Chair Report of the 3rd Management Procedures Dialogue

La Reunion, France, 21 May 2016

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EXECUTIVE SUMMARY

The 3rd Session of the Indian Ocean Tuna Commission Management Procedures Dialogue (MPD03) was held in La Reunion, France, on 21st May 2016, co-chaired by Dr Ahmed Mohammed Al-Mazroui, chair of IOTC, and Dr Hilario Murua, chair of the SC of IOTC. A total of 57 delegates from 21 Contracting Parties of the Commission, 2 delegates from 1 Cooperating Non-Contracting Party and 12 Observers (including 4 invited experts) attended the session.

- The MPD discussed the first set of results on the evaluation of Management Procedures (MP) for Indian Ocean albacore and skipjack tuna, and preliminary results for yellowfin and bigeye.
- The MPD considered that given the technical nature of the management procedure approach, the use of consistent terminology would help ensure all partners were able to contribute to the dialogue.
- The MPD suggested that management objectives could include those related to economic and social criteria.
- The evaluation of certain management objectives, e.g. spatially explicit ones, might require an extension of the existing models. Identifying this was an important component of the MPD process.
- The importance of good information was recognized by MPD. Management Procedures still depend on data such as Catch Per Unit Effort (CPUE) to provide robust advice.
- The MPD noted that the multispecies nature of tropical tuna fisheries will need to be addressed within further developments of the work.
- The Secretariat was encouraged to seek funding to continue the important work on yellowfin and bigeye tuna Management Procedures.
- The MPD provided feedback and suggestions to SC including:
    - a clear description of the underlying decision rule to be presented to managers prior to any results from that management procedure.
    - the key assumptions within specific Management Procedures should be clarified, and potential challenges that might arise should be highlighted.
    - presentation of the output performance indicators for management procedures using the Kobe plot (SB/SB_{MSY} and F/F_{MSY}) was welcomed, and further refinement of that figure should be undertaken for future dialogues.
- The usefulness of the ability of the scientists to respond rapidly to the requests for additional information made during the 3rd MPD was noted, and such an interactive presentation of results, would be welcomed at future dialogues.
- The dialogue between scientists and managers in developing Management Procedures was felt to be highly important and continuation and enhancement of the process was strongly encouraged. The process should continue to move from capacity building to decision making, although capacity building should be maintained in parallel.

1. OPENING OF THE MEETING AND ADOPTION OF THE AGENDA

1. The third Management Procedures Dialogue meeting was conducted on the 21st May 2016, in Saint Denis, La Reunion.
2. Dr Ahmed Mohammed Al-Mazroui, the Chair of the IOTC, and Dr Hilario Murua, the Chair of the Scientific Committee, introduced the meeting and welcomed attendees. The interim Executive Secretary of the IOTC, Mr Alejandro Anganuzzi also welcomed the attendees to the meeting and emphasised the importance of this process for IOTC.
3. The meeting was facilitated by Dr Graham Pilling (SPC), who welcomed 57 delegates from 21 Contracting Parties of the Commission, 2 delegates from 1 Cooperating Non-Contracting Party and 12 Observers (including 4 invited experts) to the session. Dr Pilling acknowledged the assistance of the GEF ABNJ Common Oceans project that sponsored his attendance at the meeting.
4. The aim of the workshop was to facilitate the dialogue between scientists and fishery managers in developing Management Procedures for IOTC stocks. To this aim, key scientists presented progress in developing management procedures for the four key tuna stocks in the Indian Ocean. Based upon that information, it is expected to receive feedback from managers on desired information and actions needed, as well as discuss the future of the MPD approach.
5. Dr Pilling noted that the intended approach for the meeting was an informal dialogue between scientists and managers. Specific proposals tabled for the Commission meeting the following week were not intended to be discussed in detail, beyond relevant technical aspects.
6. The participants in the workshop meeting are listed in Appendix I and the adopted agenda for the meeting is presented in Appendix II.

2. OVERVIEW OF THE EVALUATION OF MANAGEMENT PROCEDURES IN THE IOTC

7. Dr Toshihide Kitakado provided an overview of the evaluation of management procedures in the IOTC to date.
8. The MPD welcomed the overview of the approach, and noted that given the technical nature of the approach, there would always be a need to ensure all partners in the dialogue are able to contribute through the use of a consistent terminology. The MPD supported the observation that terms related to management procedure work in the IOTC glossary be used consistently in the future, and the glossary of those terms be reviewed and expanded where necessary.
9. The MPD noted that management objectives could include those related to economic and social criteria. The implicit relationship between economic objectives and performance indicators such total catch and catch rates was highlighted.
10. The MPD noted that management objectives could be spatially explicit, and asked whether existing operating models would allow such objectives to be evaluated. It was noted that some of the current models were spatially explicit. If management objectives could not be met by the existing structures, however, refinements to the operating model would be required. Identifying this was an important component of the MPD process.
11. Dr Hilario Murua summarised SC's recommendations in relation to the management procedure process, including the performance statistics defined by SC to evaluate management procedure performance against a suite of five management objectives (see Appendix III). SC18 recommendations to create Technical Committee on Management Procedures for a formal communication channel for the science and management dialogue to enhance decision making were highlighted.
12. The MPD welcomed the presentation and acknowledged the need for further discussion on the issues raised.

3. STATUS OF THE MANAGEMENT PROCEDURE EVALUATION

Albacore tuna

13. Dr Iago Mosqueira summarised the latest results from evaluations of two alternative management procedures for Indian Ocean albacore (see Figure 1 for description of the CPUE-based MP).

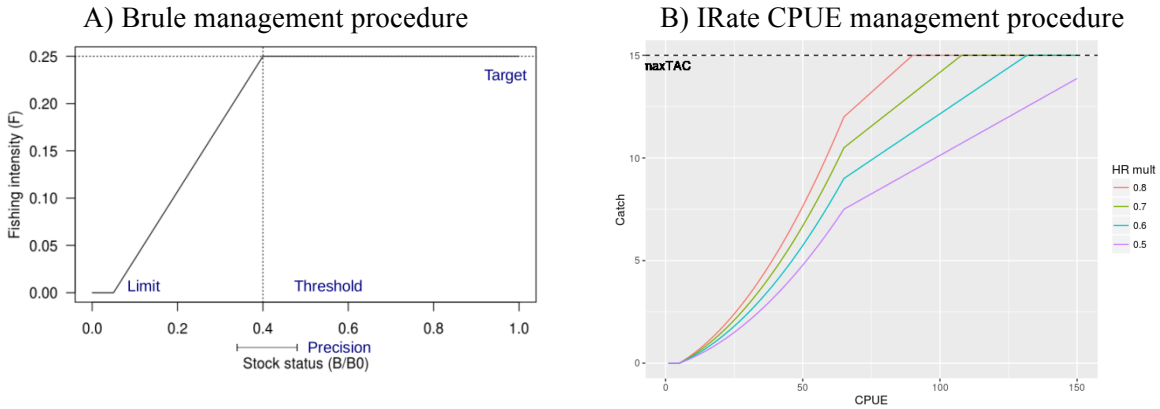

Figure 1. Graphical representation of the two management procedure harvest control rules examined for Indian Ocean albacore. A) the BRule management procedure, showing the relationship between estimated stock status (B/B_0) and recommended fishing mortality (F). Threshold indicates the level of biomass at which fishing is reduced, while limit is the level at which the fishery will be closed or severely limited. B) the IRate CPUE-based management procedure. The relationship between changes in CPUE from historical levels and catch is shown for different values of one of the MP parameters: HR mult, the factor by which historical harvest rates are multiplied. The maxTAC parameters established a maximum recommended catch. Please note that the numbers shown are purely for demonstration purposes and do not reflect any particular stock.

14. The MPD welcomed the presentation and acknowledged the work that has been carried out for Indian Ocean albacore.

15. The MPD asked to inspect the output performance indicators for all examined management procedures that correspond to the dimensions of the Kobe plot (SB/SB_{MSY} and F/F_{MSY}). This is presented in Figure 2. Further refinement of that figure will be undertaken for future dialogues.

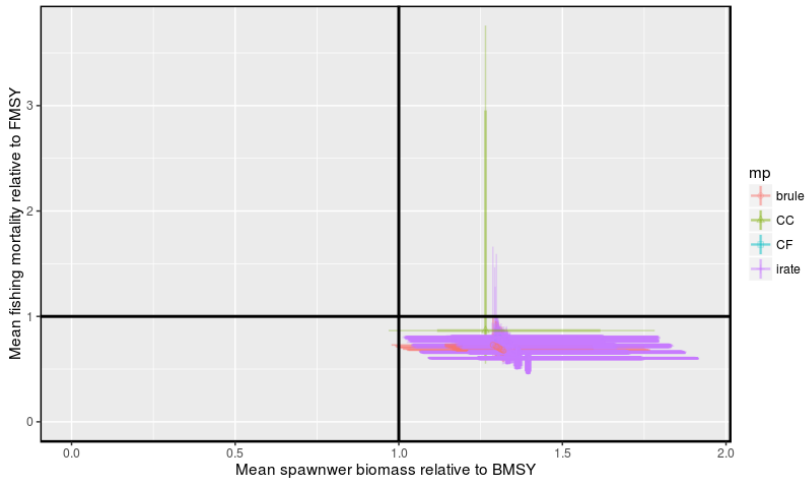

Figure 2. Trade-offs in the performance statistics linked to the Kobe plot dimensions (SB/SB_{MSY} and F/F_{MSY}) over the 20 years of projections, for a range of MPs for albacore. Crosses represent the 10-90% quantiles (thin lines), 25-75% quantiles (thick lines), and the median (point). Quadrants divide the space across the four Kobe plot panels.

16. The MPD noted that both Management Procedure classes (i.e. CPUE and model-based) relied on fleet-derived indices of abundance as their main source of information. The quality of those indices is essential for the performance of the management procedures. The MPD acknowledged that improvement of those key indices are essential for the quality of the advice arising from either management procedure or stock assessments. The robustness of management procedures to degradation of the quality of CPUE indices was a key uncertainty being considered within the evaluations.

17. The MPD noted that a new stock assessment for Indian Ocean albacore is scheduled for this year, and asked about the implications of this for the management procedure work. It was noted that if the new stock assessment fell within the range of the scenarios included within the operating model, there would be no need to rebuild the operating model.

Skipjack tuna

18. Mr Nokome Bentley summarised the latest results from evaluations of three contrasting management procedures for Indian Ocean skipjack:

    - Brule: a model-based (assessment) management procedure which recommends a fishing mortality (F) (Figure 1)
    - Frange: a model-based (assessment) or model-free (tagging) MP which recommends changes to effort (Figure 3)
    - Irate: a model-free (CPUE) MP which recommends a total allowable catch (TAC) (Figure 1)

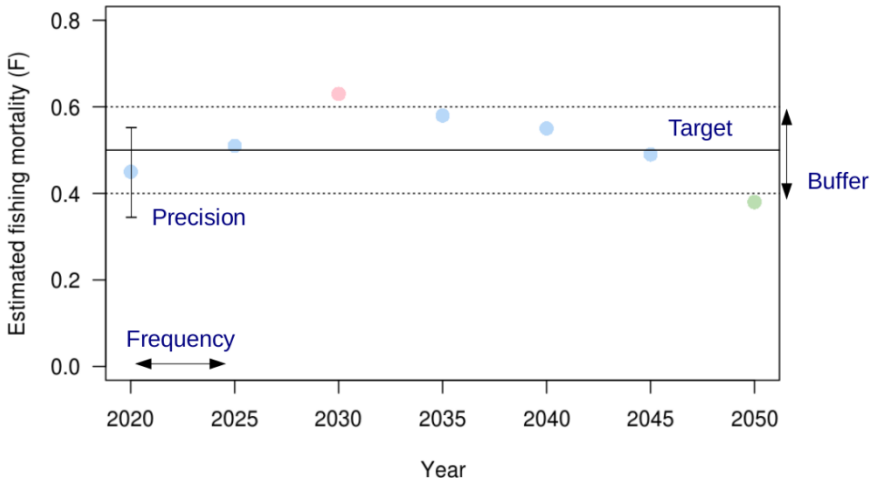

Figure 3. Diagram of the FRate management procedure, based on estimates of fishing mortality (F), from either stock assessment or tagging results, which is then used to recommend a level of effort to bring F to levels inside a buffer centered on a target value.

19. The MPD welcomed the presentation and acknowledged the work that had been carried out for Indian Ocean skipjack tuna.

20. The MPD asked for further information on the results for the full suite of performance indicators endorsed by SC. The resulting tables are presented in Table 1 for the FRange class of management procedure.

Table 1. Example of performance statistics for one management procedure. This example is for the FRange management procedure with the following control parameter values: frequency = 3 years, precision = 0.1, target = 0.15, buffer = 0.05, change_max = 30%.

Performance statistic	Mean	10th percentile	50th percentile	90th percentile
Status (Mean $\%B_0$)	59.39	42.20	58.65	79.00
Fishing intensity ($F/F_{40\%B0}$)	0.54	0.17	0.56	0.88
Kobe green (Years %)	74.56	48.84	76.74	100.00
Kobe top-right (Years %)	9.02	0.00	0.00	28.37
Kobe red (Years %)	9.81	0.00	0.00	32.56
Kobe bottom-left (Years %)	6.60	0.00	0.00	25.58
Safety (Prop. years B>20%B_0)	95.23	85.12	100.00	100.00
Yield (Mean catch; kt)	577.57	145.74	611.75	927.11
Yield (Years catch>=425kt %)	57.21	0.00	72.09	100.00
Stability (MAPC %)	23.49	14.80	20.30	32.95
Probability of shutdown (Years catch<1kt %)	1.28	0.00	0.00	0.00
Stability (Years TAC decrease %)	8.13	0.00	12.50	25.00
Stability (Years TAC increase %)	8.38	0.00	6.25	25.00
Western purse seine CPUE (relative to 2000-2015)	0.93	0.47	0.91	1.34
Maldives pole and line CPUE (relative to 2000-2015)	0.96	0.53	0.96	1.35
Eastern gill net CPUE (relative to 2000-2015)	0.94	0.43	0.93	1.38

21. The MPD acknowledged the usefulness of the ability of the scientists to respond rapidly to the requests for additional information made during the MPD. The MPD observed that future manager/scientist dialogues on MPs incorporate an interactive presentation of results, as demonstrated at the 3rd MPD.
22. The MPD noted the benefit of comparing the outputs from the management procedures to a "status quo" scenario (constant catch, or constant fishing mortality), as seen within Figure 2.

YELLOWFIN AND BIGEYE TUNAS

23. On behalf of Dr Dale Kolody, Dr Toshihide Kitakado summarised the results from a set of initial evaluations of alternative management procedures for Indian Ocean bigeye and yellowfin tuna. It was noted that these represented a work in progress and should not be used for management advice.
24. The MPD welcomed the presentation and acknowledged the work that has been carried out for Indian Ocean yellowfin and bigeye tunas.
25. The MPD asked whether uncertainty arising from the challenges in developing species-specific catch estimates for bigeye and yellowfin at younger ages could be incorporated within the management procedure. It was noted that the robustness of a management procedure to this form of uncertainty could be examined.
26. The MPD noted that the multispecies nature of tropical tuna fisheries will need to be addressed within further developments of this work.
27. The MPD suggested that the Secretariat seek funding to continue the important work on yellowfin and bigeye tuna management procedures.

4. ACTIONS NEEDED FOR ESTABLISHING MANAGEMENT PROCEDURES AND FUTURE DIRECTIONS OF THE MANAGEMENT PROCEDURES DIALOGUE

28. The MPD noted the importance of the process. The MPD indicated that the dialogue between scientists and managers in developing management procedures be continued (as agreed in Resolution 14/03) and enhanced in order to allow an iterative and effective dialogue and feedback between both groups. The process should continue to move from capacity building to decision making, however it is also important that the capacity building process be continued in parallel to ensure managers understand all the concepts and technical matters.
29. The MPD noted the SC proposal for a Technical Committee on Management Procedures that would be discussed at the Commission meeting the following week. The MPD also noted that those discussions should cover the composition of the Committee, the responsibilities and tasks of scientists and managers, the frequency at which the Committee should meet, the potential duration of the meeting, and the cost implications.
30. The MPD indicated that as a routine, a more complete description of the underlying decision rule be presented to managers prior to any results from that management procedure. This could include a diagrammatical representation of the rule, and an explicit description of the decision steps.
31. The MPD also indicated that scientists clarify the key assumptions within specific management procedures, and highlight the potential limitations that might arise. For example, those management procedures that are based upon CPUE time series or tagging information rely on those data continuing to be collected with appropriate quality to support that management procedure.
32. The Chair of the IOTC thanked all attendees for their contributions to the meeting. He stressed that capacity building elements should remain a part of the dialogue process in the future so that all members could make informed decisions based upon the information provided. The Chair thanked the Facilitator and presenters for their inputs to the process.

5. FINALISATION OF THE REPORT

33. The report was finalized by the co-chairs, and the report attempts to reflect the discussion and opinions expressed during the meeting by the participants. References to the MPD should not be taken as reflection of a total consensus but simply the interpretation by the Chairs of the existence of a general agreement.

APPENDIX I
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APPENDIX II
AGENDA FOR THE 3RD MANAGEMENT PROCEDURES DIALOGUE MEETING

Date: 21 May, 2016
Location: La Réunion, France
Time: 0900–1700 daily
Facilitators: Graham Pilling (SPC)**;** Toshihide Kitakado (Japan) & Iago Mosqueira (EU)

1. **OPENING OF THE SESSION AND ARRANGEMENTS** (Facilitators; IOTC Secretariat)

2. **OVERVIEW OF THE EV ALUATION OF MANAGEMENT PROCEDURES IN THE IOTC** (Chairperson of the Working Party on Methods - WPM)

3. **IOTC SCIENTIFIC COMMITTEE RECOMMENDATIONS, *INTER ALIA* THE RECOMENDED PERFORMANCE MEASURES** (Chairperson of the Scientific Committee)

4. **STATUS OF THE MANAGEMENT PROCEDURE EVALUATION/OPERATING MODELS** (Chairperson of WPM) 4.1 ALBACORE TUNA (Iago Mosqueira, Vice-Chairperson of the WPM) 4.2 SKIPJACK TUNA (Nokome Bentley, Consultant) 4.3 YELLOWFIN AND BIGEYE TUNAS (Toshihide Kitakado, Chairperson of the WPM)

5. **DISCUSSION ON THE ACTIONS NEEDED FOR THE ESTABLISHMENT OF MANAGEMENT PROCEDURES** (Facilitators)

6. **FUTURE DIRECTION OF THE MANAGEMENT PROCEDURES DIALOGUE AND THE SCIENTIFIC COMMITTEE PROPOSAL ON THE ESTABLISHMENT OF A TECHNICAL COMMITTEE ON MANAGEMENT PROCEDURES** (Facilitators)

APPENDIX III
TABLE OF PERFORMANCE INDICATORS ENDORSED BY SC18

Candidate performance statistics	Performance measure/s	Summary statistic
Status: maximize probability of maintaining stock in the Kobe green zone		
Mean spawner biomass relative to unfished	SB/SB_0	Geometric mean over years
Minimum spawner biomass relative to unfished	SB/SB_0	Minimum over years
Mean spawner biomass relative to B_{MSY}	SB/SB_{MSY}	Geometric mean over years
Mean fishing mortality relative to target	F/F_{targ}	Geometric mean over years
Mean fishing mortality relative to F_{MSY}	F/F_{MSY}	Geometric mean over years
Probability of being in Kobe green quadrant	SB, F	Proportion of years that $SB \geq SB_{targ}$ & $F \leq F_{targ}$
Probability of being in Kobe red quadrant	SB, F	Proportion of years that $SB < SB_{targ}$ & $F > F_{targ}$
Safety: maximize the probability of the stock remaining above the biomass limit		
Probability that spawner biomass is above 20% of SB_0	SB	Proportion of years that $SB > 0.2SB_0$
Yield: maximize catches across regions and gears		
Mean catch	C	Mean over years
Mean catch by region and/or gear	C	Mean over years
Mean proportion of MSY	C/MSY	Mean over years
Abundance: maximize catch rates to enhance fishery profitability		
Mean catch rates by region and gear	A	Geometric mean over years
Stability: maximise stability in catches to reduce commercial uncertainty		
Mean absolute proportional change in catch	C	Mean over years of absolute (C_t / C_{t-1})
Variance in catch	C	Variance over years
Variance in fishing mortality	F	Variance over years
Probability of fishery shutdown	C	Proportion of years that C = 0

Note: All the candidate performance statistics are summarised using the XX^{th} percentiles (e.g. XX=5/10/50) of their distributions over multiple stochastic realisations. The summary will include short and long-term time windows (e.g. 1, 3, 5, 10 and 20 years).