

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

PIRAQUARA DE FORA COVE ISRA

South American Atlantic Region

SUMMARY

Piraquara de Fora Cove is located in Angra dos Reis municipality, Rio de Janeiro state, southeast Brazil. The area is situated within Ilha Grande Bay and is primarily characterised by a sandy and rocky substrate. Within this bay, a persistent eastward current is observed. The area partially overlaps with the Tamoios Ecological Station. Within this area there are: **threatened species** and **undefined aggregations** (Blacktip Shark *Carcharhinus limbatus*).

CRITERIA

Criterion A - Vulnerability; Sub-criterion C5 - Undefined Aggregations

BRAZIL

0-20 metres

12.08 km²



DESCRIPTION OF HABITAT

Piraquara de Fora Cove is located in Angra dos Reis municipality, Rio de Janeiro state, southeast Brazil. The area is situated within Ilha Grande Bay and is characterised by a substrate that is primarily sandy and rocky (Teixeira et al. 2012). Within Ilha Grande Bay, a persistent eastward current is observed, lasting longer than the dominant tidal period and occurring independently of wind forces. This current is associated with a subsurface eastward coastal current that flows along the adjacent continental shelf, driven by the adjustment of density fields over the shelf and oceanic region (Rodrigues et al. 2022). Additionally, the mixing of South Atlantic Central Water with coastal waters results in a horizontally homogeneous water mass below 15 m depth. Above this depth, the presence of saline waters of oceanic origin indicates the influence of offshore water masses on the bay's hydrodynamic structure (Rodrigues et al. 2022). The Central Nuclear Almirante Álvaro Alberto (CNAAA) nuclear power plant discharges into this area. The mean temperature of the seawater in this area ranges from 29.5 °C in austral winter to 36.5 °C in summer, and the thermal plume stretches to an area of approximately 3.7 km² (Teixeira et al. 2012).

The area partially overlaps with the Tamoios Ecological Station (UNEP-WCMC & IUCN 2024).

This Important Shark and Ray Area is pelagic and is delineated from surface waters (0 m) to 20 m based on the bathymetry of the area.

ISRA CRITERIA

CRITERION A – VULNERABILITY

One Qualifying Species considered threatened with extinction according to the IUCN Red List of Threatened Species regularly occurs in the area. This is the Vulnerable Blacktip Shark (Rigby et al. 2021).

SUB-CRITERION C5 – UNDEFINED AGGREGATIONS

Piraquara de Fora Cove is an important area for undefined aggregations of one shark species.

Blacktip Sharks regularly and predictably aggregate within this area. Between 2020–2024, 69 drone belt transects (~1.2 km long by 300 m wide) were undertaken within the area (FA Rolim et al. unpubl. data 2025). Aggregations of Blacktip Sharks were recorded on all transects (n = 57) conducted between April to mid-September (82.6% of transects), with aggregations ranging between 5–113 individuals (average = 17.2; FA Rolim et al. unpubl. data 2025).

Between August 2023 and June 2024, four female Blacktip Sharks were tagged within the area with SPOT (n = 1), PSAT (n = 1), and MINIPAT (n = 2) tags (Lana et al. 2025a). The duration of tagging time was 2–3 days except for the SPOT tag that lasted 138 days and revealed a female that stayed within Ilha Grande Bay for three months after which it had an excursion outside the bay into the mid-Atlantic Ocean in December 2023. The remaining three sharks stayed within the broader Ilha Grande Bay for the 2–3 days monitored (Lana et al. 2025a).

While bottom water temperatures (~22°C) in Piraquara de Fora Cove, starting at 3 m depth in the water column, are comparable to other nearby areas in Ilha Grande Bay, thermal discharge from the CNAAA raises surface temperatures by approximately 3°C near the outflow (Ferreira et al. 2017; FA Rolim et al. unpubl. data 2025). Sharks may favour these warmer waters for their physiological benefits, as elevated temperatures have been suggested to enhance metabolic and physiological

functions, including digestion and somatic growth, allowing them to conserve energy more effectively (Bernal et al. 2004). However, reports from fishers prior to the nuclear power plant's establishment indicate that shark aggregations regularly occurred in this area during the months of May, June, and November, although species identification could not be confirmed (Singer 1979).

Furthermore, while there is likely an influence of the nuclear outflow on the presence of sharks in this area, drone monitoring in July 2024 outside of the impact zone of the outflow, also recorded an aggregation of over 50 Blacktip Sharks. Both pieces of evidence indicate that this aggregative behaviour is not solely driven by the temperature within this bay, but that Blacktip Sharks are aggregating regularly within this area. One pregnant Blacktip Shark was stranded within this area in June 2020 (FA Rolim et al. unpubl. data 2025) and one pregnant Blacktip Shark was captured in June 2024 (Lana et al. 2025b). Blacktip Sharks have a well-defined parturition period from late spring to early summer in the southwestern Atlantic Ocean (Bornatowski 2008; Santander-Neto et al. 2020), matching the seasonal aggregation within this area. Additionally, the abundance of mullets (Mugilidae), which are more prevalent in Piraquara de Fora Cove compared to adjacent areas (Teixeira et al. 2012), may also play a key role in attracting Blacktip Sharks with animals observed pursuing mullets near the surface (FA Rolim et al. unpubl. data 2025). In 24 of 38 monitoring days during the drone survey, at least one individual jumping out of the water was observed (average = 2.4 per sampling) (FA Rolim et al. unpubl. data 2025). Although it is possible that feeding and/or reproduction drive this aggregation, further information is required to understand the nature and function of the aggregation within this area.

Acknowledgments

Fernanda Andreoli Rolim (Universidade de São Paulo), Leonardo Mitrano Neves (Universidade Federal Rural do Rio de Janeiro), Fernanda de Oliveira Lana (Associação Instituto PROSHARK Ecodesenvolvimento de Tubarões e Raias), Nathan Lagares Franco Araujo (Instituto Mar Urbano), José Truda Palazzo Jr (Instituto Brasileiro de Conservação da Natureza), Marco Antonio Light Slerca (NASH Maritime Ltd.), Leandro Amaro Pessoa (Associação Instituto PROSHARK Ecodesenvolvimento de Tubarões e Raias), and Vanessa Bettcher Brito (IUCN SSC Shark Specialist Group - ISRA Project) contributed and consolidated information included in this factsheet. We thank all participants of the 2025 ISRA Region 05 - South American Atlantic 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. 2025. Piraquara de Fora Cove ISRA Factsheet. Dubai: IUCN SSC Shark Specialist Group.

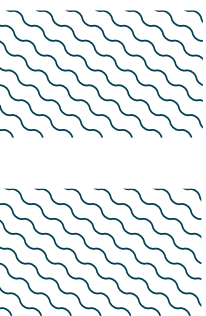
QUALIFYING SPECIES

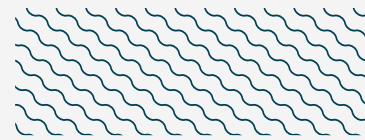
Scientific Name	Common Name	IUCN Red List Category	Global Depth Range (m)	ISRA Criteria/Sub-criteria Met								
				A	B	C1	C2	C3	C4	C5	D1	D2
RAYS												
<i>Carcharhinus limbatus</i>	Blacktip Shark	VU	0-140	X						X		

SUPPORTING SPECIES

Scientific Name	Common Name	IUCN Red List Category
SHARKS		
<i>Carcharhinus brevipinna</i>	Spinner Shark	VU
RAYS		
<i>Aetobarus narinari</i>	Whitespotted Eagle Ray	EN
<i>Dasyatis hypostigma</i>	Groovebelly Stingray	EN
<i>Gymnura altavela</i>	Spiny Butterfly Ray	EN
<i>Mobula tarapacana</i>	Sicklefin Devil Ray	EN

IUCN Red List of Threatened Species Categories are available by searching species names at www.iucnredlist.org Abbreviations refer to: CR, Critically Endangered; EN, Endangered; VU, Vulnerable; NT, Near Threatened; LC, Least Concern; DD, Data Deficient.





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