

EXECUTIVE SUMMARY: SWORDFISH

Status of the Indian Ocean swordfish (SWO: *Xiphias gladius*) resourceTABLE 1. Swordfish: Status of swordfish (*Xiphias gladius*) in the Indian Ocean.

Area ¹	Indicators		2017 stock status determination
Indian Ocean	Catch 2016 ² :	31,407 ³ (39,777 ⁴) t	
	Average catch 2012-2016:	31,463 ³ (35,142 ⁴) t	
	MSY (1,000 t) (80% CI):	31.59 (26.30–45.50)	
	F _{MSY} (80% CI):	0.17 (0.12–0.23)	
	SB _{MSY} (1,000 t) (80% CI):	43.69 (25.27–67.92)	
	F ₂₀₁₅ /F _{MSY} (80% CI):	0.76 (0.41–1.04)	
SB ₂₀₁₅ /SB _{MSY} (80% CI):	1.50 (1.05–2.45)		
SB ₂₀₁₅ /SB ₁₉₅₀ (80% CI):	0.31 (0.26–0.43)		

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

² Proportion of catch estimated or partially estimated by IOTC Secretariat in 2016: 38 %

³ Indonesian fresh tuna longline catch assumed to be the same as in 2011–2013

⁴ Indonesian fresh tuna longline catch estimated using species composition from the Taiwanese fresh tuna longline in the same years.

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)		
Stock not subject to overfishing (F _{year} /F _{MSY} ≤ 1)		
Not assessed/Uncertain		

INDIAN OCEAN STOCK – MANAGEMENT ADVICE

Stock status. A new assessment was undertaken in 2017 using stock synthesis with fisheries data up to 2015. The assessment uses a spatially disaggregated, sex explicit and age structured model. The SS3 model, used for stock status advice, indicated that MSY-based reference points were not exceeded for the Indian Ocean population (F₂₀₁₅/F_{MSY} < 1; SB₂₀₁₅/SB_{MSY} > 1). Most other models applied to swordfish also indicated that the stock was above a biomass level that would produce MSY. Spawning stock biomass in 2015 was estimated to be 26–43% of the unfished levels. There are some uncertainties in the catch estimates from the Indonesian fresh tuna longline (Fig. 1b); an alternative catch history was used in the base case stock assessment (Fig. 1a). Most recent catches are at the MSY level (31,590 t). On the weight-of-evidence available in 2017, the stock is determined to be **not overfished** and **not subject to overfishing**.

Outlook. The decrease in longline catch and effort from 2005 to 2011 lowered the pressure on the Indian Ocean stock, and despite the recent increase in total recorded catches, current fishing mortality is not expected to reduce the population to an overfished state over the next decade. There is a very low risk of exceeding MSY-based reference points by 2026 if catches are maintained at 2015 levels (<1% risk that SB₂₀₂₆ < SB_{MSY}, and <1% risk that F₂₀₂₆ > F_{MSY}) (Table 2).

Management advice. The most recent catches (31,407 t in 2016) are at the MSY level (31,590 t). However, given the uncertainty of most recent catches from Indonesian fresh tuna longline fisheries there is a possibility that total catches could already be 39,777 t. The catches should not be increased beyond the MSY level (31,590 t).

The following key points should also be noted:

- A revised advice should be developed after the next updated stock assessment scheduled in 2020 once Indonesian catches are corrected.
- **Maximum Sustainable Yield (MSY):** estimate for the Indian Ocean is 31,590 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 fishing gear (average catches 2012–16):** Longline catches are currently estimated to comprise approximately 79% of total swordfish catches in the Indian Ocean.
- **Main fleets (average catches 2012-16):** Indonesia: 25%; Taiwan,China: 18%; Sri Lanka: 13%; EU,Spain: 11%.

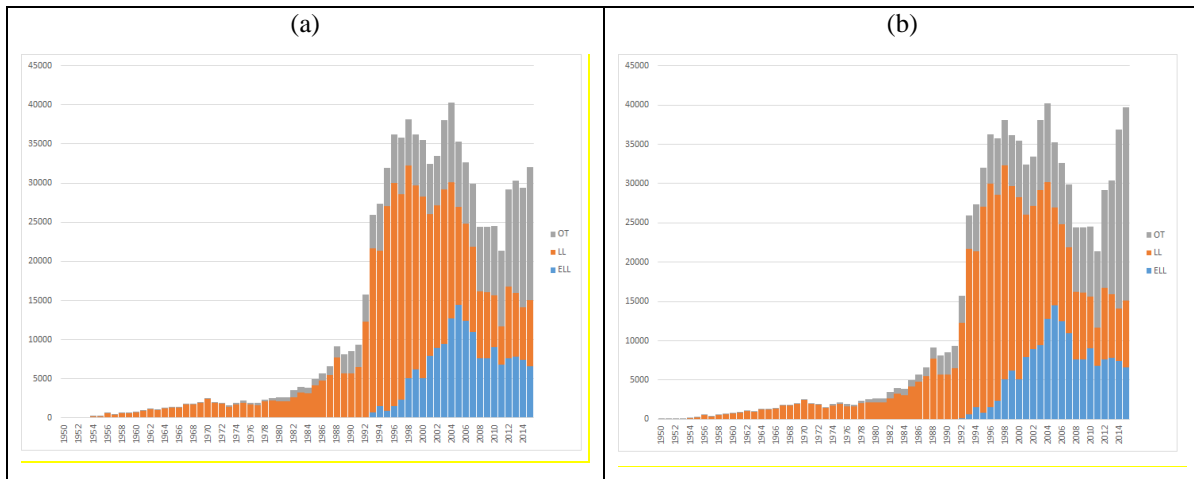


Fig. 1. Swordfish: catches by gear and year recorded in the IOTC Database (1950–2015): (a) the catch for Indonesian fresh tuna longline in 2014 and 2015 is assumed to be the average of 2011–2013; (b) the catch for Indonesian fresh tuna longline is estimated using species composition from the Taiwanese fresh tuna longline in the same years. Other gears (OT) includes: longline-gillnet, handline, gillnet, coastal longline, troll line, sport fishing, and all other gears.

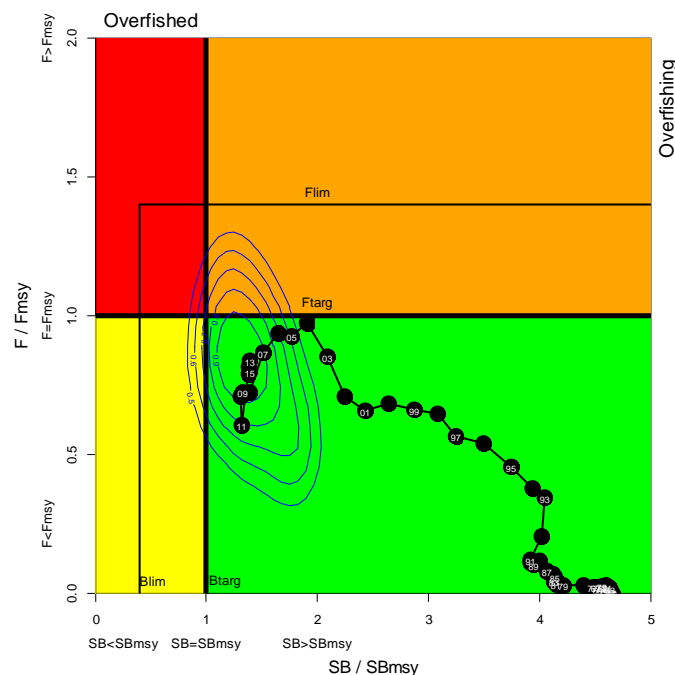


Fig. 2. Swordfish: SS3 Aggregated Indian Ocean assessment Kobe plot (contours are the 50, 60, 70, 80 and 90 percentiles of the 2015 estimate). Blue circles indicate the trajectory of the point estimates for the SB ratio and F ratio for each year 1950–2015. Interim target (F_{targ} and SB_{targ}) and limit (F_{lim} and SB_{lim}) reference points, as set by the Commission, are shown.

TABLE 2. Swordfish: SS3 aggregated Indian Ocean assessment Kobe II Strategy Matrix. Probability (percentage) of violating the MSY-based target (top) and limit (bottom) reference points for nine constant catch projections relative to 2015 catch level (32,129 t), $\pm 10\%$, $\pm 20\%$, $\pm 30\%$ $\pm 40\%$ projected for 3 and 10 years.

Alternative catch projections (relative to the average catch level from 2015: 32,129 t) and probability (%)									
Reference point and projection timeframe	of violating MSY-based target reference points								
	(SB _{targ} = SB _{MSY} ; F _{targ} = F _{MSY})								
	60%	70%	80%	90%	100%	110%	120%	130%	140%
	(19,278 t)	(22,491 t)	(22,704 t)	(28,917 t)	(32,129 t)	(35,343 t)	(38,556 t)	(41,769 t)	(44,982 t)
SB ₂₀₁₈ < SB _{MSY}	0	0	0	0	0	0	0	8	13
F ₂₀₁₈ > F _{MSY}	0	0	0	0	13	33	42	58	71
SB ₂₀₂₅ < SB _{MSY}	0	0	0	0	8	33	46	63	75
F ₂₀₂₅ > F _{MSY}	0	0	0	4	38	54	71	83	88

Alternative catch projections (relative to the average catch level from 2015: 32,129 t) and probability (%)									
Reference point and projection timeframe	of violating MSY-based limit reference points								
	(SB _{lim} = 0.4 SB _{MSY} ; F _{Lim} = 1.4 F _{MSY})								
	60%	70%	80%	90%	100%	110%	120%	130%	140%
	(19,278 t)	(22,491 t)	(22,704 t)	(28,917 t)	(32,129 t)	(35,343 t)	(38,556 t)	(41,769 t)	(44,982 t)
SB ₂₀₁₈ < SB _{Lim}	0	0	0	0	0	0	0	0	0
F ₂₀₁₈ > F _{Lim}	0	0	0	0	0	0	0	13	33
SB ₂₀₂₅ < SB _{Lim}	0	0	0	0	0	0	0	0	21
F ₂₀₂₅ > F _{Lim}	0	0	0	0	0	21	42	63	75