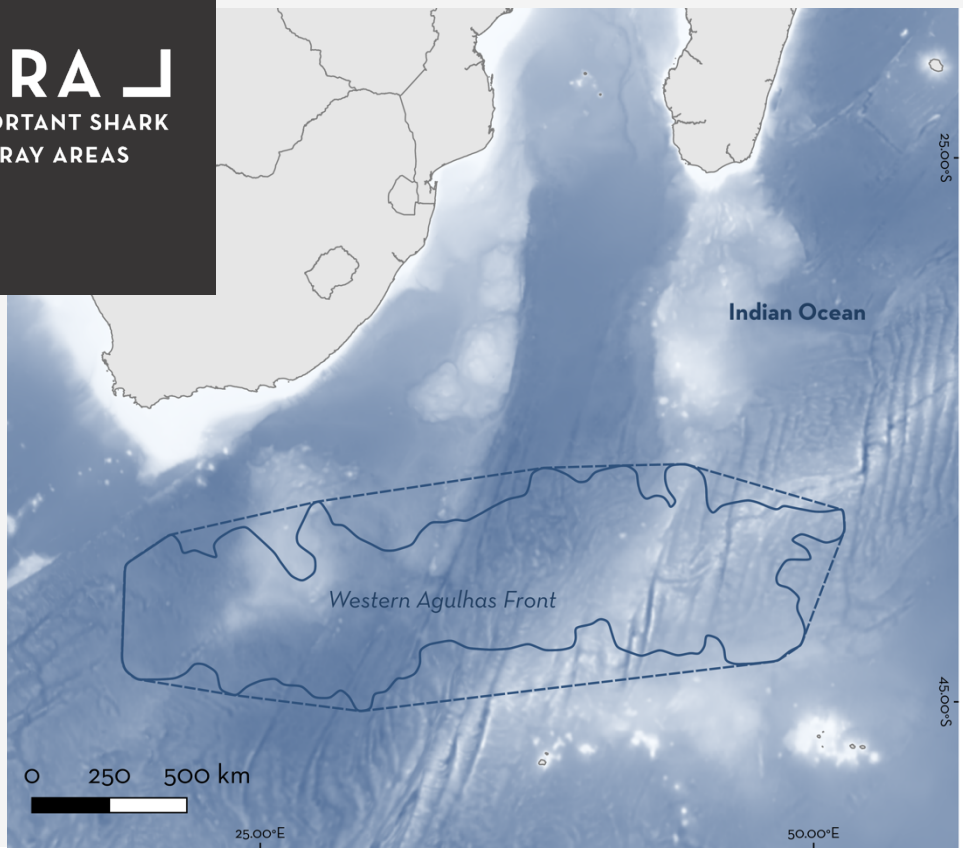
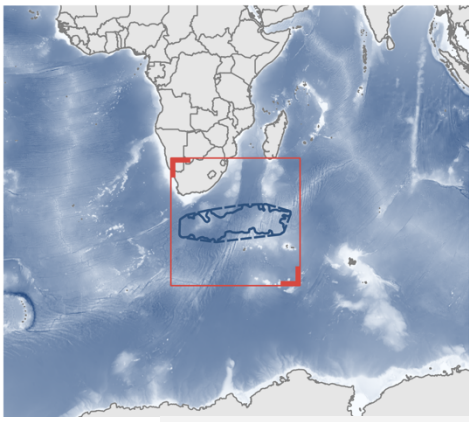
ISRA
IMPORTANT SHARK AND RAY AREAS





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

WESTERN AGULHAS FRONT ISRA

Western Indian Ocean Region

– **–**

ABNJ

– **–**

0–180 metres

– **–**

1,454,950.9 km²

– **–**

SUMMARY

Western Agulhas Front is a large temperate pelagic area beyond national jurisdiction (ABNJ) in the southwestern Indian Ocean. This area partially overlaps with the Agulhas Front which is the eastward extension of the Agulhas Current. This front connects water from southeastern Africa to subtropical and sub-Antarctic waters. In the south, this borders with the Subantarctic Front. This area is characterised by unusually high productivity compared to other areas beyond national jurisdiction of the Indian Ocean. The area overlaps with three Ecologically or Biologically Significant Marine Areas and three Key Biodiversity Areas. Within this area there are: **threatened species** (Porbeagle *Lamna nasus*) and **reproductive areas** (e.g., Blue Shark *Prionace glauca*).

CRITERIA

Criterion A – Vulnerability; Sub-criterion C1 – Reproductive Areas

DESCRIPTION OF HABITAT

Western Agulhas Front is a large temperate pelagic area beyond national jurisdiction in the southwestern Indian Ocean. This area partially overlaps in the west with the Agulhas Front which is the eastward extension of the Agulhas Current, which connects water from southeastern Africa to subtropical and sub-Antarctic waters as far east as the French southern territories of Amsterdam and St Paul islands (Belkin & Gordon 1996; Kostianoy et al. 2004). The Agulhas Return Current has a strong influence on the northern part of the region. The site has high productivity compared to other areas beyond national jurisdiction of the Indian Ocean and supports a significant diversity of biota (CBD 2023a). In the south, this area overlaps with the Subantarctic Front. Habitats include seamounts, transform faults and fracture zones, deep trenches, hydrothermal vents, abyssal plains, and pelagic waters. In this area, the annual mean sea surface temperature is between ~10 to 17°C (Shukla et al. 2021).

This area overlaps with three Ecologically or Biologically Significant Marine Area (EBSA): Agulhas Front (CBD 2023a); Prince Edward Islands, Del Cano Rise and Crozet Islands (CBD 2023b); and Coral Seamount and Fracture Zone Feature (CBD 2023c). This area also overlaps with three Key Biodiversity Areas (KBAs): Indian Ocean, Western 1 - Marine (KBA 2023a); Indian Ocean, Western 2 - Marine (KBA 2023b); and Indian Ocean, Western 3 - Marine (KBA 2023c).

This Important Shark and Ray Area is pelagic and is delineated from 0 to 180 m based on the depth range of the Qualifying Species in this area.

ISRA CRITERIA

CRITERION A – VULNERABILITY

The one Qualifying Species within the area is considered threatened with extinction according to the IUCN Red List of Threatened Species™. The Porbeagle is assessed as Vulnerable (Rigby et al. 2019).

SUB-CRITERION C1 – REPRODUCTIVE AREAS

Western Agulhas Front is an important reproductive area for two shark species.

From 1967–2014, 77,396 Blue Sharks were collected from longline fisheries operating between 25°N to 48°S, with sizes of 44.8–474.8 cm total length (TL) (Coelho et al. 2018). Smaller animals were mainly reported from temperate higher latitude waters, while mature individuals had a broader distribution that included equatorial and tropical regions. In this area, neonates, young-of-the-year (YOY), and juveniles (51–148 cm TL) were present. Size-at-birth for the Blue Shark is of 35–60 cm TL (Ebert et al. 2021) and size of YOY are reported up to ~122 cm TL (Skomal & Natanson 2003). Further, from 2004–2013, this area had one of the highest relative abundances of Blue Sharks in the Indian Ocean inferred from catch-per-unit-effort (CPUE; sharks/1,000 hooks) in longline fisheries (Tsai & Liu 2015). However, body sizes were not reported.

Kernel density distribution of Blue Shark YOY determined that in the Indian Ocean the largest aggregation was located in this area (Coelho et al. 2018). Thus, this area likely represents the largest known reproductive area for this species in the Western Indian Ocean. The areas with the highest shark CPUE (count/hook) are typically associated with high catches of Blue Shark (78% of total reported by global tuna Regional Fisheries Management Organizations [tRFMOs] from 2012–2020

shark catch globally). Western Agulhas Front overlaps with the region with the highest shark CPUE in the Western Indian Ocean (Burns et al. 2023). This supports findings from a recent study in the Western Indian Ocean, where it has been suggested that pregnant females undertake seasonal migrations (from tropical to temperate waters) within a year to give birth in southwestern productive temperate waters (Zhu et al. 2023).

Commercial fisheries and survey data from pelagic longlines targeting mostly tuna in the Southern Ocean between 1992–2011 were monitored in which 36,247 Porbeagles were captured with an effort of 212,622,118 hooks mostly from the Indian Ocean (Semba et al. 2013). Results indicated that most pregnant Porbeagles (19 of the 28 locations in which pregnant Porbeagles have been recorded) in the Southern Ocean were in the Western Agulhas Front in June and July (Semba et al. 2013). Porbeagles were captured at depths between 0 to 180 m (Semba et al. 2013). A similar behaviour has been recorded for pregnant Porbeagles in the southwestern Pacific Ocean (Francis & Stevens 2000). Porbeagles generally segregate by temperature and latitude, with adults and juveniles in colder waters than neonates and YOY (Yatsu 1995; Semba et al. 2013).

Acknowledgments

Lauren Nelson (Indian Ocean Tuna Commission) and Adriana Gonzalez-Pestana (IUCN SSC Shark Specialist Group - ISRA Project) contributed and consolidated information included in this factsheet. We thank all participants of the 2023 ISRA Region 7 – Western Indian Ocean 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. Western Agulhas Front 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												
Lamna nasus	Porbeagle	VU	0–1,809	X		X						
Prionace glauca	Blue Shark	NT	0–1,000			X						

SUPPORTING SPECIES

Scientific Name	Common Name	IUCN Red List Category
SHARKS		
Shortfin Mako	*Isurus oxyrinchus*	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.

REFERENCES

Belkin IM, Gordon AI. 1996. Southern Ocean fronts from the Greenwich meridian to Tasmania. *Journal of Geophysical Research* 101: 3675–3696. https://doi.org/10.1029/95JC02750

Burns ES, Bradley D, Thomas LR. 2023. Global hotspots of shark interactions with industrial longline fisheries. *Frontiers in Marine Science* 9: 1062447. https://doi.org/10.3389/fmars.2022.1062447

Coelho R, Mejuto J, Domingo A, Yokawa K, Liu KM, Cortés E, Romanov EV, Da Silva C, Hazin F, Arocha F, et al. 2018. Distribution patterns and population structure of the blue shark (*Prionace glauca*) in the Atlantic and Indian Oceans. *Fish and Fisheries* 9: 90–106. https://doi.org/10.1111/faf.12238

Convention on Biological Diversity (CBD). 2023a. Agulhas Front. Ecologically or Biologically Significant Areas (EBSAs). Available at: https://chm.cbd.int/database/record?documentID=203996 Accessed August 2023.

Convention on Biological Diversity (CBD). 2023b. Prince Edward Islands, Del Cano Rise and Crozet Islands. Ecologically or Biologically Significant Areas (EBSAs). Available at: https://chm.cbd.int/database/record?documentID=204011 Accessed August 2023.

Convention on Biological Diversity (CBD). 2023c. Coral Seamount and Fracture Zone Feature. Ecologically or Biologically Significant Areas (EBSAs). Available at: https://chm.cbd.int/database/record?documentID=204008 Accessed August 2023.

Ebert DA, Dando M, Fowler S. 2021. *Sharks of the world. A complete guide*. Princeton: Princeton University Press.

Francis MP, Stevens JD. 2000. Reproduction, embryonic development, and growth of the porbeagle shark, *Lamna nasus*, in the southwest Pacific Ocean. *Fishery Bulletin* 98: 41–63. http://hdl.handle.net/102.100.100/208989?index=1

Key Biodiversity Areas (KBA). 2023a. Key Biodiversity Areas factsheet: Indian Ocean, Western 1 - Marine. Available at: https://www.keybiodiversityareas.org/site/factsheet/30380 Accessed August 2023.

Key Biodiversity Areas (KBA). 2023b. Key Biodiversity Areas factsheet: Indian Ocean, Western 2 - Marine. Available at: https://www.keybiodiversityareas.org/site/factsheet/30381 Accessed August 2023.

Key Biodiversity Areas (KBA). 2023c. Key Biodiversity Areas factsheet: Indian Ocean, Western 3 - Marine. Available at: https://www.keybiodiversityareas.org/site/factsheet/30382 Accessed August 2023.

Kostianoy AG, Ginzburg AI, Frankignoulle M, Delille B. 2004. Fronts in the Southern Indian Ocean as inferred from satellite sea surface temperature data. *Journal of Marine Systems* 45: 55–73. https://doi.org/10.1016/j.jmarsys.2003.09.004

Rigby CL, Barreto R, Carlson J, Fernando D, Fordham S, Francis MP, Herman K, Jabado RW, Liu KM, Marshall A, et al. 2019. *Lamna nasus. The IUCN Red List of Threatened Species* 2019: e.T11200A500969. https://dx.doi.org/10.2305/IUCN.UK.2019-3.RLTS.T11200A500969.en

Semba Y, Yokawa K, Matsunaga H, Shono H. 2013. Distribution and trend in abundance of the porbeagle (*Lamna nasus*) in the southern hemisphere. *Marine and Freshwater Research* 64: 518–529. https://doi.org/10.1071/MF12272

Shukla SK, Crosta X, Ikehara M. 2021. Sea surface temperatures in the Indian Sub-Antarctic Southern Ocean for the last four interglacial periods. *Geophysical Research Letters* 48(8): e2020GL090994. https://doi.org/10.1029/2020GL090994

Skomal GB, Natanson LJ. 2003. Age and growth of the blue shark (*Prionace glauca*) in the North Atlantic Ocean. *Fishery Bulletin* 101: 627–639.

Tsai WP, Liu KM. 2015. Updated and revised standardized catch rate of blue sharks caught by the Taiwanese longline fishery in the Indian Ocean. IOTC–2015–WPEB11–52 Rev_1.

Yatsu A. 1995. Zoogeography of the epipelagic fishes in the South Pacific Ocean and the Pacific sector of the Subantarctic, with special reference to the ecological role of slender tuna, *Allothunnus fallai*. *Bulletin of the National Research Institute of Far Seas Fisheries* 32: 145.

Zhu J, Geng Z, Zhu J, Richard K. 2023. Reproductive biology and distribution of the Blue Shark (*Prionace glauca*) in the Western Indian Ocean. *Biology* 12(8): 1128. https://doi.org/10.3390/biology12081128