

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

## SOLANO BAY ISRA

### Central and South American Pacific Region

#### SUMMARY

Solano Bay is located on the northern Colombian Pacific coast. The area is characterised by a large bay formed by the Gulf of Cupica and several smaller bays. Habitats include rocky and sandy beaches with coral formations and patches of mangrove forest. The region has high rainfall, and the salinity of the area is influenced by freshwater input. Within this area there are: **threatened species** (e.g., Pacific Nurse Shark *Ginglymostoma unami*); **range-restricted species** (Chilean Angelshark *Squatina armata*); **reproductive areas** (e.g., Scoophead Shark *Sphyrna media*); **feeding areas** (e.g., Whale Shark *Rhincodon typus*); **undefined aggregations** (Oceanic Manta Ray *Mobula birostris*); and the area sustains a **high diversity of sharks** (21 species).

#### CRITERIA

**Criterion A - Vulnerability; Criterion B - Range Restricted; Sub-criterion C1 - Reproductive Areas; Sub-criterion C2 - Feeding Areas; Sub-criterion C5 - Undefined Aggregations; Sub-criterion D2 - Diversity**

— —  
**COLOMBIA**

— —  
**0-240 metres**

— —  
**1,498 km<sup>2</sup>**

— —



## DESCRIPTION OF HABITAT

Solano Bay is located on the northern Colombian Pacific coast in Chocó Department. Situated within the Pacific Central-American Coastal Large Marine Ecosystem (LME), the area is characterised by a large bay formed by the Gulf of Cupica and several smaller internal bays. Habitats include rocky shorelines and cliffs, sandy beaches, and patches of mangroves which are restricted to areas around river mouths. The marine substrate is primarily sandy with the presence of rocky substrates (around which most marine life is associated), muddy flats, and coral formations. Sea surface temperature is relatively warm between 22–28°C with medium-low salinities influenced by terrestrial freshwater input (the region has one of the highest rainfalls in the world; 7,000 mm/year). Shallow inshore waters are relatively limited in the area with the continental shelf falling to 50 m depth very close to the coast, and then gradually descending to 240 m in the west of the area (INVEMAR 2009; ANLA 2020).

This Important Shark and Ray Area is delineated from surface and inshore waters (0 m) to a depth of 240 m based on the bathymetry of the area.

## ISRA CRITERIA

### CRITERION A - VULNERABILITY

Nineteen Qualifying Species considered threatened with extinction according to the IUCN Red List of Threatened Species™ regularly occur in the area. Threatened sharks comprise four Critically Endangered species, four Endangered species, and seven Vulnerable species; threatened rays comprise one Endangered and three Vulnerable species (IUCN 2022).

The Red Book of Marine Fishes of Colombia (Chasqui et al. 2017) does not provide assessments for all Qualifying Species occurring in the area. Therefore, a lower number of species are considered threatened using this classification. Eight Qualifying Species considered threatened with extinction according to the Red Book of Marine Fishes of Colombia regularly occur in the area. Threatened sharks comprise seven Vulnerable species; threatened rays comprise one Vulnerable species.

Two of the Vulnerable sharks according to the Red Book of Marine Fishes of Colombia are globally Least Concern on the IUCN Red List. Therefore, a total of 21 Qualifying Species considered threatened with extinction according to the IUCN Red List and/or the Red Book of Marine Fishes of Colombia regularly occur in the area.

### CRITERION B - RANGE RESTRICTED

Solano Bay holds the regular presence of one resident range-restricted species: Chilean Angelshark (Mejía-Falla et al. 2007; Mejía-Falla & Navia 2011, 2019; Ágreda et al. 2022). This species is restricted to the Pacific Central-American Coastal LME and the Humboldt Current LME.

### SUB-CRITERION C1 - REPRODUCTIVE AREAS

Solano Bay is an important reproductive area for nine shark and one ray species: Pacific Smalltail Shark, Silky Shark, Blacktip Shark, Longtail Stingray, Brown Smoothhound, Sicklefin Smoothhound, Pacific Sharpnose Shark, Scalloped Hammerhead, Scoophead Shark, and Bonnethead Shark. For each of these species, gravid females or neonates have been regularly recorded in the area (Navia



et al. 2012, 2013, 2020; Squalus Fundación unpubl. data 2022). For example, gravid female Brown Smoothhound, Sicklefin Smoothhound, and Longtail Stingray have been frequently recorded as bycatch in artisanal fishing operations in the area between 2020 and 2022 (Squalus Fundación unpubl. data 2022).

For Scalloped Hammerhead, adults of this species arrive from oceanic environments to give birth in coastal waters of Colombia including Solano Bay (Quintanilla et al. 2015). Different stages of juvenile individuals of this species (from neonates) can be found in the area (Villate et al. 2022).

## SUB-CRITERION C2 - FEEDING AREAS

Solano Bay is an important feeding area for six species: Pelagic Thresher, Silky Shark, Longtail Stingray, Brown Smoothhound, Sicklefin Smoothhound, and Whale Shark.

For the first five species listed above, feeding has been documented through analysis of stomach contents with fresh prey indicating active feeding in the area (Navia et al. 2020; Fundación Marviva unpubl. data 2022; Squalus Fundación unpubl. data 2022). For example, dietary analysis shows that in Solano Bay, the diet of Sicklefin Smoothhound is dominated by stomatopods and crabs while Brown Smoothhound feeds mainly on bony fishes (Navia et al. 2020).

Juvenile Whale Sharks have been directly observed to aggregate in the area to feed. These aggregations occur between February and May each year. Whale Sharks have been observed to feed on sardines and other small fishes and are usually associated with aggregations of small-sized tuna. Aggregations of up to eight individuals have been observed in the area (M. Villate pers. obs. 2022), although fishers report aggregations of up to 15 Whale Sharks in the area (Fundación MarAdentro unpubl. data 2022).

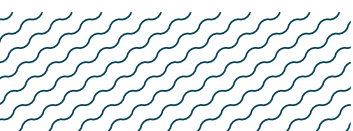
## SUB-CRITERION C5 - UNDEFINED AGGREGATIONS

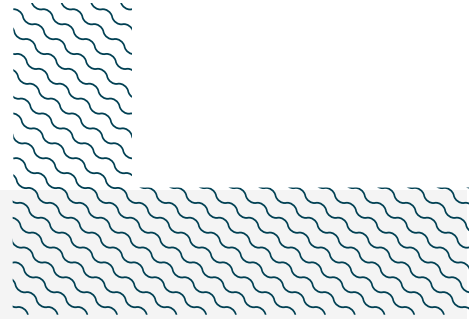
Solano Bay is an important area for Oceanic Manta Rays that form aggregations of up to eight individuals around Cabo Marzo rocks (in the northern part of the area) (Fundación Malpelo unpubl. data 2022). The function of these aggregations is unknown.

## SUB-CRITERION D2 - DIVERSITY

Solano Bay sustains a high diversity of Qualifying Species (21 species). This exceeds the regional diversity threshold (17 species) for the Central and South Pacific American region.

The regular presence of these Qualifying Species has been documented through scientific studies and monitoring of fisheries and is supported through the literature and unpublished data sources including Mejía-Falla et al. (2007); Navia et al. (2008a, 2008b, 2010, 2012, 2013, 2020); Mejía-Falla & Navia (2011, 2019); Ágreda et al. (2022); Villate et al. (2022); Fundación MarAdentro unpubl. data (2022); Fundación Marviva unpubl. data (2022); Fundación Malpelo unpubl. data (2022); Squalus Fundación unpubl. data (2022).





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## **Suggested citation**

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## QUALIFYING SPECIES

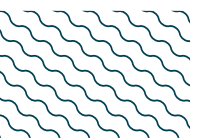
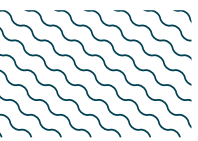
Scientific Name	Common Name	IUCN Red List Category / Red Book Colombia	Global Depth Range (m)	ISRA Criteria/Sub-criteria Met								
				A	B	C1	C2	C3	C4	C5	D1	D2
<b>SHARKS</b>												
<i>Alopias pelagicus</i>	Pelagic Thresher	EN/VU	0-300	X			X					X
<i>Carcharhinus albimarginatus</i>	Silvertip Shark	VU/--	0-800	X								
<i>Carcharhinus cerdale</i>	Pacific Smalltail Shark	CR/DD	0-40	X		X						
<i>Carcharhinus falciformis</i>	Silky Shark	VU/VU	0-500	X		X	X					
<i>Carcharhinus leucas</i>	Bull Shark	VU/--	0-164	X								
<i>Carcharhinus limbatus</i>	Blacktip Shark	VU/VU	0-140	X		X						
<i>Ginglymostoma unami</i>	Pacific Nurse Shark	EN/VU	0-13	X								
<i>Mustelus henlei</i>	Brown Smoothhound	LC/VU	1-281	X		X	X					
<i>Mustelus lunulatus</i>	Sicklefin Smoothhound	LC/VU	9-200	X		X	X					
<i>Rhincodon typus</i>	Whale Shark	EN/DD	0-1,928	X			X					
<i>Rhizoprionodon longurio</i>	Pacific Sharpnose Shark	VU/--	0-100	X		X						
<i>Sphyrna lewini</i>	Scalloped Hammerhead	CR/VU	0-1,043	X		X						
<i>Sphyrna media</i>	Scoophead Shark	CR/--	0-100	X		X						
<i>Sphyrna tiburo</i>	Bonnethead Shark	EN/--	0-90	X		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>Sphyrna zygaena</i>	Smooth Hammerhead	VU/--	1-200	X									
<i>Squatina armata</i>	Chilean Angelshark	CR/--	0-400	X	X								
<i>Triaenodon obesus</i>	Whitetip Reef Shark	VU/LC	0-330	X									
<b>RAYS</b>													
<i>Aetobatus laticeps</i>	Pacific Eagle Ray	VU/NT	0-60	X									
<i>Hypanus longus</i>	Longtail Stingray	VU/VU	0-118	X		X	X						X
<i>Mobula birostris</i>	Oceanic Manta Ray	EN/DD	0-1,000	X						X			
<i>Rostroraja velezi</i>	Rasptail Skate	VU/--	30-300	X									

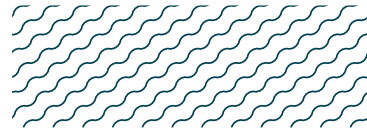
## SUPPORTING SPECIES

Scientific Name	Common Name	IUCN Red List Category
<b>RAYS</b>		
<i>Gymnura crebipunctata</i>	Mazatlán Butterfly Ray	NT
<i>Rhinoptera steindachneri</i>	Pacific Cownose Ray	NT
<i>Tetronarce tremens</i>	Chilean Torpedo	LC
<i>Urotrygon rogersi</i>	Roger's 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

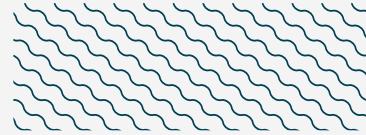


There are additional indications that Solano Bay is an important area for the resting and movement of other species.

Observations of Pacific Eagle Rays and Oceanic Manta Rays suggest that these species spend time resting in the water column in the northwest part of the area (Villate et al. unpubl. data 2022). However, resting in pelagic swimming rays is currently poorly defined and further examination of this behaviour is required.

Although direct studies are not available, the presence of highly migratory species (e.g., Pelagic Thresher, Silky Shark, Oceanic Manta Ray, Whale Shark) suggest that these species are using the area in their migratory movements. For example, Whale Sharks are only present in February and May (Fundación MarAdentro unpubl. data 2022) and must therefore move in and out of the area. The movements of these species need to be further investigated.





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