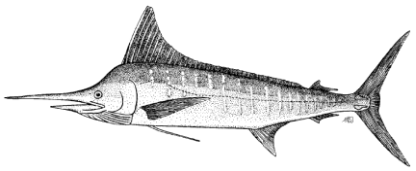
EXECUTIVE SUMMARY: STRIPED MARLIN

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



Status of the Indian Ocean striped marlin (MLS: *Tetrapturus audax*) resource

TABLE 1. Striped marlin: Status of striped marlin (*Tetrapturus audax*) in the Indian Ocean.

Area[1]	Indicators		2017 stock status determination
Indian Ocean	Catch 2016[2]:	5,299 t	
	Average catch 2012-2016:	4,854 t	
	MSY (1,000 t) (estimates):	(3.26–5.40)[3]	
	F_{MSY} (estimates):	(0.05–0.9)	
	B_{MSY} (1,000 t) (Estimates):	(1.82–61.0)	
	F_{2015}/F_{MSY} (estimates):	(1.32–3.40)	
	B_{2015}/B_{MSY} (estimates):	(0.24–0.62)	
	SB_{2015}/SB_{MSY} (SS3)[4]:	0.373	
	B_{2015}/B_{1950} (estimates):	(0.09–0.32)	
	SB_{2015}/SB_{1950} (SS3):	0.06	

[1] Boundaries for the Indian Ocean = IOTC area of competence
[2] Proportion of catch estimated or partially estimated by IOTC Secretariat in 2016: 41%
[3] Estimates are the range of central values shown in Figure 2.
[4] SS3 is the only model that used SB/SB_{MSY}, all others used B/B_{MSY}.

Colour key	Stock overfished ($B_{year}/B_{MSY} < 1$)	Stock not overfished ($B_{year}/B_{MSY} \geq 1$)
Stock subject to overfishing ($F_{year}/F_{MSY} > 1$)		
Stock not subject to overfishing ($F_{year}/F_{MSY} \leq 1$)		
Not assessed/Uncertain		

INDIAN OCEAN STOCK – MANAGEMENT ADVICE

Stock status. A new stock assessment for striped marlin was carried out in 2017, based on four different models, specifically a data-limited catch only method, two production models and an integrated length-based model. The ASPIC assessment confirmed the results from 2012, 2013 and 2015 that indicated the stock is subject to overfishing ($F>F_{MSY}$) and that biomass is below the level which would produce MSY ($B<B_{MSY}$). The other models examined in 2017 came to similar conclusions. All models were consistent in indicating that the stock has been subject to overfishing in the last two decades, and that as a result, the stock biomass is well below the B_{MSY} level. In 2016 reported catches increased to 5,299 t. On the weight-of-evidence available in 2017, the stock status of striped marlin is determined to be ***overfished*** and ***subject to overfishing*** (**Table 1**; **Fig. 2**).

Outlook. The decrease in longline catch and effort in the years 2009–11 lowered the pressure on the Indian Ocean stock, however, given the increased catches reported since 2011, combined with the concerning results obtained from the last stock assessments conducted in 2012, 2013, 2015 and 2017, the outlook is pessimistic for the stock and management action for striped marlin should be considered. K2SM probabilities are not provided because of uncertainty in quantitative results of the stock assessment models, which affected the projections estimates.

Management advice. Current or increasing catches have a very high risk of further decline in stock status. In order to enable the stock to start rebuilding, the Commission should consider a substantial reduction of catches. Quantitative advice will be provided after the next stock assessment which will be carried out in 2018.

The following key points should also be noted:

- **Maximum Sustainable Yield (MSY)**: estimates for the Indian Ocean stock are highly uncertain and point estimates range between 3,270 t – 5,400 t. However, the current biomass is well below the B_{MSY} reference point and fishing mortality is in excess of F_{MSY} at recent catch levels of around 5,299 t.
- **Provisional reference points**: Although the Commission adopted reference points for swordfish in Resolution 15/10 *on target and limit reference points and a decision framework*, no such interim reference points have been established for striped marlin.
- **Main fishing gear (average catches 2012–16)**: Striped marlin are largely considered to be a non-target species of industrial fisheries. Longlines account for around 69% of total catches in the Indian Ocean, followed by gillnets (24%), with remaining catches recorded under troll and handlines (Fig. 1).
- **Main fleets (average catches 2012-16):** Indonesia: 35%; Taiwan,China: 24%; I.R. Iran: 14%; and Pakistan: 8%.

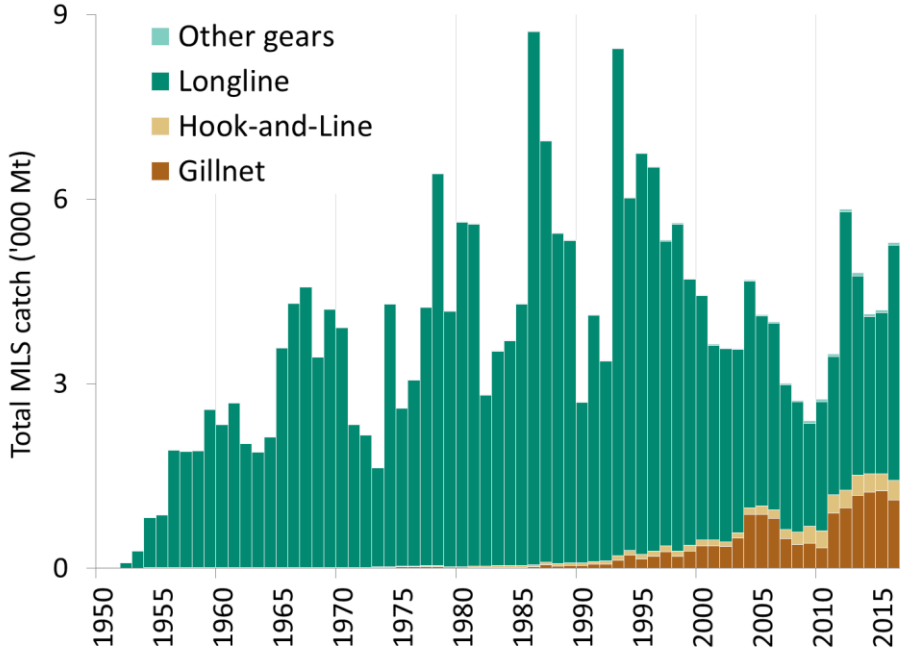


Fig.1. Striped marlin: catches by gear and year recorded in the IOTC Database (1950–2016)[1].

[1] **Definition of fisheries:** Longline; Gillnet; Hook-and-Line (includes handline, trolling, baitboat, and sport fisheries); Other gears (includes coastal purse seine, Danish purse seine, beach seine, and purse seine).

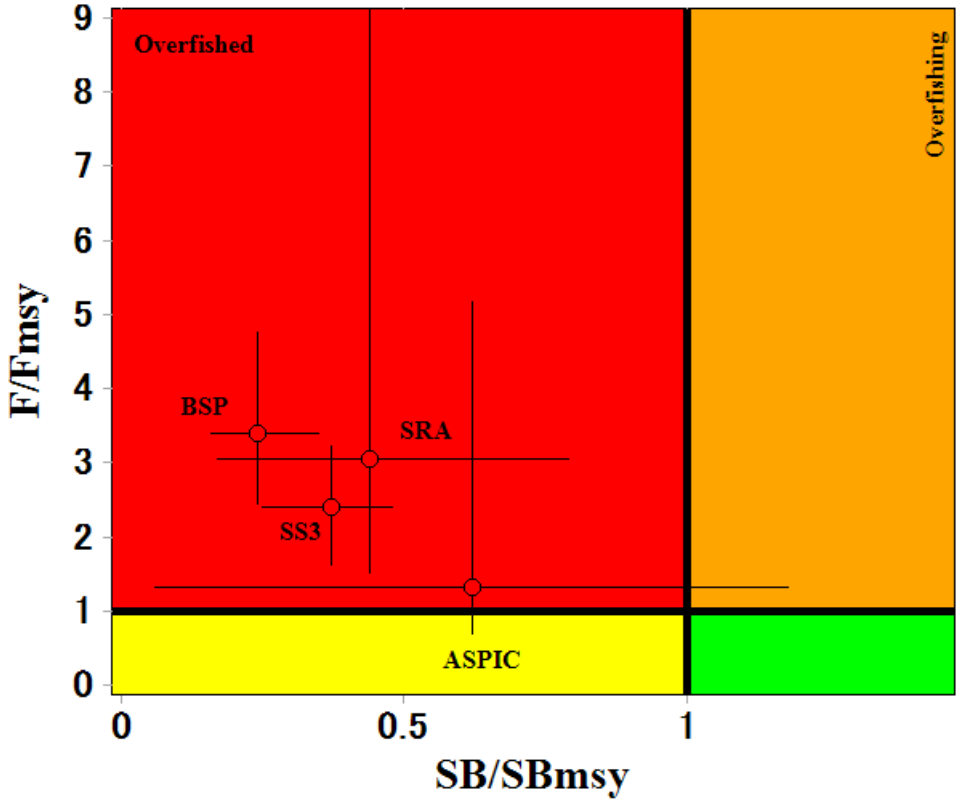


Fig. 2. Striped marlin: Stock status from the aggregated Indian Ocean assessment models with the confidence intervals. NB: SS3 refers to SB/SB_{MSY} while all other models correspond to B/B_{MSY}.