

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

## SAINT-GILLES TO SAINT-PAUL ISRA

### Western Indian Ocean Region

#### SUMMARY

Saint-Gilles to Saint-Paul is located on the northwest coast of Reunion Island. This area has the widest island shelf of Reunion Island (~ 5 km long) and is sheltered from oceanic swells and austral swell events. This area partially overlaps with the National Marine Nature Reserve of Réunion Island protected area and with La Réunion Marine Natural Reserve Key Biodiversity Area. Within this area there are: **threatened species** (e.g., Common Eagle Ray *Myliobatis aquila*); and **undefined aggregations** (e.g., Bull Shark *Carcharhinus leucas*).

#### CRITERIA

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

FRANCE

0-200 metres

98.03 km<sup>2</sup>





## DESCRIPTION OF HABITAT

Saint-Gilles to Saint-Paul is located on the northwest coast of Reunion Island. This area has the widest shelf of the island, which extends up to 5 km from land. In the northern part of the area, Saint-Paul Bay is the largest bay on the island. There are freshwater inputs to the area, in the east from the 'Rivière des Galets', the Saint-Paul Pond, and the Saint Gilles Ravine. While most of the island is affected by sporadic oceanic swells generated by tropical cyclones (occurring mainly during the austral summer, from November to March) or by winter swell events (from April to October; Rindraharisaona et al. 2020), this area is the most sheltered area in Reunion Island. The summer season is warm with average annual Sea Surface Temperature (SST) of 28°C with heavy rains; the winter is cooler (SST = 23°C) with infrequent rain (Conand et al. 2008). The benthos is covered with volcanic sand and mud. There are wide fringing coral reefs in the westernmost area, from Saint Gilles to La Saline les Bains and a patchy reef bank at Boucan Canot (Montaggioli & Faure 1980).

This area partly overlaps with the National Marine Nature Reserve of Réunion Island protected area and with La Réunion Marine Natural Reserve Key Biodiversity Area (KBA 2023).

The Important Shark and Ray Area is benthopelagic and is delineated from inshore and surface waters (0 m) to 200 m based on the observations of the Qualifying Species in 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 Vulnerable species; threatened rays comprise one Critically Endangered species, one Endangered species, and two Vulnerable species (IUCN 2023).

### SUB-CRITERION C5 - UNDEFINED AGGREGATIONS

Saint-Gilles to Saint-Paul is important for undefined aggregations of two shark and four ray species.

From October 2012 to May 2014, 20 adult Bull Sharks (size range = 183–329 cm total length [TL]; sex ratio, 0.35:1 male:female; estimated size-at-birth for this species in Reunion Island is 60–80 cm TL and size-at-maturity is 234 cm TL for males and 257 cm TL for females; Pirog et al. 2019) were monitored with acoustic receivers along the west coast of Reunion island (Institute de Recherche pour le Développement [IRD] 2015). Receivers were deployed ~2 km apart from each other and at depths of 10–60 m. This area had the highest detections of Bull Sharks in Reunion Island during the tracking period (J Mourier unpubl. data 2021). Further, the spatial dynamics of Bull Sharks were found to be strongly influenced by size. Larger sharks, especially larger females, were mostly found within the area during the winter (Mourier et al. 2021). This geographical structuring of the population indicates an ontogenetic segregation in habitat, where older and younger sharks use different habitats and their space-use rarely overlaps, a common pattern observed in many shark species (Speed et al. 2010). More importantly, in this area the second highest number of female/female co-occurrences and occasional male/female co-occurrences were recorded among the receiver network (J Mourier unpubl. data 2021). These co-occurrences mostly occurred from April to July and altogether indicate that undefined aggregations of Bull Sharks occur in this area. The function of these aggregations is currently unknown. It is unclear why, in Reunion Island, larger sharks display a preference for Saint-Gilles to Saint-Paul, but it may be due to the presence of abundant food

resources or a preference for the sandy bottom on a 50 m deep shelf between Saint-Gilles and Saint-Paul (IRD 2015). Alternatively, this area could represent a resting area due to optimal current conditions (Soria et al. 2019). The detection of these larger individuals increased during autumn and winter (Blaison et al. 2015; IRD 2015; Soria et al. 2019), which could also possibly be a result of increased mating activity. It has been suggested that a pre-mating aggregation could occur in the area from April onwards (Soria et al. 2019). The observed dynamics in movement patterns could also be driven by parturition with female Bull Sharks using some areas as pupping and nursery grounds, and parturition occurring in October–November (Pirog et al. 2019). Despite their ability to travel long distances, several studies have highlighted site-fidelity and reproductive philopatry in Bull Shark populations across the world (Brunnschweiler & Baensch 2011; Karl et al. 2011; Tillett et al. 2012).

Tiger Sharks were captured in the local shark control program along the west coast of Reunion Island using Shark Management Alert in Real Time (SMART) drumlines and benthic-set longlines. SMART drumlines were deployed at depths of 12–35 m and mostly set at night while longlines were deployed at depths of 10–70 m. From 2012 to 2017, a total of 150 Tiger Sharks (87 females, 63 males) were captured. These were almost exclusively adults (size range = 130–429 cm TL;  $L_{50}$  for males = 270–280 cm TL,  $L_{50}$  for females = 330–340 cm TL; Centre Sécurité Requin unpubl. data 2023). Most individuals ( $n = 112$ ; 77.8%) were caught within Saint-Gilles to Saint-Paul (Centre Sécurité Requin unpubl. data 2023). From December 2011 to September 2014, 55 Tiger Sharks (average size, 277 cm TL; range, 111–397 cm TL; sex ratio, 0.9:1.0 male:female) were monitored with acoustic telemetry along the west coast of Reunion Island (IRD 2015; J Mourier unpubl. data 2021). The highest number of detections (>10,000 detections) and the highest cumulative hours spent (>400 h) within the proximity of a receiver were made in the area, particularly at the receiver located near the shelf edge of the area. Seventeen individuals were detected at this receiver in total, and in many cases, individuals were detected at the same time at this same receiver (up to seven individuals detected simultaneously; J Mourier unpubl. data 2023). This indicates that undefined aggregations of Tiger Sharks occur in this area. The function of these aggregations is currently unknown.

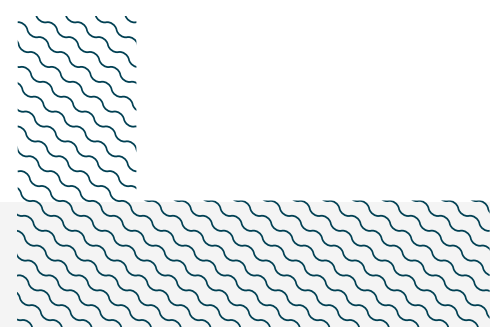
The Mascarene Archipelago Elasmobranch Observatory has maintained a citizen science and scientific diving database since early 2021 from the area. This has provided data on aggregations of ray species. Further information is required to determine the nature and function of these aggregations.

Spotted Eagle Rays are recurrent year-round in the area and have been recorded in a total of 34 observations, forming aggregations of 2–10 individuals.

Common Eagle Rays were sighted 14 times in the area, every year from September to April, forming aggregations of 2–20 individuals.

Pink Whiprays were also recurrently sighted ( $n = 25$  observations), from November to April, forming aggregations of 2–40 individuals.

Blotched Fantail Ray were sighted 16 times, every-year, from January to August, forming aggregations of 2–14 individuals.



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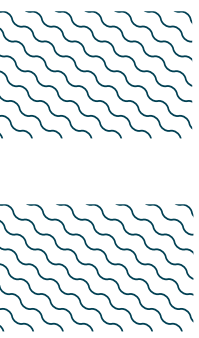
## QUALIFYING SPECIES

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>Carcharhinus leucas</i>	Bull Shark	VU	0-256	X							X		
<i>Galeocerdo cuvier</i>	Tiger Shark	NT	0-1,257								X		
<b>RAYS</b>													
<i>Aetobatus ocellatus</i>	Spotted Eagle Ray	EN	0-40	X							X		
<i>Myliobatis aquila</i>	Common Eagle Ray	CR	0-537	X							X		
<i>Pateobatis fai</i>	Pink Whipray	VU	0-200	X							X		
<i>Taeniurops meyeri</i>	Blotched Fantail Ray	VU	0-439	X							X		

## SUPPORTING SPECIES

Scientific Name	Common Name	IUCN Red List Category
<b>SHARKS</b>		
<i>Carcharhinus albimarginatus</i>	Silvertip Shark	VU
<i>Carcharhinus amblyrhynchos</i>	Grey Reef Shark	EN
<i>Carcharhinus melanopterus</i>	Blacktip Reef Shark	VU
<i>Carcharhinus plumbeus</i>	Sandbar Shark	EN
<i>Carcharodon carcharias</i>	White Shark	VU
<i>Isurus oxyrinchus</i>	Shortfin Mako	EN
<i>Loxodon macrorhinus</i>	Sliteye Shark	NT
<i>Mustelus mosis</i>	Arabian Smoothhound	NT
<i>Nebrius ferrugineus</i>	Tawny Nurse Shark	VU
<i>Rhincodon typus</i>	Whale Shark	EN
<i>Sphyrna zygaena</i>	Smooth Hammerhead	VU
<i>Triaenodon obesus</i>	Whitetip Reef Shark	VU
<b>RAYS</b>		
<i>Bathytoshia lata</i>	Brown Stingray	VU
<i>Rhynchobatus australiae</i>	Bottlenose Wedgefish	CR

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





## REFERENCES

- Blaison A, Jaquemet S, Guyomard D, Vangrevelinghe G, Gazzo T, Cliff G, Cotel P, Soria M. 2015.** Seasonal variability of bull and tiger shark presence on the west coast of Reunion Island, western Indian Ocean. *African Journal of Marine Science* 37: 199–208. <https://doi.org/10.2989/1814232X.2015.1050453>
- Brunnschweiler JM, Baensch H. 2011.** Seasonal and long-term changes in relative abundance of bull sharks from a tourist shark feeding site in Fiji. *PLoS One* 6: e16597. <https://doi.org/10.1371/journal.pone.0016597>
- Conand F, Marsac F, Tessier E, Conand C. 2008.** A ten-year period of daily sea surface temperature at a coastal station in Reunion Island, Indian Ocean (July 1993–April 2004): patterns of variability and biological responses. *Western Indian Ocean Journal of Marine Science* 6: 1–16. <https://doi.org/10.4314/wiojms.v6i1.48222>
- Institut de Recherche pour le Développement (IRD). 2015.** Rapport scientifique final du programme CHARC (Connaissances de l'écologie et de l'habitat de deux espèces de requins côtiers sur la côte ouest de La Réunion). Saint-Denis de La Réunion: Institut de recherche pour le développement.
- IUCN. 2023.** The IUCN Red List of Threatened Species. Version 2022-2. Available at: <https://www.iucnredlist.org> Accessed September 2023.
- Karl SA, Castro ALF, Lopez JA, Charvet P, Burgess GH. 2011.** Phylogeography and conservation of the bull shark (*Carcharhinus leucas*) inferred from mitochondrial and microsatellite DNA. *Conservation Genetics* 12: 371–382. <https://doi.org/10.1007/s10592-010-0145-1>
- Key Biodiversity Areas (KBA). (2023).** Key Biodiversity Areas factsheet: La Réunion Marine Natural Reserve. Available at: <https://www.keybiodiversityareas.org/site/factsheet/45426> Accessed August 2023.
- Montaggioni LF, Faure G, eds 1980.** Récifs coralliens des Mascareignes: Océan Indien. Collection des Travaux du Centre Universitaire. La Réunion: Université Française de l'Océan Indien.
- Mourier J, Soria M, Blaison A, Simier M, Certain G, Demichelis A, Hattab T. 2021.** Dynamic use of coastal areas by bull sharks and the conciliation of conservation and management of negative human-wildlife interactions. *Aquatic Conservation: Marine and Freshwater Ecosystems* 31: 2926–2937. <https://doi.org/10.1002/aqc.3674>
- Pirog A, Magalon H, Poirout T, Jaquemet S. 2019.** Reproductive biology, multiple paternity and polyandry of the bull shark *Carcharhinus leucas*. *Journal of Fish Biology* 95: 1195–1206. <https://doi.org/10.1111/jfb.14118>
- Rindraharisaona EJ, Cordier E, Barruol G, Fontaine FR, Singh M. 2020.** Assessing swells in La Réunion Island from terrestrial seismic observations, oceanographic records and offshore wave models. *Geophysical Journal International* 221: 1883–1895. <https://doi.org/10.1093/gji/ggaa117>
- Soria M, Heithaus MR, Blaison A, Crochelet E, Forget F, Chabanet P. 2019.** Residency and spatial distribution of bull sharks *Carcharhinus leucas* in and around Reunion Island marine protected area. *Marine Ecology Progress Series* 630: 101–113. <https://www.jstor.org/stable/26920543>
- Speed CW, Field IC, Meekan MG, Bradshaw CJ. 2010.** Complexities of coastal shark movements and their implications for management. *Marine Ecology Progress Series* 408: 275–293. <https://doi.org/10.3354/meps08581>
- Tillett BJ, Meekan MG, Field IC, Thorburn DC, Ovenden JR. 2012.** Evidence for reproductive philopatry in the bull shark *Carcharhinus leucas*. *Journal of Fish Biology* 80: 2140–2158. <https://doi.org/10.1111/j.1095-8649.2012.03228.x>