Food and Agriculture Organization of the United Nations

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

RESOLUTION 22/03
ON A MANAGEMENT PROCEDURE FOR BIGEYE TUNA IN THE IOTC AREA OF COMPETENCE.

Keywords: *Bigeye tuna, Management Procedure, Harvest Strategy, Target reference point, MSY.*

The Indian Ocean Tuna Commission (IOTC),

HAVING responsibility for the conservation and optimum utilization of tuna and tuna-like species in the Indian Ocean;

RECOGNISING the need for action to ensure the achievement of IOTC objectives to conserve and manage tuna resources in the IOTC area of competence;

RECOGNISING the adopted management objectives of the Commission set out in Resolution 15/10 are to: 1) maintain the biomass at or above levels required to produce MSY or its proxy, 2) maintain the fishing mortality rate at or below F_{MSY} or its proxy, and 3) avoid the biomass being below B_{LIM} and the fishing mortality rate being above F_{LIM};

MINDFUL of Article XVI of the IOTC Agreement regarding the rights of Coastal States and of Articles 87 and 116 of the UN Convention on the Law of the Sea regarding the right to fish on the high seas;

RECOGNISING the special requirements of developing States, particularly Small Island developing States, in Article 24 of the Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (UNFSA);

RECOGNISING Resolution 12/01 *On the implementation of the precautionary approach* calls on the Indian Ocean Tuna Commission to implement and apply the precautionary approach, in accordance with Article 6 of UNFSA;

RECALLING Resolution 15/10 *On Target and Limit Reference Points and a Decision Framework*, which identifies objectives of the Commission to maintain stocks in perpetuity and with high probability, at levels not less than those capable of producing their maximum sustainable yield as qualified by relevant environmental and economic factors including the special requirements of developing States in the IOTC area of competence; and identifies reference points for IOTC stocks including bigeye tuna;

RECOGNIZING the intent of the Commission to adopt management procedures aimed at achieving the objectives of the IOTC Agreement (Resolution 15/10) aided by advice of the Technical Committee on Management Procedures (TCMP), as established in Resolution 16/09 [superseded by Resolution 25/10] and as further expounded in the *Schedule of work for the development of management procedures for key species in the IOTC Area*;

ACKNOWLEDGING the Scientific Committee advice that the most recent stock assessment in 2019 determined bigeye tuna is not overfished but subject to overfishing;

FURTHER CONSIDERING the endorsement of the bigeye tuna operating model by the 24th meeting of the Scientific Committee (December 2021, SC24) and the SC24's advice that the key technical work (management strategy evaluation) required to test the performance of candidate management procedures had been completed;

FURTHER CONSIDERING the advice and recommendations of the 5th Session of the Technical Committee on Management Procedures (TCMP) regarding a management procedure for bigeye tuna which noted that both candidate management procedures for bigeye tuna presented to the TCMP achieved the management objective and recommended the 26th Session of the Commission discuss and select a candidate management procedure for adoption.

ADOPTS in accordance with paragraph 1 of Article IX of the IOTC Agreement:

1. A management procedure for the bigeye tuna stock managed by the IOTC with a view of maintaining the stock biomass in the green zone of the Kobe plot (not overfished and not subject to overfishing) while maximizing the average catch from the fishery and reducing the variation in the total allowable catch (TAC) between management periods.

Management procedure

2. The adopted management procedure for bigeye tuna known as MP1 Harvest is described in Annex I (MP).
3. Consistent with the adopted management objectives of the Commission, the management procedure is designed to achieve:
    a) a 60% probability that the bigeye tuna spawning stock biomass achieves the target reference point of SB_{MSY}[1] by 2034-2038;
    b) the bigeye tuna spawning stock biomass avoids breaching the interim limit reference point specified in Resolution 15/10 with a high probability;

    and operates with the following constraint:

    c) the maximum increase or decrease in the TAC shall be 15% relative to the previous TAC.

Total Allowable Catch setting

4. The Scientific Committee shall run the MP and advise the Commission of the outcome, including a recommended TAC and any advice on exceptional circumstances in accordance with the Commission endorsed Guidelines for the Provisions of Exceptional Circumstances for IOTC MPs as documented in Appendix 6a of IOTC-2021-SC24-R.
5. The Commission shall adopt the TAC based on the outcome of the MP, unless the Scientific Committee identifies exceptional circumstances that require consideration of alternate management actions to be taken by the Commission.
6. The first TAC derived from the MP shall apply in 2024 and 2025. After 2025, the TAC shall apply in each of the subsequent three years following the year it is set by the Commission[2].
7. The schedule for setting and applying the TAC, beginning the calendar year immediately following adoption of this Resolution, is shown in Annex II.
8. If exceptional circumstances are triggered, the pre-existing TAC shall remain in place until a new TAC or other management action is agreed by the Commission.

TAC allocation

9. Allocation of the TAC among CPCs will take place according to a process agreed external to this measure.
10. The Commission will develop a mechanism to constrain catch to the MP derived TAC for bigeye tuna no later than 2025, if an allocation scheme has not yet been agreed and implemented by the Commission.

Review

11. A review of performance of the MP by the Commission and its subcommittees is to occur in 2030. The aim of the review is to ensure the MP is performing as expected and whether there

[1] The spawning stock biomass associated with achieving maximum sustainable yield.

[2] E.g. the Scientific Committee runs the MP in 2022, the TAC is set by the Commission in 2023, the TAC applies in 2024 and 2025. The Scientific Committee runs the MP in 2024, the TAC is set by the Commission in 2025, the TAC applies from 2026-2028.

are any conditions that warrant reconditioning the operating models, retuning the existing MP, or consideration of alternate candidate MPs and a new full management strategy evaluation.

12. The Scientific Committee is requested to review, and if necessary, further develop and refine (not later than 2024), the exceptional circumstances guidelines (adopted by SC24 and S26), taking into account, *inter alia*, the need for an appropriate balance between specificity versus flexibility in defining exceptional circumstances, and the appropriate level of robustness to ensure that exceptional circumstances are triggered only when necessary.
13. The IOTC, through the Technical Committee on Management Procedures, is requested to review the need for, and if necessary, develop at latest by 2025, guidance on a range of appropriate management responses should those exceptional circumstances be found to occur.

ANNEX I

DESCRIPTION AND FORMULAE FOR CALCULATING TACS FOR MP1_HARVEST

MP1 Harvest has two data inputs: total catch biomass and spatially aggregated longline CPUE from 1980 to the most recent year of catch data. It then fits a Pella-Tomlinson biomass dynamic model to the CPUE data given the catch biomass. Estimated parameters are carrying capacity (*K*), intrinsic rate of increase (*r*), initial biomass depletion (*delta*), the production curve shape parameter (*m*), and finally annual biomass *B* and its stochastic variability *sigmaB*. From these parameters we derive the key variables used in the harvest control rue (HCR):

1. Ratio of fishing mortality to the value which produces MSY (F_{MSY} ratio)
2. Relative biomass or depletion: B/K

The HCR is a simple hockey stick type: for biomass depletion above 0.4 the HCR multiplier (HCR_{mult}) is 1, it decreases to (almost) zero linearly by a biomass depletion of 0.1. The overall fishing mortality used to estimate the TAC is calculated as follows: F_{MSY} ratio x HCR_{mult} x tuning parameter (F_{mult}). This fishing mortality is used in conjunction with the estimated biomass *B* to calculate the new TAC. A symmetric maximum change of 15% is then applied to calculate the actual recommended TAC. The main suite of equations that define the HCR are as follows:

$$HCR_{mult} = 1 \; if \; \frac{B_y}{K} \geq 0.4$$

$$HCR_{mult} = \frac{\frac{B_y}{K} - 0.1}{0.3} \; if \; 0.1 < \frac{B_y}{K} < 0.4$$

$$HCR_{mult} = 0.0001 \; if \; \frac{B_y}{K} \leq 0.1$$

$$TAC_{new} = B_y(1 - exp(-F_{mult} \times HCR_{mult} \times F_{MSY} \; ratio))$$

DATA SPECIFICATION

The input data for MP1_Harvest are:

a) Total catches of bigeye tuna in the IOTC Area of Competence. These are collated by the IOTC Secretariat and prepared annually for the IOTC Working Party on Tropical Tuna. Data used are from 1980 to the most recent year of data available.
b) Standardised and spatially aggregated longline catch per unit effort (CPUE). These are derived from the joint standardisation analysis approach described in Hoyle *et al* (2019)[3] applied to catch and effort data from 1980 to the most recent year of data available.

[3] Hoyle, S., Chang, S.T, Fu, D., Kim, D.N., Lee, S.I., Matsumoto, T., Chassot, E., Yeh, Y.M. 2019. Collaborative study of bigeye and yellowfin tuna CPUE from multiple Indian Ocean longline fleets in 2019, with consideration of discarding. IOTC–2019–WPM10–16.

ANNEX II

SCHEDULE FOR MP IMPLEMENTATION

IOTC COMMITTEE	2022	2023	2024	2025	2026	2027	2028	2029
Commission (May/June)	**Select and adopt BET MP**	Annual Review of SC advice →						
		Set TAC (2024-2025)		**Set TAC** (2026-2028)			**Set TAC** (2029-2031)	
WPTT and WPM (Oct)	Collate catch data and CPUE series used in MP		Collate data used in MP			Collate data used in MP		
	Consider exceptional circumstances (EC), advise SC		Consider EC			Consider EC		
SC (Dec)	**Run MP**		**Run MP**			**Run MP**		
	Assess* stock status				Assess stock status			Assess stock status
	Annual Review of Exceptional Circumstances →							
	Provide TAC advice to the Commission		Provide TAC advice			Provide TAC advice		

- The assessment of stock status has a distinct role and purpose from the management procedure and is not used for TAC advice. It is included in this schedule to identify best practice in the timing of running of the assessment, i.e. in the year after MP TAC decisions have been made.