

**REPORT OF THE SECOND INTERSESSIONAL MEETING OF PANEL 2 ON BLUEFIN TUNA
MANAGEMENT STRATEGY EVALUATION (BFT MSE)**
(Online, 9-10 May 2022)

1. Opening of the meeting and meeting arrangements

The meeting was opened by the Chair of Panel 2, Mr. Shingo Ota (Japan).

2. Nomination of Rapporteur

Mr. Mathieu Pellerin (Canada) was appointed as Rapporteur.

3. Adoption of Agenda

The SCRS suggested to add an item of discussion regarding how to obtain feedback from the CPCs to the SCRS to inform finalization of Candidate Management Procedures (CMPs) development in good time before the September meeting of the BFT Technical Sub-group on MSE. However, the agenda did not need amendment and this topic was discussed in Agenda item 8 (Other matters). The Agenda was adopted and is included in **Appendix 1**.

The List of Participants is included in **Appendix 2**.

4. Update on BFT MSE framework and Candidate Management Procedure (CMPs) by SCRS

5. CMP performance, refinement and selection

These Agenda items were discussed together.

Dr. John Walter (Rapporteur for the West Atlantic bluefin tuna stock) presented an update on the BFT-MSE framework, including CMPs development, performance, refinement and selection. There are currently 8 candidate CMPs remaining that are under development by 6 different developers. All of them currently assume a 2-year management cycle and calculate separate total allowable catches (TACs) for the West and East management areas. The SCRS rigorously reviewed all western and eastern indices, resulting in two indices being deemed not usable in their present condition by the MSE. After this, the choice of indices used in each CMP has been at the discretion of developers with emphasis placed on whether the indices perform well in the CMPs.

SCRS responses to feedback provided at the March 4 Panel 2 meeting

With regards to the B_{LIM} statistic, representing the biomass limit reference point of stock size below which recruitment and yield would likely be impaired, the SCRS proposed a value of 0.4 dynamic SSB_{MSY} . Panel 2 will need to decide on the percentage probability risk of falling below B_{LIM} , using the Lowest Depletion (LD^*) performance statistic over projection years 11-30 (e.g., LD^*_5 , LD^*_{10} or LD^*_{15}). The SCRS Chair noted that while this management objective expresses the intention of the Panel regarding ensuring stock safety, the MSE operating models have been intentionally designed to cover a wide range of plausible scenarios, including scenarios that depict the stocks in a depleted state at the start of the 30-year projection period. In light of this, for purposes of analysis and evaluation, time is provided for the CMPs to operate. In this case, therefore, the LD^* value will be evaluated across the years 11-30 in the projection.

At the Intersessional Meeting of Panel 2 (including BFT MSE) (1-4 March 2022), CPCs expressed different point of views on % TAC change limits between management cycles. The requested scenarios to be tested were: +20%/-30%; +20%/-20%; +20%/-10% and no limits. Through their testing, the developers found that increased performance can be achieved when allowing the TAC to be reduced by more than 20% between management cycles, as this allows adjustment of the TAC more quickly in response to a drop in the stock indicators. The +20%/-10% scenario did not allow the CMPs to stay over B_{LIM} 0.4 using LD^*_{15} . Based on testing done to date, the SCRS recommends the +20%/-30% scenario as it allows faster reaction, and it provides both adequate safety and acceptable stability in yield.

Panel 2 previously requested additional statistics to evaluate performance, including an F statistic representing the probability of being above dynamic SSB_{MSY} for each projection year and after 30 years. The SCRS suggested using the statistic U/U_{MSY} . U (exploitation rate in biomass) is annual catch divided by the total annual biomass. U_{MSY} is the fishing rate that achieves SSB_{MSY} in equilibrium. This can then be used to calculate other related statistics such as probability of being in the Kobe green quadrant (neither overfished nor overfishing), probability of not being in the red Kobe quadrant (both overfished and overfishing), and overfished trend. Panel 2 agreed to move forward with U/U_{MSY} as the F statistic. One CPC requested having a time series graph showing U/U_{MSY} to see what years the stock is being overfished, and the SCRS mentioned that this is under development and should be available very soon.

As requested at the previous meeting, the SCRS looked at the possibility of producing spider plots (also known as radar plots) in addition to quilt plots but noted that there are currently too many dimensions considering the number of CMPs under development, which makes these plots very difficult to interpret. The SCRS suggested that spider plots could be produced after the process of culling CMPs.

Process of CMPs development/performance tuning and culling

The SCRS proposed a two-step process for CMPs development and performance tuning. In step 1 which is development tuning, CMPs are tested on a common Br30 performance level (currently 1.0, 1.25 or 1.5, for each stock). The SCRS will give advice on ordering CMPs across performance statistics corresponding to yield, status, safety, and stability objectives. Panel 2 will then need to evaluate relative performance of CMPs in order to cull underperforming CMPs. At this point, development tuning is nearly complete.

In step 2, the top performing CMPs that have been selected in step 1 will be performance tuned. All CMPs include at least one adjustable setting to determine how heavily or lightly it applies fishing pressure to achieve desired performance on the risk-reward trade-off for both the eastern stock and western stock, which allows tuning to achieve higher yields while also meeting safety, status, and stability objectives. Performance tuning has not yet begun and will occur following the process of culling CMPs.

With regard to the culling process, Panel 2 will first need to agree on a set of performance statistics and minimum standards to evaluate CMPs performance. Then, the SCRS will review CMPs and compare them to the previously established performance standards. CMPs deemed by the SCRS to not perform satisfactorily may be culled by the SCRS and not recommended to Panel 2, with results and rationale provided. The SCRS will use scientific rationale (e.g., lack of performance across robustness tests and substantially low ranking across performance statistics) for any decisions to cull CMPs. CMP developers may also withdraw CMPs if they are not performing as desired. At its October meeting, Panel 2 may first select a CMP and then select from within a range of tested performance tuning settings.

6. Key decisions

7. Feedback and guidance on trade-offs and additional changes to CMPs by PA2 to the SCRS

These Agenda items were discussed together.

Decision point #1: Agreement on operational management objectives percentages, timeframes and performance statistics

For the consideration of the Panel, the United States submitted the, “Working Document for proposed Panel 2 guidance to the SCRS on Bluefin Tuna Management Objectives for MSE Testing”. Following the discussion as set forth below, the document was revised (**Appendix 3**) to further refine the interim operational management objectives to support the next step in the MSE process.

a) Status

On the % probability of keeping the stock in the green quadrant of the Kobe matrix, 60% remains the functional minimum threshold for testing, which does not preclude selection of a higher threshold later. In particular, one CPC recommended keeping both 60% and 70% on the table since development tuning is not completed for all CMPs. The SCRS noted that they can currently keep both targets of 60% and 70% without excluding one or another. One CPC noted that “60% or greater” would include “70% or greater” and thus

are functionally the same. Panel 2 thus agreed to keep both targets of 60% and 70% of the stock remaining in the green quadrant of the Kobe matrix after 30 years for the time being.

b) Safety

Panel 2 endorsed the proposed B_{LIM} statistic of 0.4 dynamic SSB_{MSY} and using a percentile of LD^* falling below that value as a measure of success on this objective. However, Panel 2 did not reach consensus on the percentile to use between LD^*_5 , LD^*_{10} or LD^*_{15} over projection years 11-30. Therefore, Panel 2 agreed to go forward with LD^*_{15} at this stage for the purpose of comparing CMPs performance. Some CPCs expressed a preference for LD^*_5 and LD^*_{10} . One CPC suggested that while performance tuning proceeds at LD^*_{15} level as a minimum standard, preference could be given to CMPs that succeed at LD^*_{10} and those CMPs could be ranked higher, but there was no consensus to proceed in this way at this time. In a later step (before the 3rd Interseasonal Meeting of Panel 2 on BFT MSE (14 October 2022)), Panel 2 will need to decide on the percent probability of breaching B_{LIM} to be included as the final operational management objective.

United States had suggested the following text for the operational management objective guidance on Safety in their document:

- There should be no more than a 15% probability of the stocks falling below B_{LIM} at any point during the 30-year projection period.
- The SCRS will provide to Panel 2 relevant performance statistics to support evaluation of the likelihood of each stock falling below B_{LIM} . Key statistics are the lowest depletion statistics LD5%, LD10%, LD15% across years 11-30 in the projection period. The LD value is evaluated relative to the SCRS-adopted B_{LIM} (40% of dynamic SSB_{MSY}). Based on this analysis, Panel 2 will decide on the percent probability to be included as the final operational management objective.

During the discussion, some CPCs raised concern that the lowest depletion statistics would only be considered across years 11-30 rather than the full 30-year projection period, noting that this seemed inconsistent with how the text of the management objective was written. The United States suggested that a footnote be inserted to explain the apparent discrepancy between the aspirational nature of the text of the management objective and the practical approach needed to evaluate performance. The proposed footnote read as follows:

“While this management objective expresses the intention of the Panel regarding ensuring stock safety, the MSE operating models have been intentionally designed to cover a wide range of plausible scenarios, including scenarios that depict the stocks in a depleted state at the start of the 30-year projection period. In light of this, for purposes of analysis and evaluation, time is provided for the CMPs to rebuild such stocks before beginning an evaluation of a relative biomass status performance statistic (such as LD). In this case, therefore, the LD value will be evaluated across the years 11-30 in this projection period.”

The Panel took note of this matter but decided against including such a footnote in the revised document. Instead, it was agreed that the explanation of this issue would be included in the meeting report and that the apparent discrepancy in the language of the management objective and how it would be evaluated should be addressed by adding the phrase “in principle” to the management objective reflected in the revised document, as follows:

- There should be no more than a 15% probability of the stocks falling below B_{LIM} at, in principle, any point during the 30-year projection period.

c) Stability

On stability and in light of the SCRS recommendation to use the +20%/-30% scenario for TAC variation, some CPCs noted a preference for the scenario of +20%/-20%, while indicating that they could support the SCRS recommendation. One CPC mentioned that supporting +20%/-30% would be easier with a 3-year management cycle. However, the SCRS noted that testing or adopting a CMP with a 3-year management cycle would imply changing these percentages to more conservative values in order to achieve the same results. The SCRS said they would continue testing based on the range of views expressed and did not need a final agreement at this time. Panel 2 agreed to request the SCRS to conduct testing using a two-by-two

matrix consisting of 2 and 3 year management cycles with +20%/-30% and +20%/-20% TAC variation scenarios, as shown in the table below. A limited number of CMPs to be selected by the SCRS in consultation with CMP developers will be tested in accordance with the matrix to see if the same testing should be conducted for other CMPs.

	<i>2 year management cycle</i>	<i>3 year management cycle</i>
TAC variation: +20%/-20%	2 year management cycle with +20%/-20% TAC variation scenario	3 year management cycle with +20%/-20% TAC variation scenario
TAC variation: +20%/-30%	2 year management cycle with +20%/-30% TAC variation scenario	3 year management cycle with +20%/-30% TAC variation scenario

The SCRS also noted that several CMPs indicate possible initial decreases in TAC which may be due to how CMPs are structured and how they behave during the transition period, and often not a result of underlying stock declines. Therefore, the SCRS suggested a phase-in approach for the first two management cycles of the MSE, during which limits for TAC change of +20%/-10% may be desirable as constraints to build into CMPs. Most CPCs supported the phase-in approach, but no final decision was made during the meeting.

Decision point #2: Does Panel 2 approve the proposed two-step process for CMPs development and performance tuning?

Recognizing that SCRS will not cull CMPs without appropriate Panel 2 input, there was no opposition from Panel 2 members with regard to the two-step process for CMPs development and performance tuning proposed by the SCRS and described in this report under item 5 above. The SCRS noted that performance tuning after the 3rd Interseasonal Meeting of Panel 2 on BFT MSE (14 October 2022) would be difficult, but that they would be able to perform some final tuning on selected CMPs.

Decision point #3: Does Panel 2 approve the process for narrowing (culling) of CMPs?

Panel 2 agreed with the culling process proposed by the SCRS and described in this report under item 5. However, Panel 2 also agreed to not cull any CMPs at the May meeting since the development of CMPs is not completed yet.

For CMPs comparison purposes, there were various performance statistics on which Panel 2 agreed and the SCRS will produce a list of these performance statistics. Panel 2 also agreed to request the SCRS to add a column in the quilt plot showing the number of surveys and CPUE indices of each CMPs. The SCRS suggested that this could be used as a factor after the CMPs comparison is made, to exclude CMPs that perform similarly.

Decision point #4: Relative weighting of key performance statistics

To facilitate discussion, the SCRS provided three examples of weighting schemes for the key performance statistics of the primary quilt plot as shown in the table below. The ultimate decision to use one of the three examples, to apply all three and compare among them, and/or to consider the use of other weighting schemes to help with the final selection of an MP is up to Panel 2 and is a question to be considered in the future. PGK is not weighted as the CMPs are tuned to achieve a common Status objective (Br30). The purpose of the relative weightings is to facilitate decision making but is not intended to be the sole criterion for CMP selection.

There was general support from Panel 2 members for maintaining the default weighting scheme (equal weighting of yield, stability, and safety) for ranking CMP performance at this point in the process, but the approach to ranking could be revisited later in the process. For instance, once CMPs that fail the safety management objective are eliminated, a process of weighting could be valuable to help in the final selection among top performing CMPs. One CPC asked if it would be possible to have different weighting schemes for East and West stocks, and the SCRS answered that these elements will surface later during performance tuning. A representative of the SCRS noted the general support by the Panel for the default weighting scheme at this stage of the process and indicated that this was all the direction SCRS needed at this time. In that regard, SCRS would see if CMP results are sensitive to the default weighting scheme.

<i>Examples of weighting schemes</i>	<i>Status PGK (mean)</i>	<i>Yield AvC10 (50%)</i>	<i>Yield AvC30 (50%)</i>	<i>Stability VarC (50%)</i>	<i>Safety LD* (%TBD)</i>
Default: Equal across yield, stability, and safety	0	0.5	0.5	1	1
Sensitivity 1: Double weighting of safety	0	0.25	0.25	0.5	1
Sensitivity 2: Double weighting of yield	0	1	1	1	1

PGK: Probability of Green Kobe ($SSB > SSB_{MSY}$ & $U < U_{MSY}$) after 30 projected years

AvC10: Mean catches over first 10 projected years

AvC20: Mean catches over first 20 projected years

VarC: Average annual variation in catches

8. Other matters

After the meeting, the initial calendar only included one remaining meeting of Panel 2 to take place before the Commission Plenary, scheduled for 14 October 2022. Based on the work remaining, it was decided to organize another 1-day online meeting of Panel 2 during the week of 11 July (ideally late in the week) as an additional feedback point for the SCRS and decision point for Panel 2. The ICCAT Secretariat will coordinate with the SCRS to propose timing for this meeting

A key aspect of the refinement of CMPs after this meeting will involve making adjustments to the CMPs to provide anticipated future TAC trajectories in line with stakeholder preferences, both for short-term stability and longer-term trends and variability. This will require dialogue on how best to provide feedback from CPCs and their industry to the SCRS to inform finalization of CMPs development. This process is to be discussed in more detail before and at the additional July meeting.

9. Adoption of Report and closure

The Chair thanked all participants for their work and adjourned the meeting. The meeting report was adopted by correspondence.

Agenda

1. Opening of the meeting and meeting arrangements
2. Nomination of Rapporteur
3. Adoption of Agenda
4. Update on BFT MSE framework and Candidate Management Procedure (CMPs) by SCRS
 - a) SCRS responses to feedback provided at the March PA2 meeting (+20%/-30%; +20%/-20%; +20%/ -10% and no limit TAC change explorations, index evaluation table)
 - b) Additional requested statistics (F, probability of being above dynamic SSB_{MSY} for each projection year and after 30 years and statistics requested simply for reporting)
 - c) SCRS to provide a proposal for a B_{LIM} value solely within the MSE framework for the purposes of CMP selection, PA2 to discuss and eventually select an associated probability (see section 6 under key decisions)
5. CMP performance, refinement and selection
 - a) Process of development tuning and performance tuning described further
 - b) PA2 will see complete set of existing CMPs which will illustrate performance tradeoffs and facilitate decisions in section 7
 - c) PA2 will see BFT Species Group recommendations for the process to select a limited set of top performing CMPs
6. Key decisions
 - a) Final operational management objectives and performance statistics
 - b) PA2 approval of process for development tuning and performance tuning
 - c) Approval of process for narrowing (culling) of CMPs to retain a reduced subset for further consideration
7. Feedback and guidance on trade-offs and additional changes to CMPs by PA2 to SCRS
 - a) PA2 provides further feedback on trade-off preferences
 - b) Possible 'phase-in' period for management procedures
8. Other matters
9. Adoption of report and closure

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**Working Document for proposed Panel 2 guidance to the SCRS
on Bluefin Tuna Management Objectives for MSE Testing**

Status (of stocks, East and West)

Res. 18-03: Conceptual Management Objective (MO):

- The stock should have a greater than [__]% probability of occurring in the green quadrant of the Kobe matrix.

2019 Panel 2 Operational MO guidance:

- There should be a 60% or greater probability of being in the green zone of the Kobe plot.
- The SCRS will present results of the simulation in plots with a trajectory so that managers can evaluate the status of the stock (F relative to F_{MSY} and B relative to B_{MSY}) at intermediate points between zero and 30 years, and at the end of the 30-year period.

2022 Panel 2 Operational MO guidance:

- There should be a 60% or greater probability of each stock being in the green quadrant of the Kobe plot.
- SCRS will provide to Panel 2 relevant performance statistics (including Br30, PGK, U/ U_{MSY} , Br20, AvgBr, POF, PNRK, and OFT) together with relevant graphs reflecting the yearly U/ U_{MSY} , Br, and PGK statistics to support evaluation of the projected status of the stocks (F relative to F_{MSY} and SSB relative to SSB_{MSY}) for each year between 1 and 30 years, as well as at the end of the 30-year period.

Safety (of stocks, East and West)

Res. 18-03: Conceptual Management Objective (MO):

- There should be a less than [__]% probability of the stocks falling below B_{lim} at any point during the 30 year evaluation period.

2019 Panel 2 Operational MO guidance:

- There should be no more than a 15% chance of the stock falling below B_{LIM} at any point during the 30-year evaluation period.
- A definition of B_{LIM} should be recommended by SCRS.

2022 Panel 2 Operational MO guidance:

- There should be no more than a 15% probability of the stocks falling below B_{LIM} at, in principle, any point during the 30-year projection period.
- The SCRS will provide to Panel 2 relevant performance statistics to support evaluation of the likelihood of each stock falling below B_{LIM} . Key statistics are the lowest depletion statistics LD5%, LD10%, LD15% across years 11-30 in the projection period. The LD value is evaluated relative to the SCRS BFT Species Group - proposed B_{LIM} (40% of dynamic SSB_{MSY}) and endorsed by Panel 2. Based on this analysis, Panel 2 will decide on the percent probability to be included as the final operational management objective.

- Yield (of catch by area, East and West)

Res. 18-03: Conceptual Management Objective (MO):

- Maximize overall catch levels

2019 Panel 2 Operational MO guidance:

- Evaluate outcomes related to maximizing mean catch levels with respect to each management area over the short, medium, and long-term.

2022 Panel 2 Operational MO guidance:

- Maximize overall catch levels
- SCRS will provide relevant performance statistics (including AvC10, AvC20, AvC30, and C1) to support evaluation of catch levels over projected years in the short, medium, and long term.

Stability (of catch by area, East and West)

Res. 18-03: Conceptual Management Objective (MO):

- Any increase or decrease in TAC between management periods should be less than [_]%

2019 Panel 2 Operational MO guidance:

- Evaluate outcomes of 20%, 30%, and 40% as well as no limitation on the change in TAC between management periods.

2022 Panel 2 Operational MO guidance:

- Any change in TAC between management periods should be no more than a 20% increase or a [20%][30%] decrease, except during the application of the MP in the first two management periods (e.g., 2023-24 and 2025-26), where any TAC change shall not exceed a 20% increase or a 10% decrease.

A limited number of CMPs to be selected by the SCRS in consultation with CMP developers will be tested in accordance with the matrix below to see if the same testing should be conducted for other CMPs.

	+20%/-20%	+20%/-30%
Two-year management period		
Three-year management period		

Appendix

The performance statistics to be used for testing CMPs are:
(List of performance statistics to be produced by the SCRS)