Appendix 7: Feedback on "Basic Structure of PBF MSE"

ISC PBFWG

Summary

In May 2018, the ISC hosted a PBF MSE Workshop in Yokohama, Japan. Some 70 participants including managers, scientists and stakeholders attended the meeting and started discussion on elements necessary for management strategy evaluation (MSE) of PBF. The Workshop developed a document titled "Basic Structure of PBF MSE" as a living-document to keep track of MSE development of PBF. The ISC PBFWG reviewed the document in its meeting in March 2019 and provides the attached feedback.

Basic structure of PBF MSE Process (as of March 2019)

This document will continuously be updated as MSE develops.

Modification in this version in red is made by ISC PBFWG in March 2019.

1. **The Purpose of MSE of PBF**: "To develop long-term management strategies of PBF robust to perceived uncertainties including environmental impacts while also evaluating the current rebuilding strategy to rebuild the stock to 20%$SSB_{F=0}$ by 2034"

2. **Management objectives, operational management objectives and corresponding performance indicators:**

(1) Suggested possible additions to the current (aspirational) management objectives in the WCPFC Harvest Strategy (for further discussion at WCPFC NC-IATTC joint WG)

- Minimize negative impacts of increased PBF on other fisheries not targeting PBF
- Minimize negative impacts of management measures on sustainability of small-scale fisheries

(2) Possible operational management objectives (should be able to be evaluated quantitatively through MSE)

Sustainability:

- Rebuilding: achieve 2nd rebuilding target (20%$SSB_{F=0}$) by 2034 with probability of at least 60%.
- Target: maintain the stock above TRP (B-base and/or F-base) (TBD) with relatively high probability (TBD)
- Risk: maintain the stock above LRP (B-base and/or F-base) (TBD) with (very) high probability (TBD). If the stock falls below LRP, rebuild the stock above LRP (TBD) within TIME (TBD) under the long-term management strategy (after 2034). (add recruitment related objective?)

Harvest:

- Yield: maximize yield (possibly including changing size of fish caught)
- Stability: ensure management changes are relatively small (TBD)
- Responsiveness: Respond more timely to biomass trend including recruitment variability

Socio-economics:

- Maximize revenue to fisheries (trade-offs among fisheries? Increase Yield/Recruit?)
- Maximize social benefit from PBF fisheries (economic size of related industry?)

(3) Performance indicators **suggested by ISC based on the proposed management objectives in 2. (2)**

Category	Management objective	Suggested performance indicator	Comments/questions from ISC
Sustainability	Rebuilding	Probability to achieve the 2nd rebuilding target by 2034.	A target probability needs to be specified, i.e., what level of certainty is needed to achieve rebuilding?
	Target	Probability to stay above the target (or to stay in a certain area on Kobe chart).	TRP needs to be specified.
	Risk	- Probability to breach LRP. - Time required to rebuild the stock above LRP.	LRP and acceptable risk need to be specified. Need Threshold RP?
Harvest	Maximize yield	Expected average yield.	Timeframe needs to be considered. For example, short, medium, and long-term.
	Stability	Expected annual variance in catch.	Will managers set duration/amount of TAC change?
	Responsiveness to abundance	None. (or expected annual variance in fishing mortality of age 0 fish)	"Responsiveness to abundance" can be inferred to some extent from the combination of "Maximize yield" and "Stability". The higher the yield and variance, the more responsive. In addition, variance in fishing mortality of age 0 fish can show how responsive the catch is to the strength of recruitment
Socio-economics	Maximize revenue	None. (or CPUE or Y/R can be useful?)	Yield can be provided. Trade-offs among fisheries should be investigated by the comparison of candidate Management Strategies.
	Maximize social benefit	None. (or CPUE or Y/R can be useful?)	At this stage, economic model is not anticipated for MSE. However, CPUE or Y/R may be used as proxy for economic indicators.

3. **Features of candidate management strategies to be advised by managers: options could to be evaluated through MSE. Some of them could be automatically filled as operational management objectives will be specified more.**

Features	Status	Additional instruction
Rebuilding targets	Specified (SSBmed and 20%$SSB_{F=0}$, including timeframe)	
Risks (probability)	Specified only for rebuilding strategy	Risk to go below LRP, no more than 20% usually in WCPFC
Type of Management Strategy	Not specified. Empirical or Model based?	
Reference points	Not specified. Not indispensable, but low limit is desirable to evaluate MSs	Threshold RP may need to be considered.
Duration of TAC	e.g. 2 or 3 years	
Change of TAC	e.g. 10%, 20% or absolute value (e.g. maximum or minimum)	Minimum change can also be specified.
General guidance of TAC change	Proportional, different among CCMs, among fisheries?	
Any other features	e.g. Area-wise, size-wise, country-wise TAC? Any other?	

4. **Organizational structure for advancing PBF MSE**: Organizations responsible for various aspects to advance MSE, including decision-making and steering of MSE related work, scientific work and outreach, need to be clearly specified. Advice further discussion in this regard at NC-IATTC joint WG meeting.

5. **Timeframe and structure of computational aspects of PBF MSE**: It is expected that technical work on MSE on PBF would be conducted by a small group of experts, who would be work under the instruction from ISC PBFWG. However, it is difficult for PBFWG to engage in MSE related work extensively while simultaneously conducting assessment work. As the WG plans to conduct assessment in 2020 (2019-2020 March), the progress in MSE related work in 2019 could be relatively small.