COMMISSION
FOURTEENTH REGULAR SESSION
Manila, Philippines
3-7 December 2017

Performance Indicators and Monitoring Strategies for Bigeye and Yellowfin Tuna Compatible with Candidate Management Objectives for the Tropical Longline Fishery

WCPFC14-2017-DP30
06 December 2017

Submitted by USA

Abstract

In accordance with the timetable for the development of a harvest strategy approach for WCPFC stocks and fisheries (WCPFC-13 Summary Report Attachment N), and consistent with the approach used by the Small Working Group on Management Objectives at WCPFC13, SC13 reviewed candidate performance indicators and monitoring strategies for bigeye and yellowfin tuna commensurate with candidate management objectives for the Tropical Longline Fishery (WCPFC-SC13-2017/MI-WP-03). Following modifications based upon input from the SC13 ISG8, SC13 requested that a revised version of that paper be forwarded to WCPFC14.

We therefore present here an updated list of proposed performance indicators based on the candidate management objectives for the tropical longline fishery provided in the MOW2 report (WCPFC10-2013-15b) and the considerations of the WCPFC13 and SC13 small working groups. These candidate management objectives and their associated performance indicators provide the necessary initial guidance for development of the MSE framework which will allow the Commission to assess the performance of candidate harvest control rules and to objectively consider the resulting trade-offs between objectives.

In reviewing the paper SC13 noted that while the number of key performance indicators should be kept to a tractable level as they will influence the Management Strategy Evaluation (MSE) modelling framework currently being developed, they should also be sufficient to monitor the key long-term management objectives for the fishery. It was also noted that the list of indicators and monitoring strategies can be reviewed throughout the current MSE work.

We invite WCPFC14 to:

- note the candidate performance indicators and monitoring strategies for the tropical longline fishery, and
- provide advice on what performance indicators and monitoring strategies should be included for this fishery, for the development of harvest strategies under CMM 2014-06.

Introduction

In accordance with the timetable for the development of a harvest strategy approach for WCPFC stocks and fisheries (WCPFC-13 Summary Report Attachment N), and consistent with the approach used by the Small Working Group on Management Objectives at WCPFC13, SC13 reviewed candidate performance indicators and monitoring strategies for bigeye and yellowfin tuna commensurate with candidate management objectives for the Tropical Longline Fishery (WCPFC-SC13-2017/MI-WP-03). Following modifications based upon input from SC13 (SC13 final report Attachment F – Report of ISG8 Performance Indicators and Monitoring Strategies), SC13 requested that a revised version of the paper be forwarded to WCPFC14.

We therefore present here an updated list of proposed performance indicators based on the candidate management objectives for the tropical longline fishery provided in the MOW2 report (WCPFC10-2013-15b) based upon the approach used by the small working group at WCPFC13, and incorporating the resulting considerations by IWG8 at SC13. These candidate management objectives and their associated performance indicators provide the necessary initial guidance for development of the MSE framework which will allow the Commission to assess the performance of candidate harvest control rules and to objectively consider the resulting trade-offs between objectives.

Throughout this paper we use the following definitions for performance indicators and the monitoring strategy:

Performance indicators are used to measure how well a specific harvest strategy achieves some or all of the general objectives for management. They are interpreted in relation to defined limit or target reference points, or to management objectives. Reference points may not be available for all management objectives since often you want to maximise something relative to some other objective (e.g. maximise profit while ensuring a low risk of stock collapse) rather than achieve a specific value.

The **monitoring strategy** tracks the actual performance of the selected management procedure, once it has been implemented, to see if it is performing as expected and that the actual outcomes are within the range of values predicted by the MSE. For example if a management strategy was designed to maintain catch rates at a specific level, it would be necessary to monitor that actual catch rates are indeed maintained around the desired level once the strategy was implemented.

We therefore make an important distinction between performance indicators, which are used to evaluate how well a candidate management procedure is expected to perform and which enable the selection of a preferred option from a range of candidate procedures; and a monitoring strategy which tracks the actual performance of the selected management procedure, once it has been implemented, to see if it is performing as expected.

WCPO Tropical Longline fisheries

We define the tropical longline fishery as that primarily targeting bigeye and yellowfin tuna. Williams and Terawasi (2016) identified seven broad categories of longline fishery that are currently active in the WCPO. The categorisation was based on type of operation, area fished and target species. For the purpose of this paper we are specifically concerned with the following three fishery groupings.

1. **Tropical offshore bigeye/yellowfin-target fishery** includes "offshore" sashimi longliners from Chinese-Taipei, based in Micronesia, Guam, Philippines and Chinese-Taipei, mainland Chinese vessels based in Micronesia, and domestic fleets based in Indonesia, Micronesian countries, Philippines, PNG, Hawaii and Vietnam, for example.
2. **Tropical distant-water bigeye/yellowfin-target fishery** comprises primarily "distant-water" vessels from Japan, Korea, Chinese-Taipei, mainland China and Vanuatu. These vessels primarily operate in the eastern tropical waters of the WCP–CA (and into the EPO), targeting bigeye and yellowfin tuna for the frozen sashimi market.
3. **Longline fisheries in the sub-tropical and temperate WCP–CA** comprise vessels targeting different species within the same fleet depending on market, season and/or area. These fleets include the domestic fishery of Australia, Japan, New Zealand and distant water fleets including EU/Spanish vessels targeting swordfish.

We note that bigeye and yellowfin tuna are also caught in purse seine fisheries (less than 20% of the total purse seine catch in 2015; Williams and Terawasi, 2016). Management action applied to the purse seine fishery in relation to skipjack may have implications for the performance of management procedures for yellowfin and bigeye, and vice versa.

Candidate performance indicators and monitoring strategies

We present here a list of potential performance indicators and monitoring strategies for the tropical longline fishery (Table 1). Where objectives for this fishery/stock were identical to those of skipjack, the corresponding performance indicators agreed by WCPFC13 were used. In reviewing the working paper supplied to SC13, the ISW-8 noted the following:

1. Due to the finer-scale data requirements of some performance indicators (e.g. catch at the level of individual CCMs), and/or a dependency on information which will not currently be modelled within the MSE operating model (e.g. multi-species interactions for ecosystem effects), ISW-8 recognised that some performance indicators will not be included in the outputs of the Harvest Strategy Work Plan (at least in the short-term). Nevertheless, it may be possible to monitor these objectives independently of the outputs of the MSE operating model (e.g. using data collected by individual CCMs), as part of the monitoring strategy.

2. While it may not be possible to evaluate all performance indicators in the short-term (especially via the outcomes of the MSE operating model), the Commission should nevertheless not lose sight of the monitoring strategies required to support the management framework to achieve the Commission's longer term management objectives. The collection of the necessary data is an important consideration in this respect. WCPFC-SC13-2017/MI-IP-01 provides a high level evaluation of current WCPO data collection processes to assess the availability of data to support monitoring strategies.

3. In the short-term it was seen as best practice to support a broad range of performance indicators in support of the multiple management objectives already identified by the Commission. However, ISW-8 noted that there will be scope to iteratively refine both the management objectives and related performance indicators and monitoring strategies in light of the outcomes of the current Harvest Strategy Work Plan and the development of the management framework within the WCPFC.

Table 1. Candidate management objectives for the tropical longline fishery and proposed performance indicators and monitoring strategies for bigeye and yellowfin tuna for the purpose of evaluation of HCRs. Final column notes the comments made by the SC13 ISW-8.

Objective Type	**Objective Description**	**Performance Indicators**	**Monitoring Strategy**	**ISW-8 Comment**
Biological	Maintain YFT, BET (and SWO) biomass at or above levels that provide stock sustainability throughout their range.	Probability of SB_{recent} /$SB_{F=0}$> 20% as determined from the MSE.	Probability of $SB_{recent}/SB_{F=0}$> 20% in the long-term as determined from the reference set of MSE operating models (updated and reconditioned periodically, as appropriate).	**Supported:** ISG-8 noted the new definition of 'recent' to now include the last 4 years in the definition. Some discussion as to exactly how this will be calculated, e.g. final year of the model time-frame or over some time period. PNA members requested the inclusion of SKJ.
Economic	Maximise economic yield from the fishery.	Predicted effort relative to E_{MEY} (to take account of multi-species considerations including impacts on PS fisheries; may be calculated at the individual fishery level). B_{MEY} and F_{MEY} may also be considered at a single species level.	Observed effort in the fishery relative to E_{MEY}.	**Supported** ISG8 noted that MEY can be difficult to calculate and will be dependent on availability of economic data. As such, the PI will likely be modelled in a similar manner as the economic indicators described in working paper ST-WP-08
	Minimize impacts from upstream fisheries, including the tropical purse seine fishery	MSY of BET and YFT	Monitoring changes and expected changes in MSY	WCPFC addition
	Maintain acceptable CPUE.	Average deviation of predicted CPUE from reference period levels.	Observed CPUE maintained at or greater than specified levels.	**Supported** ISG-8 noted that CPUE will be modelled by the 'fleet' and region structure included in the MSE operating model.
	Increase fisheries-based development within developing states economies	Amount and proportional contribution of SIDS fleet catch/catch in SIDS waters	Amount and value of product (exported or catches) from SIDS	**Supported** ISG8 noted that implementation of this PI will be dependent on the ability to separate SIDS and non-SIDS fleets in the MSE operating model.
	Optimize fishing effort	E_{MEY} (as for Maximise economic yield) or some other economic measure Effort consistent with specified level.	Annual monitoring through logbooks and VMS	**Supported** ISG-8 noted that effort will be modelled by the 'fleet' and region structure included in the MSE operating model
	Maximise SIDS revenues from	Average value of SIDS/non-SIDS catch	Observed proportion of SIDS-effort/catch	**Supported** ISG8 noted that

	resource rents.		to total effort/catch in SIDS waters from log-sheet or VMS data.	implementation of this PI will be dependent on the ability to separate SIDS and non-SIDS fleets in the MSE operating model.
	Catch stability [Stability and continuity of market supply]	Average annual variation in catch.	Observed variation in catch from log-sheet data	**Supported** ISG-8 again noted that catch will be modelled by the 'fleet' and region structure included in the MSE operating model
	Effort predictability	Effort variation relative to reference period level (may also be calculated at the assessment region level).	Observed effort levels from log-sheet or VMS data	**Supported** Based on effort from the harvest strategy model for the modelled fleets
	Maintain BET, YFT (and ALB &SWO) stock sizes around the TRP (where adopted)	Probability of and deviation from $SB/SB_{F=0}> X$ in the short- medium- long-term as determined from MSE (may also be calculated at the assessment region level).	Current median adult biomass, as determined from the reference set of operating models.	**Supported** ISG-8 noted that this will be a direct outcome of the Harvest Strategy Work Plan
Social	Food security in developing states (import replacement) [affordable protein for coastal communities]	As a proxy: Average proportion of CCMs-catch to total catch for fisheries operating in specific regions.	Ratio of locally marketed fish to imported fish products.	**Supported** ISG8 noted that due to the often fine-spatial scale of these PIs as opposed to the broader scale of fishery impacts being modelled in the MSE operating model that it would be difficult to implement these PIs at the required region scale for some CCMS at this stage.
	Employment opportunities	As a proxy: Average proportion of CCMs-catch to total catch for fisheries operating in specific regions	Numbers employed in fishing and processing sector relative to some target	
	Maintain/develop domestic fishery	Ratio of domestic catch to total catch	Monitoring of fisheries in CCMs	
	Human resource development	As a proxy: Ratio of domestic catch to total catch	Monitoring of fisheries in CCMs	
	Avoid adverse impacts on small scale fishers.		Monitoring of fisheries in CCMs	
Ecosystem	Minimise catch of non-target species.	Expected catch of other species based on observer data	Ratio of target species catch to catch of non-target species from observer program	**Supported** Noted use of proxy bycatch ratio information
	Minimise fishery impact on the ecosystem	Similar to previous PI. As a proxy use the expected catch of other species based on observer data	Ratio of target species catch to catch of non-target species	**Supported** Noted use of proxy bycatch ratio information

References

Cartwright, I., Allen, R. and Ianelli, J. (2013) Report of the expert working group: Management objectives, performance indicators and reference points. WCPFC10-2013-15b.

Scott, R., Pilling, G.M. and Hampton, J. (2017) Performance indicators and monitoring strategies for bigeye and yellowfin tuna compatible with candidate management objectives for the Tropical Longline Fishery WCPFC-SC13-2017/MI-WP-03.

Scott, R., Pilling, G.M., Reid, C., Williams, P., and Smith, N. (2017) Operationalising the monitoring strategies for tropical purse seine and southern longline fisheries: Information requirements and data availability. WCPFC-SC13-2017/MI-IP-01

Williams, P. and Terawasi, P. (2016) Overview of tuna fisheries in the Western and Central Pacific Ocean, including economic conditions – 2015. WCPFC-SC12-2106/GN-WP-01.