



**COMMISSION
THIRTEENTH REGULAR SESSION**
Denarau Island, Fiji
5 – 9 December, 2016

**REFERENCE DOCUMENT FOR THE DEVELOPMENT OF
HARVEST STRATEGIES UNDER CMM 2014-06**

**WCPFC13-2016-11A
17 November 2016**

Paper prepared by the Secretariat

A. Introduction

1. The purpose of this paper is to provide a quick reference guide to the recommendations of the Scientific Committee (SC) and as applicable the Technical and Compliance Committee (TCC) of relevance to the discussions in support of the Commission's development of a harvest strategy framework under CMM 2014-06. It lists the recommendations drawn from the summary report of SC12. The Summary Reports of the meeting is part of the meeting documentation and readily available for access and they provide the context and discussion in support of the recommendations. The agreed 2016 work plan for the adoption of harvest strategies under CMM 2014-06 is in Attachment A.

B. Scientific Committee Recommendations

Development of a harvest strategy framework

A brief history

2. A brief history of discussions at the Scientific Committee meetings concerning the development of reference points, harvest strategies and the use of management strategy evaluation (MSE) are as follows (*SC12 Paras 523-524*)

- a) SC3 (2007): SC3-ME-WP-03 (*A brief review of the use of the precautionary approach and the role of target and LRPs and Management Strategy Evaluation in the management of highly migratory fish stocks*) was presented.
 - SC3 recommended that a scoping paper and draft work plan should be developed on the potential costs, benefits and difficulties of alternative approaches for the identification of appropriate RPs and the implementation of an MSE within the WCPO.
- b) SC4 (2008): SC4-GN-WP-10 (*Approaches for identification of appropriate reference points and implementation of MSE within the WCPO*) was presented.
 - SC4 recommended that the Commission i) hold a technical workshop to progress work on reference points, and ii) establish a process for establishing key management objectives for each target species including the possibility of holding an inter-sessional workshop on management objectives in 2009.

- c) WCPFC5 (2008): The Commission agreed that WCPFC6 should consider the possibility of holding a dedicated workshop on management objectives in 2010.
- d) SC5 (2009): A technical workshop on reference points was held jointly with SC5. Following a re-structuring of the SC meeting format, the Management Issues Theme was incorporated into the SC from SC6 in 2010.
- e) MOW-1 (2012): Focused on increasing the understanding of the use and application of management objectives, indicators and reference points, and preliminary discussions on management objectives for key fisheries.
- f) MOW-2 (2013): Considered a 'Strawman' (MOW2-IP/01Rev1: *Report of the expert working group management objectives, performance indicators and reference points*), a candidate list of management objectives, performance indicators and TRPs for each major fishery in the WCPFC.
- g) MOW-3 (2014): Discussed and supported for the development of a harvest strategy-based management framework.
- h) WCPFC11 (2014): The Commission adopted CMM-2014-06 (*CMM to develop and implement a harvest strategy approach for key fisheries and stocks in the WCPO*).
- i) MOW-4/HSW (2015): Reviewed MSE work undertaken by other t-RFMOs, risk levels of breaching LRPs, TRPs and HCRs for skipjack and SP albacore and an MSE work-plan.
- j) WCPFC12 (2015): The Commission agreed that the harvest strategy-related issues would be included on the WCPFC13 agenda, directed SC12 to include these discussions under the Management Issues theme agenda item, adopted the work-plan for the adoption of harvest strategies under CMM 2014-06, and tasked SC with support from the scientific services provider to undertake the activities specified in the agreed work-plan.

Management objectives (SC12 Paras 525-530)

3. It was noted that establishing the objective is important because a management objective requires performance indicators and monitoring strategies, etc., all the pieces needed to fit together.
4. SC12 noted that the Commission is scheduled to 'record' the management objectives for each fishery or stock (south-Pacific albacore, skipjack, yellowfin and bigeye) in 2016. Noting the direct relationship between management objectives, and the need to identify performance indicators within the Management Strategy Evaluation (MSE) currently being developed, SC12 encourage WCPFC13 to provide additional clarity on the management objectives for skipjack and south-Pacific albacore.

Reference points (SC12 Paras 531-553)

South Pacific albacore

5. The Commission is scheduled to agree a TRP for South Pacific albacore in 2016 and SC12 was asked to consider providing advice on the implications of a range of TRPs for South Pacific albacore.
6. SC12-MI-WP-01(*Biological and economic consequences of alternative trajectories to achieve a candidate south Pacific albacore target reference point*) was presented:
 - a) Using deterministic projections, biological and economic consequences of status quo (2013), effort and catch scenarios, were examined for south Pacific albacore and southern longline fishery. Three alternative management interventions recovering the stock to a candidate TRP (TRP; 45% $SB_{F=0}$) over 20 years were also examined, which specified either significant early effort reductions, larger effort reductions after 10 years, or smaller year-on-year reductions. Status quo conditions led to both stock and CPUE decline, and significantly reduced profits over the next 20 years.

- b) The stock was reduced to 32% $SB_{F=0}$ with effort at 2013 levels, and to 23% $SB_{F=0}$ with catch at 2013 levels. Achieving constant catch from a declining stock biomass required a more than doubling of fishing effort by 2033 and led to economic losses under all economic conditions, a 41% risk of falling below the LRP, and a risk of stock collapse.
- c) Economic performance was much improved under three effort reduction scenarios, with the early significant effort reduction generally outperforming the others. Displacement cost to vessels exiting the fishery was not included in this analysis, but are likely to strongly influence results. The three economic conditions examined provide some sensitivity around prices and costs, but remain fixed over the 20 years. Economic indicator analyses of the fishery suggest the likelihood of optimistic conditions occurring is likely to decrease over time. Managers should consider the likelihood of good and bad economic conditions, and resulting trade-offs and risks, when selecting a robust management strategy. The choice of management scenario will also be influenced by the time horizon used by managers, and the value operators place on their investment.

7. FFA members recalled their proposal at WCPFC12 for a south Pacific albacore TRP, noted that the participants to the Tokelau Arrangement would be again proposing the adoption of a TRP that maintains the spawning biomass at 45% of spawning biomass in the absence of fishing, addressing the major objective of returning CPUE to levels that allow the average vessel a chance of making a profit, as well as avoiding the LRP with a low level of risk, and proposed that the major outputs of SC12-MI-WP-01 are as follows:

- a) note the advice in the abstract of SC12-MI-WP-01, that status quo conditions will lead to both stock and CPUE declines and significantly reduced profits over the next 20 years, whereas economic performance was much improved under the effort reduction scenario; and
- b) that maintaining status quo (2013) effort would reduce the spawning biomass to 32% $SB_{F=0}$, with a relatively high risk of breaching the LRP, and CPUE would be reduced by a further 14% over the projection period.

8. In summary, SC12 reviewed information related to the biological and economic consequences of alternative catch trajectories to achieve a candidate south Pacific albacore target reference point (SC12-MI-WP-01) and provided a number of suggestions to clarify aspects of the paper before a revised version is forwarded to WCPFC13.

- a) SC12 recommends that WCPFC13 note the biological and economic consequences of the various trajectory options modelled in this paper in making a decision on an appropriate target reference point for south Pacific albacore.
- b) In particular, SC12 draws the attention of WCPFC13 to the importance of assumptions on key bycatch species catch levels for economic estimates; and the need to include additional economic losses due to the exit of vessels from the fishery.

Bigeye tuna

9. The Commission is scheduled to agree timeframes to rebuild bigeye to the LRP, and SC has been requested to provide advice on determining a biologically reasonable timeframe for rebuilding bigeye tuna to [or above] its LRP.

10. SC12-MI-WP-02 (*Biologically reasonable rebuilding timeframes for bigeye tuna*) was presented.

11. SC12 reviewed information related to biologically reasonable rebuilding timeframes for bigeye tuna (SC12-MI-WP-02) and provided a number of suggestions to clarify aspects of the paper before a revised version is forwarded to WCPFC13.

- a) SC12 recommends that WCPFC13 note the various options modelled in this paper in making a decision on an appropriate rebuilding timeframe for bigeye tuna.

- b) In particular, SC12 draws the attention of WCPFC13 to i) the estimated bigeye generation time of 4 years, and minimum rebuilding time in the absence of fishing of 2-4 years, ii) that consideration of acceptable risk for the bigeye stock falling below the limit reference point will influence the findings, and iii) it will be important to examine not only the timeframe but also the stock trajectory of rebuilding.

Implications of alternative levels of acceptable risk (SC12 Paras 554-570)

12. The Commission is scheduled in 2016 to agree the levels of risk for the four key tuna species in 2016 (south Pacific albacore, skipjack, yellowfin and bigeye tuna). No specific advice has been requested by the Commission, but SC12 may review information (including a summary of previous work and the requirements of the ongoing MSE work) and provide comments and/or recommendations for the consideration of the Commission.

13. SC12-MI-WP-03 (*Proposal for adopting interim acceptable levels of risk for breaching limit reference points of four key tuna species in the WCPO*) was presented.

14. SC12 reviewed a proposal for adopting interim acceptable levels of risk for breaching limit reference points in the WCPO (SC12-MI-WP-03) and provided a number of suggestions to clarify aspects of the rationale within the paper before a revised version is forwarded to WCPFC13.

- a) Noting that WCPFC13 is scheduled to agree levels of risk for the four key tuna species, SC12 recommended that WCPFC13 take into consideration the rationale outlined in this paper for identifying acceptable levels of risk and again notes that the UN Fish Stocks Agreement states that the risk of exceeding LRPs should be very low.
- b) SC12 also recommends that adopted risk levels be seen as interim and be reviewed in light of the outcomes of the MSE work-plan.
- c) SC12 recommended that WCPFC13 notes that levels of risk for breaching LRP should be considered coupled with the corresponding conservative or liberal nature of the LRP. For example, the bigeye tuna LRP (20% of unfished spawning biomass) is very close to the depletion expected to occur (0.21) if the fishery attained the spawning biomass at MSY. Therefore the bigeye tuna LRP is viewed as conservative and could have associated higher levels of risk for breaching the LRP.

Performance indicators and monitoring strategy (SC12 Paras 571-580)

15. The Commission has tasked SC12 with providing advice on a range of performance indicators to evaluate the performance of HCRs, together with monitoring strategies to assess performance against reference points, for both South Pacific albacore and skipjack.

16. SC12-MI-WP-04 (*Performance statistics and monitoring strategies for skipjack and South Pacific albacore commensurate with candidate management objectives for the Tropical Purse Seine and Southern Longline Fisheries*) was presented.

- a) SC12-MI-WP04 identifies potential performance statistics and monitoring strategies based on the information presented in WCPFC10-2013-15b but additionally takes into account recent experience of analyses to evaluate candidate HCRs for skipjack (SC12-MI-WP-06: *Evaluation of candidate harvest control rules for the tropical skipjack purse seine fishery*) and recent discussions on an MSE framework for WCPFC (SC12-MI-WP-05: *Report of the Expert Consultation Workshop on Management Strategy Evaluation*).
- b) SC12 noted that the ultimate choice of performance statistics and monitoring strategies will be dependent on the decisions of managers on their objectives for the fishery.

17. SC12 reviewed candidate performance indicators and monitoring strategies for skipjack and South Pacific albacore commensurate with candidate management objectives for the tropical purse seine and southern longline fisheries (SC12-MI-WP-04) and provided a number of suggestions to clarify aspects of the paper and expand on the list of performance indicators before a revised version is forwarded to WCPFC13.

- a) SC12 recommends that WCPFC13 note the candidate performance indicators and monitoring strategies listed in this paper, and noting that the number of key performance indicators should be kept to a tractable level, provide advice on what performance indicators and monitoring strategies should be included for the development of harvest strategies under CMM 2014-06.

Harvest control rules and management strategy evaluation (SC12 Paras 581-598)

18. The development of HCRs and management strategy evaluation frameworks for South Pacific albacore and skipjack is scheduled to commence in 2016 and continue through until 2018. SC12 had been requested to review progress and information on the development of HCRs and MSE and if necessary make recommendations for the consideration of the Commission.

19. SC12 reviewed the report of the expert consultation held at SPC in June 2016 on the development of a management strategy evaluation framework for WCPFC tuna stocks (SC12-MI-WP-05). SC12 endorsed the scope of the work to be undertaken as outlined in this report and recommended that i) while a model-based management strategy may be appropriate for skipjack, the concern of the workshop was on the future availability of abundance indices and tagging data for skipjack and WCPFC13 should consider how these necessary data can continue to be provided to support the assessment and MSE, and ii) that both empirical and model-based management strategies could be tested for South Pacific albacore but that CPUE based methods may be dependent on access to operational longline logbook data.

20. SC12 also recommended that WCPFC13 support the recommendation of the MSE workshop for the continued involvement of experts to provide technical advice on the MSE work as well as a process for ongoing science and management dialogue to facilitate stakeholder involvement in the development of harvest strategies. The SC12 considers both of these additional processes are essential for completion of the harvest strategies work-plan under CMM 2014-06, with separate consideration required for each of the species included in this work-plan. SC12 recommends that expert technical advice to the Scientific Service Provider be facilitated via informal meetings and/or workshops similar to the arrangements for the annual Pre-Assessment Workshop. With respect to science and management dialogue, SC12 recommended that stakeholder involvement should be undertaken via in-country stakeholder engagement with the Scientific Service Provider together with a higher-level meeting or workshop for broader stakeholder engagement (to be held as needed) to finalise input to the MSE analyses (e.g. performance indicators and harvest control rules) as well as subsequent refinements and feedback based on preliminary and ongoing results. WCPFC13 is encouraged to explore mechanisms and options for facilitating and funding these arrangements.

21. SC12 reviewed an evaluation of candidate harvest control rules for the tropical skipjack purse seine fishery (SC12-MI-WP-06). SC12 recommends that WCPFC13 note i) the utility of the approach taken for evaluating harvest control rules, ii) the associated need to develop appropriate performance indicators to adequately track effort creep in this and other fisheries in the WCPO, and iii) the need to identify an appropriate time-frame for evaluating the effectiveness of a harvest control rule.

22. SC12 was informed about the work undertaken by the Northern Committee and the ISC on the development of harvest control rules and Management Strategy Evaluation for Pacific bluefin and North Pacific albacore stocks (SC12-MI-WP-07: *2nd ISC Management Strategy Evaluation Workshop: ALBWG*

Chairman's Report on Outcomes for North Pacific Albacore). SC12 recommends that WCPFC13 note these developments and consider the need to facilitate discussion on Management Strategy Evaluation between those groups undertaking such work within the WCPO (i.e. the Scientific Service Provider and ISC) and across all t-RFMOs.

Candidate skipjack tuna harvest control rules (SC12 Paras 599-605)

23. SC12-MI-WP-06 (*An evaluation of candidate HCRs for the tropical skipjack purse seine fishery*) was presented.

- a) This paper outlined the four candidate HCRs that apply only to effort of fisheries within regions 2, 3, and 5 of the skipjack stock assessment and did not apply to archipelagic waters.
- b) Two information papers were also noted related to this agenda item: SC12-MI-IP-01 (*Preliminary evaluation of catch-based HCRs for South Pacific albacore tuna*) and SC12-MI-IP-04 (*Approaches used to undertake management projections of WCPO tuna stocks based upon MULTIFAN-CL stock assessments*).

Agreed 2016 work plan for the adoption of harvest strategies under CMM 2014-06

	South Pacific Albacore	Skipjack	Bigeye	Yellowfin
2016	<p><u>Scientific Committee</u></p> <ul style="list-style-type: none"> • SC provide advice on implications of a range of Target Reference Points for south Pacific albacore. • SC provide advice on a monitoring strategy to assess performance against reference points. • SC provide advice on a range of performance indicators to evaluate performance of harvest control rules. <p><u>Commission</u></p> <ul style="list-style-type: none"> • Commission record management objectives for south Pacific albacore noting advice provided by the SC on a range of target reference points. • Commission agree to acceptable levels of risk for breaching Limit Reference Point for south Pacific albacore. • Commission agree a Target Reference Point for south Pacific albacore. • Commission agree to a monitoring strategy to assess performance against reference points. • Commission agree performance indicators to evaluate harvest control rules • Management strategy evaluation 	<p><u>Scientific Committee</u></p> <ul style="list-style-type: none"> • SC provide advice on a monitoring strategy to assess performance against reference points. • SC provide advice on a range of performance indicators to evaluate performance of harvest control rules. <p><u>Commission</u></p> <ul style="list-style-type: none"> • Commission record management objectives for skipjack noting advice provided by the SC on a range of target reference points. • Commission agree to acceptable levels of risk for breaching Limit Reference Point for skipjack. • Commission agree to a monitoring strategy to assess performance against reference points. • Commission agree performance indicators to evaluate harvest control rules • Management strategy evaluation 	<p><u>Scientific Committee</u></p> <ul style="list-style-type: none"> • Commission task SC to determine a biologically reasonable timeframe for rebuilding bigeye tuna to [or above] its limit reference point. <p><u>Commission</u></p> <ul style="list-style-type: none"> • Commission agree timeframes to rebuild stock to LRP • Commission agree acceptable levels of risk for breaching Limit Reference Point for bigeye tuna. • Commission record management objectives for bigeye and ask SC for advice on a range of target reference points. 	<p><u>Commission</u></p> <ul style="list-style-type: none"> • Commission agree to acceptable levels of risk for breaching Limit Reference Point for yellowfin tuna. • Commission record management objectives for yellowfin and ask SC for advice on a range of target reference points.