

EXECUTIVE SUMMARY: SWORDFISH



Indian Ocean Tuna Commission
Commission des Thons de l'Océan Indien



Status of the Indian Ocean swordfish (SWO: *Xiphias gladius*) resource

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

Area ¹	Indicators		2016 stock status determination
Indian Ocean	Catch 2015 ² :	41,760 t	
	Average catch 2011–2015:	31,900 t	
	MSY (1,000 t) (80% CI):	39.40 (33.20–45.60)	
	F _{MSY} (80% CI):	0.138 (0.137–0.138)	
	SB _{MSY} (1,000 t) (80% CI):	61.4 (51.5–71.4)	
	F ₂₀₁₃ /F _{MSY} (80% CI):	0.34 (0.28–0.40)	
	SB ₂₀₁₃ /SB _{MSY} (80% CI):	3.10 (2.44–3.75)	
	SB ₂₀₁₃ /SB ₁₉₅₀ (80% CI):	0.74 (0.58–0.89)	

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

²Proportion of catch estimated or partially estimated by IOTC Secretariat in 2015: 39%

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. No new assessment was undertaken in 2016. Thus, stock status is based on the previous assessment undertaken in 2014, as well as indicators available in 2015. The SS3 model, used for stock status advice, indicated that MSY-based reference points were not exceeded for the Indian Ocean population as a whole (F₂₀₁₃/F_{MSY} < 1; SB₂₀₁₃/SB_{MSY} > 1). All other models applied to swordfish also indicated that the stock was above a biomass level that would produce MSY. Spawning stock biomass in 2013 was estimated to be 58–89% of the unfished levels. Catches has increased in the last two years from around 30,000 t in 2013 to 41,760 t in 2015 (Fig. 1), and most recent catches of 41,760 t in 2015 are 2,360 t above the MSY level (39,400 t). On the weight-of-evidence available in 2016, 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 as a whole, 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 2022 if catches are maintained at 2011–2013 average levels (<1% risk that SB₂₀₂₂ < SB_{MSY}, and <1% risk that F₂₀₂₂ > F_{MSY}) (Table 2).

Management advice. The most recent catches (41,760 t in 2015) are 2,360 t above the MSY level (39,400 t). Hence catches in 2017 should be reduced to less than MSY (39,400 t). As the updated stock assessment is scheduled in 2017, more concrete advice after 2018 should be developed next year.

The following key points should be noted:

- **Maximum Sustainable Yield (MSY):** estimate for the whole Indian Ocean is 39,400 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 $0.4 \cdot SB_{MSY}$ (Fig. 2).
- **Main fishing gear** (2012–15): Longline catches are currently estimated to comprise approximately 85% of the total estimated swordfish catch in the Indian Ocean.
- **Main fleets** (2012–15): Indonesia (fresh longline): 20%; Taiwan, China (longline): 17%; Sri Lanka (longline-gillnet): 12%; EU, Spain (swordfish targeted longline): 12% (of the total estimated swordfish catch).

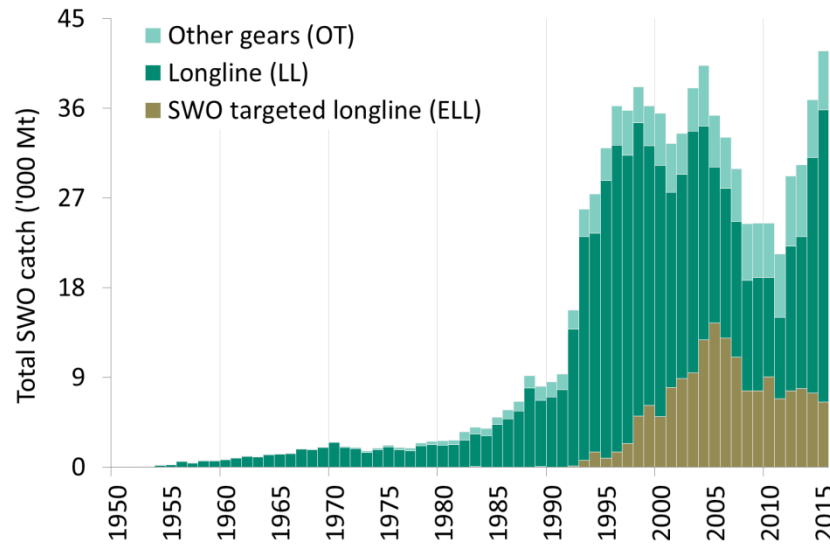


Fig. 1. Swordfish: catches by gear and year recorded in the IOTC Database (1950–2015). Other gears includes: longline-gillnet, handline, gillnet, coastal longline, troll line, sport fishing, and all other gears.

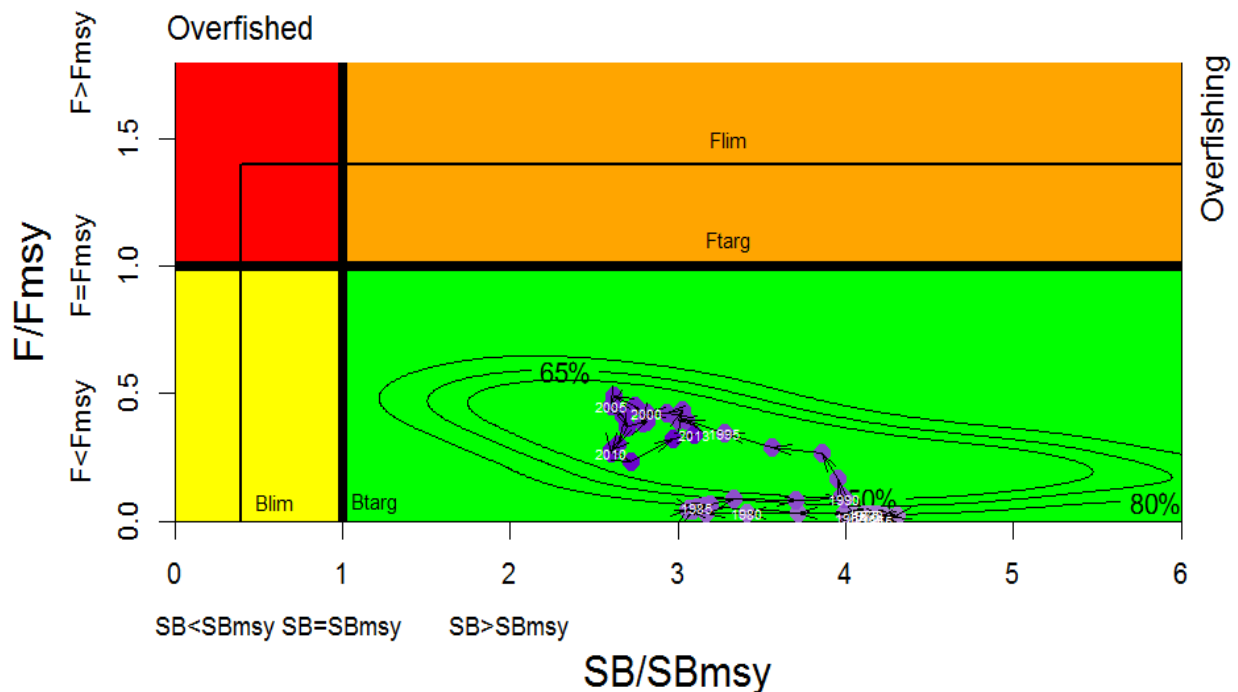


Fig. 2. Swordfish: SS3 Aggregated Indian Ocean assessment Kobe plot (contours are the 50, 65 and 80 percentiles of the 2013 estimate). Blue circles indicate the trajectory of the point estimates for the SB ratio and F ratio for each year 1950–2013. Interim target (F_{targ} and SB_{targ}) and limit (F_{lim} 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 (average catch level from 2011–13 (27,809 t), $\pm 10\%$, $\pm 20\%$, $\pm 30\%$ $\pm 40\%$) projected for 3 and 10 years.

Reference point and projection timeframe	Alternative catch projections (relative to the average catch level from 2011–13, 27,809 t) and probability (%) of violating MSY-based target reference points ($SB_{\text{targ}} = SB_{\text{MSY}}$; $F_{\text{targ}} = F_{\text{MSY}}$)								
	60%	70%	80%	90%	100%	110%	120%	130%	140%
	(16,685 t)	(19,466 t)	(22,247 t)	(25,028 t)	(27,809 t)	(30,590 t)	(33,371 t)	(36,152 t)	(38,933 t)
$SB_{2016} < SB_{\text{MSY}}$	0	0	0	0	0	0	0	0	0
$F_{2016} > F_{\text{MSY}}$	0	0	0	0	0	0	0	0	2
$SB_{2023} < SB_{\text{MSY}}$	0	0	0	0	0	0	0	0	0
$F_{2023} > F_{\text{MSY}}$	0	0	0	0	0	0	0	0	4
Reference point and projection timeframe	Alternative catch projections (relative to the average catch level from 2011–13, 27,809 t) and probability (%) of violating MSY-based limit reference points ($SB_{\text{lim}} = 0.4 SB_{\text{MSY}}$; $F_{\text{lim}} = 1.4 F_{\text{MSY}}$)								
	60%	70%	80%	90%	100%	110%	120%	130%	140%
	(16,685 t)	(19,466 t)	(22,247 t)	(25,028 t)	(27,809 t)	(30,590 t)	(33,371 t)	(36,152 t)	(38,933 t)
$SB_{2016} < SB_{\text{Lim}}$	0	0	0	0	0	0	0	0	0
$F_{2016} > F_{\text{Lim}}$	0	0	0	0	0	0	0	0	4
$SB_{2023} < SB_{\text{Lim}}$	0	0	0	0	0	0	0	0	0
$F_{2023} > F_{\text{Lim}}$	0	0	0	0	0	0	0	0	4