INTER-AMERICAN TROPICAL TUNA COMMISSION

4th WORKSHOP ON MANAGEMENT STRATEGY EVALUATION (MSE) FOR TROPICAL TUNAS

(*by videoconference*)
March 20-21, 2025

REPORT OF THE MEETING

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SUMMARY

The fourth IATTC workshop on Management Strategy Evaluation (MSE) for tropical tunas was held during March 20-21, 2025. The workshop was held as a bilingual (Spanish and English with simultaneous interpretation) meeting by videoconference. The objectives of this workshop, the fourth one funded and organized by the IATTC, are to continue to enhance communication and foster mutual understanding among fisheries scientists, managers, and other stakeholders on matters related to harvest strategies and MSE, and finalize objectives, performance metrics, reference points and harvest control rules for the ongoing bigeye tuna MSE, as discussed during previous workshops. Although the discussion was relevant to tropical tuna in general, the main focus was on specific elements of the ongoing MSE for bigeye tuna (Operating models, Harvest Control Rules, etc.). The workshop had 56 participants from 18 countries, non-governmental organizations (NGOs) and IATTC staff. The workshop format included lectures and discussions to elicit discussions and dialogue and create learning opportunities. A list of potential management objectives developed in previous workshops was further refined during this workshop, alternative harvest control rules were discussed and refined to included in the ongoing MSE. A fifth workshop is scheduled for May 30-31st 2025, and is expected to continue to enhance communication and foster mutual understanding among fisheries scientists, managers, and other stakeholders on matters related to management strategies and their evaluation, as well as to refine elements of candidate strategies for further evaluation and presentation to the SAC and Commission Annual meeting during 2025. The 2nd day of the 5th MSE Workshop may provide an opportunity to form the "Ad Hoc Working Group To Strengthen The Dialogue Among Scientists, Managers And Other Stakeholders On Management Strategy Evaluation" (Working Group on MSE), as proposed by CPCs during the 4th IATTC MSE workshop.

1. BACKGROUND

The purpose of the Management Strategy Evaluation (MSE) process in fisheries is to compare the performance of alternative management strategies in meeting management objectives, using computer simulations and relevant fisheries performance metrics. MSE is recognized as best practice to evaluate alternative management strategies (Punt *et al*., 2016) and has been widely used both nationally (*e.g*. Australia, New Zealand, South Africa and the United States) and internationally (*e.g*. ICES, IWC, NAFO), including all tuna regional fisheries management organizations (RFMOs: IATTC, IOTC, WCPFC, ICCAT and CCSBT), which are in different stages of evaluation and implementation (Nakatsuka *et al*. 2017, Valero et al. 2025).

The IATTC adopted elements of a harvest strategy for tropical tunas, such as the interim reference points and the harvest control rule (HCR), in Resolution C-16-02 and Resolution C-23-06. The IATTC Strategic Science Plan includes a work plan for evaluating the IATTC's current strategy, along with alternatives, using MSE. Because the elements, concepts and approaches involved in MSE are mostly new for managers and other stakeholders, a series of workshops was planned to introduce them to MSE. With financial support from the FAO-GEF Common Oceans project, introductory workshops on MSE for tropical tunas in the eastern Pacific Ocean (EPO) were held in Panama (2015) and the United States (2018), aimed at managers, and a further five, aimed at the tuna industry, took place during 2019 in Colombia, Ecuador, Mexico, Panama, and the United States.

The IATTC MSE work plan includes a series of workshops, the first held at the end of 2019, a second one in May 2021, a third one in December 2022 whose terms of reference were established in Resolution C-19-07. This report summarizes the fourth MSE workshop for tropical tunas in the EPO, funded and organized by the IATTC and held during March 20-21, 2025. Its goals were to explain and clarify the MSE process, enhance communication and foster mutual understanding among fisheries scientists, managers, and other stakeholders on matters related to harvest strategies and MSE, and further discuss potential management goals, performance metrics, alternative reference points and harvest control rules (identified during the previous workshops) with managers and other stakeholders. A fifth workshop is scheduled for May 30-31st 2025, which may provide an opportunity to form the MSE Dialogue Working group as proposed by CPCs during the 4th IATTC MSE workshop, to continue the dialogue and foster mutual understanding among fisheries scientists, managers, and other stakeholders on matters related to management strategies and their evaluation, as well as to refine elements of candidate strategies for further evaluation and presentation to the SAC and Commission Annual meeting during 2025 and beyond.

2. OBJECTIVES OF THE REPORT

This report summarizes the activities conducted during the workshop, including presentation outlines, and discussions on alternative management objectives, performance metrics, reference points, harvest control rules and operating models for both tropical tunas in general, and in particular for the ongoing MSE for EPO bigeye tuna.

3. WORKSHOP DESIGN

This workshop aimed to provide background skills on management strategies for new participants and a refresher for participants of previous MSE workshops. Presentations and discussions were used to illustrate how MSEs contribute to the development of robust and functional management strategies. The intention was to empower the participants with knowledge and skills related to MSE in general, to foster communication among stakeholders, and to elicit input (such as alternative/refined objectives, performance metrics, reference points and harvest control rules) required for the technical component of the work. The specific objectives of this workshop were to provide opportunities for dialogue and input on management objectives, harvest strategies elements and MSE, in line with the recent IATTC

Performance Review and the proposed Strategic Science Plan, which recommended improving knowledge sharing, human-institutional capacity building and communication of scientific advice. The workshop was designed to go beyond general concepts, which were covered in previous workshops, and into specific characteristics of the IATTC context, with a focus to finalize objectives, performance metrics, reference points and harvest control rules for the ongoing bigeye tuna MSE, as discussed during previous workshops on the ongoing MSE for bigeye tuna in the EPO. Introductory materials on harvest strategies and MSE were provided by the Ocean Foundation and made available as background documents for the workshop.

The languages of the workshop virtual sessions and workshop materials were Spanish and English, with simultaneous translation. The agenda (Appendix 1) was intended to be flexible, to allow it to be modified based on feedback during the workshop, encouraging active two-way dialogue and discussion rather than a focus on a one-way series of presentations.

4. WORKSHOP DESCRIPTION

4.1. Overview

The Workshop was originally scheduled for December 2024 but had to be postponed to March 2025, due to an ongoing cyber-attack of the IATTC servers at that time. The workshop was facilitated by Dr. Juan Valero from the IATTC staff. Dr. Alexandre Da-Silva, IATTC's Coordinator of Scientific Research opened the meeting and helped facilitate the meeting during questions and discussion sessions. The workshop was attended by 56 participants (Appendix 2), mainly tuna industry stakeholders, managers, scientists, non-governmental organizations (NGOs) and IATTC staff (Appendix 2).

4.2. Presentations

The presentations were followed by questions and answers, and discussions, on each topic. The workshop started with an overview of the workshop's goals, format, agenda and logistics. The **first** presentation was a recap of the previous IATTC workshops on MSE for tropical tunas, a review of the list of objectives, performance metrics and harvest control rules proposed and discussed so far, along with current MSE workplan status and next steps.

The **second** presentation was a review of MSE components implemented or in development across tuna RFMOs (based on Document WSMSE-04-01), highlighting MSE processes for North Pacific Albacore tuna, Indian Ocean Tuna Commission bigeye tuna and Western Pacific skipjack tuna. MSE components discussed included management objectives, type of strategy, management cycle length, strategy inputs, management measures, operating models, estimation models, performance indicators, reference points, harvest control rules and exceptional circumstances.

The **third** presentation was an overview of harvest strategy elements in place for tropical tunas at the IATTC. First element discussed was the general management objectives set by the Antigua Convention, highlighting the need to further specification of operational objectives along with a table of objectives and performance indicators that were developed based on previous IATTC MSE workshops (Table 1). IATTC Target and Limit reference points adopted for tropical tunas were discussed, as well as the staff recent revisit of target reference points (Maunder et al. 2024) and proposed more global approach to defining MSY (given historical changes in overall fisheries selectivity due to the expansion of purse-seine fleets), which is designed to support a range of proportioning of catch among the fleets, supports a less depleted target biomass (30%B_0). The distinction between reference points as levels used to evaluate the performance of different harvest control rules, versus control points (or trigger reference points) which define the shape of the HCR was discussed. Needed further specifications for the data collected for an eventual complete strategy were discussed, including recent changes such as the Individual Vessel Threshold (IVT) program on catches of bigeye tuna and the Enhanced Monitoring Program (EMP) program.

Also presented were the different roles and timing of the full stock assessment vs. estimation model used in the harvest strategy as well as alternatives for continuation of the MSE work for the other tropical tunas beyond current work on bigeye tuna.

The **fourth** presentation was on Exceptional Circumstances, using the rules and metarules in place for Southern Bluefin tuna to illustrate the decision flow regarding alternative actions depending on invoking or not exceptional circumstances. This was the first time this element of harvest strategies was discussed during the IATTC MSE workshops, although none have been defined yet some candidates were presented and discussed including being in a state not considered to be plausible in the MSE, when new information on the biology or fisheries that is expected to affect MSE results is available, when one or a combination of stock status indicators exceed historical ranges, when data needed to apply the strategy is not available or no longer reliable, when there is evidence that implementation of the HCR (i.e. converting the specified *F* into an actual management action e.g. effort or catch limits) is different than intended or evaluated, when a stock assessment indicates that the previous MSE is no longer applicable, when a stock assessment for the other tropical tuna stocks indicates that another stock requires stricter management measures. Metarules have not been defined yet, however some candidates were discussed including the following potential actions after the triggering of exceptional circumstances: Pre-existing management measures shall remain in place until new management measures are implemented, or other action is agreed by the Commission, conducting a full benchmark stock assessment, reevaluation of components of the harvest strategy (data collection, data analyses, available management actions, etc.) and reevaluation of the harvest strategy via MSE.

The **fifth** presentation was a description of the operating (OM) and estimation models (EM) used for the bigeye tuna MSE. The OMs include the alternative model configurations from the 2024 bigeye tuna benchmark stock assessment as a reference set with equal model weighting and a robustness set with natural mortality, growth and selectivity assumptions from the previous (SAC-11) benchmark stock assessment. The estimation model is an age structured production model with recruitment deviates estimated.

The **sixth** presentation focused on harvest control rules (HCR). In previous workshops only generic forms were discussed as alternatives to the currently in place for tropical tunas at IATTC. Here, four alternative model-based HCRs were discussed as candidates (Figure 1) for evaluation during the bigeye tuna MSE. Implementation errors (0%, 10%, 20%) in the translation between fishing mortality and the actual potential implementable management action (closure days, IVT, active FAD limits) are considered in the MSE. The HCRs are applied on a 3-year cycle with effort controls. The data inputs for the HCRs are the standardized Japanese longline index of abundance and total catches.

All presentations and background materials are available at the IATTC workshop website in both Spanish and English.

4.3. General discussion and next steps

The last presentation was a summary of proposed next steps towards MSE development and implementation for bigeye tuna (Table 2) and beyond. The MSE work plan in the IATTC Strategic Science Plan focused initially on bigeye tuna, and will move to the other tropical tuna towards the end of the plan. The MSE dialogue component has included so far a series of dedicated workshops to provide training, enhance dialogue among stakeholders and solicit input and feedback on important elements of harvest strategies and MSE. Based on requests by stakeholders for the establishment of a dedicated dialogue Working Group (WG), to enhance or replace the MSE workshops, along with recommendations from SAC-14 and from staff in SAC-15 for the Commission consider a Science-Management Dialogue (SMDWG) or informal workshops approach to continue the MSE process, the Commission resolved via Resolution C-

24-08 the creation of an ad hoc Working Group to strengthen the dialogue among scientists, managers and other stakeholders on MSE. There was a request to change the second day of the planned 5th IATTC MSE workshop (May 30-31, 2025) as the first meeting of the Working Group on MSE.

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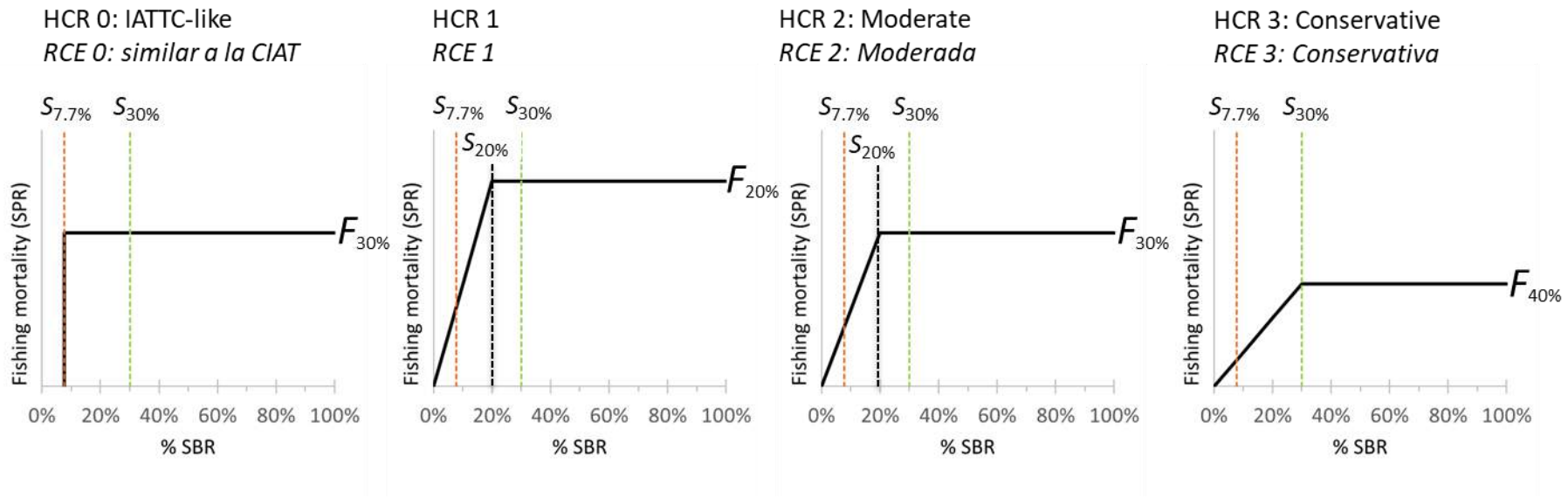

FIGURE 1. Alternative Harvest Control Rules (HCR) discussed during the workshop as candidates for evaluation during the bigeye tuna MSE.

TABLE 1. Objectives, quantities and performance indicators discussed during the workshop.

OBJECTIVE	**Quantity**	**Performance Indicators**
Safety *Maintain stock above limit reference points*	*Equilibrium virgin spawning biomass S_0* • *< 10% probability SB below 7.7% of S_0* • *< 5% probability SB below 7.7% of S_0* < 10% P SB < Smsy Flim (< 5% *P* F > Fmsy)	Ratio of S_{yr} over S_0 Probability calculated over projected 30 years (All years, any year by replicates)
Status Maintain stock in green quadrant of Kobe plot	SB≧ dynamic SB_{MSY} and $F<F_{MSY}$ • *60% probability* • *75% probability*	% of simulated runs falling in Kobe's green quadrant Probability calculated over projected 30 years
Stability Maintain low variability of catch and effort limits, gradual changes in management measures. Caps at 10% (effort), 15% (catch)	Standard deviation of annual catch, effort Average interannual proportional change (catch, effort)	% change in catch and/or effort between years Calculated over projected 3, 15 and 30 years
Yield/Abundance Maintain catches/effort/CPUE above historical ranges	Average catch/effort/CPUE by fishery (PS and LL) • *1994-2019 (since FAD expansion)* • *2017-2019 (latest status quo)*	Ratio of projected 3, 15 and 30-year average catch/effort/CPUE by fishery over historical period
Status quo Maintain the stock at levels near the (2017-2019) status quo	Spawning biomass, Index (LL CPUE)	Ratio of projected 3, 15 and 30-year average SB, Index (LL CPUE) over status quo period (2017-2019)

TABLE 2. Chromogram of harvest strategy implementation for EPO bigeye tuna.

	2025	2026	2027	2028	2029	2030	2031	2032
Management Measures	In place, Res. C-24-01		Set in 2026			Set in 2029		
SAC	BET MSE results	BET MSE results	Assess stock status			Assess stock status		
AM	Select/Adopt BET MP	Select/Adopt BET MP Set Measures (2027-2029)			Set Measures (2030-2032)			Set Measures (2033-2035)
Staff work	Start MSE for SKJ or YFT	Collate data for MP Run MP Check Excep. Circumst.	Check Excep. Circumst.	Check Excep. Circumst.	Collate data for MP Run MP Check Excep. Circumst.	Check Excep. Circumst.	Check Excep. Circumst.	Collate data for MP Run MP Check Excep. Circumst.

APPENDIX 1. Workshop Agenda

INTER-AMERICAN TROPICAL TUNA COMMISSION

4TH WORKSHOP ON MANAGEMENT STRATEGY EVALUATION (MSE) FOR TROPICAL TUNAS

(by videoconference)
20-21 March 2025

Agenda

1. Overview of MSE process for tropical tunas at IATTC, including results of previous IATTC MSE Workshops.
2. Review of MSE components used or proposed in other tuna RFMOss
3. Review and discussion on components of MSE for IATTC tropical tunas:
    a. Objectives
    b. Reference Points
    c. Harvest Control Rules
    d. Performance Indicators
    e. Exceptional circumstances
4. Operating Models for BET MSE
    a. Reference and Robustness sets
5. Estimating Models for BET MSE
    a. ASPM-Rdevs
6. Harvest Control Rules for BET MSE
7. MSE Dialogue Working Group
8. Discussion of next steps and MSE timeline
9. Other Issues

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