**22-09 BFT**

**RECOMMENDATION BY ICCAT ESTABLISHING A MANAGEMENT PROCEDURE FOR**

**ATLANTIC BLUEFIN TUNA TO BE USED FOR BOTH THE WESTERN ATLANTIC**

**AND EASTERN ATLANTIC AND MEDITERRANEAN MANAGEMENT AREAS**

 *NOTING* that the objective of the Convention is to maintain populations of tuna and tuna-like species at levels that will support Maximum Sustainable Yield (MSY);

 *RECALLING* that the Commission often had difficulties in deciding the Total Allowable Catch (TAC) based on advice from the Standing Committee on Research and Statistics (SCRS);

 *ALSO RECALLING* that the SCRS had difficulties in providing robust scientific advice to the Commission due to various uncertainties such as the low quality of data;

*RECOGNIZING that* Harvest Control Rules (HCRs) and Management Procedures (MPs) developed using Management Strategy Evaluation (MSE) provide a more robust management framework than that based on a conventional stock assessment, ensuring a more precautionary approach and better stability of TACs;

*ALSO RECOGNIZING* the intent of the Commission to adopt HCRs and MPs developed using MSE, as established in *Recommendation by ICCAT on the development of Harvest Control Rules and of Management Strategy Evaluation* (Rec. 15-07);

 *NOTING* the *Resolution by ICCAT on developing initial management objectives for eastern and western bluefin tuna* [Res. 18-03], which outlined the conceptual objectives for the Atlantic bluefin tuna MSE;

 *RECALLING* that the Commission requested the SCRS to continue testing various candidate MPs in 2022 and to meet with Panel 2 to review the results and support the Panel in selecting one to adopt and apply for 2023 as anticipated in the 2021 Recommendations, the *Recommendation by ICCAT amending Recommendation 17-06 for an interim conservation and management plan for western Atlantic bluefin tuna* (Rec. 21-07) and *Recommendation by ICCAT amending the Recommendation 19-04 amending Recommendation 18-02 establishing a multi-annual management plan for bluefin tuna in the eastern Atlantic and the Mediterranean* (Rec. 21-08) and for this purpose Panel 2 held four intersessional meetings in 2022;

 *STRESSING* the importance that all the stakeholders are involved in the MSE process since the MP automatically calculates the TAC to be adopted by the Commission unless it encountered an exceptional circumstance that is not envisaged by the MP;

 *APPRECIATING* the efforts of all the scientists involved in the MSE process who made tremendous contribution not only to the scientific work but also to better communication of the results to various stakeholders involved in the bluefin tuna fisheries, including through informal ambassador meetings in three languages;

 *RECOGNIZING* that the bluefin tuna MSE framework evaluated the status of the stock over the course of a 30-year projection period ending in 2052;

 *FURTHER RECOGNIZING* that the relative biomass statistic (lowest depletion or LD value, which is the spawning biomass relative to dynamic SSBMSY) will be evaluated across years 11-30 in this projection period to provide time for the MP to rebuild stocks given that the MSE operating models have been designed to cover a wide range of plausible scenarios, including scenarios that depict the stocks in a depleted state in the first 10 years of the 30-year projection period;

 *NOTING* the importance of establishing an exceptional circumstances protocol in 2023 that could result in suspending or modifying the application of the MP;

THE INTERNATIONAL COMMISSION FOR THE CONSERVATION

OF ATLANTIC TUNAS (ICCAT) RECOMMENDS THAT:

**PART I**

**GENERAL PROVISIONS**

1. Contracting Parties and Cooperating non-Contracting Parties, Entities or Fishing Entities (CPCs) whose vessels fish for Atlantic bluefin tuna (*Thunnus thynnus*) in the Convention area shall implement the following MP. This MP shall be used to calculate the Total Allowable Catch (TAC) for both the western Atlantic management area (hereafter called “the western management area”) and the eastern Atlantic and the Mediterranean management area (hereafter called “the eastern management area”).

**Management Objectives**

1. The management objectives for Atlantic bluefin tuna are:
	1. Stock Status:
		* + Both the western and eastern stocks should have a 60% or greater probability of occurring in the green quadrant of the Kobe plot (no overfishing occurring and not overfished);
	2. Safety:
		* + There should be a 15% or less probability of either stock falling below BLIM[[1]](#footnote-1);
	3. Yield:
		* + Maximize overall catch levels in both the western and eastern management areas; and,
	4. Stability:
		* + Any change in TAC between consecutive management periods in both the western and eastern management areas should be no more than a 20% increase or a 35% decrease.

Performance Measures (indicators) used to evaluate the performance of MPs for each management objective are found in **Annex 1**.

**Part II**

**Management Procedure and Catch Limits**

1. Consistent with the management objectives specified in paragraph 2, the BR management procedure has been selected and is fully described in **Annex 2**.

**TAC Setting**

1. The first TACs derived from the MP shall apply in 2023, 2024, and 2025. The management cycle length shall be three years; therefore, the MP shall be applied every three years.
2. Notwithstanding the stability management objective in paragraph 2d, there will be a phase-in period of one management cycle where the decrease in TAC shall be no more than 10%.
3. If the TAC change as a result of the application of the MP is less than 50 t for the western management area and 1,000 t for the eastern management area, the TAC shall not be changed.
4. According to the timeline set out in **Annex 3**, the SCRS shall run the MP specified in **Annex 2** and advise the Commission of the resulting TAC for both the western management area and the eastern management area.
5. The Commission shall then adopt the TACs based on the outcome of the MP, unless the SCRS identifies exceptional circumstances that require consideration of alternative management actions to be taken by the Commission.
6. The SCRS shall assess the occurrence of exceptional circumstances annually and the Commission shall act in accordance with the exceptional circumstances protocol, developed based on scientific advice provided by the SCRS and adopted by the Commission.

**TAC Implementation**

1. The MP shall be applied according to the determined schedule and procedure and the resulting TACs for the eastern and western management areas shall be implemented and monitored according to the provisions set out in the *Recommendation by ICCAT amending Recommendation 21-08 establishing a multi-annual management plan for bluefin tuna in the eastern Atlantic and Mediterranean* (Rec. 22-08) and the *Recommendation by ICCAT for a conservation and management plan for western Atlantic bluefin tuna* (Rec. 22-10).

**Part III**

**Final Provisions**

1. A review of the performance of the MP by the Commission and the SCRS shall be completed by 2028 and every 6 years thereafter. The aim of the review is to ensure the MP is performing as expected and to determine whether there are conditions that justify its continuation, or that warrant: reconditioning the MSE operating models; retuning the existing MP; including new indices into a new MP; and/or considering alternate candidate management procedures or development of a new MSE framework. Based on that review and subsequent SCRS advice, the Commission shall decide on future management measures, approaches, and strategies, including, *inter alia*, regarding TAC levels, for bluefin tuna stocks in both management areas.
2. Panel 2, with scientific guidance from the SCRS, shall develop the exceptional circumstances protocol for this MP, for review and adoption by the Commission at its 2023 annual meeting. The protocol will become **Annex 4** of this Recommendation once adopted.
3. This Recommendation repeals and replaces *Resolution by ICCAT on development of initial management objectives for eastern and western bluefin tuna* (Res. 18-03).

**Annex 1**

**Table of Operational Management Objectives and Performance Measures**

Performance Measures are calculated based on 48 simulations/replicates for each of the 48 operating models of a 30-year projection under a CMP.

|  |  |  |
| --- | --- | --- |
| **Management Objectives**  | **Primary Performance Measures**  | **Secondary Performance Measures**  |
| **Status** Both the western and eastern stocks should have a 60% or greater probability of occurring in the green quadrant of the Kobe plot (no overfishing occurring and not overfished) (To be evaluated at intermediate points between zero and 30 years, and at the end of the 30-year period)  | **PGK**: Probability of being in the Kobe green quadrant (i.e., SSB≧dynamic SSBMSY1 and U<UMSY2) in year 30 of the management period (2052).  | **Br30** – Br (i.e., biomass ratio, or spawning stock biomass (SSB) relative to dynamic SSBMSY) after 30 years. **AvgBr** – Average Br over projection years 11-30. **Br20** – Br after 20 years. **POF** – Probability of overfishing (U>UMSY) after 30 projected years. **PNRK** – Probability of not being in the red Kobe quadrant (SSB ≧ SSBMSY and/or U < UMSY) after 30 projected years. **OFT** – Overfished Trend, SSB trend if Br30<1.  |
| **Safety** There should be a 15% or less probability of either stock falling below BLIM at any point during the years 11-30 of the projection period.  | **LD\*** – Lowest depletion (i.e., the lowest SSB relative to dynamic SSBMSY) over years 11-30 in the projection period. LD\* value is evaluated relative to BLIM (40% of dynamic SSBMSY). LD\*15% (15th percentile) is used as the primary performance measures.  | LD\* – LD\*5% (5th percentile) and LD\*10% (10th percentile) are presented in the secondary performance measures. |
| **Yield** Maximize overall catch levels in both western and eastern management areas.  | **AvC10** – Median TAC (t) over years 1-10. **AvC30** – Median TAC (t) over years 1-30.  | **C1** – TAC in first 3 years of MP (i.e., 2023-25). **AvC20** – Median TAC (t) over years 1-20.  |
| **Stability** Any change in TAC between consecutive management periods in both the western and eastern management areas should be no more than a 20% increase or a 35% decrease, except during the first application of the MP, where any TAC change shall not exceed a 20% increase or a 10% decrease.  | **VarC** – Variation in TAC (%) between management cycles.  |  |

1 Dynamic SSBMSY is a set fraction of dynamic SSB0, which is the spawning stock biomass that would occur in the absence of fishing, historically and in the future. Dynamic SSBMSY can change over time since it is based on current recruitment levels, which fluctuate due to time-varying dynamics in the models.

2 The exploitation rate (U) is annual catch (in tonnes) divided by the total annual biomass in tonnes. UMSY is the fixed harvest rate (U) corresponding with SSB/SSBMSY=1 at year 50.

**Annex 2**

**Description and formulae for calculating TACs for western Atlantic and eastern Atlantic and Mediterranean bluefin tuna management areas using the BR Management Procedure**

The BR MP is empirical, based on inputs related to abundance indices which are first standardised for magnitude, then aggregated by way of a weighted average of all indices available for the East or for the West areas as appropriate (**Table A1**, five indices in each management area), and finally smoothed over years to reduce observation error variability effects. TACs are then set based on the concept of taking a fixed proportion of the abundance present, as indicated by these aggregated and smoothed abundance indices.

*Aggregate abundance indices*

An aggregate abundance index is developed for each of the East and the West areas by first standardising each index available for that area to an average value of 1 over the past years for which the index appeared reasonably stable, and then taking a weighted average of the results for each index, where the weight is inversely proportional to the variance[[2]](#footnote-2) of the residuals used to generate future values of that index in the future modified to take into account the loss of information content as a result of autocorrelation. The mathematical details are as follows:

The indices, $I\_{y}^{i}$, are first standardised to an average value of 1 over the past years for which the index appeared reasonably stable:

 $I\_{y}^{i\*}=\frac{I\_{y}^{i}}{{\sum\_{y\_{1}^{i}}^{y\_{2}^{i}}I\_{y}^{i}}/{\left(y\_{2}^{i}-y\_{1}^{i}+1\right)}}$ (A1)

where $y\_{1}^{i}$ and $y\_{2}^{i}$ specify the period to which each index (*i*) is standardised (**Table A1**).

$J\_{y}^{E/W} $is an average index over *n* series (*n*=5 for the East area and *n*=5 for the West area):

 $J\_{y}^{E/W}=\frac{\sum\_{i}^{n}w\_{i}×I\_{y}^{i\*}}{\sum\_{i}^{n}w\_{i}}$ (A2)

where $w\_{i}=\frac{1}{√σ^{i}}$ (i.e., effective inverse variance to the power ¼ weighting). $σ^{i}$ is computed as $σ^{i}=\frac{SD^{i}}{1-AC^{i}}$ , where *SDi* is the standard deviation of the residuals in log space and ACi is their autocorrelation, averaged over the OMs, as used for generating future pseudo-data. **Table A1** lists these values for $w\_{i}$.

For the West, the weights computed above for US\_RR\_66\_144, JPN\_LL\_West2 and CAN\_SWNS have been multiplied by 3 (i.e., $w\_{i}\rightarrow 3w\_{i}$). This change has been implemented to avoid a steep drop in the median TAC for the West area during the 2030s.

In case of a missing index value in year *y*, $J\_{y}^{E/W}$, is computed by setting *wi* to zero, i.e., that index is disregarded when averaging over indices for that year only.

The actual index used in the MP, $J\_{av,y-2}^{E/W}$, is the average over the last three years for which data would be available at the time the MP would be applied, hence:

 $J\_{av,y-2}^{E/W}=\frac{1}{3}\left(J\_{y-2}^{E/W}+J\_{y-3}^{E/W}+J\_{y-4}^{E/W}\right)$ (A3)

where the$J\_{av,y-2}^{E/W}$ applies either to the East or to the West area.

*MP specifications*

The BR Fixed Proportion MP sets the TAC (in mt) every management cycle simply as a multiple of the *Jav* value for the area at the time (**Figure A1**), but subject to the change in the TAC for each area being restricted to a maximum of 20% up and 35% down (10% down for the phase-in period).

For the East area:

 $TAC\_{E,y}=\left\{\begin{matrix}\left(\frac{35032.31}{J\_{2017}^{E}}\right)∙α\_{y}∙J\_{av,y-2}^{E}&for J\_{av,y-2}^{E}\geq T^{E} \\\left(\frac{35032.31}{J\_{2017}^{E}}\right)∙α\_{y}∙\frac{\left(J\_{av,y-2}^{E}\right)^{2}}{T^{E}}&for J\_{av,y-2}^{E}<T^{E}\end{matrix}\right.$ (A4a)

$$α\_{y}=\left\{\begin{matrix}α\_{0}+∆α\left(y-2023\right)&for 2023\leq y\leq 2027\\α\_{0}+4∆α&for y>2027\end{matrix}\right.$$

For the West area:

 $TAC\_{W,y}=\left\{\begin{matrix}\left(\frac{2269.362}{J\_{2017}^{W}}\right)∙β\_{y}∙J\_{av,y-2}^{W}&for J\_{av,y-2}^{W}\geq T^{W} \\\left(\frac{2269.362}{J\_{2017}^{W}}\right)∙β\_{y}∙\frac{\left(J\_{av,y-2}^{W}\right)^{2}}{T^{W}}&for J\_{av,y-2}^{W}<T^{W}\end{matrix}\right.$ (A4b)

$$β\_{y}=\left\{\begin{matrix}β\_{0}+∆β\left(y-2023\right)&for 2023\leq y\leq 2030\\β\_{0}+7∆β&for y>2030\end{matrix}\right.$$

The values $35,032.314 mt$ and $2,269.362 mt$ used in equations A4a and b respectively are the ICCAT Task 1 catch by management area in 2020 as at April 2022.

Note that in equation (A4a), setting $α\_{y}=1$ would amount to keeping the East area TAC the same as the corresponding catch in 2020 (as explained above) if the abundance indices stayed at their 2017 level. If $α\_{y} or β\_{y}>1$ harvesting would be more intensive than at that time, and for $α\_{y} or β\_{y}<1$ it would be less intensive.

Below *T*, the law is parabolic rather than linear at low abundance (i.e., below some threshold, so as to reduce the proportion taken by the fishery as abundance drops); this is to better enable resource recovery in the event of unintended depletion of the stock. For the BR MP, the choices of $T^{E}=1$ and $T^{W}=1$ have been made.

*Constraints on the extent of TAC increase and decrease*

 $∆TAC^{E/W}=\frac{TAC\_{y}^{E/W}}{TAC\_{y-1}^{E/W}}$ (A5)

with $TAC\_{y}^{E/W}$ from equation A4. $∆TAC^{E/W}$ is then modified as follows:

 $∆TAC^{E/W'}=exp⁡(ln(∆TAC^{E/W})VarCadj)$ (A6)

with a control parameter, *VarCadj*, taken for the BR MP to be 0.5. This parameter is introduced to reduce the magnitude of the TAC changes; the smaller the value of this parameter the smaller the TAC change.

$∆TAC^{E/W'}$ is then constrained to a maximum of 20% up and 35% down and 10% down for the phase-in period,

if $∆TAC^{E/W'}>(1+maxUp^{E/W})$ then $∆TAC^{E/W'}=(1+maxUp^{E/W})$, or

 if $∆TAC^{E/W'}<(1-maxDown^{E/W})$ then $∆TAC^{E/W'}=(1-maxDown^{E/W})$

The TAC is then computed as:

 $TAC\_{y}^{E/W'}=TAC\_{y-1}^{E/W}∙∆TAC^{E/W'}$ (A7)

Minimum TAC change constraints lead to the addition of the following rules:

if $\left|TAC\_{y-1}^{E/W}-TAC\_{y}^{E/W'}\right|<min∆TAC^{E/W}$ (A8)

then $TAC^{E/W''}=TAC\_{y-1}^{E/W}$

where values for $min∆TAC^{E/W}$ are 50 t for the West and 1,000 t for the East.

**Table A1**. The index periods $y\_{1}^{i}$ and $y\_{2}^{i}$ (equation A1) and $w^{i}$ weights used when averaging over the indices to provide composite indices for the East and the West areas (equation A2).

|  |  |  |  |
| --- | --- | --- | --- |
|  | East |  | West |
| *i* | Index | $$y\_{1}^{i}$$ | $$y\_{2}^{i}$$ | $$w^{i} $$ |  | Index | $$y\_{1}^{i}$$ | $$y\_{2}^{i}$$ | $$w^{i} $$ |
| 1 | FR\_AER\_SUV2 | 2014 | 2017 | 1.33 |  | GOM\_LAR\_SUV | 2006 | 2017 | 1.33 |
| 2 | MED\_LAR\_SUV | 2012 | 2016 | 1.66 |  | US\_RR\_66\_144 | 2006 | 2018 | 2.55 |
| 3 | GBYP\_AER\_SUV\_BAR[[3]](#footnote-3) | 2015 | 2018 | 1.06 |  | MEXUS\_GOM\_PLL2 | 2006 | 2018 | 1.39 |
| 4 | MOR\_POR\_TRAP | 2012 | 2018 | 1.43 |  | JPN\_LL\_West2 | 2010 | 2019 | 3.96 |
| 5 | JPN\_LL\_NEAtl2 | 2012 | 2019 | 1.33 |  | CAN\_SWNS | 2006 | 2017 | 2.88 |

**Table A2**. Control parameter values for the MP (equation A4). A TAC variation reduction adjustment factor with VarCadj=0.5 has been applied.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CMPname | PGK | Cycle | stability |  | $$α\_{0}$$ | $$∆α$$ | $$β\_{0}$$ | $$∆β$$ |
| B360 | 60 | 3 | +20/-35 |  | 1.235 | 0.204 | 0.810 | -0.032 |

**Figure A1**. Illustrative relationship (the “catch control law”) of *TAC* against *Jav,y* for the BR MP, which includes the parabolic decrease below *T*.

**Annex 3**

**Schedule for Management Procedure implementation**

***3 Year Cycle***

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | *2022* | *2023* | *2024* | *2025* | *2026* | *2027* | *2028* |
|  |  |  |  |  |  |  |  |
| SCRS check for exceptional circumstances |  | X | X | X | X | X | X |
|  |  |  |  |  |  |  |  |
| SCRS runs MP | X |  |  | X |  |  | X |
| Commission endorses and implements TAC based on MP(unless other action is needed due to exceptional circumstances) | X |  |  | X |  |  | X |
| TAC in effect  |  | X | X | X | X | X | X |
| SCRS MP review |  |  |  |  |  | X | X |
| Status Check/Assessment |  |  |  |  | X\* | X\* |  |
| Commission assesses SCRS review and next steps |  |  |  |  |  |  | X |

\*The Commission shall decide the timing of the next stock assessment in consultation with the SCRS.

1. For the purposes of this bluefin tuna MSE, the Commission has agreed to use a BLIM of 40% of the dynamic spawning stock biomass at Maximum Sustainable Yield. [↑](#footnote-ref-1)
2. This is modified somewhat in a few cases to provide the smoother TAC trend over time., as explained further below. [↑](#footnote-ref-2)
3. For the GBYP aerial survey, there is no value for 2016 and that year was therefore omitted from this averaging. [↑](#footnote-ref-3)