# Report of the 17th Session of the IOTC Working Party on Methods (Management Strategy Evaluation Task Force)

Online, 23-24 March 2026

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## ACRONYMS

| | |
|---|---|
| ABNJ | Areas Beyond National Jurisdiction |
| ALB | Albacore |
| B | Biomass (total) |
| $B_0$ | Unfished biomass |
| BET | Bigeye tuna |
| $B_{MSY}$ | Biomass which produces MSY |
| CMM | Conservation and Management Measure (of the IOTC; Resolutions and Recommendations) |
| CPCs | Contracting parties and cooperating non-contracting parties |
| CPUE | Catch per unit of effort |
| current | Current period/time, i.e. $F_{current}$ means fishing mortality for the current assessment year. |
| F | Fishing mortality |
| FAD | Fish aggregating device |
| $F_{MSY}$ | Fishing mortality at MSY |
| IOTC | Indian Ocean Tuna Commission |
| MP | Management Procedure |
| MPD | Management Procedures Dialogue |
| MSE | Management Strategy Evaluation |
| MSY | Maximum Sustainable Yield |
| OM | Operating Model |
| P | Probability |
| SC | Scientific Committee, of the IOTC |
| SB | Spawning biomass (sometimes expressed as SSB) |
| $SB_{MSY}$ | Spawning stock biomass which produces MSY (sometimes expressed as $SSB_{MSY}$) |
| TCMP | Technical Committee on Management Procedures |
| WPM | Working Party on Methods |
| WPNT | Working Party on Neritic Tunas |
| WPTT | Working Party on Tropical Tunas of the IOTC |
| YFT | Yellowfin tuna |

## GLOSSARY OF TERMS

The WPM decided to utilise the MSE Glossary developed by the Joint Tuna RFMO MSE Working Group in 2018**.**

**Average Annual Variation -** (in catch/TAC) The absolute value of the proportional TAC change each year, averaged over the projection period.

**Biomass -** Stock biomass, which may refer to various components of the stock. Often spawning stock biomass (SSB) of females is used, as the greatest conservation concern is to maintain the reproductive component of the resource.

**Candidate Management Procedure -** An MP (defined below) that has been proposed, but not yet adopted.

**Conditioning -** The process of fitting an Operating Model (OM) of the resource dynamics to the available data on the basis of some statistical criterion, such as a Maximum Likelihood. The aim of conditioning is to select those OMs consistent with the data and reject OMs that do not fit these data satisfactorily and, as such, are considered implausible.

**Error -** Differences, primarily reflecting uncertainties in the relationship between the actual dynamics of the resource (described by the OMs) and observations. Four types of error may be distinguished, and simulation trials may take account of one or more of these:

- Estimation error: differences between the actual values of the parameters of the OM and those provided by the estimator when fitting a model to the available data;
- Implementation error: differences between intended management actions (as output by an MP) and those actually achieved (e.g. reflecting over-catch);
- Observation error (or measurement error): differences between the measured value of some resource index and the corresponding value calculated by the OM;
- Process error: natural variations in resource dynamics (e.g., fluctuations about a stock-recruitment curve or variation in fishery or survey selectivity /catchability).

**Estimator -** The statistical estimation process within a population model (assessment or OM); in a Management Strategy Evaluation (MSE) context, the component that provides information on resource status and

productivity from past and generated future resource-monitoring data for input to the Harvest Control Rule (HCR) component of an MP in projections.

**Exceptional circumstances -** Specifications of circumstances (primarily related to future monitoring data falling outside the range covered by simulation testing) where overriding of the output from a Management Procedure should be considered, together with broad principles to govern the action to take in such an event.

**Feedback Control -** Rules or algorithms based, directly or indirectly, on trends in observations of resource indices, which adjust the management actions (such as a TAC change) in directions that will change resource abundance towards a level consistent with decision makers' objectives.

**Harvest Control Rule -** (also Decision Rule) A pre-agreed and well-defined rule or action(s) that describes how management should adjust management measures in response to the state of specified indicator(s) of stock status. This is described by a mathematical formula.

**Harvest Strategy -** Some combination of monitoring, assessment, harvest control rule and management action designed to meet the stated objectives of a fishery. Sometimes referred to as a Management Strategy (see below). A fully specified harvest strategy that has been simulation tested for performance and adequate robustness to uncertainties is often referred to as a Management Procedure.

**Implementation -** The practical application of a Harvest Strategy to provide a resource management recommendation.

**Kobe Plot -** A plot that shows the current stock status, or a trajectory over time for a fished population, with abundance on the horizontal axis and fishing mortality on the vertical axis. These are often shown relative to BMSY and to FMSY, respectively. A Kobe plot is often divided into four quadrants by a vertical line at B=BMSY and a horizontal line at F=FMSY.

**Limit Reference Point -** A level of biomass below, or fishing mortality above, which an actual value would be considered undesirable, and which management action should seek to avoid.

**Management Objectives -** The social, economic, biological, ecosystem, and political (or other) goals for a given management unit (i.e. stock). These typically conflict, and include concepts such as maximising catches over time, minimising the chance of unintended stock depletion, and enhancing industry stability through low inter-annual variability in catches. For the purposes of Management Strategy Evaluation (MSE) these objective need to be quantified in the form of Performance statistics (see below).

**Management Plan -** In a broad fisheries governance context, a Management Plan is the combination of policies, regulations and management approaches adopted by the management authority to reach established societal objectives. The management plan generally includes the combination of policy principles and forms of management measures, monitoring and compliance that will be used to regulate the fishery, such as the nature of access rights, allocation of resources to stakeholders, controls on inputs (e.g. fishing capacity, gear regulations), outputs (e.g. quotas, minimum size at landing), and fishing operations restrictions (e.g. closed areas and seasons). Ideally, the Management Plan will also include the Harvest Strategy for the fishery or a set of principles and guidelines for the specification, implementation and review of a formal Management Procedure for target and non-target species.

**Management Procedure -** A management procedure has the same components as a harvest strategy. The distinction is that each component of a Management Procedure is formally specified, and the combination of monitoring data, analysis method, harvest control rule and management measure has been simulation tested to demonstrate adequately robust performance in the face of plausible uncertainties about stock and fishery dynamics.

**Management Strategy -** Synonymous with harvest strategy. (But note that this is also used with a broader meaning in a range of other contexts.)

**Management Strategy Evaluation -** A process whereby the performances of alternative harvest strategies are tested and compared using stochastic simulations of stock and fishery dynamics against a set of performance statistics developed to quantify the attainment of management objectives.

**Maximum Economic Yield -** The (typically annual) yield that can be taken continuously from a stock sustainably (i.e. without reducing its size) that maximizes the economic yield of a fishery in equilibrium. This yield occurs at the effort level that creates the largest positive difference between total revenues and total costs of fishing (including the cost of labor, capital, management and research etc.), thus maximizing profits.

**Maximum Sustainable Yield -** The largest (typically annual) yield that can be taken continuously from a stock sustainably (i.e. without reducing its size). In real, and consequently stochastic situations, this is usually estimated as the largest average long-term yield that can be obtained by applying a constant fishing mortality F, where that F is denoted as FMSY.

**Observation Model -** The component of the OM that generates fishery-dependent and/or fishery-independent resource monitoring data from the underling true status of the resource provided by the OM, for input to an MP.

**Operating Model(s) -** A mathematical–statistical model (usually models) used to describe the fishery dynamics in simulation trials, including the specifications for generating simulated resource monitoring data when projecting forward in time. Multiple models will usually be considered to reflect the uncertainties about the dynamics of the resource and fishery.

**Performance statistics/measures -** A set of statistics used to evaluate the performance of Candidate MPs (CMPs) against specified management objectives, and the robustness of these MPs to important uncertainties in resource and fishery dynamics.

**Plausibility (weights) -** The likelihood of a scenario considered in simulation trials representing reality, relative to other scenarios also under consideration. Plausibility may be estimated formally based on some statistical approach, or specified based on expert judgement, and can be used to weight performance statistics when integrating over results for different scenarios (OMs).

**Precautionary Approach -** An approach to resource management in which, where there are threats of serious irreversible environmental damage, lack of full scientific certainty is not used as a reason for postponing cost-effective measures to prevent environmental degradation.

**Reference case -** (also termed reference scenario or base case) A single, typically central, conditioned OM for evaluating Candidate MPs (CMPs) that provides a pragmatic basis for comparison of performance statistics of the CMPs.

**Reference set** - (also termed base-case or evaluation scenarios) A limited set of scenarios, with their associated conditioned OMs, which include the most important uncertainties in the model structure, parameters, and data (i.e. alternative scenarios which have both high plausibility and major impacts on performance statistics of Candidate MPs).

**Research-conditional option -** Temporary application of an MP that does not satisfy conservation performance criteria, accompanied by both a research programme to check the plausibility of the scenarios that gave rise to this poor performance and an agreed subsequent reduction in catches should the research prove unable to demonstrate implausibility.

**Robustness tests -** Tests to examine the performance of an MP across a full range (i.e. beyond the range of the Reference Set of models alone) of plausible scenarios. While plausible, robustness test OMs are typically considered to be less likely than the reference set OMs, and often focus on particularly challenging circumstances with potentially negative consequences to be avoided.

**Scenario-** A hypothesis concerning resource status and dynamics or fishery operations, represented mathematically as an OM.

**Simulation trial/test -** A computer simulation to project stock and fishery dynamics for a particular scenario forward for a specified period, under controls specified by a HS or MP, to ascertain the performance of that HS or MP. Such projections will typically be repeated a large number of times to capture stochasticity.

**Spawning Biomass, initial -** Initial spawning biomass prior to fishing as estimated from a stock assessment.

**Spawning Biomass, current -** Spawning biomass (SSB) in the last year(s) of the stock assessment.

**Spawning Biomass at MSY -** The equilibrium spawning biomass that results from fishing at FMSY. In the presence of recruitment variability, fishing a stock at FMSY will result in a biomass that fluctuates above and below SSBMSY.

**Stationarity -** The assumption that population parameter values are fixed (at least in expectation), and not varying systematically, over time. This is a standard assumption for many aspects of stock assessments, OMs and management plans.

**Stock assessment -** The process of estimating stock abundance and the impact of fishing on the stock, similar in many respects to the process of conditioning OMs.

**Target Reference Point -** The point which corresponds to a state of a fishery and/or resource which is considered desirable and which management aims to achieve.

**Trade-offs -** A balance, or compromise, achieved between desirable but conflicting objectives when evaluating alternative MPs. Trade-offs arise because of the multiple objectives in fisheries management and the fact that some objectives conflict (e.g. maximizing catch vs minimizing risk of unintended depletion).

**Tuning -** The process of adjusting values of control parameters of the Harvest Control Rule in a Management Procedure to achieve a single, precisely-defined performance statistic in a specified simulation test. This reduces confounding effects to allow the performance of different candidate MPs to be compared more readily with respect to other management objectives. For example, in the case of evaluating rebuilding plans, all candidate MPs might be tuned to meet the rebuilding objective for a specified simulation trial; then the focus of comparisons among MPs is performance and behaviour with respect to catch and CPUE dimensions.

**Weight(s) -** Either qualitative (e.g. high, medium, low) or quantitative measures of relative plausibility accorded across a set of scenarios.

**Worm plot -** Time series plots showing a number of possible realizations of simulated projections of, for example, catch or spawning biomass under the application of an MP for a specific OM or weighted set of OMs.

## STANDARDISATION OF IOTC WORKING PARTY AND SCIENTIFIC COMMITTEE REPORT TERMINOLOGY

SC16.07 (para. 23) The SC **ADOPTED** the reporting terminology contained in Appendix IV and **RECOMMENDED** that the Commission considers adopting the standardised IOTC Report terminology, to further improve the clarity of information sharing from, and among its subsidiary bodies.

## HOW TO INTERPRET TERMINOLOGY CONTAINED IN THIS REPORT

***Level 1:*** ***From a subsidiary body of the Commission to the next level in the structure of the Commission:***
**RECOMMENDED, RECOMMENDATION**: Any conclusion or request for an action to be undertaken, from a subsidiary body of the Commission (Committee or Working Party), which is to be formally provided to the next level in the structure of the Commission for its consideration/endorsement (e.g. from a Working Party to the Scientific Committee; from a Committee to the Commission). The intention is that the higher body will consider the recommended action for endorsement under its own mandate, if the subsidiary body does not already have the required mandate. Ideally this should be task specific and contain a timeframe for completion.

***Level 2:*** ***From a subsidiary body of the Commission to a CPC, the IOTC Secretariat, or other body (not the Commission) to carry out a specified task:***
**REQUESTED**: This term should only be used by a subsidiary body of the Commission if it does not wish to have the request formally adopted/endorsed by the next level in the structure of the Commission. For example, if a Committee wishes to seek additional input from a CPC on a particular topic, but does not wish to formalise the request beyond the mandate of the Committee, it may request that a set action be undertaken. Ideally this should be task specific and contain a timeframe for the completion.

***Level 3:*** ***General terms to be used for consistency:***
**AGREED**: Any point of discussion from a meeting which the IOTC body considers to be an agreed course of action covered by its mandate, which has not already been dealt with under Level 1 or level 2 above; a general point of agreement among delegations/participants of a meeting which does not need to be considered/adopted by the next level in the Commission's structure.
**NOTED/NOTING**: Any point of discussion from a meeting which the IOTC body considers to be important enough to record in a meeting report for future reference.

***Any other term:*** Any other term may be used in addition to the Level 3 terms to highlight to the reader of and IOTC report, the importance of the relevant paragraph. However, other terms used are considered for explanatory/informational purposes only and shall have no higher rating within the reporting terminology hierarchy than Level 3, described above (e.g. **CONSIDERED**; **URGED**; **ACKNOWLEDGED**).

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**EXECUTIVE SUMMARY**

The 17th Session of the Indian Ocean Tuna Commission's (IOTC) Working Party on Methods Management Strategy Evaluation Task Force (WPM(MSE)) was held online on 23-24 March 2026. A total of 33 participants attended the Session. The list of participants is provided in Appendix I. The meeting was opened by the Chairperson, Ann Preece (AUS) who welcomed participants.

The following are the recommendations from the WPM(MSE), which are provided in Appendix V

**Albacore MSE**

WPM(MSE) 17.01 (para. 13): The WPM(MSE) **RECOMMENDED** that the Commission secures dedicated funding to ensure completion of the work within the timeframes outlined in the MP schedule of work.

**Development of Yellowfin Tuna OMs and MPs**

WPM(MSE) 17.02 (para. 26): The WPM(MSE) therefore **RECOMMENDED** that the Commission secures dedicated funding to ensure continuity and timely delivery of the yellowfin MSE processes.

**Format and guidelines for presenting MSE/MP results**

WPM(MSE) 17.03 (para. 42): WPM(MSE) **RECOMMENDED** that presentations of MSE progress to managers, including at TCMP and Commission meetings, focus on clearly identifying the key questions and areas where managerial input is required. The WPM(MSE) **NOTED** that presentations should focus on items that MSE developers need to advance the work; such as: (i) clarification of management objectives (including probabilities to achieve objectives), (ii) identification of preferred types of management procedures (MPs) (e.g., CPUE, model-based), (iii) timelines and risk, and (iv) guidance on the types of management measures to be considered (e.g., particularly relevant for species such as blue shark). This approach is expected to enhance the effectiveness of interactions between scientists and managers and support timely decision-making.

# 1. OPENING AND ADOPTION OF AGENDA

1. The 17th Session of the Indian Ocean Tuna Commission's (IOTC) Working Party on Methods Management Strategy Evaluation Task Force (WPM(MSE)) was held online on 23-24 March 2026. A total of 33 participants attended the Session. The list of participants is provided in Appendix I. The meeting was opened by the Chairperson, Ann Preece (AUS) who welcomed participants.

2. The WPM(MSE) **ADOPTED** the Agenda provided at Appendix II. The documents presented to the WPM(MSE) are listed in Appendix III.

# 2. REVIEW OF MP PROCESS IN IOTC

### *2.1 Review outcomes of S29 in 2025*

3. The WPM(MSE) **NOTED** a presentation by the Secretariat regarding the updates from the 2025 Session of the Commission (S29). The presentation summarised the information related to MSE found in document IOTC-2025-S29-R.

4. The WPM(MSE) were **INFORMED** that in the Commission report (IOTC-2025-S29-R):

*[Para 123] The Commission **NOTED** the report of the 9th meeting of the Technical Committee on Management Procedures (TCMP) (IOTC-2025-TCMP09-R) and **ENDORSED** the following TCMP recommendations:*

- *The TCMP **RECOMMENDED** that the Commission adopt the TAC advice for bigeye tuna of 92,670 t.*
- *The TCMP **RECOMMENDED** adopting Australia's proposal (IOTC-2025-S29-PropU) to amend the swordfish MP (as specified in Resolution 24/08), to ensure the current objective of at least 60% probability of being in Kobe green zone is met during 2034-2038. This involves a minor amendment to the Target CPUE in Annex I of Res 24/08, changing it from 0.7125 to 0.75. Further, the TCMP **RECOMMENDED** that the Commission establish a TAC (30,527 t) for swordfish for 2026-2028 based on the revised MP **NOTING** that this TAC is the same as that from the original MP.*

*[Para 124] The Commission also **NOTED** the TCMP recommendation on the arrangements for TCMP meetings in 2025:*

- *The TCMP **NOTED** that as the albacore MP is likely to be recommended for adoption by the SC next year, it would be advisable to hold an in-person meeting in 2026. The TCMP further **NOTED** that in years that a MP has not been recommended for adoption, the TCMP may still be required to consider exceptional circumstances.*
- *The TCMP **NOTED** the value of having flexibility to accommodate different situations each year. **NOTING** that Resolution 16/09 currently requires the TCMP to be held back-to-back with the Commission meeting, the TCMP **SUGGESTED** that the Commission consider an amendment to the Resolution 16/09 that would allow TCMP meetings to be held, when appropriate, intersessionally and online. Under that arrangement, the TCMP considered that in any given year, the Commission would (under advice of the SC Chair) indicate its preferred date and nature (online or in person) of the following years TCMP. However, it would also allow for the SC (following the Commission) to request a change to the Commissions suggested approach if SC discussions identified subsequent circumstances associated with development and review of MPs that warranted such a change*

*[Para 87] However, **NOTING** that it was unlikely that any Management Procedure would be ready for adoption in 2025, the Commission proposed that the first meeting of the TCMP in February should only be held if deemed*

*necessary by the SC. The Commission **AGREED** that the second meeting of the TCMP could be shortened to one day.*

### *2.2 Review outcomes of SC28 in 2025*

5. The WPM(MSE) **NOTED** a presentation by the Secretariat regarding the updates from the 2025 Session of the Scientific Committee (S28) as well as a recap of the deliberations during the 2025 TCMP09. The presentation summarised the information related to MSE found in document IOTC-2025-SC28-R.

6. The WPM(MSE) **NOTED** that in 2025, the SC made a number of endorsements and recommendations in relation to the WPM16 report. These are provided below for reference:

*7.5.1 Update on TCMP09*
*[Para 206] The SC **NOTED** document IOTC-2025-TCMP09-R on the Report of the 8th session of the TCMP held in May 2025. The SC **NOTED** that the WPM had taken into consideration the recommendations and discussions held at that meeting.*

*7.5.2 Management Strategy Evaluation Progress*
*[Para 207] The SC **NOTED** that the albacore assessment in 2025 has a more pessimistic stock status, but the new stock assessment estimates still fall within the range of the OM, however a full evaluation of candidate Management Procedures could not be completed ahead of this meeting, and the SC **NOTED** that these will not be reviewed before the TCMP in January 2026. Therefore, the SC **AGREED** that the TCMP in January 2026 is not required.*

*7.5.3 Blue shark MP*
*[Para 208] The SC **NOTED** that the work of blue shark (BSH) MSE process has started, and that initial results suggest that both TAC- and length-based Management Procedures should be tested. The SC **ENDORSED** the plan of work for BSH, with results to be presented first to the MSE Taskforce, followed by the TCMP and then presented to the Commission for consideration.*

*[Para 209] The SC **AGREED** that the BSH fishery is a target fishery, and that the MSE and resulting MP should be built on this, and that it was important that the BSH was not confused with a bycatch species where the resulting MP would result in decreasing catches over time.*

*7.5.4 Bigeye tuna MP (Resolution 22/03)*
*[Para 210] The SC **NOTED** the completed review of the BET MSE that highlighted an inconsistency in Resolution 23/03, which indicates that the MP is designed to achieve a 60% SSB>SSBMSY when the MP was tuned to 60% probability of being in green. The SC **AGREED** that it was not urgent to correct as the issue is clearly noted and documented by the SC and Commission to be changed in future, perhaps in association with the next MP review.*

*[Para 211] The SC **NOTED** that 2024 catch of bigeye tuna (82,874 t) has exceeded the 2024 TAC (80,583 t), which is an exceptional circumstance, and as such, the SC **RECOMMENDED** that the Commission should ensure that the appropriate provisions (e.g., in paragraphs 4, 5 and 8) of 23/04 are implemented to ensure catches remain inside the TAC, conditional on the allowances and requirements of those provisions.*

*7.5.5 Skipjack tuna MP (Resolution 24/07)*
*[Para 212] The SC **NOTED** the 2025 running of the SKJ MP **NOTING** that the this generated an unconstrained TAC of 528,130 t, which is >10% lower than the TAC set for 2024–2026. By applying the maximum 10% decrease in the TAC as per Resolution 24/07, the SC **RECOMMENDED** the Commission to adopt the TAC for skipjack tuna of 565,745 t. per year for 2027–2029.*

*[Para 213] The SC **NOTED** that there are no exceptional circumstances regarding the application of the skipjack tuna Management Procedure (2024 catch < TAC & both CPUEs within 95th percentile of MSE OMs.*

*[Para 214] The SC **AGREED** not to use the target 40% $SSB_0$ to determine stock status for skipjack tuna, **NOTING** that the SC is still in discussion regarding appropriate ways to define the status of this species.*

*7.5.6 Swordfish tuna MP (Resolution 24/08)*

*[Para 215] The SC **NOTED** that although there was a new study published on stock structure of swordfish in the Indian Ocean, there is not sufficient evidence currently to conclude a different stock structure, or exceptional circumstance in relation to the swordfish MP TAC advice.*

*[Para 215] The* SC **RECOMMENDED** that the Commission urgently propose and adopt the TAC for swordfish resulting from the MP (Resolution 24/08, now superseded by 25/07) in 2026*.*

*[Para 125] Irrespective of the MP chosen by the Commission, the SC **RECOMMENDED** that the Commission endorse the resultant TAC of 30,527 t for swordfish for 2026-2028.*

*7.5.7 General MSE issues*

*[Para 222] The SC **NOTED** that there are confidentiality agreements between longline countries and various tuna RFMO Secretariats regarding the use of operational data (such as those in place with the WCPFC and IATTC) and NOTING the provisions to ensure confidentiality of the operational data submitted to the Secretariat in IOTC Resolution 12/02, the SC **RECOMMENDED** that the Commission explore potential arrangements between longline-fleet CPCs and the IOTC Secretariat, under strict confidentiality rules (similar to those outlined in Resolution 12/02), so that the Secretariat can use operational data and participate in, as well as support, the development of the joint longline CPUE index. The SC further **RECOMMENDED** exploring similar arrangements for other fleets.*

## 3. STATUS OF WORK ON ALBACORE OMS AND MPS

### *3.1* REVIEW PROGRESS

7. The WPM(MSE) **NOTED** the presentation of the work carried out in 2025 and the current status of development on MSE for albacore, contained in document IOTC-2026-WPM17(MSE)-03, and summarized by the authors as follows:

"*Work carried out for the development and application of Management Strategy Evaluation (MSE) for Indian ocean albacore tuna (ALB) in 2025 is summarized in this report. This work has been carried out under an LoA between WMR and IOTC/FAO, and with the collaboration in kind of CSIRO. The ABC (Approximate Bayesian Computation) methodology for conditioning the operating models has been finalized, and a set of OMs has been prepared. Changes in the historical catch series and on the methodology employed for standardizing, have introduced discrepancies in the estimated stock dynamics that could not be reconciled through hindcasting. The OMs need to be reconditioned around the 2025 updated albacore dataset. A workplan for future work was presented that attempts to bring a full MSE analysis for consideration by WPM in October 2026, but funding for this work is not available at this stage*"

8. The WPM(MSE) **NOTED** that while updates to the catches for the 2025 stock assessment have been incorporated into the OM, more recent updates to the catches made in 2025 for years 2023 and 2024 have not yet been included.

9. The WPM **NOTED** that the ABC approach uses status over MSY reference points (F/Fmsy and B/Bmsy) obtained from the stock assessment to generate priors for the OM and **SUGGESTED** that when reconditioning the OM, it would be useful to compare these between the current and new assessment models at the same point in time to ensure extreme values are not introduced when reconditioning using the updated data from the 2025 assessment, which is still under revision.

### *3.2* FUTURE WORK

10. The WPM(MSE) **NOTED** that for work to be completed in the expected timeframe, a supervisory group should be established that provides feedback to the developers on a shorter cycle than that of the regular WPM meetings. The WPM(MSE) **SUGGESTED** a more detailed workplan to be prepared that helped achieving the intending deadline, including decisions and feedback required from various IOTC bodies.

11. The WPM(MSE) **NOTED** that the developers for the albacore MSE will work with the WPM chair and vice chair intersessionally to prepare a workplan that can be presented to the TCMP in 2026.

12. The WPM(MSE) **AGREED** that it would seek to convene its next meeting in person to better facilitate technical discussions on MSE.

13. The WPM(MSE) **RECOMMENDED** that the Commission secures dedicated funding to ensure completion of the work within the timeframes outlined in the MP schedule of work.

## 4. DEVELOPMENT OF YELLOWFIN TUNA OMS AND MPS

### *4.1* REVIEW PROGRESS

14. The WPM(MSE) **NOTED** the paper on operating models (OMs) and candidate management procedures (MPs) for Indian Ocean yellowfin tuna (YFT), with the following summary provided by the authors:

"*This document outlines the initial steps in evaluating management strategies for Indian Ocean yellowfin tuna using Management Strategy Evaluation (MSE). The focus is the development of a reference Operating Model (OM) conditioned from the latest stock assessment, along with exploratory evaluations of three types of Candidate Management Procedures (CMP). Details of the OM and an early review of both model-based and empirical CMPs are provided. This document is intended as a foundation for discussion at the 17th IOTC Working Party on Methods (MSE Task Force) meeting. The goal is to further refine and agree on reference OMs and explore various CMP options*"

15. The WPM(MSE) **ACKNOWLEDGED** the work and the project, funded by ISSF in 2025 and 2026, to develop the Yellowfin MSE.

16. The WPM(MSE) **NOTED** that the OM was conditioned on the 2024–2025 stock assessments (SS3) and implemented as a single-area model in FLBEIA/FLR (https://flbeia.azti.es/). Uncertainty was characterised across three factors, generating 12 operating models. The most influential uncertainty relates to the CPUE index (split vs. non-split).

17. The WPM(MSE) **NOTED** three candidate MPs being tested:

- **Model-based MP**: SPiCT surplus production model + HCR, using total catch and abundance to estimate stock status and reference points.
- **Indicator-based MP**: TAC adjusted based on CPUE relative to a target, with stability provisions over the last two years.
- **Quasi-constant catch MP**: TAC constant unless CPUE falls below a reference level.

18. The WPM(MSE) **DISCUSSED** the adequacy of the current uncertainty grid (12 models) and **NOTED** the reasonable coverage of productivity as indicated by the implied MSY range (350–450,000 t). Some participants suggested expanding the grid and including sensitivity from the stock assessment and additional factors such as alternative natural mortality, effort creep, or new CPUE indices to be further explored. Robustness testing ("break-the-system" scenarios), including climate-related changes, was discussed.

19. The WPM(MSE) **NOTED** that the preliminary runs were made using equilibrium recruitment and that rrecruitment variability is represented via the stock–recruitment relationship.

20. The WPM(MSE) **NOTED** that the currently target F is 0.8 FMSY and biomass threshold is BMSY in the preliminary runs. Additional values will be evaluated once management objectives for YFT are agreed. Tuning to specific performance metrics remains under discussion.

21. The WPM(MSE) **DISCUSSED** the performance of candidate MPs. It was **NOTED** that MPs with maximum TAC constraints may be less responsive to productivity increases and, as such, stability provisions can strongly influence outcomes. The WPM(MSE) **SUGGESTED** that performance metrics should include the frequency in which TAC bounds are reached, maximum TAC changes, and interaction of these constraints, as recommended by the external review of the bigeye tuna MSE. The WPM(MSE) **AGREED** that TAC values should be presented inclusive of stability provisions.

22. The WPM(MSE) **NOTED** that CPUE-based MPs could improve stability of the MP results by using different recent CPUE averaging periods (e.g., from 2–4 years). The WPM(MSE) also **NOTED** that model-based MPs (SPiCT) estimate status and scale F to derive the TAC. The WPM(MSE) further **NOTED** that with the model-based approach, it is possible to use the K2SM short-term projection to recommend TAC, as was investigated previously in the bigeye tuna MSE.

### *4.2* FUTURE WORKPLAN

23. The WPM(MSE) **NOTED** that this work represents a first step towards an MSE framework for YFT, covering a wide range of stock status and productivity. Further development of candidate MPs is needed, including alternative F targets, stability provisions, and maximum TAC. Use of an observation error model (OEM) is planned. Initial results to be presented to the TCMP may exclude the OEM and tuning options, which will be developed ahead of the WPM in October. Visualisation tools, including a Shiny app for FLBEIA, are also under development for stakeholder engagement.

24. The WPM(MSE) **NOTED** that next steps include expanding the uncertainty grid, developing an Observation Error Model (OEM), conducting robustness tests, standardising plot templates in IOTC format, and sharing preliminary results via Shiny, HTML, or repository-based solutions. Managers will be requested to provide input on candidate MPs and management objectives during the TCMP. Options for tuning to specific management objectives (e.g. xx% of being in the green quadrant of the Kobe plot) will be explored before the WPM in October following TCMP advice.

25. The WPM(MSE) **NOTED** that continued progress on the MSE processes for yellowfin tuna will require sustained funding. While significant contributions have been secured to date (from 2025 and 2026), additional resources will be required to complete the development, testing, and implementation phases of the MSE work in the following years.

26. The WPM(MSE) **RECOMMENDED** that the Commission secures dedicated funding to ensure continuity and timely delivery of the yellowfin MSE processes.

## 5. DEVELOPMENT OF BLUE SHARK OMS AND MPS

### *5.1* FUTURE WORKPLAN

27. The WPM(MSE) **DISCUSSED** the blue shark MSE workplan and emphasized that MSE is an iterative process, with MP development likely to require several rounds of discussion between scientists and managers. The plan is to formally begin the blue shark MSE in 2026 and to follow the IOTC's usual MSE decision and review process. So far, work has been on administration, including recruitment of the consultant. The consultant is now onboard; technical work is expected to begin around June, with feedback sought at WPEB and key results reported to the WPM in October.

28. The WPM(MSE) **NOTED** that the preliminary scoping study completed last year reviewed options for operating models and potential MPs suitable for blue shark, and that forthcoming work will build on this. The immediate focus will be to develop an operating model and seek endorsement by the WPM and SC. The scoping study

recommended considering a size-based MP, and the WPM also suggested considering a catch-based MP, given that blue shark is a target species for many fleets.

29. The WPM(MSE) **NOTED** that the IOTC MSE process will develop a detailed timeline to guide MSE development and decision-making, and to support efficient communication and engagement with managers at different stages. Given that the blue shark MSE has only just begun, it is anticipated that a realistic timeline will be developed at the October WPM meeting once sufficient progress has been made to estimate achievable objectives.

30. The WPM(MSE) **NOTED** that blue shark catch data are subject to substantial uncertainty, and that MSY estimates can be biased if based on inflated reported catches. A project has been initiated to review and quantify blue shark catches, including providing guidance on how to address uncertainty arising from re-estimation of Indonesian catches. This work is expected to inform the MSE and improve how catch uncertainty is handled.

## 6. STATUS/PROGRESS OF OTHER SPECIES MPS

31. The WPM(MSE) **NOTED** that the Chair provided a summary of progress in adopting and running MPs for SKJ, SWO and BET and the workplan focus for WPM was discussed.

32. The SKJ MP was adopted in 2024 (Res 24/07) and was run in 2025 to provide TAC advice of 565,745 t per year for 2027–2029, which will be considered by the Commission. Exceptional circumstances are reviewed annually, and none were detected.

33. The SWO MP was adopted in 2024 (and corrected in Res 25/7). The MP was run to provide TAC advice in 2025, however, this advice has not yet been adopted as catch limits for swordfish for 2026-2028. The SC has **RECOMMENDED** that this is resolved this year.

34. The BET MP was adopted in 2022 (Res 23/03) and has been run in 2022 (TAC Res 23/04) and 2024 to provide TAC advice for 2026-2028 (Res 25/04). The BET MSE was externally reviewed in 2025. An inconsistency in Resolution 23/03 was detected and has been clearly noted but no change to the resolution is needed at this time. Review of exceptional circumstances indicated that the 2024 catch of bigeye tuna (catch estimates at time of the WPM 2025) exceeded the 2024 TAC. The SC has **RECOMMENDED** that the Commission should ensure that the provisions in the resolution (Res 23/04 which specified 2024 catches) are implemented to ensure catches remain under the TAC.

35. The focus for the WPM in October 2026 will be MSE development for ALB, YFT and BSH, and review of Exceptional Circumstances for all species using an MP for TAC advice. In addition, the next WPM will consider two SKJ-MP related work requests from the Commission outlined in paragraphs 16 and 17 of Resolution 25/03 on catch limits for SKJ. The WPM **NOTED** these 2 issues for the agenda for WPM in Oct 2026.

36. The WPM(MSE) **RECALLED** that the process for implementing and running the MPs for IOTC species was agreed in 2024. This process established an initial phase of close collaboration between the Secretariat and the developer(s) to run the MPs, followed by a transition to a Secretariat-led process for further application of MPs. The WPM(MSE) **REAFFIRMED** the importance of adhering to this agreed process to ensure transparency, consistency, and efficiency in MSE development across species.

## 7. PREPARATION OF THE 10TH SESSION OF TCMP

### *7.1* AGENDA FOR TCMP10

37. The WPM **DISCUSSED** the agenda for the TCMP10 and AGREED to the version provided in Appendix IV of this report.

### *7.2* ORGANIZATION, TASKS AND RESPONSIBILITIES

38. The WPM(MSE) **DISCUSSED** the organization of TCMP10 meeting with associated tasks and responsibilities prior to and during the meeting and **AGREED** that the yellowfin tuna, albacore, and blue shark MSE runs would take priority in the May meeting.

39. The WPM(MSE) **ACKNOWLEDGED** that progress on the ALB MSE has been delayed, however, the WPM(MSE) **AGREED** that the progress to date will be presented at the upcoming TCMP meeting. The WPM(MSE) also **ACKNOWLEDGED** the progress on the YFT MSE, funded by ISSF in both 2025 and 2026 (the objectives include finalising the OM and documenting the candidate MPs to be presented at the WPTT/WPM meeting in October 2026), and **AGREED** that it will also be presented at the upcoming TCMP meeting. For both Albacore and Yellowfin Tuna presentations to TCMP, it was **NOTED** that this will provide an important opportunity to update managers on the current status of OMs and candidate MPs, as well as to identify where further input and feedback from managers is required. The WPM(MSE) **REQUESTED** that the developers ensure that the presentations clearly highlight progress to date and key challenges that will allow TCMP to identify the next steps for both the Albacore and Yellowfin Tuna MSEs.

40. The WPM(MSE) **AGREED** that the blue shark presentation to TCMP will focus on the key results of the MSE scoping study, including potential MP options that may be appropriate for blue shark. TCMP will provide an opportunity for managers to agree on the management objectives for the fisheries.

### *7.3* FORMAT AND GUIDELINES FOR PRESENTING MSE/MP RESULTS

41. The WPM(MSE) **NOTED** that while SC adopted guidelines for presenting the evaluation of MP performances to the TCMP, there has not been much guidance on the presentation of the process and results of running the MP.

42. The WPM(MSE) **RECOMMENDED** that presentations of MSE progress to managers, including at TCMP and Commission meetings, focus on clearly identifying the key questions and areas where managerial input is required. The WPM(MSE) **NOTED** that presentations should focus on items that MSE developers need to advance the work; such as: (i) clarification of management objectives (including probabilities to achieve objectives), (ii) identification of preferred types of management procedures (MPs) (e.g., CPUE, model-based), (iii) timelines and risk, and (iv) guidance on the types of management measures to be considered (e.g., particularly relevant for species such as blue shark). This approach is expected to enhance the effectiveness of interactions between scientists and managers and support timely decision-making.

43. The WPM(MSE) also **EMPHASISED** that the presentation of MSE results should utilise the template adopted and used for Bigeye Tuna MSE results in 2022/23 (WPM13(MSE)-03).

### *7.4* CAPACITY BUILDING ON MSE AT IOTC

44. The WPM-MSE **NOTED** a verbal summary from IOTC Secretariat on the outcomes of the cross tRFMO workshop on MSE held in Rome in January 2026. The workshop received updates on MSE progress from each RFMO and also discussed:
    - The new ICCAT MSE webpage, noting other RFMO could usefully develop similar pages to make it easier to find summaries of MSE work in each RFMO (WCPFS has already had one)
    - A range of case studies on how MSE can be implemented including from non-tuna fisheries and relating to multispecies MSE. There was discussion on issues that stalled the MSE process or made it run more smoothly, with real stakeholder engagement noted as a key ingredient for success
    - Demonstrations of different open access software
    - The importance of well documented reproducible workflows and diagnostics
    - Model-free versus model-based MPs
    - Terminology consistency – the preference was for using the term management procedure rather than harvest strategy, and performance indicator rather than performance metric/performance statistic
    - The FAO's new online MSE capacity building course (link: Course: E-learning series: Management procedures for sustainable tuna fisheries | FAO elearning Academy)

45. The WPM-MSE NOTED that The Ocean Foundation (TOF) has funding from the FAO to support several capacity building workshops that are intended to serve as a complement to the FAO e-learning course mentioned above, and that anyone interested in such a workshop should get in touch with Rebecca Scott at TOF (see participant list).

## 8. OTHER BUSINESS

**Reconditioning of Operating Models**

46. The WPM-MSE **DISCUSSED** the implications of major catch revisions to species catch histories for the implementation of MPs. It was **NOTED** that if this occurs during the MSE testing phase of developing candidate MPs then a decision can be made to recondition the OMs (as may occur for Albacore tuna OMs) prior to MP adoption. If such catch history revisions occur after the adoption of an MP then consideration of whether to recondition OMs (and MP) should occur as part of the standard annual review of Exceptional Circumstances.

**Feedback at species Working Party meetings**

47. The WPM(MSE) pointed out that MSE development requires interaction with the relevant species Working Party as well as the Working Party on Methods. As such, there is the need for guidance on the appropriate level of engagement between developers and these groups to avoid confusion and better define roles and responsibilities.

48. The WPM **NOTED** that, in practice, the Species Working Party typically provides input on data and biological assumptions for the MSE and helps identify sources of uncertainty. The WPM, in turn, is responsible for guiding the overall direction and methodology of the MSE. This has worked well previously, including for the Swordfish MSE at the WPB and the Skipjack and Bigeye Tuna MSE at the WPTT. The WPM (MSE) **AGREED** that the Blue Shark MSE will follow the same process: feedback will be sought through the WPEB, while primary direction and instructions will be provided through the WPM. This approach is not expected to be difficult to manage or overly demanding.

## 9. ADOPTION OF REPORT

49. The WPM(MSE) **NOTED** that the report would be adopted via correspondence.

## APPENDIX I
## LIST OF PARTICIPANTS

| CHAIRPERSONS | | | | | |
|---|---|---|---|---|---|
| **Title** | **First name** | **Last name** | **Organisation** | **E-mail** | **Contracting Parties & Cooperating Non-Contracting Parties (CPC)** |
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## APPENDIX II
## MEETING AGENDA

**Date**: 23-24 March 2026
**Location**: Online
**Platform**: ZOOM
**Time**: 12:00 – 16:00 daily (Seychelles time)
**Chair**: Ann Preece (AUS); **Vice-chair**: Dr Giancarlo Correa (EU.ESP)

**DRAFT AGENDA**

1. **Opening and adoption of agenda**
2. **Review of MP process in IOTC**
   2.1. Review outcomes of S29 in 2025
   2.2. Review outcomes of SC28 in 2025
   2.3. Process of MSE development, discussion and adoption at IOTC
3. **Status of work on Albacore OMs and MPs**
   3.1. Review progress
   3.2. Future work
4. **Development of Yellowfin tuna OMs and MPs**
   4.1. Future workplan
5. **Development of Blue Shark OMs and MPs**
   5.1. Future workplan
6. **Preparation of TCMP10 and Commission (S20)**
   6.1. Agenda for TCMP10
   6.2. Organization, tasks and responsibilities
   6.3. Format and guidelines for presenting MSE/MP results
   6.4. Capacity building on MSE at IOTC
7. **Other business**
8. **Adoption of Report**

# APPENDIX III
## LIST OF DOCUMENTS

| Document | Title |
|---|---|
| IOTC–2026–WPM17(MSE)–01a | Agenda of the 17th Working Party on Methods Management Strategy Evaluation Task Force |
| IOTC–2026–WPM17(MSE)–03 | Technical development of Management Strategy Evaluation for Indian ocean albacore tuna: 2025 progress report and current status (Mosqueira I, Hilary R) |
| IOTC–2026–WPM17(MSE)–04 | Management Strategy Evaluation for Indian Ocean yellowfin tuna (Urtizberea A, Correa G, Merino G) |

## APPENDIX IV

## PROPOSED AGENDA FOR THE TECHNICAL COMMITTEE ON MANAGEMENT PROCEDURES (TCMP)

**Date:** 9 May 2026

**Location:** Male, Maldives (Hybrid)

**Co-Chairs:** Mr Adam Ziyad (Commission Chair) and Dr Sylvain Bonhommeau (SC Chair)

**1. OPENING OF THE SESSION AND ARRANGEMENTS** (Co-Chairs)

**2. ADOPTION OF THE AGENDA AND ARRANGEMENTS FOR THE SESSION** (Co-Chairs)

**3. ADMISSION OF OBSERVERS** (Co-Chairs)

**4. DECISIONS OF THE COMMISSION RELATED TO THE WORK OF THE TECHNICAL COMMITTEE ON MANAGEMENT PROCEDURES** (IOTC Secretariat)

- 4.1 Outcomes of the 8th Session of TCMP

**5. INTRODUCTION TO MSE AND PRESENTATION OF MSE RESULTS**

**6 STATUS OF THE MANAGEMENT STRATEGY EVALUATION/MANAGEMENT PROCEDURES AND ACTIONS NEEDED FOR ADOPTION/IMPLEMENTATION** (Developers)

- 6.1 Albacore tuna
- 6.2 Bigeye tuna
- 6.3 Swordfish
- 6.4 General Issues
  - 6.4.1 MP implementation, actions and regular implementation review

**7 FUTURE DIRECTION OF THE TECHNICAL COMMITTEE ON MANAGEMENT PROCEDURES** (Co-Chairs)

- 7.1 Workplan
  - 7.1.1 New timelines
  - 7.1.2 Budget and resources needed for technical developments
  - 7.1.3 External review
- 7.2 Priorities
- 7.3 Process and future meetings of TCMP

**8 ADOPTION OF REPORT** (Co-chairs)

# APPENDIX V
# CONSOLIDATED RECOMMENDATIONS OF THE 17TH SESSION OF THE WORKING PARTY ON METHODS (MANAGEMENT STRATEGY EVALUATION TASK FORCE)

The 17th Session of the Indian Ocean Tuna Commission's (IOTC) Working Party on Methods Management Strategy Evaluation Task Force (WPM(MSE)) was held online using Zoom on 24 March 2026. A total of 33 participants attended the Session. The list of participants is provided in Appendix I. The meeting was opened by the Chairperson, Ann Preece (AUS) who welcomed participants.

The following are the recommendations from the WPM17 to the Scientific Committee, and key outcomes of the WPM, which are provided in Appendix V

**Albacore MSE**

WPM(MSE) 17.01 (para. 13): The WPM(MSE) **RECOMMENDED** that the Commission secures dedicated funding to ensure completion of the work within the timeframes outlined in the MP schedule of work.

**Development of Yellowfin Tuna OMs and MPs**

WPM(MSE) 17.02 (para. 25): The WPM(MSE) **RECOMMENDED** that the Commission secures dedicated funding to ensure continuity and timely delivery of the yellowfin MSE processes.

**Format and guidelines for presenting MSE/MP results**

WPM(MSE) 17.03 (para. 42): WPM(MSE) **RECOMMENDED** that presentations of MSE progress to managers, including at TCMP and Commission meetings, focus on clearly identifying the key questions and areas where managerial input is required. The WPM(MSE) **NOTED** that presentations should focus on items that MSE developers need to advance the work; such as: (i) clarification of management objectives (including probabilities to achieve objectives), (ii) identification of preferred types of management procedures (MPs) (e.g., CPUE, model-based), (iii) timelines and risk, and (iv) guidance on the types of management measures to be considered (e.g., particularly relevant for species such as blue shark). This approach is expected to enhance the effectiveness of interactions between scientists and managers and support timely decision-making.