

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

SINALOA COASTAL AREA ISRA

Central and South American Pacific Region

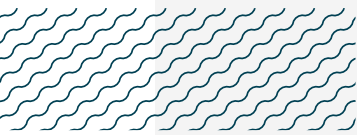
SUMMARY

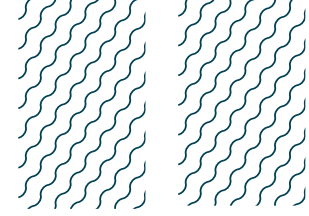
Sinaloa Coastal Area is located in the southern Gulf of California, within the Mexican state of Sinaloa. This area is characterised by a narrow continental shelf and includes sandy beaches, coastal lagoons, muddy bays, estuaries, and marshes. The area has year-round high productivity due to the convergence of three different currents (California Current, Costa Rica Current, and Gulf of California Internal Current), the presence of coastal upwellings during the boreal winter, and the high input of freshwater and terrestrial nutrients during the rainy season. Within the area there are: **threatened species** (e.g., Diamond Stingray *Hypanus dipterurus*); **range-restricted species** (e.g., Spotted Round Ray *Urobatis maculatus*); **reproductive areas** (e.g., Pacific Sharpnose Shark *Rhizoprionodon longurio*); **feeding areas** (e.g., Grey-spotted Guitarfish *Pseudobatos glaucostigmus*); and the area sustains a **high diversity of sharks** (19 species).

CRITERIA

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

— —
MEXICO — —
 — —
0-200 metres
 — —
33,989 km²
 — —





DESCRIPTION OF HABITAT

Sinaloa Coastal Area is located on the continental shelf of the Mexican state of Sinaloa. Situated within the Gulf of California Large Marine Ecosystem (LME), the area extends from the border with Sonora state to areas in front of Playa Novillero in Nayarit. This area shares many of the general characteristics of the Gulf of California. The area is influenced by the convergence of three different currents (California Current, Costa Rica Current, and Gulf of California Internal Current), the presence of coastal upwellings during the boreal winter, and the high input of freshwater and terrestrial nutrients during the rainy season. North-western winds and currents from the Pacific Ocean are the major environmental influences in this region. Cold-temperate waters from the California Current during boreal winter and spring, and warm-water input during summer and fall, produce high productivity year-round (Lavín & Marinone 2003; Lluch-Cota et al. 2007). This region has fluvial input from eight rivers that bring terrestrial material to coastal areas. During winter, strong winds produce coastal upwellings in the region. The area is characterised by a narrow continental shelf with soft bottoms and includes extensive sandy beaches, coastal lagoons, muddy bays, estuaries, and marshes (Kessler 2006; Lluch-Cota et al. 2007; Bizzarro et al. 2009; Conde-Moreno 2009; Garcés-García et al. 2020).

This Important Shark and Ray Area is delineated from inshore and surface waters (0 m) to the continental shelf edge at 200 m.

ISRA CRITERIA

CRITERION A - VULNERABILITY

Thirteen 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 five Vulnerable species; threatened rays comprise six Vulnerable species (IUCN 2022).

CRITERION B - RANGE RESTRICTED

Sinaloa Coastal Area holds the regular presence of California Butterfly Ray, Spotted Round Ray, Dwarf Round Ray, and Southern Banded Guitarfish as resident range-restricted species. California Butterfly Ray and Spotted Round Ray are restricted to the Gulf of California LME and California Current LME. California Butterfly Ray has been reported as one of the main species in the bycatch of shrimp trawlers in the area, occurring in 26% of monitored trawl tows (256 individuals from 2011-2017), while Spotted Round Ray was present in 8.3% of trawls (Garcés-García 2020).

Dwarf Round Ray is restricted to the Gulf of California LME and Pacific Central-American Coastal LME. This species is caught as bycatch in shrimp trawlers and was present in 10.7% of monitored tows between 2011-2017 (Garcés-García et al. 2020).

Southern Banded Guitarfish is restricted to the Pacific Central-American Coastal LME, Humboldt Current LME, and the Gulf of California LME, but only a small portion of its distribution is within the borders of the latter two LMEs. From 2011-2017, this species was reported in the catch of shrimp trawlers in the coast of Sinaloa, where it was present in 7.6% of monitored tows (Garcés-García et al. 2020).



SUB-CRITERION C1 – REPRODUCTIVE AREAS

Sinaloa Coastal Area is an important reproductive area for two shark and six ray species. Based on landings of artisanal fisheries in the area prior to 2009, pregnant California Butterfly Ray, Diamond Stingray, Grey-spotted Guitarfish, Pacific Cownose Ray, Haller's Round Ray, and Blotched Round Ray are landed during the summer (Salomón-Aguilar 2015). Recent data from bycatch in shrimp trawlers from 2011-2017 indicate these species are still caught and that reproductive processes continue to take place in the area (Garcés-García et al. 2020).

Neonates of some of these species were also caught as bycatch in the shrimp fishery from 2011-2016. California Butterfly Ray was present in 26% of the tows (n = 286) with neonates reported (size range: 21-92 cm disc width [DW]). Size-at-birth for this species is 21-26 cm DW (Last et al. 2016). Grey-spotted Guitarfish was present in 35% of the tows (n = 307). The size-at-birth for this species is unknown, but the sizes of individuals caught (14-17 cm total length [TL]) are similar to the size-at-birth for related species, suggesting that they were neonates. Pacific Cownose Ray was also regularly caught, occurring in 34% of trawl tows (n = 272). These individuals measured 24-74 cm DW suggesting that neonates are still present (size-at-birth: 38-43 cm DW; Last et al. [2016]). Diamond Stingray was present in 24% of the tows (n = 121), with neonates reported (16-69 cm DW). Size-at-birth for this species is 18-23 cm DW (Last et al. 2016). Haller's Round Ray were regularly caught in the shrimp fishery, occurring in 36% of trawls (n = 707). Most individuals were neonates, measuring 5-28 cm disc width (DW). Size-at-birth is 6-8 cm DW (Last et al. 2016). Blotched Round Ray was present in 19% of trawls (n = 215) The size-at-birth for this species is unknown, but the sizes of individuals caught (6-7 cm DW) are similar to the size-at-birth for related species like the Haller's Round Ray, suggesting that they were neonates.

Pacific Sharpnose Shark uses the areas near Navolato and La Reforma for parturition, based on the presence of pregnant females with terminal embryos between April and July from 2005-2009. Pregnant females (n = 119) represented 39% of the females caught in the study. The area is also a potential nursery due to the presence of neonates with umbilical scars between May and August (Corro-Espinosa 2011; Corro-Espinosa et al. 2011).

Neonate Scalloped Hammerheads are landed within the area. The presence of a nursery area for this species was first suggested more than 40 years ago (Saucedo et al. 1982). Scalloped Hammerhead is one of the main species caught in the area (Saldaña-Ruiz et al. 2017), and during June (1998-1999), most individuals caught were neonates and young-of-the-year (<90 cm total length [TL]). Smaller Scalloped Hammerheads (< 96.5 cm TL) were more recently landed in 2007-2008 suggesting that these smaller sharks continue to dominate the catches for this species (Bizzarro et al. 2009).

SUB-CRITERION C2 – FEEDING AREAS

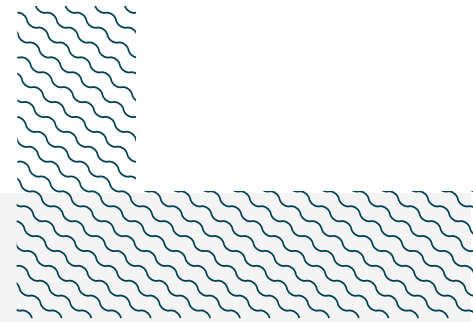
Sinaloa Coastal Area is an important feeding area for one shark and one ray species. Grey-spotted Guitarfish mainly feed on crustaceans in the area, especially on shrimps (43.47% of the prey-specific index of relative importance) that are the target species from the most important industrial and artisanal fisheries in the area. This species takes advantage of the increased biomass of shrimps in the area during the rainy season as reflected in stomach content analysis (n = 464 caught between 2011-2012; Cota-Durán et al. 2021). Immature Grey-spotted Guitarfish individuals feed mostly on amphipods, and adults feed on shrimps and crabs (Lara-Mendoza et al. 2015).

Pacific Sharpnose Shark is a specialist consumer within the area. Most individuals (n = 311) studied between 2003-2004 and 2007-2008 (80%) had full stomachs. All size-classes of Pacific Sharpnose Sharks feed mostly on cephalopods (*Argonauta* spp.) and herrings, with juveniles consuming more fish than adults. In addition, stable isotope analysis of muscle and liver revealed that individuals caught in this area reflect local coastal feeding grounds (Conde-Moreno 2009; Osuna-Peralta et al.

2014). Juveniles are commonly caught in the southern part of the area during fall and winter, while adults during winter and spring before moving to northern parts of the area for reproductive purposes, indicating that this area is seasonally important for feeding.

SUB-CRITERION D2 - DIVERSITY

Sinaloa Coastal Area sustains a high diversity of Qualifying Species (19 species). This exceeds the regional diversity threshold (17 species) for the Central and South Pacific American region.



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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>Carcharhinus falciformis</i>	Silky Shark	VU	0-500	X								X
<i>Carcharhinus leucas</i>	Bull Shark	VU	0-164	X								
<i>Carcharhinus limbatus</i>	Blacktip Shark	VU	0-140	X								
<i>Nasolamia velox</i>	Whitenose Shark	EN	0-192	X								
<i>Rhizoprionodon longurio</i>	Pacific Sharpnose Shark	VU	0-100	X		X	X					
<i>Sphyrna lewini</i>	Scalloped Hammerhead	CR	0-1,043	X		X						
<i>Sphyrna zygaena</i>	Smooth Hammerhead	VU	1-200	X								

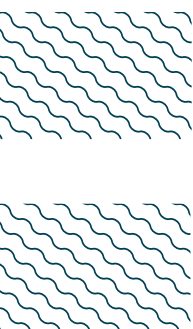
QUALIFYING SPECIES

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		
RAYS														
<i>Aetobatus laticeps</i>	Pacific Eagle Ray	VU	0-60	X										X
<i>Gymnura marmorata</i>	California Butterfly Ray	NT	1-95		X	X								
<i>Hypanus dipterurus</i>	Diamond Stingray	VU	0-150	X		X								
<i>Hypanus longus</i>	Longtail Stingray	VU	0-118	X										
<i>Narcine entemedor</i>	Cortez Numbfish	VU	0-100	X										
<i>Pseudobatos glaucostigmus</i>	Grey-spotted Guitarfish	VU	0-110	X		X	X							
<i>Rhinoptera steindachneri</i>	Pacific Cownose Ray	LC	0-65			X								
<i>Urobatis halleri</i>	Haller's Round Ray	LC	15-91			X								
<i>Urobatis maculatus</i>	Spotted Round Ray	LC	0-30		X									
<i>Urotrygon chilensis</i>	Blotched Round Ray	NT	1-60			X								
<i>Urotrygon nana</i>	Dwarf Round Ray	NT	2-15		X									
<i>Zapteryx xyster</i>	Southern Banded Guitarfish	VU	1-150	X	X									

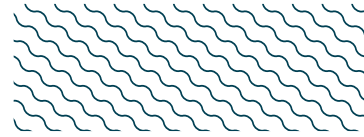
SUPPORTING SPECIES

Scientific Name	Common Name	IUCN Red List Category
SHARKS		
<i>Alopias pelagicus</i>	Pelagic Thresher	EN
<i>Carcharhinus altimus</i>	Bignose Shark	NT
<i>Carcharhinus obscurus</i>	Dusky Shark	EN
<i>Mustelus albipinnis</i>	White-margin Fin Smoothhound	LC
<i>Mustelus henlei</i>	Brown Smoothhound	LC
<i>Mustelus lunulatus</i>	Sicklefin Smoothhound	LC
<i>Prionace glauca</i>	Blue Shark	NT
RAYS		
<i>Beringraja inornata</i>	California Skate	LC
<i>Diplobatis ommata</i>	Pacific Dwarf Numbfish	LC
<i>Mobula munkiana</i>	Munk's Pygmy Devil Ray	VU
<i>Narcine vermiculatus</i>	Vermiculate Numbfish	LC
<i>Platyrhinoidis triseriata</i>	Thornback Ray	LC
<i>Pteroplatytrygon violacea</i>	Pelagic Stingray	LC
<i>Rostroraja velezi</i>	Rasptail Skate	VU
<i>Urotrygon aspidura</i>	Spinytail Round Ray	NT
<i>Urotrygon munda</i>	Munda Round Ray	NT
<i>Urotrygon rogersi</i>	Rogers' Round Ray	LC

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

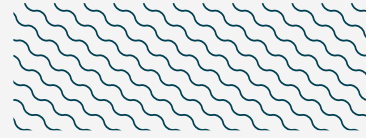


SUPPORTING INFORMATION



There are additional indications that this area is important for reproductive and feeding purposes of other species. Based on previous studies (some of them from 20 years ago), focused on monitoring fisheries landings, the area was reported as important for reproduction and was suggested as a nursery (due to the presence of neonates) during spring and summer for Silky Shark, Bull Shark, Blacktip Shark, Whitenose Shark, Smooth Hammerhead, and only in spring for Sicklefin Smoothhound (Salomón-Aguilar 2009). These species are still landed in artisanal fisheries at the state level, however, more information is needed to confirm that these reproductive processes are ongoing (Saldaña-Ruiz et al. 2017).

Juvenile Scalloped Hammerheads seem to use the coastal areas near Mazatlán as a feeding area. They have high residency to this area where they mostly consume benthic prey, according to stable isotope and stomach content analysis (Torres-Rojas et al. 2014). However, more information is needed to confirm the importance of this area for feeding.



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