



Planning of PBF MSE Workshop

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Summary

During the 13th Meeting of the WCPFC-Northern Committee (WCPFC-NC) in August 2017 the ISC agreed to initiate development of a management strategy evaluation (MSE) for Pacific Bluefin tuna (PBF) in 2019 with the goal of completing it by 2024. To support development of the MSE the WCPFC-NC agreed to provide 1) funding to ISC for two MSE experts if possible, 2) target and limit biological reference points, and a harvest control rule (HCR) by 2019. Furthermore, without the requested funds to hire the experts and information (reference points and HCR), ISC would not engage in the MSE process for PBF. To initiate the PBF MSE process, the ISC also agreed to host a workshop in 2018. This document summarizes past activities considered germane to developing a PBF MSE and future plans agreed to by ISC and WCPFC.

Introduction

WCPFC recently adopted a harvest strategy for Pacific Bluefin Tuna (PBF) at its annual meeting held in December 2017, which includes management objectives, reference points, acceptable levels of risk, monitoring strategy, decision rules, and performance evaluation of PBF (**Appendix A**). Under the item of performance evaluation, ISC has agreed to conduct a management strategy evaluation (MSE) of PBF to “evaluate the performance of candidate rebuilding strategies”. In doing so, the harvest strategy further requests ISC “to organize workshops in early 2018 and 2019 to identify specific management objectives, including level of risks and timelines”.

In accordance with the request of WCPFC, ISC will convene the PBF MSE workshop during late May 2018 in Yokohama, Japan, and Dr. Gerard DiNardo (USA) will Chair the workshop. This document is intended to foster a common expectation for the preparation of the workshop. Meeting documents for the workshop will be prepared in advance of the workshop and based on discussions during the March 2018 PBFWG workshop at SWFSC.

Background

1. The Harvest Strategy adopted by WCPFC (**Appendix A**)

Though some clarification may be needed, the harvest strategy of PBF adopted by WCPFC contains several important information for the future development of MSE of PBF, namely,

- The objective of the MSE is *to evaluate the candidates of rebuilding strategies*.
- Start MSE related works in 2019 and complete *by 2024*.
- *Management objectives are specified*, namely, “The management objectives are, first, to support thriving Pacific bluefin tuna fisheries across the Pacific Ocean while recognizing that the management objectives of the WCPFC are to maintain or restore the stock at levels capable of producing maximum sustainable yield, second, to maintain an equitable balance of fishing privileges among CCMs and, third, to seek cooperation with IATTC to find an equitable balance between the fisheries in the western and central Pacific Ocean (WCPO) and those in the eastern Pacific Ocean (EPO).”
- Rebuilding target is specified (20%SSB_{F=0} by 2034 with at least 60% probability) but reference

points for long-term management are not, which may not be relevant for the current MSE given that it is to evaluate rebuilding strategies.

- Acceptable levels of risk are not specified.
- 8 evaluation criteria are provided as follows;
 - Probability of achieving each of the rebuilding targets within each of the rebuilding periods.
 - Time expected to achieve each of the rebuilding targets (if applicable).
 - Expected annual yield, by fishery.
 - Expected annual fishing effort, by PBF-directed fishery.
 - Inter-annual variability in yield and fishing effort, by fishery.
 - Probabilities of SSB falling below the B-limit and the historical lowest level.
 - Probability of fishing mortality exceeding F_{MSY} or an appropriate proxy, and other relevant benchmarks.
 - Expected proportional fishery impact on SSB, by fishery and by WCPO fisheries and EPO fisheries.

2. History of PBF MSE related activities at ISC and WCPFC

2010

ISC provided a list of candidate biological reference points including their description and pros and cons (http://isc.fra.go.jp/pdf/ISC10/Plenary4_Biological_Reference_Points_ISC10.pdf).

2013

WCPFC developed a list of candidate management objectives of PBF thorough questionnaire and discussions at Management Objectives Workshop (**Appendix B**, see <https://www.wcpfc.int/system/files/WCPFC10-2013-15b%20Report%20of%20the%20MOW%20FINAL.pdf> for detail). They may or may not be relevant for future PBF MSE results given that management objectives and performance indicators have been specified in the harvest strategy of WCPFC.

2015

ISC convened a workshop on MSE. The contents were mostly for educational purposes (for more information, visit http://isc.fra.go.jp/reports/isc_mse_workshop.html).

2017

WCPFC adopted the PBF harvest strategy including the call for the workshop on MSE.

Proposed Organization of MSE Workshop

1. Meeting Arrangement

Japan Fisheries Research and Education Agency (FRA) will host the workshop on May 30-31 in Yokohama, Japan. The workshop will be chaired by G. DiNardo (USA).

2. Expected Participants

The meeting is open to anybody interested in development of MSE of PBF who have registered for participation. Expected participants are managers, scientists, industry and NGOs related to PBF management.

3. Possible Agenda

ISC agreed to initiate development of a PBF MSE in 2019 with the goal of completing it by 2024. As this is the first of a likely series of meetings needed for the development of a PBF MSE, no concrete conclusions are expected. Rather, this first workshop is intended to introduce participants to the concept and process of MSE and to start the discussion on various elements necessary for the required steps to develop the MSE. Based on such a premise, the following draft agenda is proposed. For reference, the October 2017 ALB MSE Workshop agenda is attached (**Appendix C**).

Draft Agenda for PBF MSE Workshop (the complete draft agenda is provided as Appendix D)

- i. What is MSE (presentation by G. DiNardo)
 - Concept and process of MSE are introduced.
- ii. What needs to be agreed by who and relevant discussions on PBF to date (presentation by S. Nakatsuka?)
 - The roles of various stakeholders in the development of MSE are introduced. The discussions in the past related to MSE of PBF are also introduced.
- iii. Clarification of the adopted Management Strategy (moderator: S. Nakatsuka?)
 - Some clarification may be needed regarding the Management Strategy such as what is meant by “equitable balance” in the management objective or harvest strategies containing reference points need to be tested.
- iv. Discussion by workshop participants on elements necessary for MSE development (moderator: S. Nakatsuka?)
 - Participants discuss some of the elements of MSE, including management objectives and their performance indicators, reference points, and acceptable levels of risk. If possible, a brief summary of the discussion, which could be a living document of elements of PBF MSE, will be developed.
- v. Future work plan (introduction by S. Nakatsuka?)
 - Future work plan for scientists and managers respectively will be discussed, noting that WCPFC requested ISC “to start the work to develop MSE PBF in 2019 and have a goal of completing it by 2024”.

4. Expected Outcome

A report of the meeting, which could be a living document of elements of PBF MSE, and a future work plan will be produced.

Work after the Workshop

The results will be provided to relevant RFMOs, in particular Joint IATTC WCPFC NC Working Group meeting scheduled in conjunction with the WCPFC NC in September 2018. It is hoped that further discussion on MSE elements will continue in those meetings under the initiative of managers and be fed back to ISC. In the meantime, ISC PBFWG will discuss scientific aspects of MSE, including how to incorporate MSE related work in its work schedule, how and who to develop Operating Model and what type of Management Procedure may be expected and who will develop its candidates.

Appendix A



COMMISSION FOURTEENTH REGULAR SESSION

Manila, Philippines 3-8 December 2017

HARVEST STRATEGY FOR PACIFIC BLUEFIN TUNA FISHERIES

Harvest Strategy 2017-XX

Introduction and scope

This harvest strategy has been prepared in accordance with the Commission's Conservation and Management Measure on Establishing a Harvest Strategy for Key Fisheries and Stocks in the Western and Central Pacific Ocean.

Although the provisions of this harvest strategy are expressed in terms of a single stock, they may be applied to multiple stocks as appropriate and as determined by the Northern Committee.

1. Management objectives

The management objectives are, first, to support thriving Pacific bluefin tuna fisheries across the Pacific Ocean while recognizing that the management objectives of the WCPFC are to maintain or restore the stock at levels capable of producing maximum sustainable yield, second, to maintain an equitable balance of fishing privileges among CCMs and, third, to seek cooperation with IATTC to find an equitable balance between the fisheries in the western and central Pacific Ocean (WCPO) and those in the eastern Pacific Ocean (EPO).

2. Reference points

Because steepness in the stock-recruitment relationship is not well known but the key biological and fishery variables are reasonably well estimated,¹ the stock of PBF is to be treated as a Level 2 stock under the Commission's hierarchical approach for setting biological limit reference points.

2.1 Rebuilding targets

Initial rebuilding target: The initial rebuilding target for the PBF stock size is the median SSB estimated for the period 1952 through 2014, to be reached by 2024 with at least 60% probability.

¹ See the information provided by the International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean (WCPFC-NC9-2013/IP-03) in response to a request made by the Northern Committee at its Eighth Regular Session (Attachment F of the report of NC8).

Recruitment scenario during initial rebuilding period: The low recruitment scenario (resampling from the relatively low recruitment period (1980-1989)) or the recent recruitment scenario (resampling from the last 10 years), whichever is lower, will be used for the ISC's SSB projections until 2024 or until the SSB reaches the initial rebuilding target, whichever is earlier. The ISC is requested to periodically evaluate whether the recruitment scenario used during the initial rebuilding period is reasonable given current conditions, and to make recommendations on whether a different scenario should be used. If ISC recommends a different scenario, this will be considered by the NC.

Second rebuilding target: The second rebuilding target for the PBF stock size is $20\%SSB_{F=0}$ ², to be reached by 2034, or 10 years after reaching the initial rebuilding target, whichever is earlier, with at least 60% probability.

However, if: (1) the SSB reaches the initial rebuilding target earlier than 2024; (2) ISC recommends a recruitment scenario lower than the average recruitment scenario; and (3) the SSB projections indicate that the second rebuilding target will not be achieved on this schedule, the deadline for rebuilding may be extended to 2034 at the latest.

Also, if there is a recommendation from the Northern Committee that $20\%SSB_{F=0}$ is not appropriate as the second rebuilding target, taking into account consideration from IATTC, scientific advice from ISC, IATTC or WCPFC SC, and socioeconomic factors, another objective may be established.

Recruitment scenario during second rebuilding period: After the initial rebuilding target is reached and until the second rebuilding target is reached, the recruitment scenario to be used for the SSB projections will tentatively be the average recruitment scenario (resampling from the entire recruitment period).

The ISC is requested to periodically evaluate whether the recruitment scenario used during the second rebuilding period is reasonable given current conditions, and to make recommendations on whether a different scenario should be used. If ISC recommends a different scenario, this will be considered by the NC.

2.2 Development of reference points

The Northern Committee will develop more refined management objectives as well as limit reference point(s) and target reference point(s) through MSE process specified in Section 6.

3. Acceptable levels of risk

Until the stock is rebuilt, the Northern Committee will recommend conservation and management measures as needed to ensure rebuilding in accordance with the probabilities specified in sections 2.1 and 5 for each of the two rebuilding targets.

Once the stock is rebuilt, in accordance with Article 6.1(a) of the Convention, the Northern Committee will recommend conservation and management measures as needed to ensure that any target reference point(s) (once adopted) are achieved on average in the long term, and ensure that the risk of the stock size declining below the B-limit (once adopted) is very low.³

4. Monitoring strategy

² $SSB_{F=0}$ is the expected spawning stock biomass under average recruitment conditions without fishing.

³ WCPFC13 agreed that any risk level greater than 20 percent to be inconsistent with the limit reference point related principles in UNFSA (as references in Article 6 of the Convention) including that the risk of breaching limit reference points be very low.

The ISC will periodically evaluate the stock size and exploitation rate with respect to the established reference points and the report will be presented to the Scientific Committee. Until 2024, while the MSE is being developed (see section 6), the ISC is requested to conduct stock assessments in 2018, 2020 and 2022.

In order to cope with the adverse effects on the rebuilding of the stock due to drastic drops of recruitment: (1) all the available data and information will be reviewed annually, including recruitment data provided by the ISC and in National Reports; and (2) the ISC is requested to conduct in 2019, and periodically thereafter as resources permit and if drops in recruitment are detected, projections to see if any additional measure is necessary to achieve the initial rebuilding target by 2024 with at least 60% probability.

5. Decision rules

Harvest controls rules during initial rebuilding period: The interim harvest control rules below will be applied based on the results of stock assessments and SSB projections to be conducted by ISC.

(a) If the SSB projection indicates that the probability of achieving the initial rebuilding target by 2024 is less than 60%, management measures will be modified to increase it to at least 60%. Modification of management measures may be (1) a reduction (in %) in the catch limit for fish smaller than 30 kg (hereinafter called “small fish”) or (2) a transfer of part of the catch limit for small fish to the catch limit for fish 30 kg or larger (hereinafter called “large fish”). For this purpose, ISC will be requested, if necessary, to provide different combinations of these two measures so as to achieve 60% probability.

(b) If the SSB projection indicates that the probability of achieving the initial rebuilding target by 2024 is at 75% or larger, the WCPFC may increase their catch limits as long as the probability is maintained at 70% or larger, and the probability of reaching the second rebuilding target by the agreed deadline remains at least 60%. For this purpose, ISC will be requested, if necessary, to provide relevant information on potential catch limit increases.

Harvest controls rules during second rebuilding period: Harvest control rules to be applied during the second rebuilding period will be decided, taking into account the implementation of the interim harvest control rules applied during the initial rebuilding period.

The Northern Committee will, through MSE development process, develop decision rules related to the limit reference points once adopted including for the case of their being breached.

6. Performance evaluation

Until the stock is rebuilt, the Northern Committee will work with the ISC and the Scientific Committee and consult with the IATTC to identify and evaluate the performance of candidate rebuilding strategies with respect to the rebuilding targets, schedules, and probabilities.

The ISC is requested to start the work to develop a management strategy evaluation (MSE) for Pacific bluefin tuna fisheries in 2019 and have a goal of completing it by 2024.

To support development of the MSE, ISC is encouraged to identify at least two experts and NC members are encouraged to provide additional funds for the ISC’s work on the MSE.

The Joint WG will start to discuss in 2018, and aim to finalize no later than 2019, guidelines for the MSE, including at least one candidate long-term target reference point (TRP), two candidate limit reference points (LRPs) and candidate harvest control rules (HCRs), which will be provided to the ISC. Those candidate TRPs, LRPs and HCRs will be tested and changed if appropriate during the MSE development process.

In preparation for the Joint WG meeting in 2019, the ISC is requested to organize workshops in

early 2018 and 2019 to support the identification of specific management objectives, including level of risks and timelines. The workshops will include managers, scientists and stakeholders, taking into account any recommendations of the Joint WG, and the number of representatives should be relatively small, as it was for the MSE workshop for North Pacific albacore.

In evaluating the performance of candidate target reference points, limit reference points, and harvest control rules, the Northern Committee, in consultation with the ISC and the Scientific Committee, should consider the following criteria:

1. Probability of achieving each of the rebuilding targets within each of the rebuilding periods (if applicable).
2. Time expected to achieve each of the rebuilding targets (if applicable).
3. Expected annual yield, by fishery.
4. Expected annual fishing effort, by PBF-directed fishery.
5. Inter-annual variability in yield and fishing effort, by fishery.
6. Probabilities of SSB falling below the B-limit and the historical lowest level.
7. Probability of fishing mortality exceeding F_{MSY} or an appropriate proxy, and other relevant benchmarks.
8. Expected proportional fishery impact on SSB, by fishery and by WCPO fisheries and EPO fisheries.

Recognizing that developing the operating model and other aspects of the MSE will take time and additional resources, and might require further dialogue between the Northern Committee, the ISC, and the IATTC, while the MSE is in development the ISC is requested to perform this work using the best means at its disposal.

Appendix B

Candidate objectives and indicators for Pacific bluefin tuna

Type	Objective	Indicator	Interim rebuilding target reference points	Comments
Economic	Rebuild and stabilize catches	Biomass Depletion level	Ideally B_{MEY} Proxy would be biomass or index	Key objective to rebuild stock.
	Stability and continuity of market supply	Market throughput of tuna products	TBD	Important issue for States with high levels of historic demand for tuna products.
Biological	Maintain biomass at levels that provide stock sustainability	Estimated biomass or use CPUE (as proxy)	B_{msy}	This objective is accounted for in the LRP provided and adequate 'risk buffer' is added into the TRP, which is under development but has yet to be adopted. Model estimates of 2010 SSB are at or near their lowest level and SSB has been declining for over a decade; debate exists on the role of environmental effects. Low biomass even prior to 1950s appeared to succeed in generating recruitment and subsequent stock recovery. View that biological indicators should apply to LRPs rather than TRPs.
Social	Maintain artisanal fishery	Landings by region; number of fishermen	TBD	Mainly Japanese but also some Korean and Taiwan.
Ecosystem	Minimise catch of non-target species	Mortality of NTADs/ PETs, relative abundance	TBD	Likely to be minimal given the scale of fisheries.
	Maintain/restore ecosystem function	Small pelagic abundances	Ecological risk assessments and/or PSA (probability susceptibility analysis)	Concern with role of PBF in the broader pelagic ecosystem, in particular possible relationship with small pelagics.

Albacore Working Group (ALBWG)
International Scientific Committee for Tuna and Tuna-like Species
in the North Pacific Ocean

Management Strategy Evaluation Workshop for Managers

17-19 October 2017
Vancouver, Canada

Draft Agenda

October 17, 2017 (9:00 am – 5:00 pm. Registration: 08:30-09:00)

1. Opening of the Workshop
 - Welcoming Remarks
 - Chair's Opening Remarks
 - Overview of Workshop Goals:
 - Finalize performance metrics to be used in the MSE
 - Develop set of candidate harvest control rules (HCRs) and reference points (RPs) to be used in MSE
 - Overview of Workshop Outputs:
 - List of performance metrics and management objectives for MSE
 - Set of candidate HCRs and RPs to be used in MSE
 - Introductions
2. Meeting Logistics
 - Meeting Protocol
 - Review and Adoption of the Agenda
 - Assignment of Rapporteurs
 - Group Photo
3. Brief review of MSE structure and process
 - Presentation by D. Tommasi on "What is an MSE" with emphasis to its application to NPALB

4. Review of management objectives and performance metrics discussed during the May 2016 MSE Workshop in Yokohama
 - Presentation by D. Tommasi on translating management objectives into operational objectives and common risk language
 - Discussion and review of management objectives and performance metrics
 - Identification of acceptable level of risk for each objective

October 18, 2017 (9:00 am – 5:00 pm)

5. Review of agenda and status from Day 1
6. Development of preliminary set of candidate RPs and HCRs to be tested in MSE framework
 - Presentation by D. Tommasi on RPs and HCRs developed in other tuna RFMOs, and review of the potential RPs and HCRs for NPALB discussed during the May 2016 MSE Workshop in Yokohama
 - Examples from an initial application of potential RPs and HCRs in the NPALB MSE
 - Discussion on the identification of candidate RPs and HCRs
 - Develop list of candidate RPs and HCRs for overnight consideration

October 19, 2017 (9:00 am – 12:00 pm)

7. Identify preliminary set of candidate HCRs and RPs to be tested in the MSE
8. Review MSE timeline and work plan
9. Closing remarks

Appendix D



**Pacific Bluefin Tuna
Management Strategy Evaluation Workshop**

***Queens Forum, Queens Tower B 7th Floor (in Queen's Square)
Yokohama, Japan***

May 30-31, 2018

May 30, 2018 (10:00 am – 5:00 pm)

Registration (10:00-10:30) – Coffee Service

1. Welcome-Japan (10 minutes) – 10:30-10:45
2. Opening Remarks – G. DiNardo (10 minutes) - 10:45-10:55
3. Review and Adoption of Agenda – G. DiNardo (5 minutes) – 10:55-11:00
4. MSE Presentations
 - a. Management Strategy Evaluation – Realizing its Full Potential – G. DiNardo
(60 minutes) – 11:00-12:00

Lunch 12:00-1:30

- b. MSE Application Case Studies – G. DiNardo (60 minutes) – 1:30-2:30
 - c. MSE Application to Pacific Bluefin Tuna: Requirements for Implementation – S. Nakatsuka (60 minutes) – 2:30-3:30

Break 3:30-3:45 coffee service

5. Towards Development of a Pacific Bluefin Tuna MSE - Open Discussion –
Moderator: S Nakatsuka – (60 minutes) - 3:45-4:45

Recap Summary 4:45-5:00

May 31, 2018 (9:30 am – 2:00 pm)

Coffee Service – 9:30-10:00

5. Towards Development of a Pacific Bluefin Tuna MSE - Open Discussion –
Moderator: S Nakatsuka (60 minutes) – 10:00-11:00
6. Future Work Plan and Expectations- Moderator: G. DiNardo (30 minutes)
– 11:00-11:30
7. Open Discussion – S. Nakatsuka and G. DiNardo (30 minutes)
– 11:30-12:00

Lunch 12:00-1:30

8. Other matters: latest information about Pacific Bluefin Tuna (30 minutes)
– 1:30-2:00
9. Closing remarks – G.DiNardo

Adjourn