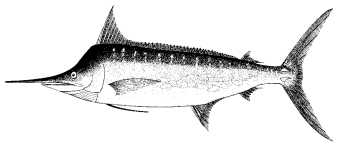
RESOURCE STOCK STATUS SUMMARIES – BLUE MARLIN

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		2019 stock status determination
Indian Ocean	Catch 2018[2]: Average catch 2014-2018:	9,969 t 11,382 t	87%*
	MSY (1,000 t) (80% CI): F_{MSY} (80% CI): B_{MSY} (1,000 t) (80% CI): H_{2017}/H_{MSY} (80% CI): B_{2017}/B_{MSY} (80% CI): B_{2017}/B_0 (80% CI):	9.98 (8.18 –11.86) 0.21 (0.13 – 0.35) 47 (29.9 – 75.3) 1.47 (0.96 – 2.35) 0.82 (0.56 – 1.15) 0.41 (0.28 – 0.57)	

[1] Boundaries for the Indian Ocean = IOTC area of competence.
[2] Proportion of catch estimated or partially estimated by IOTC Secretariat in 2019: 24%.
* 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 ($B_{year}/B_{MSY}\geq 1$)
Stock subject to overfishing($F_{year}/F_{MSY}> 1$)	87%	10%
Stock not subject to overfishing ($F_{year}/F_{MSY}\leq 1$)	0%	3%
Not assessed/Uncertain		

INDIAN OCEAN STOCK – MANAGEMENT ADVICE

Stock status. Stock status based on the Bayesian State-Space Surplus Production model JABBA suggests that there is an 87% probability that the Indian Ocean blue marlin stock in 2017 is in the red zone of the Kobe plot, indicating the stock is **overfished** and **subject to overfishing (**B_{2017}/BMSY=0.82 and F_{2017}/FMSY=1.47) as shown in Table 1 and Figure 1. The most recent catch exceeds the estimate of MSY ($catch_{2017}$ = 12,796; MSY = 9,984). The previous assessment of blue marlin (Andrade 2016) concluded that in 2015 the stock was subject to overfishing but not overfished. The change in stock status can be attributed to increased catches for the period 2015-2017 as well as improved standardisation of CPUE indices, which includes the area disaggregation of JPN and TWN indices to account for fleet dynamics.

Outlook. The B_{2017}/B_{MSY} trajectory declined from the mid 1980s to 2008 and a steady increase of F/F_{MSY} since the mid-1980s has continued unabated. Periodic data conflict between the CPUE indices included in the assessment, particularly JPN and TWN, inflate uncertainty in B_{2017}/B_{MSY} and F_{2017}/F_{MSY} point estimates. However, a 'drop one' sensitivity analysis indicated that omitting any of the CPUE time-series would not alter the stock status.

Management advice. The current catches of blue marlin (average of 11,761 t in the last 5 years, 2013-2017) are higher than MSY (9,984 t) and the stock is currently overfished and subject to overfishing. In order to achieve the Commission objectives of being in the green zone of the Kobe Plot by 2027 ($F_{2027} < F_{MSY}$ and $B_{2027} > B_{MSY}$) with at least a 60% chance, the catches of blue marlin would have to be reduced by 35% compared to the average of the last 3 years, to a maximum value of approximately 7,800 t.

The following key points should also be noted:

- **Maximum Sustainable Yield (MSY)**: estimate for the Indian Ocean blue marlin stock is 9,980 t (estimated range 8,180–11,860 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 2014-18)**: Blue marlin are largely considered to be a non-target species of industrial and artisanal fisheries. Longline catches account for around 56% of total catches in the Indian Ocean, followed by gillnets (32%), with remaining catches recorded under troll and handlines (Fig. 1).
- **Main fleets (average catches 2014-18):**
  Around 80% of the total catches of blue marlin are accounted for by four fleets: Taiwan,China (longline): 44%; Pakistan (gillnet): 14%; I.R. Iran (gillnet): 11%, and Sri Lanka (14%) (**Fig.1**).

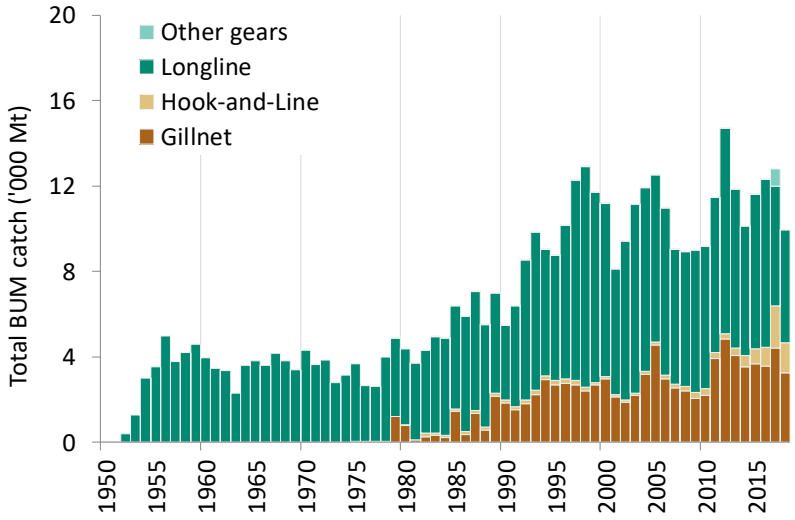


Fig. 1. Blue marlin catches by gear and year recorded in the IOTC database (1950–2018).
Notes*: Other gears (OT) includes: longline-gillnet, handline, gillnet, coastal longline, troll line, sport fishing, and all other gears.*

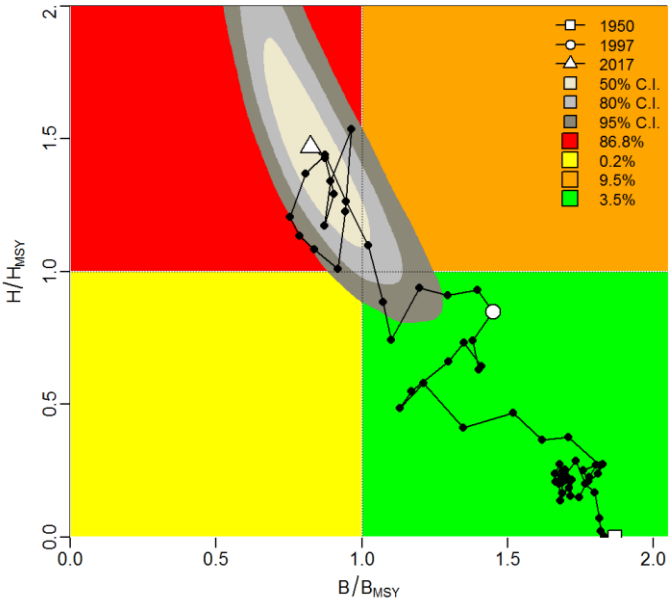


Fig. 2. Blue marlin: Kobe stock status plot for the Indian Ocean for black marlin, from the final JABBA base case (the black line traces the trajectory of the stock over time. Contours represent the smoothed probability distribution for 2018 (isopleths are probability relative to the maximum)).

Table 2. Blue Marlin: Indian Ocean JABBA Kobe II Strategy Matrix. Probability (percentage) of achieving the green quadrant of the KOBE plot nine constant catch projections, with future catch assuming to be 30–110% (in increments of 10%) of the 2017 catch level (12,029 t).

TAC | Year	2019	2020	2021	2022	2023	2024	2025	2026	2027
30% (3609)	20	39	58	71	81	87	91	93	95
40% (4812)	20	36	51	63	72	79	83	87	90
50% (6014)	21	33	44	54	62	68	73	77	81
60% (7217)	20	29	38	45	51	56	60	64	67
70% (8420)	20	26	32	37	41	45	47	50	52
80% (9623)	20	23	26	28	30	31	33	34	35
90% (10826)	17	18	19	19	20	20	20	20	20
100% (12029)	11	11	11	10	10	10	10	9	9
110% (13232)	7	6	6	6	5	5	4	4	4