EXECUTIVE SUMMARY: BIGEYE TUNA (2022)

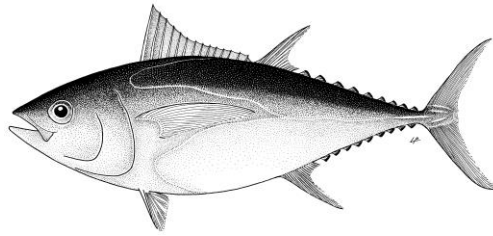**Table 1.** Status of bigeye tuna (*Thunnus obesus*) in the Indian Ocean

Area[1]	Indicator	Value	Status[4]
Indian Ocean[1]	Catch in 2021 (t)[2]	94,803	79%*
	Average catch 2017-2021 (t)[3]	87,488	
	MSY (1,000 t) (80% CI)	96 (83 –108)	
	F_{MSY} (80% CI)	0.26 (0.18–0.34)	
	SB_{MSY} (1,000 t) (80% CI)	513 (332–694)	
	F_{2021} / F_{MSY} (80% CI)	1.43 (1.10–1.77)	
	SB_{2021} / SB_{MSY} (80% CI)	0.90 (0.75–1.05)	
	SB_{2021} / SB_0 (80% CI)	0.25 (0.23–0.27)	

[1]Boundaries for the Indian Ocean stock assessment are defined as the IOTC area of competence
[2]Proportion of 2020 catch fully or partially estimated by IOTC Secretariat: 20.4%
[3]Including re-estimations of EU PS species composition for 2018 (requested for stock assessment purposes)
[4]The stock status refers to the most recent years' data used in the assessment conducted in 2019, i.e., 2018
*Estimated probability that the stock is in the respective quadrant of the Kobe Plot (**Table 2**), derived from the confidence intervals associated with the current stock status.

Table 2. Probability of stock status with respect to each of four quadrants of the Kobe plot. Percentages are calculated as the proportion of model terminal values that fall within each quadrant with model weights taken into account

	Stock overfished (SB_{2021} / SB_{MSY} <1)	Stock not overfished (SB_{2021} / SB_{MSY} ≥ 1)
Stock subject to overfishing (F_{2021} / F_{MSY} ≥ 1)	79%	17%
Stock not subject to overfishing (F_{2021} / F_{MSY} ≤ 1)	2%	2%
Not assessed / Uncertain		

INDIAN OCEAN STOCK – MANAGEMENT ADVICE

Stock status. In 2022 a new stock assessment was carried out for bigeye tuna in the IOTC area of competence to update the stock assessment undertaken in 2019. Two models were applied to the bigeye stock (Statistical Catch at Size (SCAS) and Stock Synthesis (SS3)), with the SS3 stock assessment selected to provide scientific advice. The reported stock status is based on a grid of 24 model configurations designed to capture the uncertainty on stock recruitment relationship, longline selectivity, growth and natural mortality. Spawning biomass in 2021 was estimated to be 25% (80% CI: 23-27%) of the unfished levels in 2021 (**Table 1**) and 90% (75-105%) of the level that can support MSY.

Fishing mortality was estimated at 1.43 (1.1-1.77) times the F_{MSY} level. Considering the characterized uncertainty, the assessment indicates that SB2021 is below SBMSY that F_{2021} is above FMSY (79%). On the weight-of-evidence available in 2022, the bigeye tuna stock is determined to be **overfished** and **subject to overfishing** (**Table 1**).

As IOTC agreed on a bigeye Management Procedure (Res. 22/03) it should be noted that the stock assessment is not used to provide a recommendation on the TAC.

Management Procedure. A management procedure for Indian Ocean Bigeye tuna was adopted under Resolution 22/03 by the IOTC Commission in May 2022 and was applied to determine a recommended TAC for Bigeye tuna for 2024 and 2025. A review of evidence for exceptional circumstances, was also conducted following the adopted guideline (ref SC 2021 report appendix 6A) as per the requirements of Resolution 22/03. The review covered information pertaining to i) new knowledge about the stock, population dynamics or biology, ii) changes in fisheries or fisheries operations, iii) changes to input data or missing data, and iv) inconsistent implementation of the MP advice. The evaluation concluded that there were no exceptional circumstances requiring either further research or management action on the TAC calculated by the MP. Application of the MP in 2022 results in a recommended TAC of 80,583t per year for 2024 and 2025.

Outlook. Catch in 2021 (94,803 t) of bigeye tuna is above the recommended TAC for 2024 and 2025 from the application of the bigeye tuna MP. Achieving the objectives of the Commission for this stock will require effective implementation of the MP TAC advice by the Commission going forward, a requirement further emphasised by the current status of the stock estimated from the stock assessment to be overfished and subject to overfishing.

Management advice. The TAC recommended from the application of the MP specified in Resolution 22/03 is 80,583t / year for the period 2024-2025. The recommended TAC is 15% below the 2021 catch.

The following key points should also be noted:

- **Main fisheries (mean annual catch 2017-2021)**: bigeye tuna are caught using purse seine (41.7%), followed by longline (37%) and line (13.5%). The remaining catches taken with other gears contributed to 7.8% of the total catches in recent years (**Fig. 1**).

- **Main fleets (mean annual catch 2017-2021)**: the majority of bigeye tuna catches are attributed to vessels flagged to Indonesia (23.7%) followed by Taiwan,China (15.4%) and Seychelles (15.3%). The 30 other fleets catching bigeye tuna contributed to 45.8% of the total catch in recent years (**Fig. 2**).
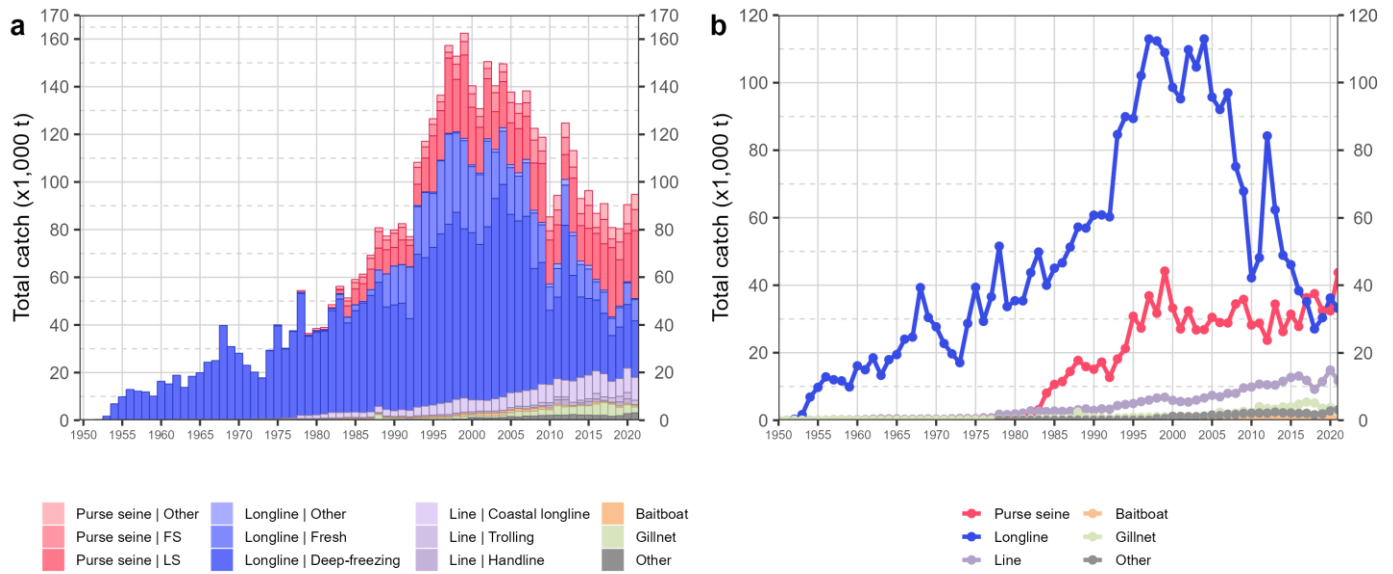
Fig. 1. Annual time series of (a) cumulative nominal catches (metric tonnes; t) by fishery group and (b) individual nominal catches (metric tonnes; t) by fishery for bigeye tuna during 1950–2021. FS = free-swimming school; LS = schools associated with drifting floating objects; Purse seine | Other: coastal purse seine, purse seine of unknown school association type, ring net; Longline | Other: swordfish and sharks-targeted longlines; Other: all remaining fishing gears
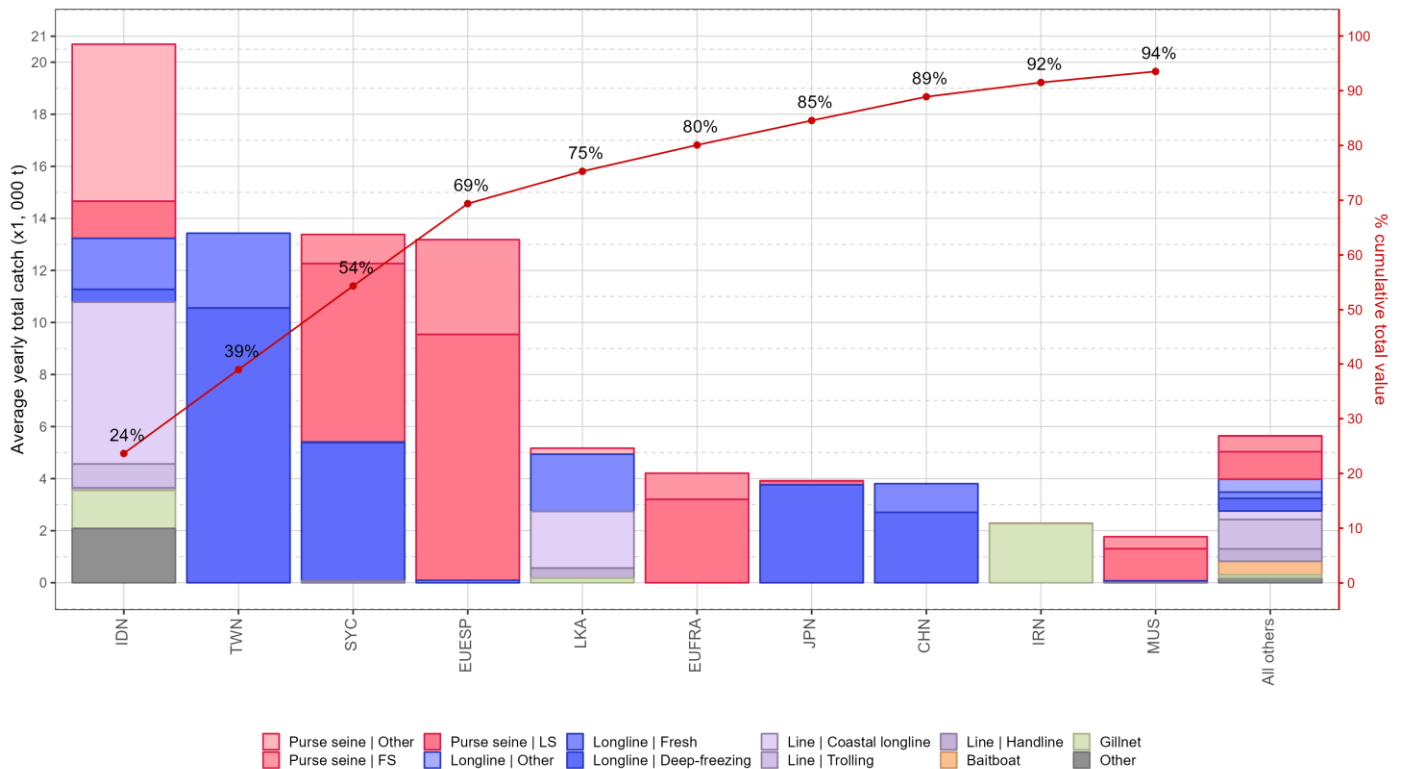

Fig. 2. Mean annual catches (metric tonnes; t) of bigeye tuna by fleet and fishery between 2017 and 2021, with indication of cumulative catches by fleet. FS = free-swimming school; LS = school associated with drifting floating objects. Purse seine | Other: coastal purse seine, purse seine of unknown association type, ring net; Longline | Other: swordfish and sharks-targeted longlines; Other: all remaining fishing gears
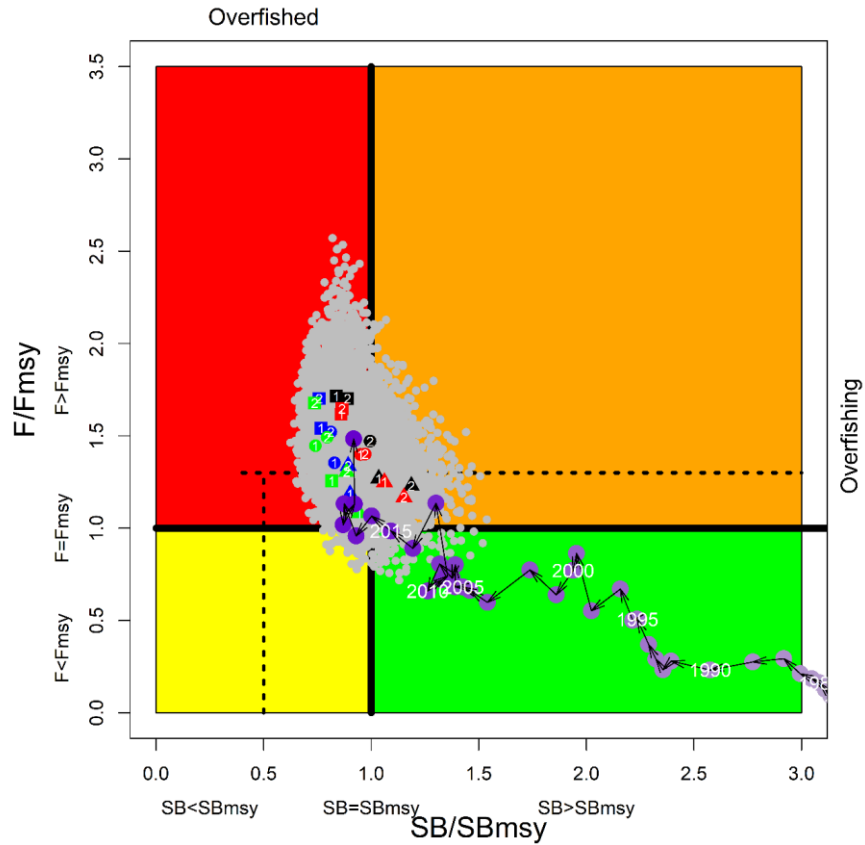
Fig. 3. Bigeye tuna: SS3 Aggregated Indian Ocean assessment Kobe plot. The coloured points represent stock status estimates from the 24 model options. Coloured symbols represent Maximum posterior density (MPD) estimates from individual models: square, circle, and Triangles represents alternative steepness options; black, red, blue, and green represents alternative growth and natural mortality option combination; 1,2, represents alternative selectivity options. The purple dot and arrowed line represent estimates of the reference model. Grey dots represent uncertainty from individual models. The dashed lines represent limit reference points for IO yellowfin tuna (SBlim = 0.5 SBMSY and Flim = 1.4 FMSY)