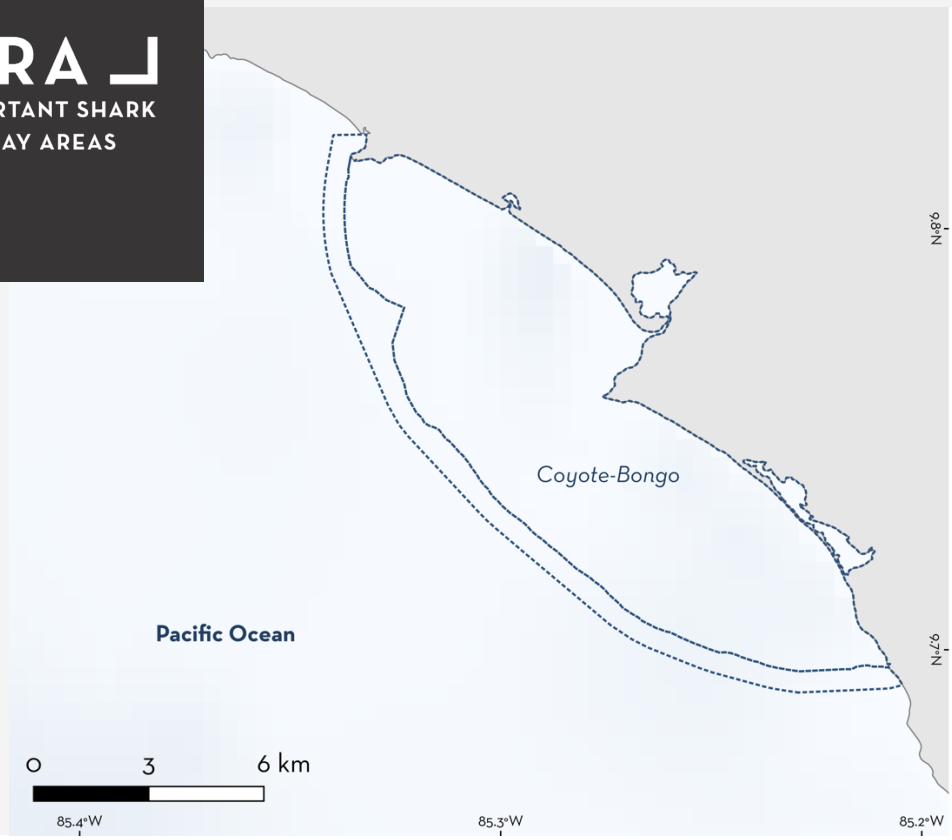
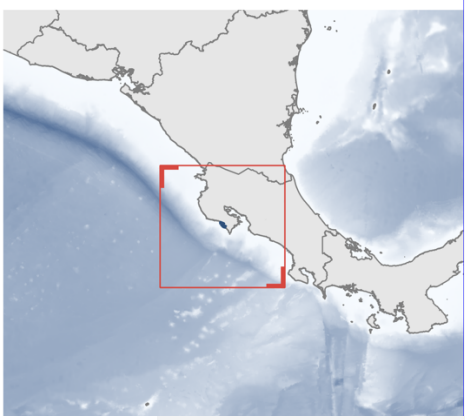
ISRA
IMPORTANT SHARK AND RAY AREAS





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

COYOTE-BONGO ISRA

Central and South American Pacific Region

COSTA RICA

0–30 metres

95.4 km²

SUMMARY

Coyote-Bongo is located in the southern Nicoya Peninsula on the north Pacific coast of Costa Rica. It includes the coastal waters of the Caletas-Ario Marine Protected Area (MPA) and those between the Caletas-Ario and Camaronal MPAs. The area encompasses a diversity of habitats including sandy beaches, rocky reefs, tidepools, and highly dynamic estuarine systems surrounded by mangrove forests. The climate across this area is influenced by dry (December to April) and rainy (May to November) seasons. Within this area there are: **threatened species** (e.g., Blacktip Shark *Carcharhinus limbatus*); **range-restricted species** (Pacific Chupare *Styracura pacifica*); **reproductive areas** (e.g., Scalloped Hammerhead *Sphyrna lewini*); and areas important for **movement** (Bull Shark *Carcharhinus leucas*).

CRITERIA

Criterion A – Vulnerability; Criterion B – Range Restricted;
Sub-criterion C1 – Reproductive Areas; Sub-criterion C4 – Movement

DESCRIPTION OF HABITAT

Coyote-Bongo is located in the southern Nicoya Peninsula along the coast of the Puntarenas and Guanacaste provinces on the north Pacific coast of Costa Rica. Situated within the Pacific Central-American Coastal Large Marine Ecosystem (LME), this area includes sandy beaches, rocky reefs, tidepools, and highly dynamic estuarine systems surrounded by mangrove forests. The climate is heavily influenced by dry and rainy seasons. The dry season runs from December to April, while the rainy season occurs from May to November, with the heaviest precipitation occurring in September and October (Carrion et al. 2013; Sáenz-Soto 2014).

This Important Shark and Ray Area is delineated from surface waters (0 m) to 30 m based on the maximum depth range of the habitat used by the Qualifying Species.

ISRA CRITERIA

CRITERION A – VULNERABILITY

Four Qualifying Species considered threatened with extinction according to the IUCN Red List of Threatened Species™ regularly occur in this area. These are the Critically Endangered Scalloped Hammerhead (Rigby et al. 2019), the Vulnerable Bull Shark (Rigby et al. 2021b), the Vulnerable Blacktip Shark (Rigby et al. 2021a), and the Vulnerable Pacific Chupare (Kyne et al. 2002).

CRITERION B – RANGE RESTRICTED

Coyote-Bongo holds the regular presence of the Pacific Chupare as a resident range-restricted species. This species is encountered in local fisheries in the Coyote and Bongo estuaries where it utilises mangrove habitats (De la Llata Quiroga 2021; A. Quiroz pers. comm. 2022; E. Chávez et al. unpubl. data. 2022). It is observed all year long in the Coyote estuary and was the only species of ray observed in both estuaries during a research project conducted in 2019 during the rainy season (June-November) (De la Llata Quiroga 2021). The Pacific Chupare occurs only in the Pacific Central-American Coastal LME.

SUB-CRITERION C1 – REPRODUCTIVE AREAS

Coyote-Bongo is an important reproductive area for three shark species.

Juvenile and neonate Scalloped Hammerheads and Blacktip Sharks are regularly caught and landed by artisanal fisheries within Coyote-Bongo (often near the mouth of the Bongo estuary), based on fishery-dependent data (2007–2019) and fishery-independent surveys (October 2021–September 2022) (Arauz et al. 2008; Mongeon et al. 2013; J. Madrigal-Mesén unpubl. data 2022; R. Arauz et al. unpubl. data 2022). Both species measured between 52–70 cm total length (TL) and were considered neonates (J. Madrigal-Mesén et al. unpubl. data 2022). Neonate and juvenile Scalloped Hammerheads have been recorded measuring between 45–160 cm TL (Bejarno Álvarez 2007). Neonate Blacktip Sharks with visible umbilical scars have a mean size of 72.9 cm ± 29.4 TL (Harry et al. 2012). Neonates have also been recorded at lengths between 53–69 cm TL (Resitad et al. 2021) and 51–71 cm TL (Hueter and Tyminski 2002).

Immature Bull Sharks are regularly found within the Coyote and Bongo estuaries (Chávez 2017; De la Llata Quiroga 2021; E. Chávez et al. unpubl. data 2022). These can be considered neonates, young-

of-the-year, and juveniles. Fifty juvenile Bull Sharks with evident umbilical scars (either open or closed) and measuring between 68–117 cm TL were captured in independent fishing surveys (Chávez 2017; De la Llata Quiroga 2021; E. Chávez unpubl. data 2022). This corresponds with the neonate size range of 70–82 cm TL, young-of-the-year size range of 68–89 cm TL, and juvenile size range of 91–189 cm TL (Simpfendorfer 2005).

SUB-CRITERION C4 – MOVEMENT

Coyote-Bongo is an important area for the movement of one shark species. There is strong evidence of residency, movement patterns, and habitat use of Bull sharks within the Coyote estuary and in the surrounding coastal habitats (Chávez 2017; E. Chávez et al. unpubl. data 2022).

Juvenile Bull Sharks (n = 6) were tagged with acoustic transmitters programmed to produce a signal every three seconds (Chávez 2017). Individuals moved in and out of the area daily. They remained within the estuary during daylight hours (05:00–17:00) and swam towards the coast at night (20:00–04:00). This movement pattern is evidence of the connectivity between estuarine and coastal habitats by juvenile Bull Sharks, as well as a strategy used to avoid predation risk during the day while increasing their search for prey at night.

Furthermore, Bull Sharks displayed ecological connectivity along the south pacific coast of the Nicoya Peninsula. Preliminary data indicate that at least five Bull Sharks tagged in the Coyote and Bongo area were detected in the Cabo Blanco Marine Protected Area (MPA) approximately one year after being tagged. This suggests that Bull Sharks (3–4 years old) travel about 40 km (linear distance) from their birth site in Coyote, to coastal and insular habitats located at Cabo Blanco MPA (E. Chávez et al. unpubl. data 2022).

Juvenile Bull Sharks are regularly observed at the beginning of the rainy season (May-June) by local fishers (A. Quiros pers. comm. 2022). However, animals tagged in August exhibited a continuous presence within the Coyote estuary and its adjacent waters between August to March of the same year (Chávez 2017). Juvenile Bull Sharks display high residency (residency index: 0.6 ± 0.3), and site fidelity (<100 m) in the Coyote estuary. Based on acoustic telemetry (passive and active), data indicate that Bull Sharks use ~70% (35.8–170.3 km^2) of the Coyote estuary; especially the upper areas where mangrove forests are more abundant and with more favourable salinity conditions (farther from the mouth).

Acknowledgments

Elpis J. Chávez (CREMA), Randall Arauz (Marine Watch International; MigraMar), Jeffry Madrigal-Mesén (CREMA), Mario Espinoza (Universidad de Costa Rica; MigraMar), and Ryan Charles (IUCN SSC Shark Specialist Group - ISRA Project) 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. Coyote-Bongo 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												
Carcharhinus leucas	Bull Shark	VU	0–164	X		X			X			
Carcharhinus limbatus	Blacktip Shark	VU	0–140	X		X						
Sphyrna lewini	Scalloped Hammerhead	CR	0–1,043	X		X						
RAYS												
Styracura pacifica	Pacific Chupare	VU	0–30	X	X							

SUPPORTING SPECIES

Scientific Name	Common Name	IUCN Red List Category
SHARKS		
Ginglymostoma unami	Pacific Nurse Shark	EN
Nasolamia velox	Whitenose Shark	EN
Mustelus henlei	Brown Smoothhound	LC
Mustelus lunulatus	Sicklefin Smoothhound	LC
Rhizoprionodon longurio	Pacific Sharpnose Shark	VU
RAYS		
Hypanus longus	Longtail Stingray	VU
Pseudobatos glaucostigmus	Grey-spotted Guitarfish	VU
Rhinoptera steindachneri	Pacific Cownose Ray	NT
Urotrygon chilensis	Blotched Round Ray	NT
Urotrygon rogersi	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 Coyote-Bongo may be an important feeding area for Bull Shark. The main prey of the juvenile Bull Sharks are catfish (family Ariidae). This family represents ~31% of the fish found in the mangrove systems of the Gulf of Nicoya and were the most abundant species in both estuaries (Coyote and Bongo) (Rojas et al. 1994; Monge-Nájera 2004). Considering the high reproductive potential of the catfish, juvenile Bull Sharks inside these estuaries may play an important role in the balance of the ecosystem by predating on them (De la Llata Quiroga 2021; E. De la Llata Quiroga unpubl. data 2022).

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