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2nd ISC Management Strategy Evaluation Workshop
ALBWG Chairman's Report on Outcomes for North Pacific Albacore

WCPFC-SC12-2016/ MI-WP-07

ISC[1]

[1] International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean

ATTACHMENT 5

2nd ISC Management Strategy Evaluation Workshop

May 24-25, 2016

ALBWG Chairman's Report on Outcomes for North Pacific Albacore

To ensure adoption of effective fishery management measures, Tuna RFMOs have been working towards developing and implementing a management strategy evaluation (MSE) process. This process provides decision makers with information to assess consequences of a range of management strategies given stated fishery objectives, exposing the underlying trade-offs between the various management objectives.

At the 15th Meeting of the International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean (ISC), members endorsed a plan developed by the Albacore Working Group (ALBWG) to implement MSE. As a first step in implementing this plan, and with endorsement from the Western Central Pacific Fisheries Commission-Northern Committee, the ALBWG was tasked with leading the development of management objectives, performance indicators, harvest control rules, and management procedures. An MSE Workshop was convened in May 2016 to develop management objectives and performance indicators for those objectives based on input from managers, stakeholders and scientists. The purpose of this report is to document proposed objectives and performance criteria that can be used in initial MSE evaluations by the ALBWG. This report also documents several concerns raised by participants that will require further engagement (meetings) between managers, stakeholders, and scientists. It is anticipated that this is the first of many such meetings and reports. The agenda for this meeting is shown in Table 1.

Approximately 24 people (Table 2) participated in the 2nd MSE workshop. John Holmes, the ALBWG Chair, led the process and reviewed the purpose, process and roles of participants in the MSE process as well as the objectives of the workshop. He emphasized that management objectives for a stock are statements about things that matter to managers and stakeholders such as conservation and harvesting. He also noted that the objectives developed at this workshop represent an initial set for use by the ALBWG in the MSE process; the NC and stakeholders are not committed to these objectives because it is expected that there will be modifications to the set based on information from the initial evaluations.

Management Objectives

Management strategy evaluation is a structured process of exploring the performance of management strategies (a set of rules that use pre-specified data and analysis to provide recommendations for management actions) relative to defined management objectives and sources of uncertainty (in monitoring, assessment, decision-making, and management action). The overall goal of MSE is to provide decision-makers and stakeholders with the information on which to base rational management decisions, given their objectives, preferences, and attitudes to risk. This information addresses two fundamental questions:

1. Do our management decisions perform the way we expect?
2. How can we develop management strategies that are robust to uncertainty?

MSE is not an optimisation procedure: it uses multiple candidate models (states of nature) to evaluate consequences of alternate management strategies across the models using simulation rather than finding the best available strategy for a given model.

Management objectives are a key component of the MSE process. Management objectives are statements describing things that are important to decision-makers and stakeholders (e.g., ecological, socio-economic, cultural aspects) and expected achievements for a stock/fishery. Objectives are important because they guide the development of specific benchmarks used to evaluate the performance of management strategies. The objectives need to be translated into measurable quantities (performance indicators) that can be computed. A set of management objectives for MSE typically consists of 5-10 statements (objectives) that capture important aspects of the stock/fisheries, that are understandable and concise, and that are sensitive in distinguishing among alternative management strategies.

Five objectives were proposed for the initial MSE by workshop participants (Table 3) after reviewing preliminary input received from NC member countries in at WCPFC12 in December 2015. The ALBWG proposed the sixth objective in Table 3 to facilitate evaluations of target reference points as requested by the NC.

Several objectives relate to maintaining catches or harvest ratios by fishery. Fishery in this context means country-gear combinations rather than the fisheries defined for the stock assessment model, which are based on country, gear, fish size composition in catches, and other criteria. Workshop participants also requested definitions of small-scale, artisanal, and subsistence fisheries. The FAO notes that "… Small-scale fisheries, often also referred to as artisanal fisheries, are difficult to define unambiguously, as the term tends to apply to different circumstances in different countries. In general, they are traditional fisheries involving fishing households (as opposed to commercial companies), using relatively small amounts of capital and energy, relatively small fishing vessels (if any), making short fishing trips close to shore, mainly for local consumption ". The ALBWG noted that subsistence fisheries usually fish for consumption purposes whereas artisanal fisheries are commercial operations. This usage is consistent with the Wikipedia definition (from Wikipedia, accessed 26 May 2016:

> *Artisanal fishing (or traditional fishing) are various small-scale, low-technology, low-capital, fishing practices undertaken by individual fishing households (as opposed to commercial companies). Many of these households are of coastal or island ethnic groups. These households make short (rarely overnight) fishing trips close to the shore. Their produce is usually not processed and is mainly for local consumption. Artisan fishing uses traditional fishing techniques such as rod and tackle, fishing arrows and harpoons, cast nets, and small (if any) traditional fishing boats.*

Operational Objectives

Converting the management objective statements in Table 3 into measurable quantities, i.e., operational objectives, requires three pieces of information:

1. target or threshold value or benchmark for a variable of interest (e.g., abundance, inter-annual variation in catch, etc.);
2. a time horizon for measurement (e.g., 2-3 generations for abundance, 5-10 years for catch or catch variability); and
3. an acceptable probability of either achieving the target or avoiding a threshold (e.g., 50% chance of being above a target, 5% chance below a threshold).

MSE Workshop participants were asked to provide information to operationalize the objectives, specifically the target or threshold level of interest, acceptable risk, and the period of measurement to be used to evaluate performance. While the quantities of interest as well as the related benchmarks (thresholds or targets) were readily apparent, there was difficulty with the concept of risk and how it would be operationalized as acceptable risk in an MSE process. Further work will be

needed to communicate these ideas in an appropriate way to managers and stakeholders. The workshop participants requested that the ALBWG develop a list of common language and levels for acceptable risk, which is shown in Table 4.

WCPFC CMM 2014-06 (Annex 1) contains the following additional information on acceptable levels of risk:

> *"The Commission shall define acceptable levels of risk associated with breaching limit reference points, and if appropriate, with deviating from target reference points, taking into account advice from the Scientific Committee and , where appropriate, other subsidiary bodies. In accordance with Article 6(1)(a) of the Convention, the Commission shall ensure that the risk of exceeding limit reference points is very low. Unless the Commission decides otherwise, target reference points shall be conservative and separated from limit reference points with an appropriate buffer, with a view to ensuring that the target reference points are not so close to the limit reference points that the chance that the limits are exceeded is greater than the agreed level of risk."*

Debate on the period of measurement ranged from 5 to 30 or more years. A 30-year period was suggested because it corresponds to approximately two generations of north Pacific albacore. A long time frame is required to test the robustness of candidate harvest control rule to uncertainty. A longer time frame is more likely to capture rare events and is particularly important if robustness to events such as regime shifts is of interest in management strategies. Shorter time frames risk not fully characterizing system uncertainty. Note that these time frames do not represent predictions of future behavior of the stock. These simulations are not projections of the future as is done in a stock assessment, they are used to characterize the variability of the system on average while subject to a management strategy every year; consequently a longer simulation period is better.

Performance Indicators

MSE Workshop participants requested that the ALBWG propose performance indicators for each proposed objective in Table 3. The ALBWG proposals on performance indicators and examples of the output that would be provided to evaluate performance are shown in Table 3. It should be noted that most of the proposed performance indicators are configured so that higher estimated values mean better performance and lower estimated values are interpreted as poorer performance, i.e., they have consistent directionality to reduce confusion in interpreting results. Exceptions to this rule are the first performance indicator for Objective 5 on management stability (%change due to harvest control rule between years) and the performance indicator for Objective 6 on target levels (Ftarget/Fcurrent). The %change indicator has no directionality while the target level indicator is configured so that ratios > 1 in at least 50% of years are consistent with better performance while ratios < 1 are indicative of overfishing.

Conclusion

MSE workshop participants recommend these objectives for initial MSE evaluations, noting their expectation that the results will be communicated to them at a future date and revisions to this set of objectives are likely as the process proceeds.

The ALBWG recommends the proposed performance indicators (Table 3) and acceptable risk language (Table 4) for the initial evaluations of the future MSE, but notes that this package is subject to future expert input from the MSE Scientist to be engaged in this process.

Literature Cited

Conrow, E. H. (2003) Effective Risk Management: Some Keys to Success. 2nd edition. American Institute of Aeronautics and Astronautics, Reston VA, USA.

Table 1. Agenda for 2nd ISC Management Strategy Evaluation meeting.

ISC Management Strategy Evaluation Workshop

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

Yokohama, Japan

May 24-25, 2016

May 24, 2016（9:45 am – 5:00 pm）

Registration (9:45-10:15) – Coffee Service

1. Welcome-Japan
2. Opening Remarks – DiNardo/Holmes
3. Workshop Goals & Objectives – Holmes
4. MSE Review
   a. MSE – Structure, process; The importance of objectives (60 Minutes)

Lunch 12:00-1:30

   b. North Pacific Albacore objectives – review NC management framework, member country input from Dec 2015
   c. Identify preliminary set of working management objectives and performance metrics - discussion

Break 3:15-3:30 coffee service

5. Preliminary set of working objectives – discussion continued
6. Develop list of objectives and performance metrics for overnight consideration

Adjourn for the Day

May 25, 2015（9:00 am – 12:00 pm）

7. Review Agenda and Status from Day 1
8. Discussion & Resolution of Issues with Objectives
9. Develop Consensus on Preliminary Objectives and Performance Metrics
   - Key conclusions
   - Uncertainties
   - Advice to Inform MSE process
10. Closing Remarks

Adjourn Workshop

Table 2. List of Participants at the 2nd MSE Workshop, 24-25 May 2016, Queens Forum, Yokohama, Japan.

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Table 3. Proposed Management Objectives for the North Pacific Albacore stock, May 2016.

Objective[A]	**Quantity**	**Proposed Performance Indicators[B, C]**	**Example Output[B]**
1. Maintain spawning biomass above the limit reference point	• $20\%SSB_{0\ F=0}$ • 14%SSB0 F=0 (calculated as (1-M)*SSB20%) • $SSB_{0.5R0}$, where h = 0.75 (IATTC SAC)	• SSBcurrent/LRP	• % of runs in which ratio ≥1 for 29/30, 27/30, 24/30; • each run = 30 yrs in length with n replicate runs;
2. Maintain the total biomass, with reasonable variability (x%), around the average depletion level in the recent 10 years of the latest stock assessment	• Total biomass is estimated as average depletion level for final 10 years (2006-2015) in the 2017 stock assessment • Variability in depletion is estimated from the historical period (1966-2015)	• Median depletion current year /Depletion(10 yr avg) • Historical CV (1966-2014)/Current depletion CV (over 30 years)	• % of median and CV ratios ≥1 for x runs; Each run = 30 year length
3. Maintain harvest ratios by fishery (fraction of the SSB harvested) at current average	• Current average ratio last 10 years (2006-2015) in 2017 stock assessment • Reasonable variability is CV estimated from fishing intensity plot (late 1990s-present)	• Median current harvest ratio (1-SPR)i/Average 1-SPR (10 years)i, where i = fishery • Historical CV/current CV (over 30 years)	• % of median and CV ratios ≥1 for x runs; Each run = 30 year length
4. Maintain catches by fishery above average historical catch	• Average catch by fishery, 1981-2010 (30 year average corresponding to the current normal period).	• Current total catch/average historical catch • Current median catch/historical median (by fishery) • Historical CV of catch/Current CV of catch (by fishery)	• % of runs in which ratio ≥1 for 29/30, 27/30, 22/30, 15/30; each run = 30 yrs in length with n replicate runs;
5. Limit the magnitude of change to effort or catch to < 15% at any one time due to management actions by fishery		• % change due to HCR between years • % years change due to HCR < 15% within a run	• Median ± 5 and 95% percentiles of maximum % change due to HCR for all years over all runs

			• Median ± 5, 25, 50, 75 and 95% percentiles of % years change due to HCR < 15% over all runs
6. Maintain F at the target value with reasonable variability*** **Proposed by the ALBWG to facilitate performance evaluation of target reference points in the MSE as requested by NC12.	• Various potential target values previously suggested by NC • Will include variability around the target value, estimated from historical data.	• Ftarget/Fcurrent	• % of runs in which ratio ≥1 for 15/30 years or more; each run = 30 yrs in length with n replicate runs; • precautionary bias to prevent overfishing; need a range of variability around the target to be more accurate.
The objectives shown below were suggested as ideas requiring further work to implement. They are shown here as an indication of future direction.			
I. Maximize economic returns of existing fisheries II. Maintain interests of artisanal, subsistence and small-scale fishers, including limiting the regulatory impact on these fisheries			
NOTES A - Objectives 1-5 are proposed by the 2nd MSE Workshop participants, May24-25, 2016. Objective 6 is proposed by the Albacore WG for operational reasons. B - Performance indicators and example output proposed by the Albacore Working Group C - Performance indicators are configured so that higher estimated values mean better performance and lower estimated values means poorer performance, i.e., they have consistent directionality to reduce confusion in interpreting results. The exception to this practice is the first indicator (% change due to HCR between years) for objective 5 for which there is no directionality.			

Table 4. Common language and values for acceptable risk categories in a management strategy evaluation proposed by the Albacore Working Group. Terms and values are modifications of a scheme proposed by Conrow (2003).

Term	Median	Quantiles
Almost Certain	95	90-<100
Highly Likely	85	80-90
Likely	75	70-80
Better than Even	65	60-70
Even	50	40-60
Less than Even	35	30-40
Unlikely	25	20-30
Highly Unlikely	15	10-20
Almost Never	5	>0-10