

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

BAHÍA DE LA PAZ ISRA

Central and South American Pacific Region

SUMMARY

Bahía de La Paz is located in the southwest coast of the Gulf of California, Mexico. This bay has maximum depths ranging from 50 to 200 m with diverse habitats including rocky shores, sandy substrates, mangrove ecosystems, and coral reefs with high primary productivity. The area also includes several islands including Espiritu Santo and Cerralvo. It overlaps with two Wetlands of International Importance (Ramsar site) and two Key Biodiversity Areas. Within the area there are: **threatened species** (e.g., Pacific Sharpnose Shark *Rhizoprionodon longurio*); **reproductive areas** (e.g., Munk’s Pygmy Devil Ray *Mobula munkiana*); **feeding areas** (e.g., Whale Shark *Rhincodon typus*); areas important for **movement** (Whale Shark); and **undefined aggregations** (e.g., Oceanic Manta Ray *Mobula birostris*).

CRITERIA

Criterion A - Vulnerability; Sub-criterion C1 - Reproductive Areas; Sub-criterion C2 - Feeding Areas; Sub-criterion C4 - Movement; Sub-criterion C5 - Undefined Aggregations

MEXICO
0-200 metres
4,244 km ²





DESCRIPTION OF HABITAT

Bahía de La Paz is located in Baja California Sur in Mexico on the eastern coast of the Baja California Peninsula. Situated within the Gulf of California Large Marine Ecosystem, this area is considered the largest coastal water body in the Gulf of California with an approximate length of 80 km and a width of 35 km. Maximum depth varies between 50 m near the coast and 200 m in the most remote areas (Obeso-Nieblas et al. 2008). This bay is influenced by the oceanographic conditions of the southern Gulf of California (Cervantes-Duarte et al. 2021). The water temperature fluctuates throughout the year between 17°C in the boreal winter and 28°C in autumn, while the salinity is ~35 ppt (Obeso-Nieblas et al. 2007). The cyclonic circulation of the deep zone elevates the pycnocline increasing nutrient concentrations (Coria-Monter et al. 2017). The fertilisation mechanism of primary production is the mixing in the water column that transports nutrients to the euphotic zone (Monreal-Gómez et al. 2001).

This area includes two Wetlands of International Importance (Ramsar sites), Balandra and Humedales Mogote-Ensenada La Paz (Ramsar 2022a, 2022b) and two Key Biodiversity Areas, Ensenada La Paz and Isla Espíritu Santo (KBA 2022a, 2022b).

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

Five 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 one Vulnerable species; threatened rays comprise one Endangered species and one Vulnerable species (IUCN 2022).

In addition, the Whale Shark is listed as Threatened in Mexico, while the Oceanic Manta Ray and the Munk's Pygmy Devil Ray are classified as Subject to Special Protection in the Official Mexican Standard NOM-059-SEMARNAT-2010 for wildlife protection, which defines the criteria that must be met for a species to be considered at risk of extinction, establishing four categories: Probably Extinct (in the wild), Endangered, Threatened, and Subject to Special Protection (DOF 2010).

SUB-CRITERION C1 - REPRODUCTIVE AREAS

Bahía de La Paz is an important reproductive area for two shark and one ray species: Pacific Sharpnose Shark, Scalloped Hammerhead, and Munk's Pygmy Devil Ray.

The southern part of La Paz Bay has been proposed as a nursery area for Pacific Sharpnose Sharks, based on catches, acoustic telemetry, and stable isotope analysis. From 237 individuals sampled between 2015-2016, a high abundance of neonates and juveniles (10% and 88%, respectively) was reported compared to other locations inside the area, especially at depths of 0-30 m and mostly between June-August. The size of neonates caught was ~35 cm total length (TL), which is similar to the reported size-at-birth (33-34 cm TL; Ebert et al. 2021). Based on the presence of neonates with umbilical scars, birthing events are estimated to occur from May to August, before the water reaches its maximum annual temperature (Trejo-Ramírez 2017; Bosch-Soler 2021).

Neonate Scalloped Hammerhead (~45 cm TL, which is within the size-at-birth previously reported [31-57 cm TL; Rigby et al. 2019]) and small juveniles (<90 cm TL) were recorded in a study during 1994-



1996 (Torres-Huerta et al. 2008). Neonates were present during June and July and juveniles occur all year, with higher abundance during summer. There are contemporary fisheries catch records (2018–2019) of these life-stages within the bay (Ángel-Moreno et al. 2021).

Munk's Pygmy Devil Ray use the area as a nursery, for pupping, and courtship (Palacios et al. 2021). Based on traditional tagging, acoustic tagging, and direct observations from 2017–2018, neonates with umbilical scars between 49.5–56.0 cm TL (size-at-birth for the species is ~35 cm [Stevens et al. 2018]) occur mostly in the late boreal summer, at depths of 2–5 m, and stay within the bay for periods up to four months (Palacios et al. 2021). Also, courtship behaviour has been documented in the area by direct observations (Palacios et al. 2021).

SUB-CRITERION C2 - FEEDING AREAS

Bahía de La Paz is an important feeding area for four shark and one ray species: Whale Shark, Scalloped Hammerhead, Pacific Sharpnose Shark, Pacific Angelshark, and Munk's Pygmy Devil Ray.

From September to June, juvenile aggregations of Whale Sharks are regularly and predictably observed in the bay (Ketchum-Mejía 2003; Whitehead et al. 2019). These annual aggregations occur in areas of high concentrations of zooplankton around the coastal waters of the El Mogote sandbar. This feeding behaviour is associated with higher concentrations of copepods and chaetognaths in coastal areas, where juveniles occur, contrasting with adults that occur in deep offshore areas (Ketchum-Mejía 2003; Hacohe-Domené et al. 2006; Hacohe-Domené, 2007; Ramírez-Macías et al. 2012; Ketchum et al. 2013; Whitehead 2019; Whitehead et al. 2019, 2020a, 2020b; Suárez-Ybarra 2020; Villa-Gómez 2020).

Juvenile Scalloped Hammerheads are common in the area. They mainly prey on cephalopods but sometimes feed on fish and crustaceans. The most important prey are Humboldt Squid *Dosidicus gigas*, Clubhook Squid *Onychoteuthis banksii*, and Armed Squid *Abraliopsis affinis*. From 139 stomachs analysed, the majority were full (92%), suggesting that feeding occurred recently within the area. In addition, stable isotope analysis suggests that individuals sampled within the area feed in coastal areas (Aguilar-Castro 2004).

Neonate Pacific Sharpnose Shark feed in coastal areas of the bay, while juveniles move further from the coast according to stable isotope analysis, stomach content analysis, and fatty acids (Trejo-Ramírez 2017; Lladó-Cabrera 2020). Within the area this species feeds mainly on Chub Mackerel *Scomber japonicus*, Cusk-eels (family Ophidiidae), and the mantis shrimp *Squilla bigelowi* (Trejo-Ramírez 2017; Acosta-Alonso 2021).

Feeding aggregations of neonate and juvenile Munk's Pygmy Devil Ray have been observed during recreational dives at Espiritu Santo Island since 2013, mostly during night in areas <6 m depth. Stable isotope analysis showed that adults feed in pelagic habitats within the area, while juveniles and neonates stay in shallow nursery areas (Díaz-Palacios 2019). Most abundant zooplankton in the area was Krill *Nyctiphanes simplex*, especially in the locations where rays were most commonly detected, according to acoustic telemetry. In addition, mysidacea were the second most abundant zooplankton group, which have been previously reported in stomach content from individuals caught inside Bahía de La Paz (Norbartolo Di Sciarra 1988).

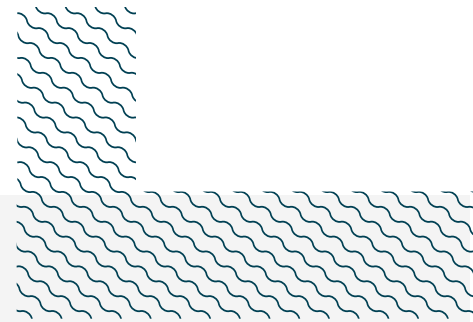


SUB-CRITERION C4 - MOVEMENT

Bahía de La Paz is an important movement area for one shark species. The movement of 26 juvenile Whale Sharks shows connectivity between La Paz Bay (southwestern Gulf of California) and Bahía de Los Ángeles (northwestern Gulf of California; Ramírez-Macias et al. 2012) with individuals moving back and forth. Although these juveniles were not permanent residents at either site, they used the bays regularly from year to year. In addition, satellite telemetry supports these movements and adult movements to offshore areas outside the Gulf of California (Ramírez-Macías et al. 2017).

SUB-CRITERION C5 - UNDEFINED AGGREGATIONS

Bahía de La Paz is an important area for aggregations of one ray species. In Cerralvo Island, specifically at La Reina islet, juvenile Oceanic Manta Rays aggregate from June to November. An aggregation of 25 individuals was observed in 2018. Previously, these aggregations were more common, but for 16 years they were not present. However, it is unknown why these aggregations occur (Saad-Navarro et al. 2020; Preciado González 2021).



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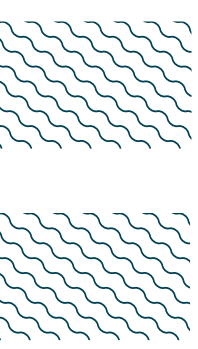
QUALIFYING SPECIES

Scientific Name	Common Name	IUCN Red List Category/ NOM 059 Status	Global Depth Range (m)	ISRA Criteria/Sub-criteria Met									
				A	B	C1	C2	C3	C4	C5	D1	D2	
SHARKS													
<i>Rhincodon typus</i>	Whale Shark	EN/Threatened	0-1,928	X			X		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	X						
RAYs													
<i>Mobula birostris</i>	Oceanic Manta Ray	EN/Special protection	0-1,000	X						X			
<i>Mobula munkiana</i>	Munk's Pygmy Devil Ray	VU/Special protection	0-30	X		X	X						

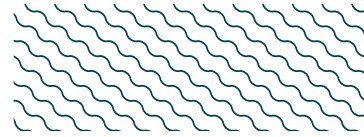
SUPPORTING SPECIES

Scientific Name	Common Name	IUCN Red List Category
SHARKS		
<i>Carcharhinus falciformis</i>	Silky Shark	VU
<i>Isurus oxyrinchus</i>	Shortfin Mako	EN
<i>Mustelus henlei</i>	Brown Smoothhound	LC
<i>Prionace glauca</i>	Blue Shark	NT
<i>Sphyrna zygaena</i>	Smooth Hammerhead	VU
<i>Squatina californica</i>	Pacific Angel Shark	NT
RAYS		
<i>Gymnura marmorata</i>	California Butterfly Ray	NT
<i>Hypanus longus</i>	Longtail Stingray	VU
<i>Hypanus dipterus</i>	Diamond Stingray	VU
<i>Myliobatis californicus</i>	Bat Ray	LC
<i>Myliobatis longirostris</i>	Longnose Eagle Ray	VU
<i>Pseudobatos productus</i>	Shovelnose Guitarfish	NT
<i>Rhinoptera steindachneri</i>	Pacific Cownose Ray	NT

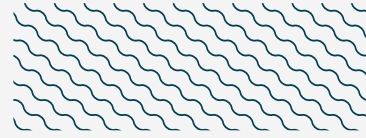
IUCN Red List categories: *CR*, Critically Endangered; *EN*, Endangered; *VU*, Vulnerable; *NT*, Near Threatened; *LC*, Least Concern; *DD*, Data Deficient.



SUPPORTING INFORMATION



There are additional indications that this area is important for feeding purposes. Based on stomach content analysis of Pacific Angelshark (n = 414) from 2000-2003, this species mainly preys upon pelagic fishes like Shortfin Scad *Decapterus macrosoma*, the benthic fishes Darkedge Midshipman *Porichthys analis*, Inotted Lizardfish *Synodus evermanni*, Panamic Soldierfish *Myripristis leiognathus*, and the crustacean Target Rock Shrimp *Sicyonia penicillata* (Escobar-Sánchez et al. 2006; Lladó-Cabrera 2020). In addition, stable isotope analysis confirmed that this species feeds on benthic prey in coastal zones within the area (Escobar-Sánchez et al. 2011).



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