

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

## SANTA ELENA GULF ISRA

### Central and South American Pacific Region

#### SUMMARY

Santa Elena Gulf is located in the north Pacific coast of Costa Rica. This area is influenced by the Costa Rica Thermal Dome (a dynamic area with strong currents, cold nutrient-rich waters, and coastal wind jets), and is subject to a strong seasonal coastal upwelling due to trade winds. Santa Elena Gulf has diverse habitats including a complex rocky platform, sand and mudflats, mangroves, and coral reefs. Within this area there are: **threatened species** (e.g., Largetooth Sawfish *Pristis pristis*); **range-restricted species** (e.g., Pacific Chupare *Styracura pacifica*); **reproductive areas** (Scalloped Hammerhead *Sphyrna lewini*); **resting areas** (e.g., Whitetip Reef Shark *Triaenodon obesus*); **undefined aggregations** (e.g., Munk's Pygmy Devil Ray *Mobula munkiana*); **distinctive attributes** (e.g., Bull Shark *Carcharhinus leucas*); and this area sustains a **high diversity** of sharks (24 species).

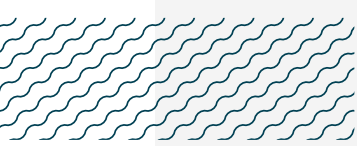
#### CRITERIA

**Criterion A - Vulnerability; Criterion B - Range Restricted;**  
**Sub-criterion C1 - Reproductive Areas; Sub-criterion C3 - Resting Areas;**  
**Sub-criterion C5 - Undefined Aggregations; Sub-criterion D1 - Distinctiveness;**  
**Sub-criterion D2 - Diversity**

COSTA RICA

0-40 metres

396.1 km<sup>2</sup>





## DESCRIPTION OF HABITAT

Santa Elena Gulf is located along the coast of Guanacaste in the north Pacific coast of Costa Rica. Situated within the Pacific Central-American Coastal Large Marine Ecosystem (LME), this area overlaps with the Bat Islands no-take Marine Protected Area, at the southern end of the Santa Elena Gulf, and the Santa Elena Bay Marine Management Area (both part of the Guanacaste Conservation Area), as well as an Ecologically or Biologically Significant Marine Area (EBSA), the Upwelling System of Papagayo and its Adjacent Seas.

This area is characterised by mangrove forests in relatively large and undisturbed bays and estuaries that are key habitats for many sharks. Other habitats such as coral and rocky reefs, coral patches, sandy shallow areas with warm waters, and soft/muddy and hard bottoms also provide refuge and food resources for many of these species. Santa Elena Gulf provides suitable habitat for a wide range of sharks and the similarity of the habitat and oceanographic conditions throughout the gulf makes this area important for the same species and purposes (Espinoza et al. 2020). This area is also defined by large mangrove and estuarine systems, which extend around Potrero Grande and Nancite in the southern end, Playa Blanca in the middle, and Santa Elena Bay, Cuajiniquil, and Thomas Bay in the northern end.

This Important Shark and Ray Area is delineated from surface waters (0 m) to a depth of 40 m based on the maximum depth range of the habitat used by the Qualifying Species.

## ISRA CRITERIA

### CRITERION A - VULNERABILITY

Twenty-two Qualifying Species considered threatened with extinction according to the IUCN Red List of Threatened Species™ regularly occur in this area. Threatened sharks comprise two Critically Endangered species, three Endangered species, and six Vulnerable species; threatened rays comprise one Critically Endangered species, one Endangered species, and nine Vulnerable species (IUCN 2022).

### CRITERION B - RANGE RESTRICTED

Santa Elena Gulf holds the regular presence of Pacific Chupare and Leopard Round Ray as resident range-restricted species. These species occur in the Pacific Central-American Coastal LME, and have been recorded through fishery-independent surveys, Baited Remote Underwater Video Surveys (BRUVS), Underwater Visual Census (UVC), local ecological knowledge (LEK), and acoustic telemetry data.

The entire size range of Pacific Chupare and Leopard Round Ray are observed within this area. There is clear size segregation in Pacific Chupare, as smaller individuals (< 30 cm disc width [DW]) are mainly found using the mangrove areas (during the high tides for refuge) and larger individuals (> 60 cm DW) tend to be found in more open inshore coastal areas (Espinoza et al. unpubl. data 2022).

Leopard Round Rays prefer rocky and coral reef habitats and flat rubble substrates. There are pregnant females (based on the visual appearance of extended abdomens) between January and March/April when water temperatures are lower due to the coastal upwelling, and smaller individuals shortly after (May-August), when water temperatures increase (Eisele et al. 2019; Espinoza et al. 2020; Madrigal-Mora et al. 2022; M. Espinoza et al. unpubl. data 2022).



## SUB-CRITERION C<sub>1</sub> – REPRODUCTIVE AREAS

Santa Elena Gulf is an important reproductive area for one shark and two ray species. Data from fishery-dependent and independent surveys, landings data, BRUVS, UVC, LEK, and acoustic monitoring supports this area as important for the reproduction (e.g., mating, nursery grounds) of Bull Shark, Leopard Round Ray, and Spinytail Round Ray. Animals use the mangrove and estuarine habitats during their early life stages and connect to other nearby habitats (rocky coral reefs) as they grow larger (Espinoza et al. 2020; M. Lara, pers. comm. 2020; López-Garro and Zanella 2021; Madrigal-Mora et al. 2022; Espinoza et al. 2022; Farías-Tafolla et al. 2022).

Shortly before they pup, Leopard Round Rays and Spinytail Round Rays aggregate in groups of at least 20 individuals, which are often dominated by females. This includes pregnant individuals based on the visual appearance of extended abdomens. These are often observed at the end of the upwelling season when the water temperature starts to increase, and many of the pups are observed in very shallow waters, possibly looking for a warmer environment (Espinoza et al. 2020; Espinoza et al. unpubl. data 2022; S. Lara, pers. comms. 2022).

Female Bull Sharks with mating scars are regularly observed every year during UVC, BRUVS, and recordings from tourists at Bat Islands (Espinoza et al. 2020; Espinoza et al. unpubl. data; S. Lara, pers. comms. 2022). In addition, there are reproductive data from fishery-dependent and independent surveys that indicate this species is also reproducing in the north Pacific region of Costa Rica (Azofeifa et al. 2021; Clarke et al. 2014; Clarke et al. 2016).

## SUB-CRITERION C<sub>3</sub> – RESTING AREAS

Santa Elena Gulf is an important resting area for two shark species. Whitetip Reef Sharks rest on the seafloor or in caves in small groups of up to eight individuals, but usually 3-5 individuals. They are predictably observed during surveys undertaken two to three times per year in less accessible sites within this area (M. Espinoza, pers. obs. 2022).

Pacific Nurse Sharks aggregate in groups of up to 40-50 individuals, often lying on the substrate on top of each other. This predictably occurs between May and September when water temperature increases relative to upwelling months (December/January-March/April) (M. Espinoza et al. unpubl. data 2022).

## SUB-CRITERION C<sub>5</sub> – UNDEFINED AGGREGATIONS

Santa Elena Gulf is an important aggregation area for one shark and two ray species. Small Lemon Sharks aggregate in groups of 15-20 individuals in coastal areas, predictably during warmer (non-upwelling) months at the beginning of the wet season (June/July) (M. Espinoza et al. unpubl. data 2022). This is a regular yearly occurrence based on ongoing surveys of coastal areas. Lemon Shark aggregations may be related to reproductive purposes, as large groups of small neonates and juveniles use coastal estuarine areas (M. Espinoza et al. unpubl. data 2022). Further research is required to determine the purpose of these aggregations.

Two ray species (Munk's Pygmy Devil Ray and Pacific Cownose Ray) aggregate in large schools during upwelling months (December/January-March/April) within the area. These aggregations are a mix of small and large aggregations (M. Espinoza unpubl. data 2022; M. Lara, pers. comm. 2022), and there is ongoing investigation to determine potential other purposes of these aggregations in

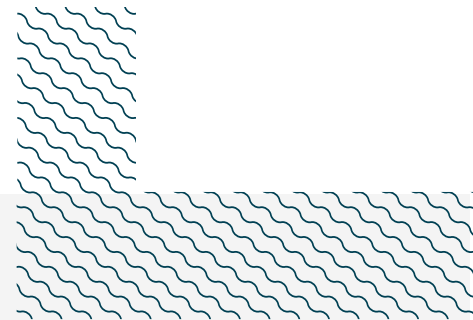
shallow coastal areas using BRUVS and LEK. Aggregations of these species are driven by coastal upwelling because of the seasonal fluxes of cool, nutrient-rich waters that enhance ocean productivity during this season (S. Lara, pers. comm. 2022; M. Espinoza et al. unpubl. data 2022).

## SUB-CRITERION D1 – DISTINCTIVENESS

Santa Elena Gulf is an important area for the distinctive behaviour of one species. Bull Sharks predictably use the San Pedrillo or El Gran Susto site within Bat Islands as a cleaning station between May and October (Espinoza et al. 2020; Madrigal-Mora et al. 2022; M. Lara, pers. comm. 2022). Bat Islands is an archipelago that consists of five islands and ten islets. During daytime visual surveys (07:00-14:00), 6-8 Bull Sharks were counted at the cleaning station, with observations of cleaning interactions with butterfly fish (Chaetodontidae) and angel fish (Pomacanthidae; Espinoza, unpubl. data 2022). Local tour operators have seen more than 10 Bull Sharks at once at the stations, and cleaning behaviour seems to be greater during morning hours (M. Lara, pers. comm. 2022).

## SUB-CRITERION D2 – DIVERSITY

Santa Elena Gulf sustains a high diversity of Qualifying Species (24 species). This exceeds the regional diversity threshold (17 species) for the Central and South Pacific American Region.



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### Acknowledgments

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

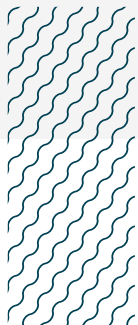
This project was funded by the Shark Conservation Fund, a philanthropic collaborative pooling expertise and resources to meet the threats facing the world's sharks and rays. The Shark Conservation Fund is a project of Rockefeller Philanthropy Advisors.

### Suggested citation

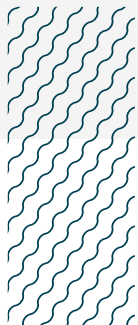
IUCN SSC Shark Specialist Group. 2023. Santa Elena Gulf ISRA Factsheet. Dubai: IUCN SSC Shark Specialist Group.

## 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		
<b>SHARKS</b>														
<i>Alopias pelagicus</i>	Pelagic Thresher	EN	0-300	X										X
<i>Alopias superciliosus</i>	Bigeye Thresher	VU	0-955	X										
<i>Carcharhinus falciformis</i>	Silky Shark	VU	0-500	X										
<i>Carcharhinus leucas</i>	Bull Shark	VU	0-164	X		X							X	
<i>Carcharhinus limbatus</i>	Blacktip Shark	VU	0-140	X										
<i>Ginglymostoma unami</i>	Pacific Nurse Shark	EN	0-13	X				X						
<i>Negaprion brevirostris</i>	Lemon Shark	VU	0-120	X							X			
<i>Rhincodon typus</i>	Whale Shark	EN	0-1,928	X										
<i>Sphyrna lewini</i>	Scalloped Hammerhead	CR	0-1,043	X										
<i>Sphyrna mokarran</i>	Great Hammerhead	CR	0-300	X										
<i>Triaenodon obesus</i>	Whitetip Reef Shark	VU	0-330	X				X						



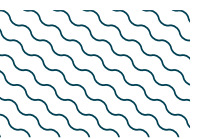
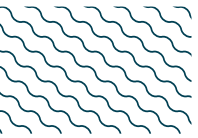
Scientific Name	Common Name	IUCN Red List Category	Global Depth Range (m)	ISRA Criteria/Sub-criteria Met								
				A	B	C1	C2	C3	C4	C5	D1	D2
<b>RAYS</b>												
<i>Aetobatus laticeps</i>	Pacific Eagle Ray	VU	0-60	X								
<i>Hypanus longus</i>	Longtail Stingray	VU	0-118	X								
<i>Mobula birostris</i>	Oceanic Manta Ray	EN	0-1,000	X								
<i>Mobula munkiana</i>	Munk's Pygmy Devil Ray	VU	0-30	X							X	
<i>Narcine entemedor</i>	Cortez Numbfish	VU	0-100	X								
<i>Pristis pristis</i>	Large-tooth Sawfish	CR	0-60	X								
<i>Pseudobatos glaucostigmus</i>	Grey-spotted Guitarfish	VU	0-110	X								
<i>Pseudobatos planiceps</i>	Pacific Guitarfish	VU	0-50	X								
<i>Pseudobatos prahli</i>	Gorgona Guitarfish	VU	0-70	X								
<i>Rhinoptera steindachneri</i>	Pacific Cownose Ray	NT	0-65							X		
<i>Styracura pacifica</i>	Pacific Chupare	VU	0-30	X	X							
<i>Urobatis pardalis</i>	Leopard Round Ray	LC	1-53		X	X	X					
<i>Urotrygon aspidura</i>	Spinytail Round Ray	NT	5-100			X	X					



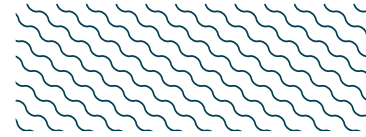
## SUPPORTING SPECIES

Scientific Name	Common Name	IUCN Red List Category
<b>SHARKS</b>		
<i>Galeocerdo cuvier</i>	Tiger Shark	NT
<i>Mustelus henlei</i>	Brown Smoothhound	LC
<b>RAYS</b>		
<i>Diplobatis ommata</i>	Pacific Dwarf Numbfish	LC
<i>Gymnura crebripunctata</i>	Mazatlán Butterfly Ray	NT

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



## SUPPORTING INFORMATION

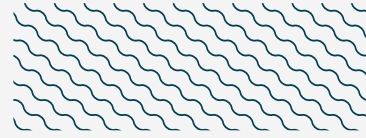


There are additional indications that 26 species may feed within Santa Elena Gulf. This is based on presumptions due to their presence within this area. Species that may feed in this area include Bull Shark, Pacific Nurse Shark, Silky Shark, Pelagic Thresher, Blacktip Shark, Bigeye Thresher, Lemon Shark, Longtail Stingray, Munk's Pygmy Devil Ray, Grey-spotted Guitarfish, Gorgona Guitarfish, Pacific Guitarfish, Leopard Round Ray, Spinytail Round Ray, Pacific Dwarf Numbfish, Southern Banded Guitarfish, Cortez Numbfish, Oceanic Manta Ray, Pacific Eagle Ray, Whale Shark, Tiger Shark, Whitetip Reef Shark, and Great Hammerhead (Valerio-Vargas & Espinoza 2019; M. Lara, pers. comm. 2020; A. Lara, pers. comm. 2020; M. Espinoza et al. unpubl. data 2022).

Multiple sharks may also use the habitat for reproductive purposes. This includes Pacific Chupare, Scalloped Hammerhead, Blacktip Shark, Lemon Shark, Longtail Stingray, Grey-spotted Guitarfish, Gorgona Guitarfish, Pacific Guitarfish, Pacific Dwarf Numbfish, Cortez Numbfish, Pacific Eagle Ray, and Whitetip Reef Shark. The current evidence comes mainly from mature females (based on the known size-at-maturity) that are commonly seen during UVC, fishing surveys, and BRUVS in several areas of this area, but particularly during upwelling (cooler) months (December–April/May) when they seek shallower, warmer waters inside bays, as well as the presence of small pups (Espinoza et al. unpubl. data; S. Lara pers. comm. 2022).

Santa Elena Gulf may be an important movement area for sharks which move to and from coastal habitats outside of this area. There are Residency Index (RI) values available (the number of days an individual was detected within the receiver array, divided by the number of days monitored) for these species. These data indicate that the following species have relatively low residency and thus move out of this area: Pacific Chupare (six individuals tagged over nearly two years; RI:  $0.11 \pm 0.13$ ), Longtail Stingray (six individuals tagged over nearly two years; RI:  $0.49 \pm 0.34$ ), Pacific Nurse Shark (28 individuals tagged over seven years; RI:  $0.41 \pm 0.30$ ), and Bull Shark (10 individuals tagged at Bat Islands for two years; RI:  $0.4 \pm 1.0$ ) (López-Garro and Zanella 2021; M. Espinoza et al. unpubl. data). Ten Bull Sharks were tagged and monitored with acoustic transmitters for two years (López-Garro & Zanella 2021). Detections were higher during the rainy season (May–November) than the dry season (December–April), with over 80% of the detections recorded between May and November. Detection frequency peaked between July and August (50% of all detections). Even though some sharks were detected during the dry season (December–February), less than 20% of detections were registered during this period. The residency of bull sharks at this site ranged from 0.41–1.0 (López-Garro & Zanella 2021). Further investigation is required to demonstrate the movement of these species, and the importance of this behaviour.





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