LC

<i>Urotrygon chilensis</i>	Blotched Round Ray	NT
<i>Urotrygon nana</i>	Dwarf Round Ray	NT
<i>Urotrygon rogersi</i>	Rogers' Round Ray	NT

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





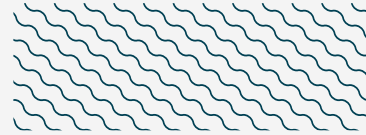
## SUPPORTING INFORMATION

There are additional indications that this area is important as a reproductive, feeding, and movement area for juveniles Smooth Hammerhead. Monitored catches of juvenile Smooth Hammerhead (102-160 cm TL) around Isla Isabel during the boreal spring (March from 2007-2013) support this area serving as a nursery for this species (Tovar-Ávila et al. 2015, 2017). Furthermore, from 2000-2001, the majority of monitored individuals caught were juveniles (n = 182) between 85-115 cm TL (Pérez-Jiménez et al. 2005).

Stomach content analysis of juvenile Scalloped Hammerheads (n=204) sampled in the area during 2007-2013 (53% of stomachs were full), revealed that the sharks feed mostly on fishes of the families Muraenidae, Polynemidae, and Carangidae, with smaller sharks also feeding on shrimps and larger juveniles on cephalopods (Rentería-Bravo 2016). However, more evidence is needed to confirm this is an important feeding area for the species.

This area is potentially important for the movement of juvenile Scalloped Hammerheads. Tagging studies have shown that juveniles of this species move between Isla Isabel and Boca Camichín and to the north towards the state of Sinaloa (Tovar-Ávila et al. 2015).





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