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

ON HARVEST CONTROL RULES FOR SKIPJACK TUNA IN THE IOTC AREA OF COMPETENCE

SUBMITTED BY: MALDIVES, KENYA, MAURITIUS, TANZANIA & MOZAMBIQUE, 22 APRIL 2016

Explanatory Memorandum

The key objective of this proposal is to ensure the long term sustainability of the Indian Ocean (IO) skipjack tuna (SKJ) tuna fishery. The overarching goal is to ensure our shared tuna resources, which are critical to our economies, communities, and cultures, will continue to provide us with jobs, food, and development opportunities well into the future – for our children, our grandchildren, and beyond.

This proposal for a Harvest Control Rule (HCR) for IO SKJ draws on SC recommendations, including the new guidance on reference points in cases where MSY-based reference points are difficult to estimate. This proposal uses the biomass limit reference point of 20% of the unfished level ($B_{LIM} = 0.2B_0$) and the target biomass reference point of 40% of the unfished level ($B_{TARG} = 0.4B_0$), consistent with the SC advice that reference points based on depletion level should be used for stocks where MSY-based reference points cannot be robustly estimated and with international conventions and current practices followed in other tRFMOs.

Since 2013, the Maldives has been working with the IOTC and a range of experts to undertake a Management Strategy Evaluation (MSE) for the IO SKJ fishery. During 2014 and 2015, the results of this work program, including the operating model, evaluation methods, performance statistics, and approaches for developing harvest control rules (HCRs) were reviewed by meetings of the Working Party on Tropical Tunas (WPTT), Working Party on Methods (WPM), the Scientific Committee (SC) and the Management Procedures Dialogue (MPD). In February 2016, the Maldives held a meeting of developing coastal states with the aim of collectively selecting a class of HCR from amongst the set of candidate classes that have been developed. The meeting agreed that, of the candidates proposed, that the model-based HCR presented in this proposal was the most appropriate at this time because it makes use of the best available information as integrated in stock assessments. Alternative model-free HCRs, whilst potentially being appropriate in the future, are not appropriate at this time due to the high uncertainty associated with individual data series, in particular CPUE-based indices of stock abundance.

The proposed HCR has three control parameters that can be tuned to provide better management performance with respect to the Commission's management objectives and the underlying dynamics of the stock. The values currently proposed for these control parameters should be considered as "reference" values. Consistent with the work plan endorsed by the 2nd MPD, the results of evaluations of a wide range of control parameters will be presented to the 3rd MPD, 20-21 May 2016. After consideration of the performance statistics arising from these evaluations, the reference values currently used in this proposal may be replaced with alternative values that the Commission considers more appropriate and presented as Revision 1 of this proposal.

It is important to note that this proposal does not seek to define a permanent HCR for the Indian Ocean skipjack tuna fishery. Rather, it will be necessary to continue work on the development of alternative, potentially better performing, HCRs as more data, improved analysis methodologies, and better scientific understanding of the stock are developed.

The proposal refers to the Resolutions 13/03 (on the recording of catch and effort data by fishing vessels in the IOTC area of competence), 10/02 (Mandatory Statistical Requirements for IOTC Contracting Parties and Cooperating Non-Contracting Parties) and 12/02 (Data Confidentiality Policy and Procedures) that relate flag States' requirements to record and report and catch effort data to the IOTC in timely manner.

A full range of scientific advice will be provided by the SC on whether agreed management action will achieve the objective and in relation to the long-term outlook for the stock under this management framework.

RESOLUTION 16/XX

ON HARVEST CONTROL RULES FOR SKIPJACK TUNA IN THE IOTC AREA OF COMPETENCE

Keywords: Skipjack tuna; Reference Points; Harvest Control Rules; Precautionary Approach; Management Strategy Evaluation.

The Indian Ocean Tuna Commission (IOTC),

NOTING Article V, paragraph 2(c), of the IOTC Agreement is to adopt, in accordance with Article IX and on the basis of scientific evidence, Conservation and Management Measures to ensure the conservation of the stocks covered by the Agreement;

BEING MINDFUL of Article XVI of the IOTC Agreement regarding the rights of Coastal States, Article 87 and 116 of the UN Convention of the Law of the Sea regarding the right to fish on the high seas and of Article 24 of the Agreement for the Implementation of the Provisions of the United Nations Convention of the Law of the Sea of December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (UNFSA) regarding recognition of the special requirements of developing states;

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 Article 6 of the Agreement for the Implementation of the Provisions of the United Nations Convention of the Law of the Sea of December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (UNFSA);

RECOGNISING the ongoing discussions on allocation and the need to avoid prejudicing future decision of the Commission;

FURTHER CONSIDERING the call by the United Nations General Assembly Resolution 70/75 upon the states to increase the reliance on scientific advice in developing, adopting and implementing conservation and management measures and to take into account the special requirements of developing states, including Small Island developing States as highlighted in the SIDS Accelerated Modalities of Action (SAMOA) Pathway;

CONSIDERING the recommendations adopted by the KOBE II, held in San Sebastian, Spain, June 23 – July 3 2009; implementing where appropriate a freeze on fishing capacity on a fishery by fishery basis and such a freeze should not constrain the access to, development of, and benefit from sustainable tuna fisheries by developing coastal States;

TAKING INTO ACCOUNT the need to have due regard for the interests of all Members concerned, in conformity with the rights and obligations of those Members under international law and in particular, to the rights and obligations for developing countries;

RECALLING Article 6, paragraph 3(b) of UNFSA that calls on States to implement the precautionary approach using the best scientific information available, using stock-specific reference points and outlining the action to be taken if they are exceeded;

FURTHER RECALLING that Article 7.5.3 of the FAO Code of Conduct for Responsible Fisheries also recommends the implementation of stock specific target and limit reference points, inter alia, on the basis of the precautionary approach;

ACKNOWLEDGING that implementing pre-agreed harvest strategies including harvest control rules is considered a critical component of modern fisheries management and international best practices for fisheries management;

FURTHER NOTING that a harvest control rule encompasses a set of well-defined, pre-agreed rules or actions used for determining a management action in response to changes in indicators of stock status with respect to reference points;

NOTING that the Scientific Committee at its 17th Session, recommended the Commission consider an alternative approach to identify biomass limit reference points, such as those based on biomass depletion levels, when the MSY-

based reference points are difficult to estimate. In cases where MSY-based reference points can be robustly estimated, limit reference points may be based around MSY;

FURTHER NOTING that the Scientific Committee also recommended that in cases where MSY-based reference points cannot be robustly estimated, biomass limit reference points be set at 20% of unfished levels ($B_{LIM} = 0.2B_0$);

ACKNOWLEDGING that the IOTC Scientific Committee has initiated a Commission requested process leading to a management strategy evaluation (MSE) process to improve upon the provision of scientific advice on HCRs;

RECALLING obligations and agreements under Resolutions 12/02[1], 15/01[2], 15/02[3], and 15/10[4];

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

Objectives

1. To maintain the Indian Ocean Tuna Commission skipjack tuna stock in perpetuity, at levels not less than those capable of producing maximum sustainable yield (MSY) as qualified by relevant environmental and economic factors including the special requirements of Developing Coastal States and Small Island Developing States in the IOTC area of competence and considering the general objectives identified in Resolution 15/10 (or any subsequent revision).

2. To use a pre-agreed harvest control rule (HCR) to maintain the skipjack tuna stock at, or above, the target reference point (TRP) and well above the limit reference point (LRP), specified in Resolution 15/10 (or any subsequent revision).

Reference Points

3. Consistent with paragraph 2 of Resolution 15/10, the biomass limit reference point, B_{lim}, shall be 20% of unfished spawning biomass[5] (i.e. $0.2B_0$).

4. Consistent with paragraph 3 of Resolution 15/10, the biomass target reference point, B_{targ}, shall be 40% of unfished spawning biomass (i.e. $0.4B_0$). This TRP takes into account difficulties involved in estimating B_{MSY} accurately for skipjack tuna.

5. The HCR described in paragraphs 6–12 seeks to maintain the skipjack tuna stock biomass at, or above, the target reference point while avoiding the limit reference point.

Harvest Control Rule (HCR)

6. The skipjack tuna stock assessment shall be conducted every three (3) years, with the next stock assessment to occur in 2017. Estimates of 7(a–d) shall be taken from a model-based stock assessment that has been reviewed by the Working Party on Tropical Tunas and endorsed by the Scientific Committee via its advice to the Commission.

7. The skipjack tuna HCR shall recommend a total annual catch limit using the following three (3) values estimated from each skipjack stock assessment. For each value, the reported median from the reference case adopted by the Scientific Committee for advising the Commission shall be used.

    a) The estimate of current spawning stock biomass (B_{curr});

    b) The estimate of the unfished spawning stock biomass (B_0);

    c) The estimate of the equilibrium exploitation rate (E_{targ}) associated with sustaining the stock at B_{targ}.

1: 12/02: Data Confidentiality, policy and procedures
2: 15/01: On the recording of catch and effort data by fishing vessels in the IOTC Area of competence
3: 15/02: Mandatory statistical reporting requirements for IOTC Contracting Parties and Cooperating Non- Contracting Parties (CPCs)
4: 15/10: On Target and Limit Reference Points and a decision framework
5: The symbol B is used to refer to spawning biomass, the total mass of mature fish, i.e. B_0, B_{lim}, B_{targ} and B_{curr} all refer to different levels of spawning biomass.

8. The HCR shall have five control parameters, with reference case values set as follows:

   a) Threshold level (T), the percentage of B_0 below which reductions in fishing mortality are required = 40%. If biomass is estimated to be below the threshold level, then fishing mortality reductions, as output by the HCR, will occur.

   b) Maximum fishing intensity (I_{max}), the percentage of E_{targ} that will be applied when the stock status is at, or above, the threshold level = 100%. When the stock is at or above the threshold level, then fishing intensity (I) = I_{max}

   c) Safety level (X), the percentage of B_0 below which non-subsistence catches are set to zero i.e. the non-subsistence fishery is closed = 10%. This level is below the LRP and is intended to prevent stock collapse should the biomass reach such levels.

   d) Maximum catch limit (C_{max}), the maximum recommended catch limit = 900,000t. To avoid adverse effects of potentially inaccurate stock assessments, the HCR shall not recommend a catch limit greater than C_{max}.

   e) Maximum change in catch limit (D_{max}), the maximum percentage change in the catch limit = 30%. To enhance the stability of management measures the HCR shall not recommend a catch limit that is 30% higher, or 30% lower, than the previous recommended catch limit.

9. The recommended total annual catch limit shall be set as follows:

   a) If the current spawning biomass (B_{curr}) is estimated to be at or above the threshold spawning biomass i.e., $B_{curr} >= 0.4B_0$, then the catch limit shall be set at [I_{max} x E_{targ} x B_{curr}]

   b) If the current spawning biomass (B_{curr}) is estimated to be below the threshold biomass i.e, $B_{curr} < 0.4B_0$, but greater than the safety level i.e.,$B_{curr} > 0.1B_0$, then the catch limit shall be set at [I x E_{targ} x B_{curr}]. See Table 1 in Appendix 1 for values of fishing intensity (I) for specific B_{curr}.

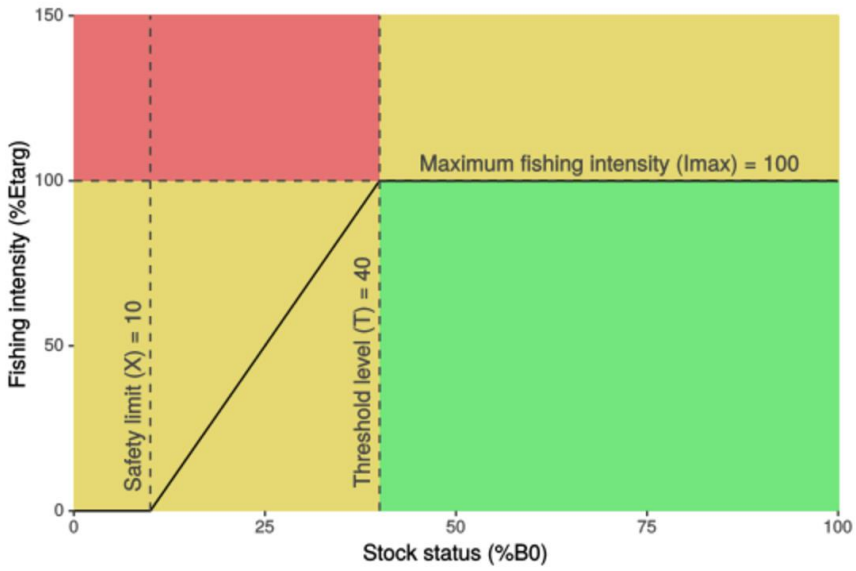
   c) If the spawning biomass is estimated to be at, or below, the safety level, i.e. $B_{curr} <= 0.1B_0$ then the catch limit shall be at 0 for all fisheries other than subsistence fisheries.

   d) In the case of (a) or (b), the recommended catch limit shall not exceed the maximum catch limit (C_{max}) and shall not increase by more than 130% or decrease by more than 70% from the previous catch limit.

   e) In the case of (c) the recommended catch limit shall always be 0 regardless of the previous catch limit.

[The above values in paragraphs 8 and 9 shall be considered as a "suggested" case and may be altered after consideration of MSE results at the 3rd MPD and provided as a Revision 1]

10. The HCR described in 8(a-c) produces a relationship between stock status (spawning biomass relative to unfished levels) and fishing intensity (exploitation rate relative to target exploitation rate) as shown below (See Table 1 in **Appendix 1** for specific values):



11. The recommended catch limit shall by default, be implemented in accordance with the allocation scheme agreed for skipjack tuna by the Commission. In the absence of an allocation scheme, the catch limit shall be implemented proportionally by all CPCs, and shall not pre-empt or prejudice future allocation negotiations. The HCR implementation will be reviewed by the Compliance Committee the following year.

12. The HCR shall be in place until the Commission adopts an alternative HCR considering paragraphs 3–7.

Review and exceptional circumstances

13. The HCR will be reviewed through further Management Strategy Evaluation (MSE), but no later than 2021 (i.e. five years from its implementation). Subject to the result of that review the current HCR may be refined or replaced with an alternative HCR.

14. In the case that the estimated spawning biomass falls below the limit reference point, the HCR will be reviewed, and consideration given to replacing it with an alternative HCR specifically designed to meet a rebuilding plan as advised by the Commission.

15. The recommended total annual catch produced by the HCR will be applied continuously as set forth in paragraph 11 above, except in case of exceptional circumstances, such as caused by severe environmental perturbations. In such circumstances, the Scientific Committee shall advise on appropriate measures.

Scientific Advice

16. The IOTC Scientific Committee shall:

    a) Include the LRP and TRP as part of any analysis when undertaking all future assessments of the status of the IOTC skipjack tuna stock.

    b) Undertake and report to the Commission a model-based skipjack tuna stock assessment every three (3) years, commencing with the next stock assessment in 2017.

    c) Undertake a programme of work to further refine Management Strategy Evaluation (MSE) for the IOTC skipjack tuna fishery as required in paragraph 13 including, but not limited to,

        i. Refinement of operating model(s)/ used,

        ii. Alternative management procedures,

        iii. Refining performance statistics.

Final Clause

17. The Commission shall review this measure at its annual session in 2019, or before if there is reason and/or evidence to suggest that the skipjack tuna stock is at risk of breaching the LRP.

Appendix 1

Table 1. Values of fishing intensity for alternative levels of estimated stock status ($\mathbf{B_{curr}/B_0}$) produced by the HCR with suggested control parameters (Safety level =10%, Threshold level=40% and Maximum fishing intensity=100%).

Stock status (B_{curr}/B_0)	**Fishing Intensity (I)**		**Stock status (B_{curr}/B_0)**	**Fishing Intensity (I)**
At or above 0.40	100%		0.24	46.7%
0.39	96.7%		0.23	43.3%
0.38	93.3%		0.22	40.0%
0.37	90.0%		0.21	36.7%
0.36	86.7%		0.20	33.3%
0.35	83.3%		0.19	30.0%
0.34	80.0%		0.18	26.7%
0.33	76.7%		0.17	23.3%
0.32	73.3%		0.16	20.0%
0.31	70.0%		0.15	16.7%
0.30	66.7%		0.14	13.3%
0.29	63.3%		0.13	10.0%
0.28	60.0%		0.12	6.7%
0.27	56.7%		0.11	3.3%
0.26	53.3%		0.10 or below	0%
0.25	50.0%			