Food and Agriculture Organization of the United Nations

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

APPENDIX 3
EXECUTIVE SUMMARY: SKIPJACK TUNA (2022)

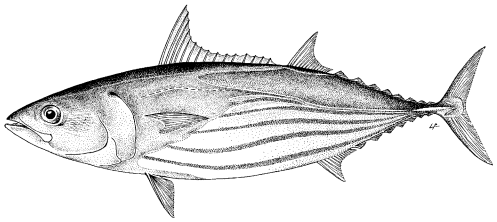

Table 1. Status of skipjack tuna (*Katsuwonus pelamis*) in the Indian Ocean

Area[1]	Indicator	Value	Status[3,4]
Indian Ocean	Catch in 2021 (t)[2]	650,331	60.4%*
	Average catch 2017-2021 (t)[3]	580,408	
	$C_{40\%SB0}$ (t) (80% CI)	535,964 (461,995–674,536)	
	C_{2019} / $C_{40\%SB0}$ (80% CI)	1.02 (0.81–1.18)	
	$E_{40\%SB0}$ [3] (80% CI)	0.59 (0.53–0.66)	
	E_{2019} / $E_{40\%SB0}$ (80% CI)	0.92 (0.67-1.21)	
	SB_0 (t) (80% CI)	1,992,089 (1,691,710–2,547,087)	
	SB_{2019} (t) (80% CI)	870,461 (660,411–1,253,181)	
	$SB_{40\%SB0}$ (t) (80% CI)	794,310 (672,825–1,019,056)	
	$SB_{20\%SB0}$ (t) (80% CI)	397,155 (336,412–509,528)	
	SB_{2019} / SB_0 (80% CI)	0.45 (0.38-0.5)	
	SB_{2019} / $SB_{40\%SB0}$ (80% CI)	1.11 (0.95-1.29)	
	SB_{2019} / SB_{MSY} (80% CI)	1.99 (1.47-2.63)	
	MSY (t) (80% CI)	601,088 (500,131–767,012)	
	E_{2019} / E_{MSY} (80% CI)	0.48 (0.35-0.81)	

[1]Boundaries for the Indian Ocean stock assessment are defined as the IOTC area of competence
[2]Proportion of 2020 catch fully or partially estimated by IOTC Secretariat: 17.7%
[3]Including re-estimations of EU PS species composition for 2018 (requested for stock assessment purposes)
[4]The status refers to the most recent years' data used in the assessment conducted in 2020, i.e., 2019
[5] $E_{40\%SB0}$ is the equilibrium annual exploitation rate (Etarg) associated with the stock at Btarg, and is a key control parameter in the skipjack harvest control rule as stipulated in Resolution 16/02. Note that Resolution 16/02 did not specify the exploitation rate associated with the stock at Blim
*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

Table 2. Probability of stock status with respect to each of four quadrants of the Kobe plot. Percentages are calculated as the proportion of model terminal values that fall within each quadrant with model weights taken into account

Colour key	Stock overfished (SB_{2019} / $SB_{40\%SB0}$<1)	Stock not overfished (SB_{2019} / $SB_{40\%SB0}$≥ 1)
Stock subject to overfishing (E_{2019} / $E_{40\%SB0}$≥ 1)	19.5%	19.5%
Stock not subject to overfishing (E_{2019} / $E_{40\%SB0}$≤ 1)	0.6%	60.4%
Not assessed / Uncertain		

INDIAN OCEAN STOCK – MANAGEMENT ADVICE

Stock status. No new stock assessment was conducted in 2022 and so the advice is based on the 2020 assessment using Stock Synthesis with data up to 2019. The outcome of the 2020 stock assessment model does not differ substantially from the previous assessment (2017) despite the large catches recorded in the period 2018-2019, which exceeded the catch limits established in 2017 for this period.

The final overall estimate of stock status indicates that the stock is above the adopted target for this stock and that the current exploitation rate is just below the target. Also, the models estimate that the spawning biomass remains above its SB_{MSY} and the fishing mortality remains below E_{MSY} with very high probability. Over the history of the fishery, biomass has been well above the adopted limit reference point ($0.2*SB_0$). The recent catches have been within the range of estimated target yield (see $C_{40\%SB0}$). Current spawning biomass relative to unexploited levels is estimated at 45% (**Table 1**). Thus, on the weight-of-evidence available in 2020, the skipjack tuna stock is determined to be: (i) above the adopted biomass target reference point; (ii) **not overfished** ($SB_{2019}>SB_{40\%SB0}$); (iii) with fishing mortality below the adopted target fishing mortality, and (iv) **not subject to overfishing** ($E_{2019}<E_{40\%SB0}$) (**Table 2**).

Outlook. Total catches in 2018 were 30% larger than the resulting catch limit from the skipjack HCR for the period 2018-2020 (470,029 t), which raises concern in the WPTT. It is important to note that reaching the management objectives defined in Resolution 16/02 requires that the catch limits adopted by the skipjack HCR are implemented effectively. It should be noted that skipjack catches for most gears have increased from 2017 to 2018 (+44% for purse seine (log/FAD-associated), +12% for gillnet and +13% for pole-and-line). In 2019, catch was reduced considerably compared to 2018. Due to its specific life history attributes, skipjack can respond quickly to ambient foraging conditions driven by ocean productivity, which seem to have been favourable in recent years. Environmental indicators should be closely monitored to inform on the potential increase/decrease of stock productivity. There remains considerable uncertainty in the assessment: The assumption of two hypotheses for the effort creep since 1995 for the standardized European purse seine CPUE was included in the model grid. The range of runs analysed illustrate a range of stock status to be between 36% and 51% of SB_{2019} / SB_0 based on all runs examined. It is important to note the differences between the runs that apply an additional effort creep parameter to the standardized series of CPUE (median $SB_{2019}/SB_0=0.44$) and those that do not (median SB_{2019} / $SB_0=0.45$). Also, there was contrast between runs that fully weighted tagging information (median SB_{2019} / $SB_0=0.42$) and those that reduced their influence (median $SB_{2019}/SB_0=0.48$).

Management advice. The catch limit calculated applying the HCR specified in Resolution 16/02 is 513,572 t for the period 2021-2023. The SC noted that this catch limit is higher than for the previous period. This is attributed to the new stock assessment which estimates a higher productivity of the stock and a higher stock level relative to the target reference point, possibly due to skipjack life history characteristics and favourable environmental conditions. Thus, it is likely that the recent catches that have exceeded the limits established for the period 2018-2020 have been sustained by favourable environmental conditions. Therefore, the Commission needs to ensure that catches of skipjack tuna during this period do not exceed the agreed limit.

The following key points should also be noted:

- **Reference points**: Commission in 2016 agreed to Resolution 16/02 on *harvest control rules for skipjack tuna in the IOTC area of competence*.
- **Biomass**: Current spawning biomass was considered to be above the target reference point of 40% of SB_0, and above the limit reference point of $0.2*SB_0$ as per Resolution 16/02 (**Fig. 2**).

- **Main fisheries (mean annual catch 2017-2021)**: skipjack tuna are caught using purse seine (54.4%), followed by baitboat (19%) and gillnet (17.8%). The remaining catches taken with other gears contributed to 8.8% of the total catches in recent years (**Fig. 1**).
- **Main fleets (mean annual catch 2017-2021)**: the majority of skipjack tuna catches are attributed to vessels flagged to Indonesia (18.4%) followed by EU (Spain) (17.8%) and Maldives (17.2%). The 31 other fleets catching skipjack tuna contributed to 46.3% of the total catch in recent years (**Fig. 2**).

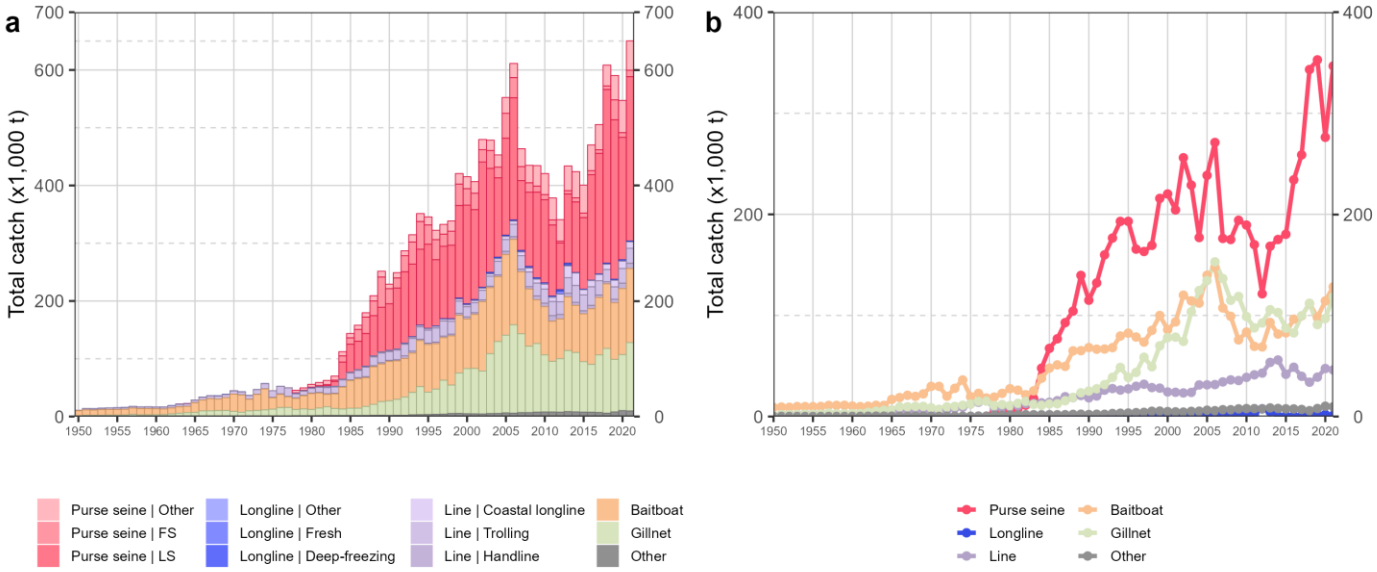

Fig. 1. Annual time series of (a) cumulative nominal catches (metric tonnes; t) by fishery and (b) individual nominal catches (metric tonnes; t) by fishery group for skipjack tuna during 1950–2021. FS = free-swimming schools; LS = schools associated with drifting floating objects. Purse seine | Other: coastal purse seine, purse seine of unknown association type, ring net; Longline | Other: swordfish and sharks-targeted longlines; Other: all remaining fishing gears

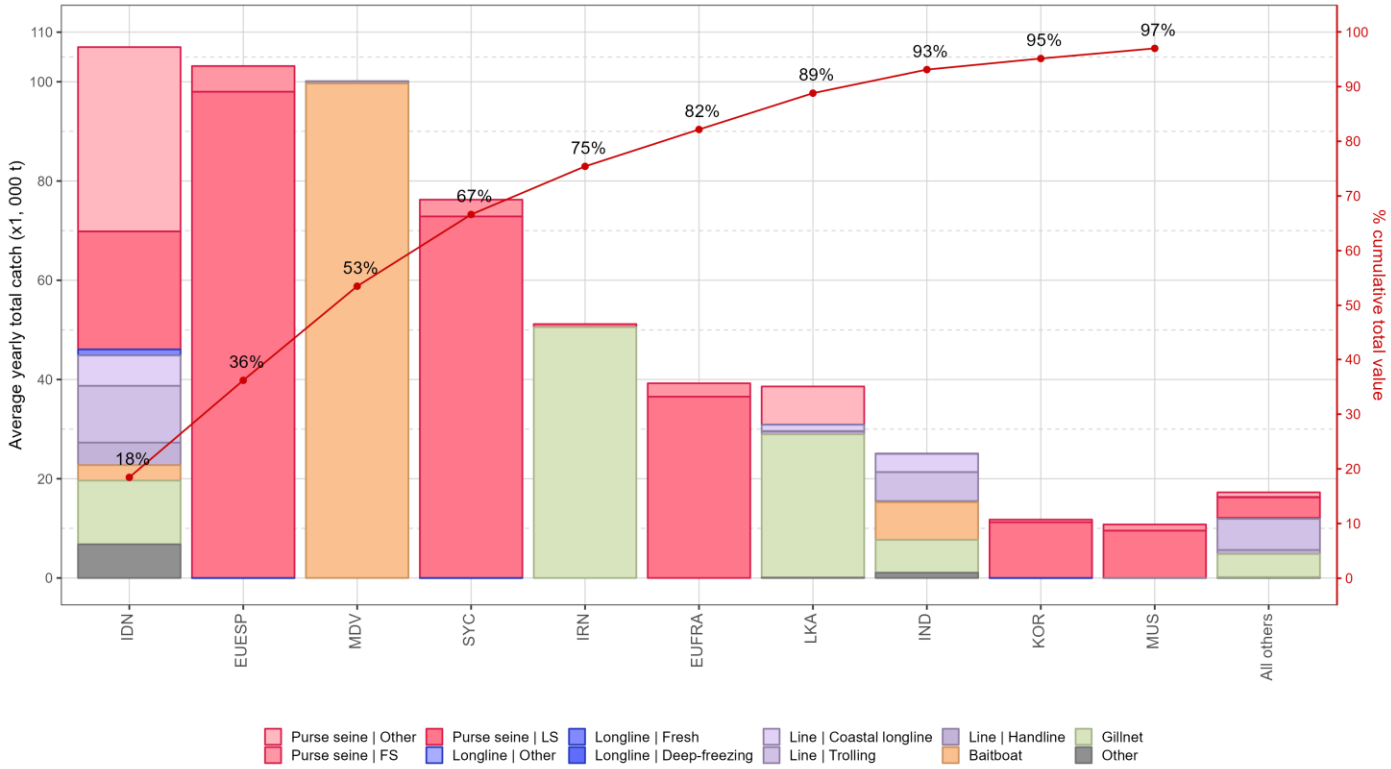

Fig. 2. Mean annual catches (metric tonnes; t) of skipjack tuna by fleet and fishery between 2017 and 2021, with indication of cumulative catches by fleet. FS = free-swimming schools; LS = schools associated with drifting floating objects. Purse seine | Other: coastal purse seine, purse seine of unknown association type, ring net; Longline | Other: swordfish and sharks-targeted longlines; Other: all remaining fishing gears

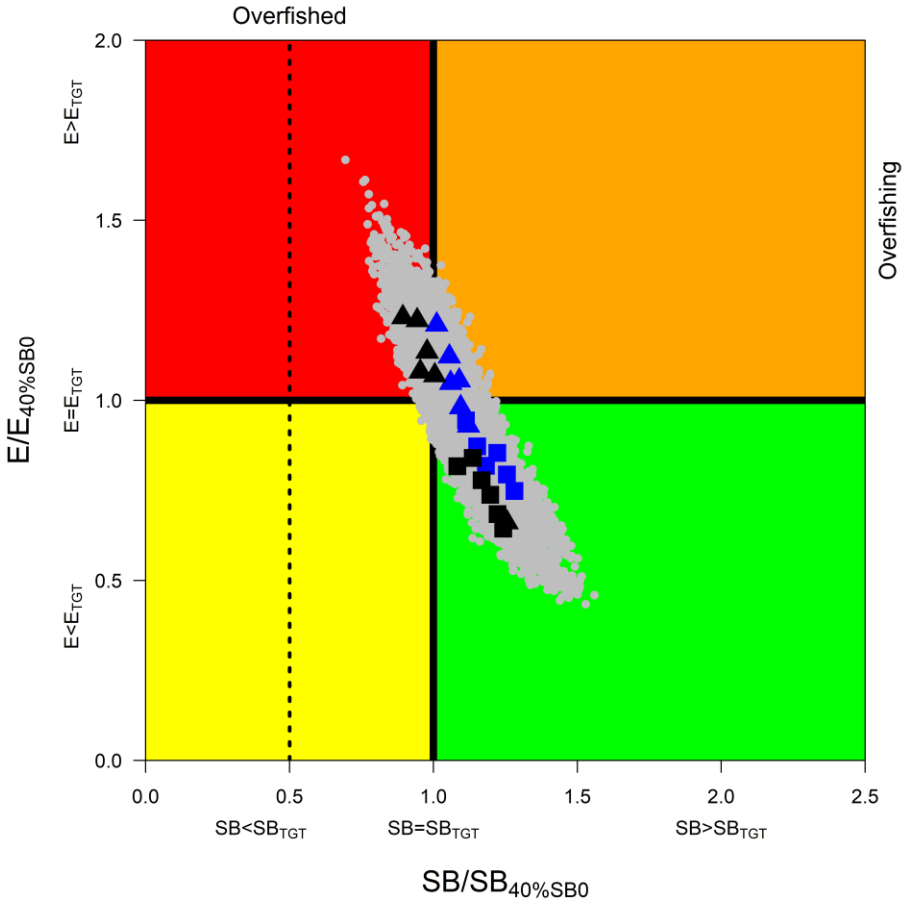

Fig. 3. Skipjack tuna: SS3 Aggregated Indian Ocean assessment Kobe plot of the 2020 uncertainty grid. Symbols represent Maximum posterior density (MPD) estimates of current stock status relative to $SB_{40\%SB0}$ (x-axis) and $E_{40\%SB0}$ (y-axis) for the individual models (blue, no effort creep; black, additional effort creep; triangle, full weighting of tagging data; square, tagging data downweighted). Grey dots represent uncertainty from individual models. The vertical dashed line represents the limit reference point for Indian Ocean skipjack tuna (SB_{lim} = 20%SB_0)