

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

CENTRAL SONORA COAST ISRA

Central and South American Pacific Region

SUMMARY

Central Sonora Coast is located along the coastline and offshore of the Mexican state of Sonora and is situated within an Ecologically or Biologically Significant Marine Area, the Midriff Islands Region. This area also includes two protected areas, two Wetlands of International Importance (Ramsar sites), and seven Key Biodiversity Areas. It includes the largest island in the Gulf of California: Tiburón Island, and smaller ones such as Turón Island, Patos Island, San Pedro Martir Island, and San Pedro Nolasco Island. The area has a narrow continental shelf between 5-10 km, mostly composed of sandy bottoms. Within the area there are: **threatened species** (e.g., Cortez Numbfish *Narcine entemedor*); **range-restricted species** (Banded Guitarfish *Zapteryx exasperata*); **reproductive areas** (e.g., Grey-spotted Guitarfish *Pseudobatos glaucostigmus*); and the area sustains a **high diversity of sharks** (20 species).

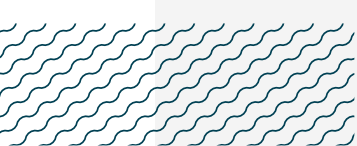
CRITERIA

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

MEXICO

0-200 metres

11,365 km²





DESCRIPTION OF HABITAT

Central Sonora Coast contains around 300 km of the Mexican state of Sonora's 1,208 km coastline, from Tiburón Island in the north to Guaymas. Situated within the Gulf of California Large Marine Ecosystem (LME), this area contains the largest island in the Gulf of California, Tiburón Island, with a surface area of ~1,200 km². In addition, the area includes smaller islands such as Turón Island, Patos Island, San Pedro Martir Island, and San Pedro Nolasco Island. This area has a narrow continental shelf between 5–10 km, mostly composed of sandy substrates. In front of Guaymas sits the Guaymas basin with maximum depth of ~2,000 m (Bizzarro et al. 2009). The area has a very well-defined seasonal upwelling in the boreal winter-spring, with the circulation going towards the south in winter and north in summer (Lluch-Cota 2000). Sea surface temperatures average >26°C between June–October (maximum of 31.7°C) and between 18.0–24.9°C from November–April. Most of the variability from the area's oceanography is driven by seasonal and inter-annual changes and the presence of mesoscale structures of which cyclonic gyres are the most frequent (García-Morales et al. 2017).

This area is situated within an Ecologically or Biologically Significant Marine Area, the Midriff Islands Region (CBD 2022). It also includes two protected areas, the Biosphere Reserve Isla San Pedro Martir and the Flora and Fauna Protection Area Islas del Golfo de California (CONANP 2000, 2007), and two Wetlands of International Importance (Ramsar sites), the Canal del Infiernillo y Esteros del Territorio Comcaac and Humedales de la Laguna La Cruz (Ramsar 2022a, 2022b). In addition, seven Key Biodiversity Areas are within the area: Estero Cardonal, Estero del Soldado, Estero Santa Cruz, Isla Alcatraz, Isla San Pedro Mártir, Isla San Pedro Nolasco, and Isla Tiburón-Canal Infiernillo-Estero Santa Cruz (KBA 2022a, 2022b, 2022c, 2022d, 2022e, 2022f, 2022g).

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

ISRA CRITERIA

CRITERION A – VULNERABILITY

Fourteen 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 and five Vulnerable species; threatened rays comprise eight Vulnerable species (IUCN 2022).

CRITERION B – RANGE RESTRICTED

Central Sonora Coast holds the regular presence of Bat Ray, Spotted Round Ray, and Banded Guitarfish as resident range-restricted species. These species are regularly encountered and caught in local fisheries. Bat Rays occur year-round in the area, with a higher catch during fall (September–October). Banded Guitarfish are most abundant in spring, although are caught in lower numbers within the area year-round. Spotted Round Rays are present all year, with highest catches being reported in spring and summer (Bizzarro et al. 2009). All these species have their distributions limited to the Gulf of California LME and California Current LME.



SUB-CRITERION C₁ – REPRODUCTIVE AREAS

Central Sonora Coast is an important reproductive area for two shark and five ray species. Data for Cortez Numbfish, Grey-spotted Guitarfish, Shovelnose Guitarfish, Pacific Cownose Ray, Scalloped Hammerhead, Pacific Angelshark, and Banded Guitarfish are based on artisanal fisheries monitoring.

Aggregations of female Cortez Numbfish (between 18-82 cm total length [TL]) are caught by artisanal fisheries in the area, especially during the boreal spring and summer, when pregnant females are targeted in nearshore waters. However, pregnant females are also caught the rest of the year in smaller numbers (Bizzarro et al. 2009).

The whole gestation period of Grey-spotted Guitarfish is undertaken in this area, with an embryonic diapause of six months (November–April) and embryo growth from May to October. Parturition occurs in coastal areas from June to October (Lara-Mendoza 2016; Lara-Mendoza & Márquez-Farías 2021). Between 1998–1999, gravid females were landed during all seasons (Bizzarro et al. 2009)

Pregnant Shovelnose Guitarfish with embryos in different stages of development are commonly caught all year in the area. This suggests that the whole gestation period is undertaken in Central Sonora Coast. Embryos start developing in the boreal spring when temperatures start to increase, and births take place from late June to October (Márquez-Farías 2007). During spring and summer, large aggregations of gravid females are targeted in local fisheries (Bizzarro et al. 2009).

Gravid female Pacific Cownose Ray (n = 147) were reported in landings within the region in all seasons, between 1998–2000, with a higher proportion found in the boreal summer, suggesting the importance of the area for gestation. These higher catches are related to the presence of larger near full-term embryos (~40 cm disc width [DW]) during June. In addition, neonates (~39 cm disc width [DW]) were reported, suggesting the importance of the area for parturition (Bizzarro et al. 2009).

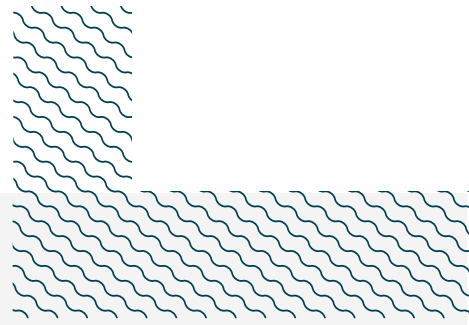
Scalloped Hammerheads use the area around Bahía Kino as a nursery. This is based on the high presence of neonates (~48 cm TL) during the boreal summer over the span of several years between 1998–1999 and 2007 (Torres-Huerta et al. 2008; Bizzarro et al. 2009; Salomón-Aguilar 2009). These sizes are similar to the reported size-at-birth for the species (31–57 cm TL; Ebert et al. 2021). Although this information is not contemporary, there are contemporary landing records of this species that suggest that this dynamic has not changed (Saldaña-Ruiz et al. 2017).

Pacific Angelshark is commonly caught in the area by artisanal fisheries, with higher catches occurring in the boreal spring. Aggregations targeted by artisanal fisheries are composed mainly of females (>70 cm TL), with pregnant females reported during spring-fall (Bizzarro et al. 2009). In addition, individuals ~30 cm TL were reported, which is closer to the reported size-at-birth of 25 cm TL (Ebert et al. 2021). Even though these data are from 20 years ago, recent information suggest this species is still one of the most important in regional artisanal fisheries (Saldaña-Ruiz et al. 2017).

Pregnant Banded Guitarfish are present from February to July, in correlation with the rise in water temperatures. In February, uterine capsules are present, while in July, embryos are fully developed. This confirms that Banded Guitarfish use coastal waters from Sonora for all their gestation. In addition, only juveniles (~40 cm TL) are caught between October and December, suggesting that this area is used as a nursery during those months (Blanco-Parra et al. 2009).

SUB-CRITERION D₂ – DIVERSITY

Central Sonora Coast sustains a high diversity of sharks (20 Qualifying Species). This exceeds the regional diversity threshold (17 species) for the Central and South Pacific American region.



Acknowledgments

Oscar Sosa-Nishizaki (CICESE), Luz Erandi Saldaña-Ruiz (CICESE), Emiliano García Rodríguez (IUCN SSC Shark Specialist Group - ISRA Project), Javier Tovar-Ávila (Instituto Nacional de Pesca y Acuicultura), Felipe Galván-Magaña (CICIMAR), and Frida Lara-Lizardi (MigraMar; Orgcas) contributed and consolidated information included in this factsheet. We thank the participants of the 2022 ISRA Region 12 - Central and South American Pacific workshop for their contributions to this process.

This factsheet has undergone review by the ISRA Independent Review Panel prior to its publication.

This project was funded by the Shark Conservation Fund, a philanthropic collaborative pooling expertise and resources to meet the threats facing the world's sharks and rays. The Shark Conservation Fund is a project of Rockefeller Philanthropy Advisors.

Suggested citation

IUCN SSC Shark Specialist Group. 2023. Central Sonora Coast ISRA Factsheet. Dubai: IUCN SSC Shark Specialist Group.

QUALIFYING SPECIES

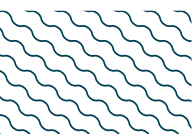
Scientific Name	Common Name	IUCN Red List Category	Global Depth Range (m)	ISRA Criteria/Sub-criteria Met								
				A	B	C1	C2	C3	C4	C5	D1	D2
SHARKS												
<i>Carcharhinus falciformis</i>	Silky Shark	VU	0-500	X								X
<i>Carcharhinus leucas</i>	Bull Shark	VU	0-164	X								
<i>Carcharhinus limbatus</i>	Blacktip Shark	VU	0-140	X								
<i>Rhizoprionodon longurio</i>	Pacific Sharpnose Shark	VU	0-100	X								
<i>Sphyrna lewini</i>	Scalloped Hammerhead	CR	0-1,043	X		X						
<i>Sphyrna zygaena</i>	Smooth Hammerhead	VU	1-200	X								
<i>Squatina californica</i>	Pacific Angelshark	NT	1-205			X						
RAYS												
<i>Hypanus dipterus</i>	Diamond Stingray	VU	0-150	X								
<i>Hypanus longus</i>	Longtail Stingray	VU	0-118	X								
<i>Mobula mobular</i>	Spinetail Devil Ray	VU	0-1,112	X								
<i>Mobula munkiana</i>	Munk's Pygmy Devil Ray	VU	0-30	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>Myliobatis californicus</i>	Bat Ray	LC	0-180		X									
<i>Myliobatis longirostris</i>	Longnose Eagle Ray	VU	0-65	X										
<i>Narcine entemedor</i>	Cortez Numbfish	VU	0-100	X		X								
<i>Pseudobatos glaucostigmus</i>	Grey-spotted Guitarfish	VU	0-110	X		X								
<i>Pseudobatos productus</i>	Shovelnose Guitarfish	NT	1-90			X								X
<i>Rhinoptera steindachneri</i>	Pacific Cownose Ray	NT	0-65			X								
<i>Rostroraja velezi</i>	Rasptail Skate	VU	30-300	X										
<i>Urobatis maculatus</i>	Spotted Round Ray	LC	0-30		X									
<i>Zapteryx exasperata</i>	Banded Guitarfish	DD	0-200		X	X								

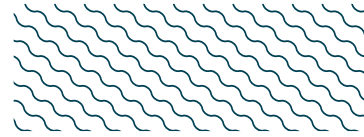
SUPPORTING SPECIES

Scientific Name	Common Name	IUCN Red List Category
SHARKS		
<i>Alopias pelagicus</i>	Pelagic Thresher	EN
<i>Alopias vulpinus</i>	Common Thresher	VU
<i>Carcharhinus cerdale</i>	Pacific Smalltail Shark	CR
<i>Carcharhinus obscurus</i>	Dusky Shark	EN
<i>Cephaloscyllium ventriosum</i>	Swellshark	LC
<i>Galeocerdo cuvier</i>	Tiger Shark	NT
<i>Heterodontus francisci</i>	Horn Shark	LC
<i>Heterodontus mexicanus</i>	Mexican Hornshark	LC
<i>Hexanchus griseus</i>	Bluntnose Sixgill Shark	NT
<i>Isurus oxyrinchus</i>	Shortfin Mako	EN
<i>Mustelus henlei</i>	Brown Smoothhound	LC
<i>Nasolamia velox</i>	Whitenose Shark	EN
<i>Prionace glauca</i>	Blue Shark	NT
<i>Triakis semifasciata</i>	Leopard Shark	LC
RAYS		
<i>Beringraja inornata</i>	California Skate	LC
<i>Mobula thurstoni</i>	Bentfin Devil Ray	EN
<i>Pseudobatos leucorhynchus</i>	Whitesnout Guitarfish	VU
<i>Urobatis halleri</i>	Haller's Round Ray	LC
CHIMAERAS		
<i>Hydrolagus colliei</i>	Whitespotted Chimaera	LC

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



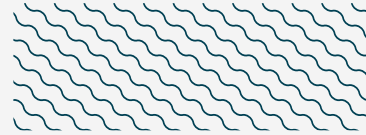
SUPPORTING INFORMATION



There are additional indications that Central Sonora Coast is an important area for currently undefined aggregations. During the boreal summer, juvenile Pacific Cownose Rays are commonly caught in the area, at depths between 10–25 m. These aggregations appear to be related to increases in temperature but there is no sufficient evidence to define their purpose (Bizzarro et al. 2007).

Diamond Stingray (between 20–84 cm DW) are commonly caught by artisanal fisheries that target aggregations of this species. This species is the second most important in landings within the area among all shark species, but the function of these aggregations is unknown. From 1998–1999, 15,747 individuals were landed in the area and recent data suggest that this species is still one of the most commonly landed by artisanal fisheries. Gravid females were caught in the boreal summer and fall (Bizzarro et al. 2009; Saldaña-Ruiz et al. 2016).

Brown Smoothhound was reported as the second most commonly landed species in the area from 1998–1999, when 33,378 individuals were landed, with males between 55–60 cm TL dominating landings. Fishers target aggregations of these species all year, with a higher catch reported in the boreal spring and fall (Bizzarro et al. 2009). The function of these aggregations remains unknown. Recent data suggest that these species are still dominating landings from the area (Saldaña-Ruiz et al. 2017).



REFERENCES

- Bizzarro JJ, Smith WD, Márquez-Farías JF, Hueter RE. 2007.** Artisanal fisheries and reproductive biology of the golden cownose ray, *Rhinoptera steindachneri* Evermann and Jenkins, 1891, in the northern Mexican Pacific. *Fisheries Research* 84: 137-146. <https://doi.org/10.1016/j.fishres.2006.10.016>
- Bizzarro JJ, Smith WD, Márquez-Farías JF, Tyminski J, Hueter RE. 2009.** Temporal variation in the artisanal elasmobranch fishery of Sonora, Mexico. *Fisheries Research* 97: 103-117. <https://doi.org/10.1016/j.fishres.2009.01.009>
- Blanco-Parra MDP, Márquez-Farías JF, Galván-Magaña F. 2009.** Reproductive biology of the banded guitarfish, *Zapteryx exasperata*, from the Gulf of California, México. *Journal of the Marine Biological Association of the United Kingdom* 89: 1655-1662. <https://doi.org/10.1017/S0025315409990348>
- Comisión Nacional de Áreas Naturales Protegidas (CONANP). 2000.** Programa de manejo Área de Protección de Flora y Fauna Islas del Golfo. Mexico City: CONANP-SEMARNAT.
- Comisión Nacional de Áreas Naturales Protegidas (CONANP). 2007.** Programa de conservación y manejo Reserva de la Biosfera Isla San Pedro Mártir. Mexico City: CONANP-SEMARNAT.
- Convention on Biological Diversity (CBD). 2016.** Ecologically or Biologically Significant Marine Areas (EBSAs) Midriff Islands Region. Available at: <https://www.cbd.int/ebsa/> Accessed November 2022.
- Ebert DA, Dando M, Fowler S. 2021.** *Sharks of the world. A complete guide. Second edition.* Plymouth: Wild Nature Press.
- García-Morales R, López-Martínez J, Valdez-Holguin JE, Herrera-Cervantes H, Espinosa-Chaurand LD. 2017.** Environmental variability and oceanographic dynamics of the central and southern coastal zone of Sonora in the Gulf of California. *Remote Sensing* 9: 925. <https://doi.org/10.3390/rs9090925>
- IUCN. 2022.** The IUCN Red List of Threatened Species. Version 2022-1, Available at: <https://www.iucnredlist.org> Accessed September 2022.
- Key Biodiversity Areas (KBA). 2022a.** Key Biodiversity Areas factsheet: Estero Cardonal. Extracted from the World Database of Key Biodiversity Areas. Available at: <https://www.keybiodiversityareas.org> Accessed November 2022.
- Key Biodiversity Areas (KBA). 2022b.** Key Biodiversity Areas factsheet: Estero del Soldado. Extracted from the World Database of Key Biodiversity Areas. Available at: <https://www.keybiodiversityareas.org> Accessed November 2022.
- Key Biodiversity Areas (KBA). 2022c.** Key Biodiversity Areas factsheet: Estero Santa Cruz. Extracted from the World Database of Key Biodiversity Areas. Available at: <https://www.keybiodiversityareas.org> Accessed November 2022.
- Key Biodiversity Areas (KBA). 2022d.** Key Biodiversity Areas factsheet: Isla Alcatraz. Extracted from the World Database of Key Biodiversity Areas. Available at: <https://www.keybiodiversityareas.org> Accessed November 2022.
- Key Biodiversity Areas (KBA). 2022e.** Key Biodiversity Areas factsheet: Isla San Pedro Mártir. Extracted from the World Database of Key Biodiversity Areas. Available at: <https://www.keybiodiversityareas.org> Accessed November 2022.
- Key Biodiversity Areas (KBA). 2022f.** Key Biodiversity Areas factsheet: Isla San Pedro Nolasco. Extracted from the World Database of Key Biodiversity Areas. Available at: <https://www.keybiodiversityareas.org> Accessed November 2022.
- Key Biodiversity Areas (KBA). 2022g.** Key Biodiversity Areas factsheet: Isla Tiburón - Canal Infiernillo - Estero Santa Cruz. Extracted from the World Database of Key Biodiversity Areas. Available at: <https://www.keybiodiversityareas.org> Accessed November 2022.
- Lara-Mendoza RE. 2016.** Biología, ecología trófica y demografía de la raya guitarra pinta, *Rhinobatos glaucostigma* (Rajiformes: Rhinobatidae), del Golfo de California. Unpublished PhD thesis, Universidad Autónoma de Sinaloa, Mazatlán. <https://doi.org/10.3390/rs9090925>
- Lara-Mendoza RE, Márquez-Farías JF. 2021.** Reproductive strategy of the speckled guitarfish, *Pseudobatos glaucostigmus* (Elasmobranchii: Rhinobatidae), from the South-Eastern Gulf of California,

Mexico. *Environmental Biology of Fishes* 104: 1501–1514. <https://doi.org/10.1007/s10641-021-01173-w>

Lluch-Cota SE. 2000. Coastal upwelling in the eastern Gulf of California. *Oceanologica Acta* 23: 731–740. [https://doi.org/10.1016/S0399-1784\(00\)00121-3](https://doi.org/10.1016/S0399-1784(00)00121-3)

Márquez-Farías JF. 2007. Reproductive biology of shovelnose guitarfish *Rhinobatos productus* from the eastern Gulf of California México. *Marine Biology* 151: 1445–1454. <https://doi.org/10.1007/s00227-006-0599-3>

Ramsar. 2022a. Canal del Infiernillo y esteros del territorio Comcaac. Available at: <https://www.ramsar.org> Accessed November 2022.

Ramsar. 2022b. Humedales de la Laguna La Cruz. Available at: <https://www.ramsar.org> Accessed November 2022.

Saldaña-Ruiz LE, Sosa-Nishizaki O, Cartamil D. 2017. Historical reconstruction of Gulf of California shark fishery landings and species composition, 1939–2014, in a data-poor fishery context. *Fisheries Research* 195: 116–129. <https://doi.org/10.1016/j.fishres.2017.07.011>

Saldaña-Ruiz LE, Sosa-Nishizaki O, Ramírez-Mendoza Z. 2016. Catch reconstruction by species of the artisanal ray fisheries in the Gulf of California, 1997–2014. *Ciencia Pesquera* 24: 81–96.

Salomón-Aguilar CA, Villavicencio-Garayzar CJ, Reyes-Bonilla H. 2009. Shark breeding grounds and seasons in the Gulf of California: Fishery management and conservation strategy; Zonas y temporadas de reproducción y crianza. *Ciencias Marinas* 35: 369–388. <https://doi.org/10.7773/cm.v35i4.1435>

Torres-Huerta AM, Villavicencio-Garayzar C, Corro-Espinosa D. 2008. Reproductive biology of the scalloped hammerhead shark *Sphyrna lewini* Griffith & Smith (Sphyrnidae) in the Gulf of California. *Hidrobiologica* 18: 227–237.