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Running the IOTC Bigeye Tuna Management Procedure for 2024

IOTC Working Party on Methods

Oct 2024

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IOTC-2024-WPM15

Citation

Williams AJ, Preece AL, Hillary RM (2024). Running the IOTC Bigeye Tuna Management Procedure for 2024. Working Paper prepared for the 15th IOTC Working Party on Methods, 24-26 October 2024.

Acknowledgements: This work was funded by DFAT Australia and CSIRO.

Contents

1 Background

The Indian Ocean Tuna Commission (IOTC) adopted a Management Procedure (MP) in 2022 to recommend the total allowable catch (TAC) for consideration by the Commission (IOTC Resolution 22/03). The bigeye tuna MP was first run by the IOTC Scientific Committee in 2022, through the Working Party on Methods and Working Party on Tropical Tunas, to derive a recommended TAC for 2024 and 2025. The adopted MP schedule requires the bigeye MP to be run again in 2024 to derive a recommended TAC for 2026, 2027 and 2028. The agreed standardisation of the joint CPUE series derived from Japanese, Korean and China,Taiwan longline fisheries, a key input to the MP, was not available at the time of this meeting. Therefore, this document provides a template that describes the key data inputs to the MP and the TAC calculation given the agreed data, which can be updated when the standardised CPUE series becomes available. The full specification of the MP is provided in Williams et al. (2022), and the consideration of exceptional circumstances is provided in Preece et al. (2024).

2 Data inputs

There are only two data inputs for the bigeye tuna MP:

1. **Catch data**: the agreed aggregated annual catches of bigeye tuna compiled by the IOTC Secretariat
2. **Longline CPUE data**: the agreed standardised joint CPUE series derived from Japanese, Korean and China,Taiwan longline fisheries.

2.1 Catch data

The catch dataset to be used in the MP is the nominal catches reported to the IOTC Secretariat by Contracting Parties and Cooperating Non-Contracting Parties (CPCs) as per the IOTC Conservation and Management Measures (CMMs) and following the standards and formats defined in the IOTC reporting guidelines. The dataset to be used in the MP includes annual catches, in weight, aggregated across fleets, gears, and IOTC areas from 1979 to the most recent year of data available. The dataset used in running the Bigeye tuna MP for 2024 is provided in Figure 1.

2.2 Longline CPUE data

The CPUE dataset to be used in the MP is based on the standardisation of the longline catch and effort data provided by Japan, Korea, and Taiwan,China for the years 1979 to present. A single aggregate CPUE index is used as the input data to the bigeye tuna MP, which is a weighted combination of the 4 region-specific, year-quarter CPUE series described in Williams et al. (2022). The weighting factors for each region are derived using the analysis by Hoyle & Langley (2020) for the period 1979 – 1994. The area weighted CPUE series is then renormalised to a value of 1 to provide a single aggregate CPUE index for input into the MP.

A joint CPUE standardisation was conducted for bigeye tuna using Japanese, Korean and Taiwanese longline fisheries data up to 2023, and presented to the Working Party on Tropical Tunas Data Preparatory meeting in 2024 (Lim et al. 2024). However, this standardised CPUE was not derived using the prescribed approach required for running the MP and it would not be appropriate to run the MP using this CPUE index.

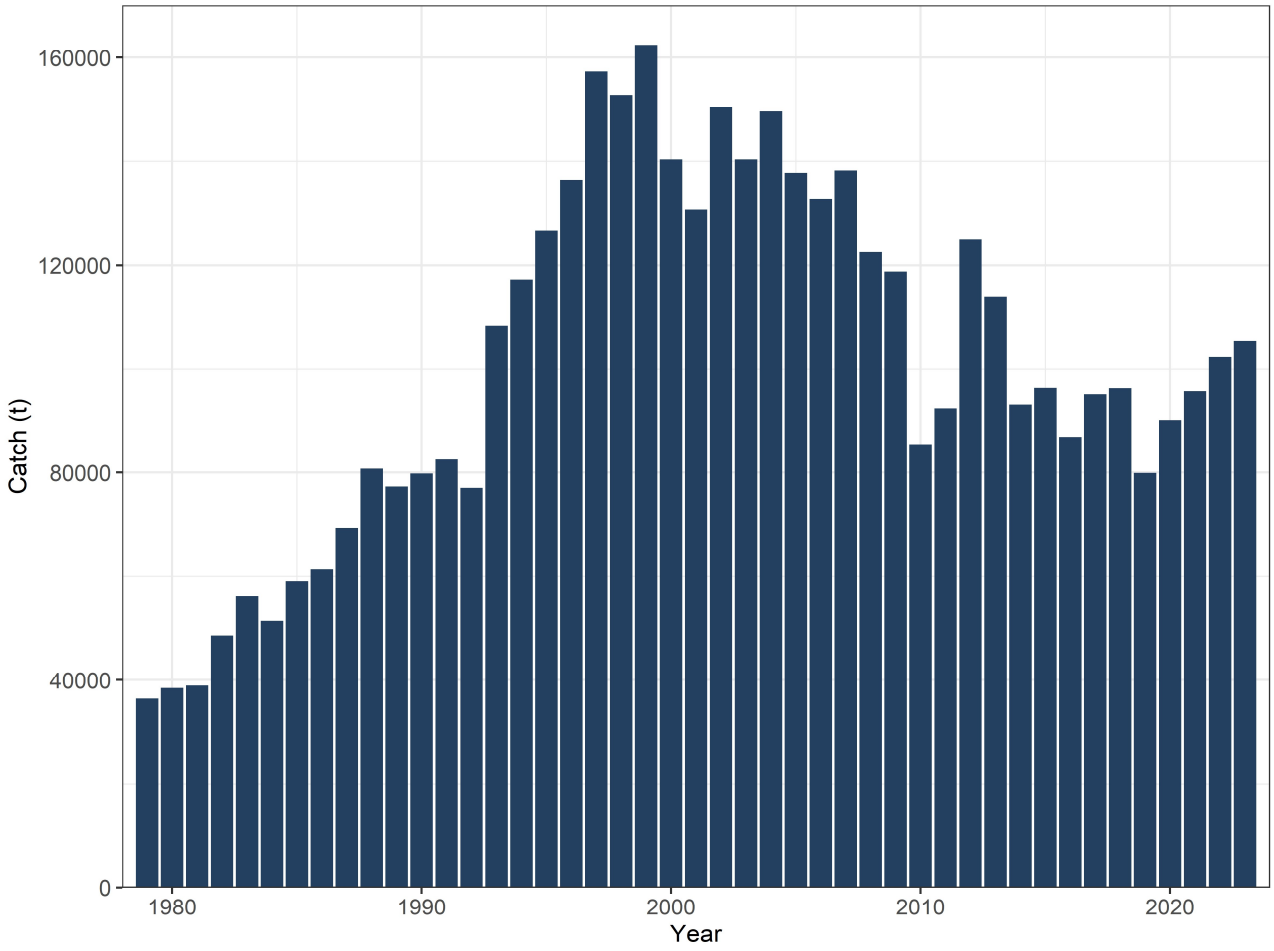

Figure 1. Annual bigeye tuna catch data (tons) used in running the bigeye tuna MP for 2024 (source https://iotc.org/WPTT/26AS/Data/03-NC).

3 Structure of the MP

The IOTC bigeye tuna MP is a model-based MP, which uses only catch and CPUE as input data. The MP fits a simple Pella-Tomlinson biomass dynamics model to estimate stock depletion, which is then used in a hockey stick-shaped harvest control rule (HCR) to calculate the TAC for the next 3-year cycle.

The estimated parameters from the estimation model used in the HCR are the ratio of current fishing mortality (F) to the F value which produces MSY (F_{MSY} ratio), biomass in the most recent year (B_y), carrying capacity (K), and the relative biomass in the most recent year (B_y/K).

The HCR derives an HCR multiplier (HCR_{mult}) as follows:

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

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

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

The new TAC is then derived using:

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

where F_{mult} is the fixed parameter (3.718) derived from tuning the MP (during the MSE process) to achieve the Commission's objective of achieving a 60% probability of being in the green zone of the Kobe plot by 2034-2038. The MP has a limit on the maximum change to the TAC of 15% of the previous TAC. The 15% limit on the maximum change to the TAC for running the bigeye tuna MP in 2024 will be relative to the TAC set for 2024 and 2025 (i.e. 80,583 t).

4 Running the MP

The MP cannot be run until the MP specified standardised CPUE index is available. When the index is available, the estimation model will be run using the catch and CPUE data inputs as described above, and details on fits to the data and parameter estimates provided.

5 TAC calculation

When the MP specified standardised CPUE index is available, key parameters from the estimation model will be inputted into the MP to generate a recommended TAC for the years 2026, 2027 and 2028. If necessary, the recommended TAC will be adjusted according to the maximum 15% change in TAC relative to the current TAC (80,583 t). The details of the calculations will be provided here when available.

6 References

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