APPENDIX 17
EXECUTIVE SUMMARY: BLUE SHARK (2022)
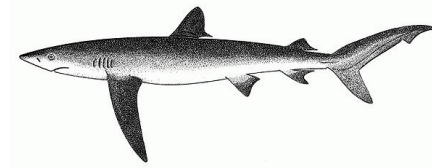

Table 1. Status of blue shark (*Prionace glauca*) in the Indian Ocean

Area	Indicators		2021 stock status determination
Indian Ocean	Reported catch 2022 (t)	24,424	
	Estimated catch 2019 (t)[4]	43,240	
	Not elsewhere included (nei) sharks[1] 2022 (t)	32,558	
	Average reported catch 2018-22 (t)	25,275	
	Average estimated catch 2015-19 (t)[4]	48,781	
	Avg. not elsewhere included (nei) sharks[1] 2018-22 (t)	31,303	**99.9%**
	MSY (1,000 t) (80% CI)[2]	36.0 (33.5 - 38.6)	
	F_{MSY} (80% CI)[2]	0.31 (0.306 - 0.31)	
	SB_{MSY} (1,000 t) (80% CI)[2,3]	42.0 (38.9 - 45.1)	
	F_{2019}/F_{MSY} (80% CI)[2]	0.64 (0.53 - 0.75)	
	SB_{2019}/SB_{MSY} (80% CI)[2,3]	1.39 (1.27 - 1.49)	
	SB_{2019}/SB_{0} (80% CI)[2,3]	0.46 (0.42 - 0.49)	

Boundaries for the Indian Ocean are defined as the IOTC area of competence

[1]Includes all other shark catches reported to the IOTC Secretariat, which may contain this species (i.e., SKH: Various sharks nei; RSK: Requiem sharks nei; AG38: Blue shark, shortfin mako, oceanic whitetip shark)

[2]Estimates refer to the base case model using estimated catches

[3]Refers to fecund stock biomass

[4]Catch estimated for stock assessment purposes only (doc IOTC-2021-WPEB17(AS)-14_Rev1)

Colour key	Stock overfished (SB_{2019}/SB_{MSY}< 1)	Stock not overfished (SB_{2019}/SB_{MSY}≥ 1)
Stock subject to overfishing(F_{2019}/F_{MSY}> 1)	0%	0.1%
Stock not subject to overfishing (F_{2019}/F_{MSY}≤ 1)	0%	99.9%
Not assessed/Uncertain		

Table 2. Blue shark: IUCN threat status of blue shark (*Prionace glauca*) in the Indian Ocean.

Common name	Scientific name	IUCN threat status[3]		
		Global status	WIO	EIO
Blue shark	*Prionace glauca*	Near Threatened	–	–

IUCN = International Union for Conservation of Nature; WIO = Western Indian Ocean; EIO = Eastern Indian Ocean

[3]The process of the threat assessment from IUCN is independent from the IOTC and is presented for information purpose only

Sources: IUCN Red List 2020, Stevens 2009

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Stock status. No new stock assessment was carried out for blue sharks in 2023 and so the results are based on the assessment carried out in 2021 using an integrated age-structured model (SS3) (**Fig. 1**) (using data up to 2019). Uncertainty in data inputs and model configuration were explored through sensitivity analysis. All models produced similar results suggesting the stock is currently not overfished nor subject to overfishing, but with the trajectories showing consistent trends towards the overfished and subject to overfishing quadrant of the Kobe plot (**Fig. 1**). A base case model was selected based on the best Indian Ocean biological data, consistency of CPUE standardized relative abundance series, model fits and spatial extent of the data (**Fig. 1, Table 1**). In particular, the base case model used the GAM-based catch history estimates and CPUE series from South Africa, EU-Portugal, EU-France (Reunion), EU-Spain, Taiwan and Japan. The major sources of uncertainty identified in the current model are catches and CPUE indices of abundance. Model results were explored with respect to their sensitivity to the major axes of uncertainty identified, however the ratio-based and nominal catches were considered unrealistic. If the alternative CPUE groupings were used, then the stock status was somewhat less positive. The ecological risk assessment (ERA) conducted for the Indian Ocean by the WPEB and SC in 2018 consisted of a semi-quantitative risk assessment analysis to evaluate the resilience of shark species to the impact of a given fishery by combining the biological productivity of the species and its susceptibility to each fishing gear type. Blue sharks received a medium vulnerability ranking (No. 10) in the ERA rank for longline gear because it was estimated as the most productive shark species but was also characterised by the second highest susceptibility to longline gear. Blue shark was estimated as not being susceptible thus not vulnerable to purse seine gear. The current IUCN threat status of 'Near Threatened' applies to blue sharks globally (**Table 2**). Information available on this species has been improving in recent years. Blue sharks are commonly taken by a range of fisheries in the Indian Ocean and in some areas they are fished in their nursery grounds. Because of their life history characteristics – they live until at least 25 years, mature at 4–6 years, and have 25–50 pups every year – they are considered to be the most productive of the pelagic sharks. On the weight-of-evidence available in 2021, the stock status is determined to be **not overfished** and **not subject to overfishing** (**Table 1**).

Outlook. The Kobe II Strategy Matrix (**Table 3**) provides the probability of exceeding reference levels in the short (3 years) and long term (10 years) given a range of percentage changes in catch.

Management advice. Target and limit reference points have not yet been specified for pelagic sharks in the Indian Ocean. The 2021 assessment indicates that Indian Ocean blue shark are not overfished nor subject to overfishing (**Table 3**). If the catches are increased by over 20%, the probability of maintaining spawning biomass above MSY reference levels (SB>SB_{MSY}) over the next 10 years will be decreased (**Table 3**). The stock should be closely monitored. While mechanisms exist for encouraging CPCs to comply with their recording and reporting requirements (Resolution 16/06), these need to be further implemented by the Commission, so as to better inform scientific advice in the future.

The following key points should also be noted:
- **Maximum Sustainable Yield (MSY)**: estimate for the Indian Ocean stock is approximately 36,000 t.
- **Reference points**: The Commission has not adopted reference points or harvest control rules for any shark species.
- **Main fishing gear** (2018–22): coastal longline; longline (deep-freezing); longline targeting swordfish; gillnet.

- **Main fleets** (2018–22): Indonesia; Taiwan,China; EU-Spain; Seychelles EU-Portugal; ; .
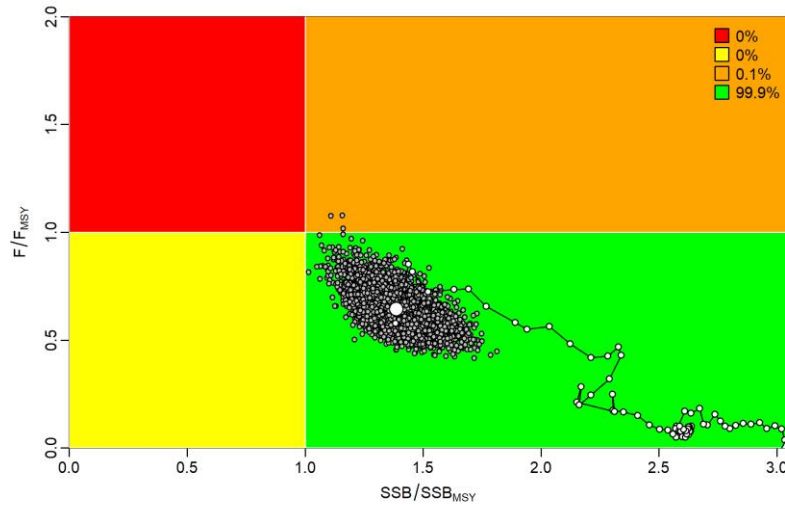

Fig. 1. Blue shark: Aggregated Indian Ocean stock assessment Kobe plot for the 2021 assessment base case model (base case model with trajectory and uncertainty in the terminal year.

Table 3. Blue shark: Aggregated Indian Ocean assessment Kobe II Strategy Matrix. Probability (percentage) of violating the MSY-based reference points for nine constant catch projections using the base case model (catch level from 2019* (43,240 MT), ± 10%, ± 20%, ± 30% and ± 40%) projected for 3 and 10 years

Reference point and projection time frame	Alternative catch projections (relative to the catch level* from 2019) and probability (%) of exceeding MSY-based reference points								
Catch Relative to 2019	60%	70%	80%	90%	100%	110%	120%	130%	140%
Catch (t)	(25,944)	(30,267)	(34,592)	(38,916)	(43,240)	(47,564)	(51,888)	(56,212)	(60,535)
$SB_{2022} < SB_{MSY}$	0%	0%	0%	0%	0%	0%	0%	0%	0%
$F_{2022} > F_{MSY}$	0%	0%	0%	0%	0%	1%	5%	16%	36%
$SB_{2029} < SB_{MSY}$	0%	0%	0%	0%	0%	2%	9%	25%	48%
$F_{2022} > F_{MSY}$	0%	0%	0%	0%	1%	13%	44%	75%	90%

*: average catch level and respective % changes refer to the estimated catch series used in the final base case model (IOTC-2021-WPEB17(AS)-15)

LITERATURE CITED

Stevens J (2009) *Prionace glauca*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.2. <www.iucnredlist.org>. Downloaded on 08 November 2012