

APPENDIX 16

EXECUTIVE SUMMARY: SWORDFISH (2024)

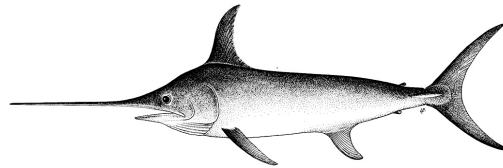


TABLE 1. Status of swordfish (*Xiphias gladius*) in the Indian Ocean.

Area ¹	Indicators		2023 stock status determination
Indian Ocean	Catch 2023 ² (t)	26,525	97%
	Average catch 2019-2023 (t)	28,142	
	MSY (1,000 t) (80% CI)	30 (26–33)	
	F _{MSY} (80% CI)	0.16 (0.12–0.20)	
	SB _{MSY} (1,000 t) (80% CI)	55 (40–70)	
	F ₂₀₂₁ /F _{MSY} (80% CI)	0.60 (0.43–0.77)	
	SB ₂₀₂₁ /SB _{MSY} (80% CI)	1.39 (1.01–1.77)	
	SB ₂₀₂₁ /SB ₁₉₅₀ (80% CI)	0.35 (0.32–0.37)	

¹ Boundaries for the Indian Ocean stock assessment are defined as the IOTC area of competence

² Proportion of 2023 catch estimated or partially estimated by IOTC Secretariat: 19.8%

³ 2021 is the final year that data were available for this assessment

Colour key	Stock overfished (SB _{year} /SB _{MSY} < 1)	Stock not overfished (SB _{year} /SB _{MSY} ≥ 1)
Stock subject to overfishing (F _{year} /F _{MSY} > 1)	0.2%	0
Stock not subject to overfishing (F _{year} /F _{MSY} ≤ 1)	3%	97%
Not assessed/Uncertain/Unknown		

INDIAN OCEAN STOCK – MANAGEMENT ADVICE

Stock status. No new stock assessment was carried out for swordfish in 2024, thus the stock status is determined on basis of the 2022 assessment. Two models were applied to the swordfish stock (ASPIC and Stock Synthesis (SS3)), with the SS3 stock assessment selected to provide scientific advice (as done previously). An update of the JABBA model was also conducted during the WPB meeting. The reported SS3 stock status is based on a grid of 48 model configurations designed to capture the uncertainty relating to steepness of the stock recruitment relationship (0.7, 0.8, and 0.9), recruitment variability (two levels), CPUE series (2 options), growth (2 options) and weighting of length composition data (two options). A number of the options included in the final grid were selected from a range of additional sensitivity runs that were conducted to explore uncertainties. In considering the assessment results, the WPB has expressed concern over whether the Japanese longline CPUE index accurately represents the change in abundance in the north-western region, which may require further investigation. Further, the south-western region, which is one of the sub-regions used in the model, exhibits a declining biomass trend which indicates higher depletion in this region, compared to other regions. Overall, median spawning biomass in 2021 was estimated to be 35% (80% CI: 32-37%) of the unfished levels (**Table 1**) and 1.39 times (80% CI: 1.01-1.77) the level required to support MSY. Median fishing mortality in 2021 was estimated to

be 60% (80% CI 43%-77%) of the FMSY level, and catch in 2021 (23,237 t) was well below the estimated MSY level of 29,856 t (80% CI: 26,319-33,393t). Taking into account the characterized uncertainty, and on the weight-of-evidence available in 2023, the swordfish stock is determined to be **not overfished** and **not subject to overfishing** (Table 1, Fig. 3). Noting that the IOTC has now agreed on a swordfish Management Procedure (Res. 24/08) to provide TAC recommendations, the stock assessment is no longer to be used to inform TACs.

Management Procedure. A management procedure for Indian Ocean Swordfish was adopted under Resolution 24/08 by the IOTC Commission in May 2024 and was applied to determine a recommended TAC for Swordfish for 2026, 2027 and 2028. A review of evidence for exceptional circumstances was also conducted following the adopted guideline (IOTC-2021-SC24-R, appendix 6A) as per the requirements of Resolution 24/08. 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) the operation of the MP. The evaluation concluded that there was one exceptional circumstance pertaining to the operation of the MP. Specifically, an error was identified in the original simulation analyses that, when corrected (without retuning), resulted in the MP not reaching the management objective. Correcting the error and retuning the MP (to 60% probability of being in the Kobe green zone) results in an MP that does reach the objective, with similar performance measure outcomes. Therefore, the recommended action is to use the corrected and retuned MP to recommend the TAC for 2026-2028. Should the Commission continue to implement the current MP, without retuning, it has a lower probability (54%) of being in the Kobe green zone and higher TAC variability, but otherwise similar performance statistics. The TAC derived from running SWO MP1 with or without retuning is 30527 t (i.e. the same) because the max TAC change constraint is reached in both MPs.

Outlook. The significant decrease in recent longline catch and effort from 2019 to 2022 (a 33% reduction from 35,256t to 23,597t) substantially lowered the fishing pressure on the Indian Ocean stock as a whole, prior to an increase in 2023 to 26,525t. The recent average catch of swordfish of 28,142t (for 2019-2023) is below the MP recommended TAC of 30,527 t for 2026-2028. Achieving the objectives of the Commission for this stock will require effective implementation of the MP TAC advice by the Commission going forward.

Management advice.

The TAC recommended from the application of the MP specified in Resolution 24/08 for the period 2026-2028 is 30,527t, which is around 15% higher than the catch in 2023 (26,525t).

The following key points should also be noted:

- **Maximum Sustainable Yield (MSY):** estimate for the Indian Ocean is 29,856 t.
- **Provisional reference points:** noting that the Commission in 2015 agreed to [Resolution 15/10 on target and limit reference points and a decision framework](#), the following should be noted:
 - a. **Fishing mortality:** current fishing mortality is considered to be below the provisional target reference point of F_{MSY} and below the provisional limit reference point of $1.4 * F_{MSY}$ (Fig. 2).
 - b. **Biomass:** current spawning biomass is considered to be above the target reference point of SB_{MSY} , and therefore above the limit reference point of $0.4 * SB_{MSY}$ (Fig. 2).
- **Main fisheries (mean annual catch 2019-2023):** swordfish are caught using longline (52.3%), followed by line (31.5%) and gillnet (15.7%). The remaining catches taken with other gears contributed to 0.4% of the total catches in recent years (Fig. 1).

- **Main fleets (mean annual catch 2019-2023):** the majority of swordfish catches are attributed to vessels flagged to Sri Lanka (26.5%) followed by Taiwan,China (15.4%) and Yemen (7.5%). The 29 other fleets catching swordfish contributed to 50.6% of the total catch in recent years (**Fig. 2**).

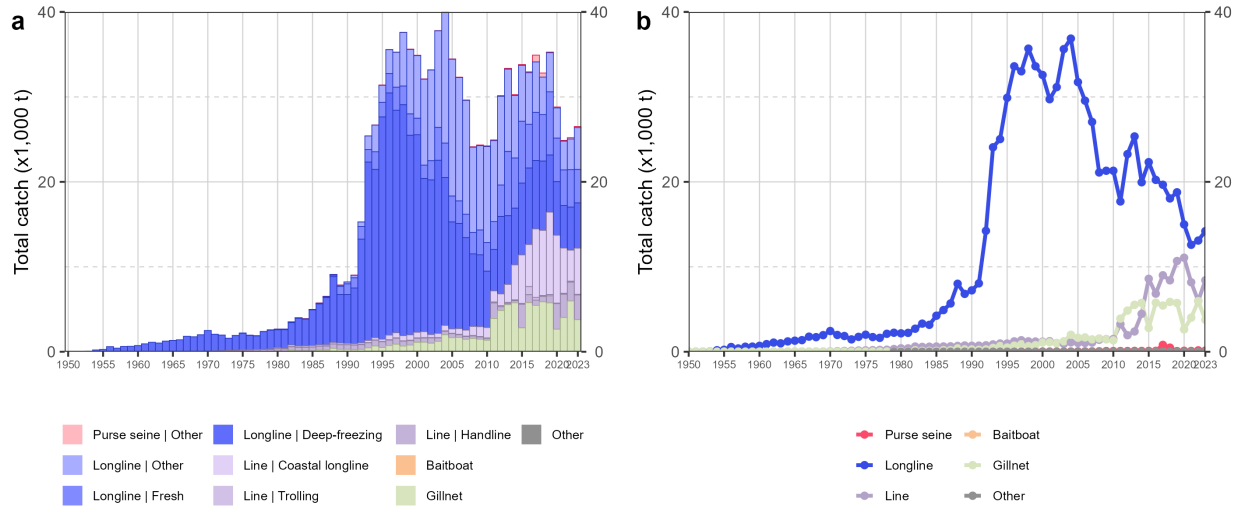


Fig. 1. Annual time series of (a) cumulative nominal catches (metric tons; t) by fishery and (b) individual nominal catches (metric tons; t) by fishery group for swordfish during 1950–2023. Longline|Other: swordfish and sharks-targeting longlines; Other: all remaining fishing gears

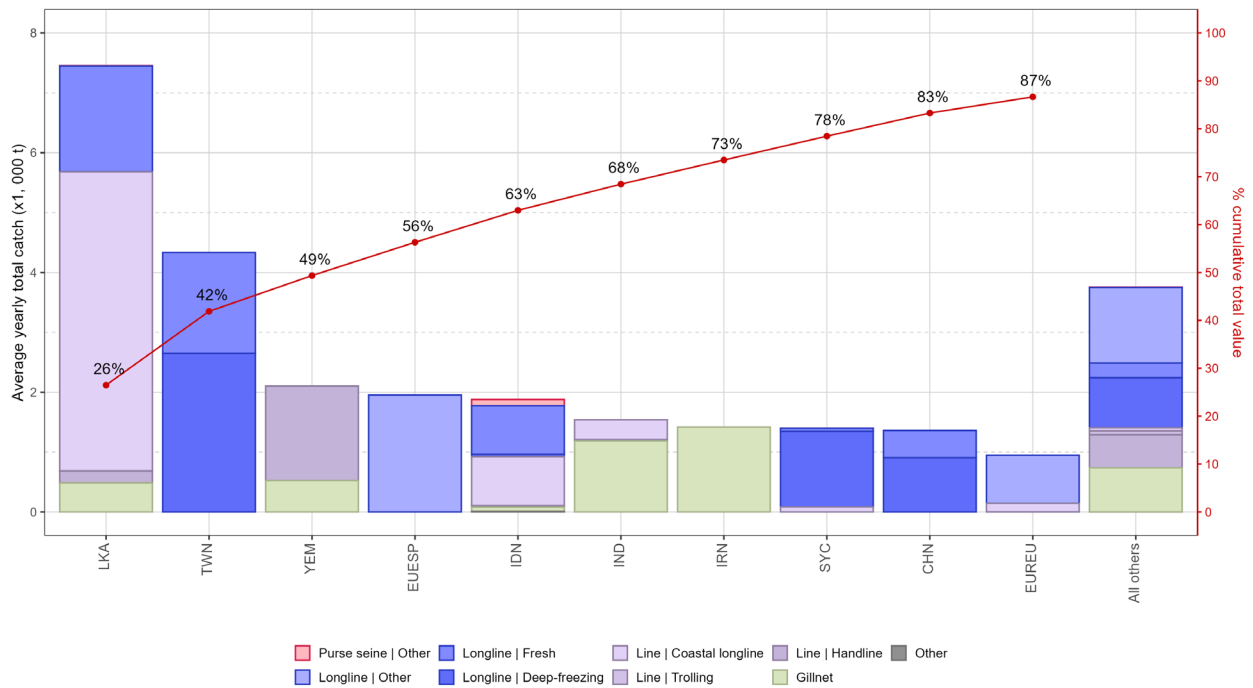


Fig. 2. Mean annual catches (metric tons; t) of swordfish by fleet and fishery between 2019 and 2032, with indication of cumulative catches by fleet. Longline | Other: swordfish and sharks-targeted longlines; Other: all remaining fishing gears

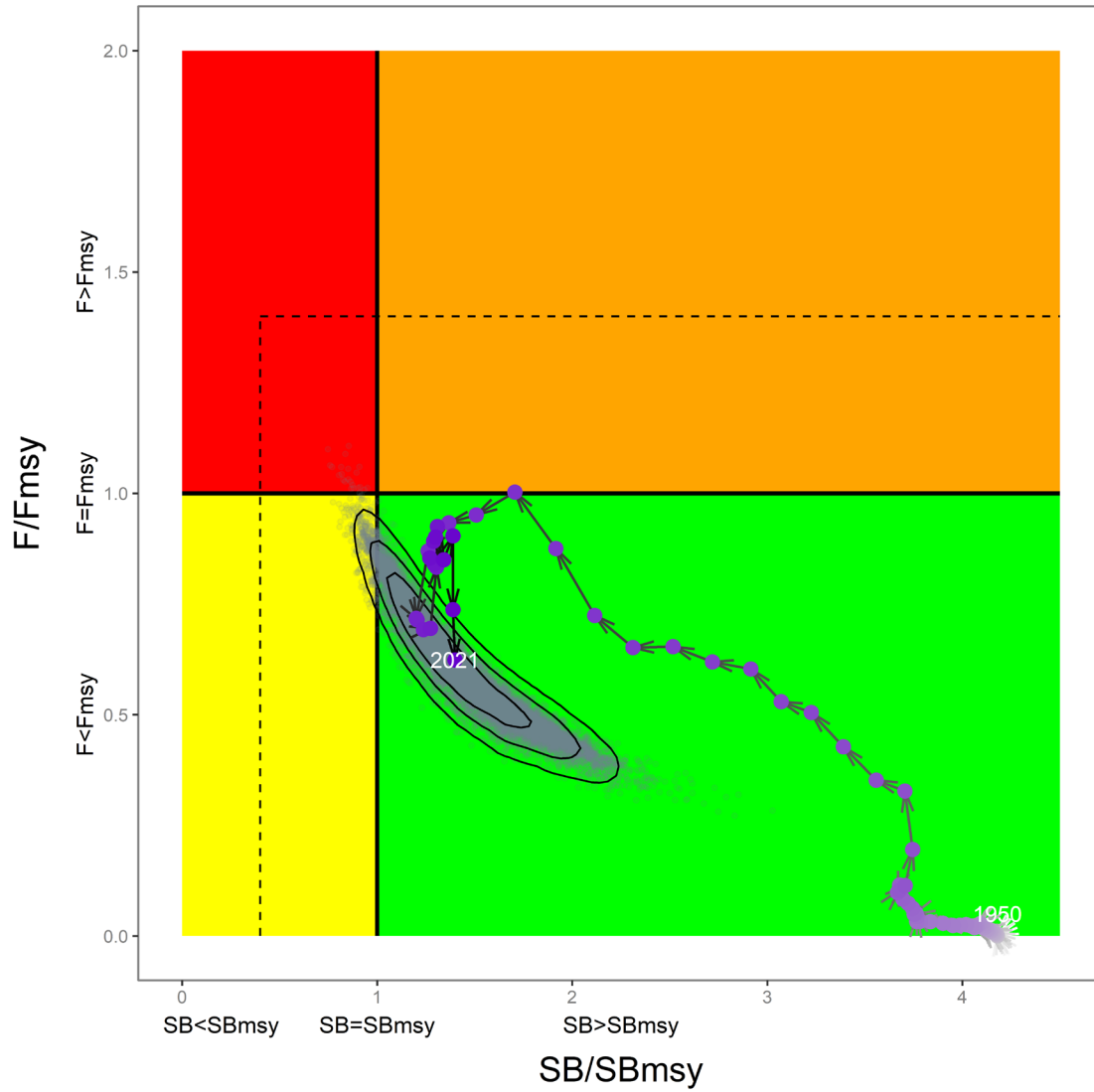


Fig. 3. Swordfish: 2021 stock status, relative to SB_{MSY} (x-axis) and F_{MSY} (y-axis) reference points for the final model grid. Grey dots represent uncertainty from individual models with 50%, 80% and 95% contours lines. The arrowed line represents the time series of stock trajectory from the reference model. The dashed lines represent limit reference points for Indian Ocean swordfish ($SB_{lim} = 0.4 SB_{MSY}$ and $F_{lim} = 1.4 * F_{MSY}$)