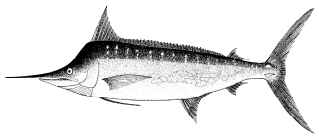
Indian Ocean Tuna Commission
Commission des Thons de l'Océan Indien
iotc ctoi



Status of the Indian Ocean blue marlin (BUM: *Makaira nigricans*) resource

TABLE 1. Blue marlin: Status of blue marlin (*Makaira nigricans*) in the Indian Ocean.

Area[1]	Indicators		2017 stock status determination
Indian Ocean	Catch 2017[2]:	12,155 t	**46.8%***
	Average catch 2013-2017:	11,635 t	
	MSY (1,000 t) (80% CI):	11.93 (9.23–16.15)	
	F_{MSY} (80% CI):	0.11 (0.08 –0.16)	
	B_{MSY} (1,000 t) (80% CI):	113 (71.7 – 162.0)	
	H_{2015}/H_{MSY} (80% CI):	1.18 (0.80–1.71)	
	B_{2015}/B_{MSY} (80% CI):	1.11 (0.90–1.35)	
	B_{2015}/B_0 (80% CI):	0.56 (0.44 – 0.71)	

[1] Boundaries for the Indian Ocean = IOTC area of competence
[2] Proportion of catch estimated or partially estimated by IOTC Secretariat in 2017: 45%
* Estimated probability that the stock is in the respective quadrant of the Kobe plot (shown below), derived from the confidence intervals associated with the current stock status.

Colour key	Stock overfished(B_{year}/B_{MSY}< 1)	Stock not overfished (B_{year}/B_{MSY}≥ 1)
Stock subject to overfishing(F_{year}/F_{MSY}> 1)	24.6%	46.8%
Stock not subject to overfishing (F_{year}/F_{MSY}≤ 1)	1.0%	27.6%
Not assessed/Uncertain		

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Stock status. No stock assessment was carried out in 2018**.** Stock status based on BSP-SS stock assessment carried out in 2016 suggests that the stock status in 2015 is in the orange zone in the Kobe plot and both F and B are close to their MSYs, i.e., F/F_{MSY}=1.18 and B/B_{MSY}=1.11. Two other approaches examined in 2016 came to similar conclusions, namely ASPIC and SS3. The results of the assessment in 2016 from the BSP-SS model indicated that the stock was **subject to overfishing** but **not overfished** in 2015 (Table 1; Fig. 2).

Outlook. The uncertainty in the catch data available at the time of the assessment and the CPUE series suggests that the advice should be interpreted with caution. A decrease in longline effort from 2005 to 2011 lowered the fishing pressure on the Indian Ocean stock, but catches in recent years have been increasing. The MSY estimates provided are derived from the previous assessment carried out in 2016 (data until 2015), in which a high catch scenario was considered. However, the catch data have subsequently been revised and a low catch scenario is currently adopted by the Scientific Committee. As such, the previous MSY value estimated from the high catch scenario is likely over-estimated and cannot be used for a direct comparison with the current catches provided in Table 1.

Management advice. Current catches exceed the catch limit as stipulated in Resolution 18/05. The Commission should provide mechanisms to ensure the catch limits are not exceeded in the future

The following key points should also be noted:

- **Maximum Sustainable Yield (MSY)**: estimate for the Indian Ocean blue marlin stock is 11,926 t (estimated range 9,232–16,149 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, nor harvest control rules have been established for blue marlin.
- **Main fishing gear (average catches 2013-17)**: Blue marlin are largely considered to be a non-target species of industrial and artisanal fisheries. Longline catches account for around 71% of total catches in

the Indian Ocean, followed by gillnets (23%), with remaining catches recorded under troll and handlines (Fig. 1).

Main fleets (average catches 2013-17):

Taiwan,China (longline): 40%; Pakistan (gillnet): 15%; I.R. Iran (gillnet): 13%; Sri Lanka (gillnet): 10%; Indonesia (longline): 7%.

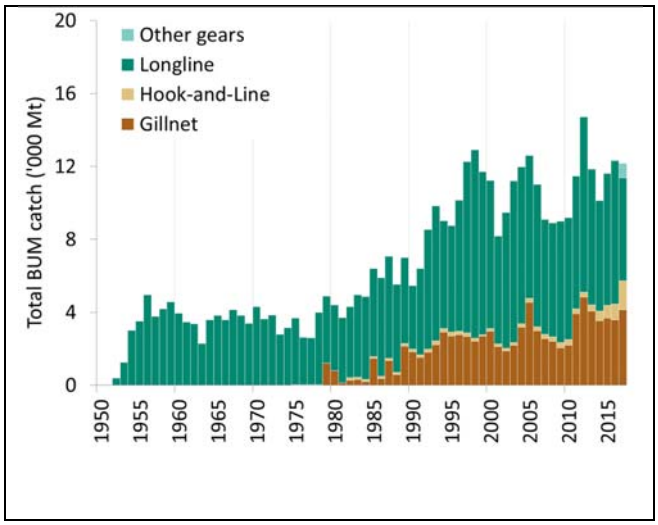

Fig. 1a-b. Blue marlin catches by gear and year recorded in the IOTC database (1950–2017):

- (Left): High-case catch scenario (IOTC-2018-WPB16-DATA03a): includes IOTC Secretariat revised catch estimates for Indonesian fresh tuna.
- (Right): Low-case catch scenario (IOTC-2018-WPB16-DATA03b): alternative catch series incorporating changes to IOTC Secretariat's methodology for estimating for Indonesia's fresh tuna longline catches.

***Notes**: Other gears (OT) includes: longline-gillnet, handline, gillnet, coastal longline, troll line, sport fishing, and all other gears.*

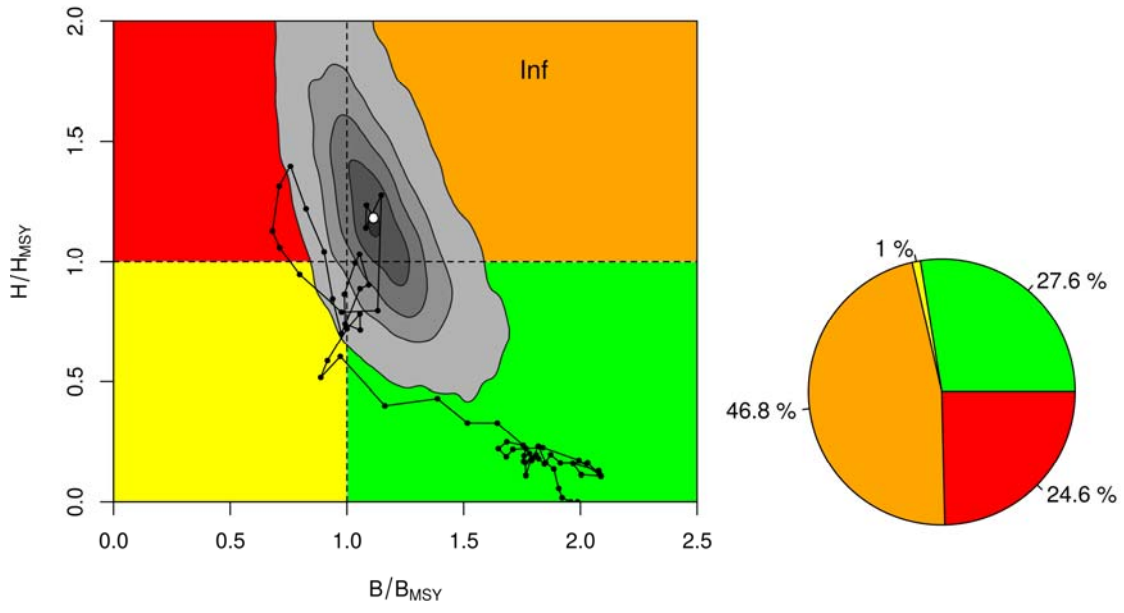

Fig. 2. Blue marlin: BSP-SS Aggregated Indian Ocean assessment Kobe plot for blue marlin (90% bootstrap confidence surfaces shown around 2015 estimate). Black line indicates the trajectory of the point estimates for the total biomass (B) ratio and Harvest ratio for each year 1950–2015.

Table 2. Blue Marlin: Indian Ocean BSP-SS Kobe II Strategy Matrix. Probability (percentage) violating the MSY-based reference points for nine constant catch projections (average catch level from 2013 to 2015 - 15,401 t ± 10%, ± 20%, ± 30% ± 40%) projected for 3 and 10 years.

Reference point and projection timeframe	**Alternative catch projections (relative to the average catch from 2013 to 2015* (15,401 t) and probability (%) of violating MSY-based reference points**								
	60%	**70%**	**80%**	**90%**	**100%**	**110%**	**120%**	**130%**	**140%**
	9,240 t	10,780 t	12,321t	13,861 t	15,401 t	16,941 t	18,481 t	20,021 t	21,561 t
$B_{2018}<B_{MSY}$	26	31	37	43	48	54	59	64	69
$F_{2018}> F_{MSY}$	14	30	47	63	75	84	90	94	96
$B_{2025}<B_{MSY}$	16	30	46	60	73	82	88	93	95
$F_{2025}> F_{MSY}$	12	30	51	68	80	89	93	96	98

** Average catches for 2013–2015, at the time of the last blue marlin assessment conducted in 2016.*