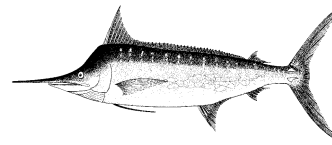


EXECUTIVE SUMMARY: BLUE MARLIN

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

Area ¹	Indicators		2017 stock status determination
Indian Ocean	Catch 2016 ² :	16,353 t	46.8%*
	Average catch 2012–2016:	15,859 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 2016: 41%

* 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		

INDIAN OCEAN STOCK – MANAGEMENT ADVICE

Stock status. No stock assessment was carried out in 2017. Stock status based on BSP-SS stock assessment carried out in 2016 suggests that the stock 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 from the BSP-SS model indicated that the stock has been **subject to overfishing** but **not overfished** in recent years (Table 1; Fig. 2).

Outlook. The uncertainty in the data available for assessment purposes and the CPUE series suggests that the advice should be interpreted with caution. The recent rapid increase of catch may bring the status of stock to the red zone (Kobe plot) in the near future if such high levels of catch continue. There is a high probability (70-80%) to exceed MSY-based reference points in next 10 years if the catch level at the time of the assessment is maintained.

Management advice. The current catches (average of 15,859 t in the last 5 years, 2012-2016) (Fig.1) are higher than MSY (11,926 t) estimated for 2015 and the stock is currently subject to overfishing (F₂₀₁₅ > F_{MSY}). If catches of blue marlin are reduced to a maximum value of 11,704 t. (24 % reduction from average catch 2013-2015 at the time of the assessment), then the stock is expected to recover to the green zone of the Kobe Plot by 2025 (F₂₀₂₅ < F_{MSY} and B₂₀₂₅ > B_{MSY}) with at least a 50% probability.

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 2012–16):** Blue marlin are largely considered to be a non-target species of industrial and artisanal fisheries. Longline catches account for around 72% of total catches in the Indian Ocean, followed by gillnets (25%), with remaining catches recorded under troll and handlines (Fig. 1).
- **Main fleets (average catches 2012-16):** Taiwan,China: 33%; Indonesia: 30%; Pakistan: 12%; I.R. Iran: 9%, and Sri Lanka (5%).

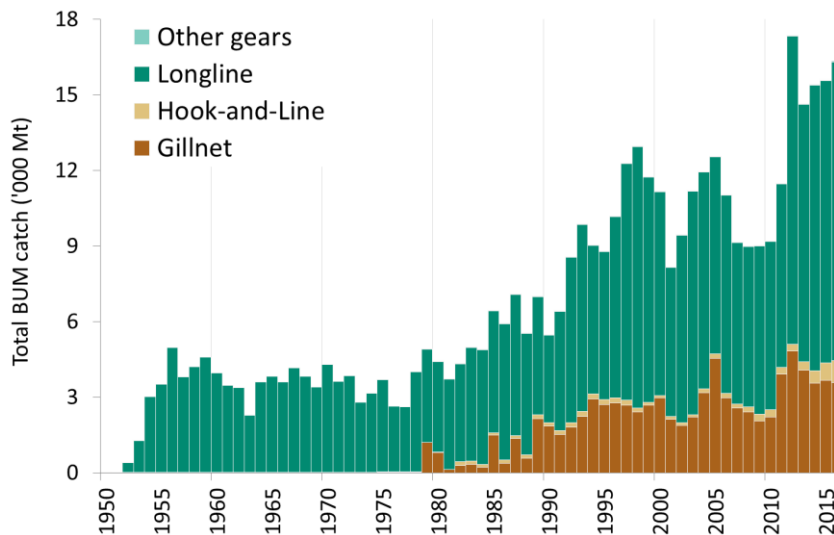


Fig. 1. Blue marlin: catches by gear and year recorded in the IOTC Database (1950–2016)¹.

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).

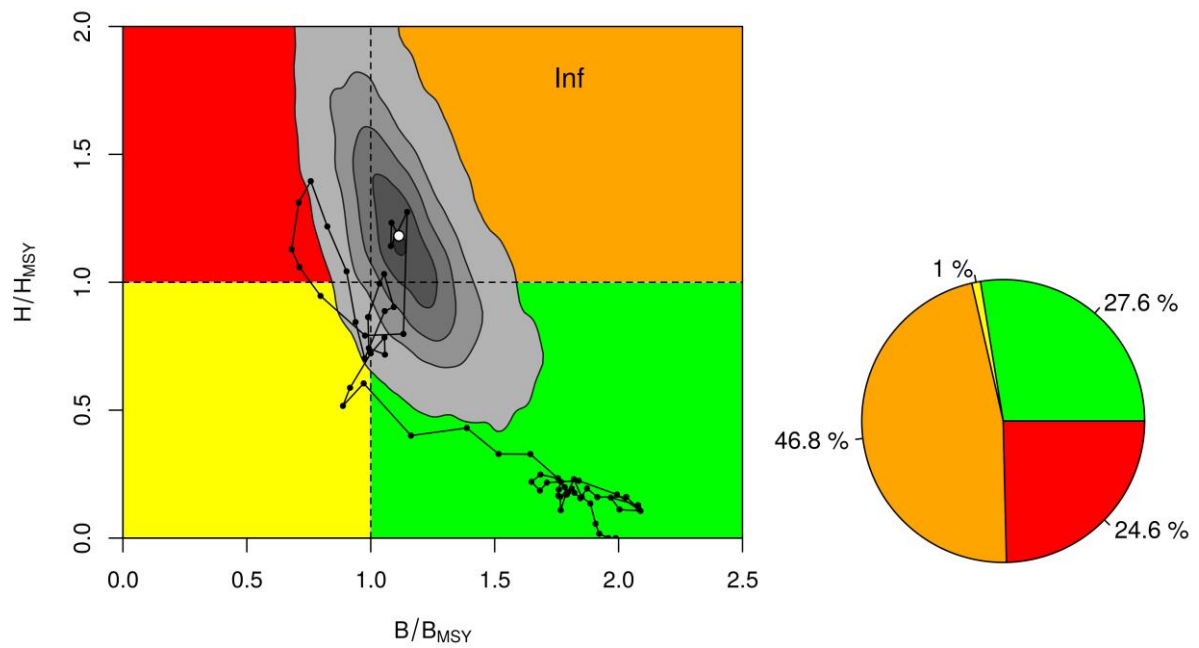


Fig. 2. Blue marlin: BSP-SS Aggregated Indian Ocean assessment Kobe plot for blue marlin (90% bootstrap confidence surfaces shown around 2015 estimate). Black line indicates the trajectory of the point estimates for the total biomass (B) ratio and Harvest ratio for each year 1950–2015.

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 \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 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