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WCPFC Mixed Fishery Approach: Progress and Key Decision Points[1]

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[1] This paper has been submitted at WCPFC22 as WCPFC22-2025-26_Rev01

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WCPFC mixed fishery approach: Progress and key decision points

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Submitted by SPC-OFP[2]

[1] Revisions:

- Figure 2 has been updated to be consistent with the most recent version of the database. Catch statistics for recent years have changed very slightly.

[2] Oceanic Fisheries Programme of the Pacific Community

Executive Summary

This paper outlines the key decisions and areas of guidance required from the Commission in order to progress the development of harvest strategies under the mixed fishery approach with particular respect to yellowfin.

The mixed fishery approach has been designed as a candidate framework to minimise conflict between species-specific management procedures defining fishing levels within WCPO fisheries. A management procedure (MP) for WCPO skipjack was adopted in 2022 and implemented in 2023. Under the Indicative Harvest Strategy Workplan, the Commission is scheduled to adopt an MP for South Pacific albacore in 2025 and to adopt an MP for bigeye tuna in 2025 or, failing that, in 2026.

Under the mixed fishery approach, there will be no specific WCPFC MP for yellowfin. The fisheries that catch yellowfin will be managed through the MPs of bigeye, skipjack, and South Pacific albacore; almost 70% of the yellowfin catch is taken in fisheries that are, or are scheduled to be, subject to management measures under those three stock MPs.

Around 30% of the yellowfin catch is taken in the domestic fisheries of Indonesia and the Philippines, a large component of which has typically been taken from archipelagic waters, and hence outside the control of WCPFC MPs. The recent introduction of a management measure for yellowfin tuna in the archipelagic waters of Indonesia has modified the pattern of fishing behaviour in this region. Catch and effort statistics for these fisheries are still subject to considerable uncertainty and guidance is requested to identify appropriate catch and effort scenarios for this region.

It will be necessary to develop the MSE framework for yellowfin to evaluate likely outcomes for that stock and to assess the probability of achieving defined management objectives. While WCPFC22 is not anticipating identifying candidate yellowfin TRP levels following decisions at WCPFC21, guidance is requested on the settings and scenarios to assume when evaluating outcomes for yellowfin including:

- Consideration of management objectives and the range of performance indicators to be provided and whether additional indicators would help inform management decision making;
- Indication of candidate levels of key indicators (e.g. catches, catch rates) that would be desirable, relative to historical levels;
- Definition of scenarios for future catches of yellowfin tuna in areas outside the control of any WCPFC MP. The SSP proposes developing sensitivity scenarios that capture levels across a range from recent averages to those that exceed historical highs, as well as scenarios based upon the impacts of recent management measures in Indonesia.

As noted in WCPFC22-2025-25, given the agreed deadline for adoption of a BET MP in 2026, and the limited opportunities for manager-level input in the period between Commission meetings, WCPFC22 may also wish to consider mechanisms and opportunities to provide strategic guidance throughout 2026.

Overview

The WCPFC has committed to the development and implementation of harvest strategies for key tuna stocks and fisheries (CMM 2022-03). A skipjack management procedure (MP) was adopted in 2022 and implemented in 2023 (CMM 2022-01). Under the WCPFC Indicative Harvest Strategy Workplan, the Commission is scheduled to adopt an MP for South Pacific albacore in 2025 and to adopt an MP for bigeye tuna in 2025 or, failing that, in 2026. The Commission is scheduled to agree a target reference point (TRP) for yellowfin tuna in 2026.

Under the WCPFC mixed fishery approach, there is no WCPFC MP that explicitly considers the stock status of yellowfin and controls the associated fisheries. Instead, the fisheries that catch yellowfin will primarily be managed through the MPs of bigeye, skipjack, and South Pacific albacore. However, it will still be necessary to evaluate likely outcomes for the yellowfin stock under these combined management measures and to assess the probability of achieving defined yellowfin management objectives.

SC21 reviewed the current state of MSE development for yellowfin and made several recommendations for the technical development of the modelling framework and calculation of performance indicators, which will be further considered at SC22. To support this work, guidance will be needed from the Commission on the settings and scenarios to assume when evaluating outcomes for yellowfin.

Progressing development of harvest strategies through the mixed fishery approach

This section highlights the areas of guidance required from WCPFC22 to progress development of harvest strategies through the WCPFC with particular focus on yellowfin.

Management objectives

Current management objectives for yellowfin tuna are outlined in CMM2023-01. Pending agreement on a target reference point, the spawning biomass depletion ratio ($SB/SB_{F=0}$) is to be maintained at or above the average $SB/SB_{F=0}$ for 2012-2015. Similar objectives are outlined for bigeye, and at WCPFC21 candidate TRPs for bigeye tuna were identified, based around the 2012-2015 bigeye depletion ratio.

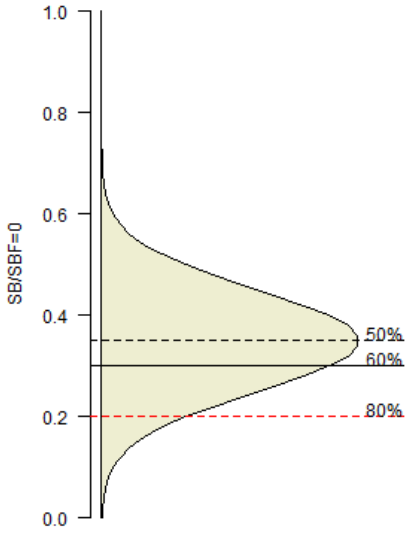
Recent analyses (WCPFC21-2024-31) have shown that the objectives in CMM 2023-01 for bigeye and yellowfin cannot both be met simultaneously. WCPFC21 supported a sequenced approach to the development of TRPs for bigeye and yellowfin whereby the Commission first addresses the TRP for BET and subsequently evaluates its implications for achieving management objectives for yellowfin. If management objectives for bigeye remain around the WCPFC21-defined candidate TRPs, the corresponding biomass depletion levels for yellowfin will be lower than those currently specified in CMM2023-01. In light of this outcome, the Commission will need to consider its management objectives for yellowfin when determining whether the outcomes of the mixed fishery approach result in acceptable performance for the yellowfin tuna stock and fishery. Two areas may be considered by WCPFC22 to guide future analyses:

- Consideration of management objectives and the range of performance indicators to be provided and whether additional indicators would help inform management decision making;
- Indication of candidate levels of key indicators (e.g. catches, catch rates) that would be desirable relative to historical levels.

Risk levels

Candidate TRPs for yellowfin may be specified either as conventional targets, to be achieved on average, or as threshold targets for which associated probabilities of being "at or above" would need to be specified.

For the purpose of developing MPs, the Commission has agreed to determine the acceptability of candidate HCRs [MPs] where the risk of breaching the LRP is 20% or less (WCPFC13 Summary report para 296). Any threshold TRP would therefore need to be set at a level greater than the LRP (20% $SB/SB_{F=0}$) and would, as a minimum, have an associated probability of being above the LRP greater than 80%. Assuming that in order to meet management objectives the threshold TRP was set sufficiently above the LRP for this LRP risk not to be an issue, the acceptable chance that the stock were above that threshold level would need to be defined, noting that a 50% chance of being above the threshold would imply similar behaviour to a conventional TRP.



A threshold TRP set at 35% $SB/SB_{F=0}$, for example, with a 60% chance of being above that level, would in practice maintain the stock, on average, at depletion levels greater than 35% $SB/SB_{F=0}$. The higher the acceptable chance of the stock being above the threshold level, the higher the relative average biomass of the stock that will be achieved on average (see Figure 1).

Figure 1. Stylised example of a threshold TRP (solid line) having a 60% probability of being above a spawning biomass depletion level of 35% $SB/SB_{F=0}$ and a greater than 80% probability of being above the LRP.

Sensitivity scenarios for YFT catches in fisheries not under BET MP control

More than 70% of the yellowfin catch is taken in fisheries that are, or are scheduled to be, subject to management through either the skipjack, bigeye, or South Pacific albacore MPs. Around 30% of the yellowfin catch is taken in the domestic fisheries of Indonesia, the Philippines and Vietnam, a large component of which has typically been taken from archipelagic waters (Table 1). Fisheries in these archipelagic waters are subject to variable fishery dynamics and face challenges in catch reporting, leading to increased uncertainty in future catch levels. The recent introduction of a management measure for yellowfin in the archipelagic waters of Indonesia has resulted in further changes in fishing practices. Uncertainty exists regarding current and future catch and effort levels for this region, in particular in the proportion of catch taken in the small-fish and large-fish handline fishery (Figure 2) and the recent apparent re-distribution of fishing effort out of archipelagic waters. Candidate MPs can be tested against alternative assumptions for these areas to assess their potential impact and determine the robustness of candidate MPs to this area of uncertainty. WCPFC22 may consider defining scenarios for:

- assumed future catches of yellowfin tuna in areas outside the control of any WCPFC MP. The SSP proposes developing sensitivity scenarios that capture levels from recent averages to those that exceed historical highs, and scenarios based upon the impacts of recent management measures in Indonesia.

Table 1. Mean catch proportion (2020-22, by weight) by gear type for the 4 main tuna stocks in the WCPFC-CA (SPA for WCPFC-CA south of the equator only)

	Tropical Longline	Southern Longline	Northern Longline	Pole & Line	Purse Seine	Troll	Other
Skipjack	0.00	0.00	0.00	0.09	0.83	0.00	0.08
South Pacific albacore	0.12	0.81	0.00	0.00	0.00	0.07	0.00
Bigeye	0.27	0.05	0.06	0.01	0.45	0.00	0.15
Yellowfin	0.08	0.02	0.01	0.03	0.55	0.00	0.31

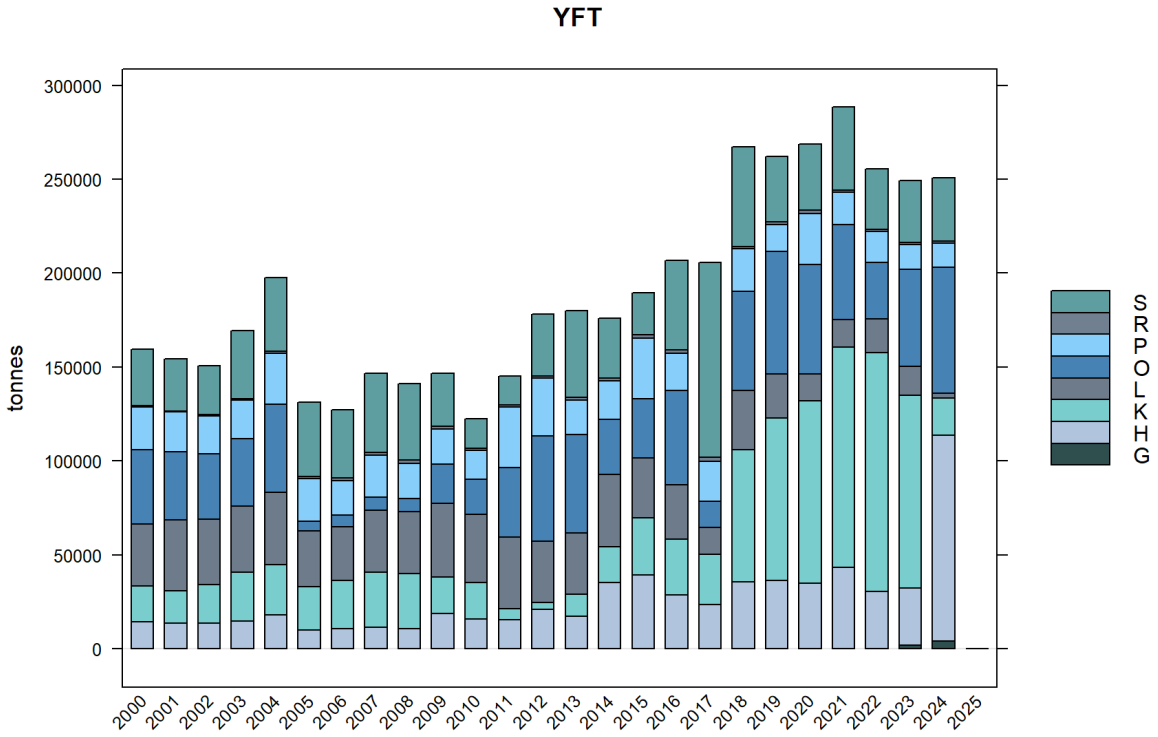


Figure 2. Yellowfin catches by gear type in region 2 of the 2023 stock assessment (S seine, R ringnet, P pole & line, O other, L longline, K small fish handline, H large fish handline, G gillnet).

Further considerations

Discussions at SC21 also covered wider issues on the mixed fishery approach that were not specific to yellowfin tuna.

Exceptional circumstances

SC21 noted a number of considerations for the further development of species-specific MPs under the mixed fishery approach including the question of whether the status of one stock could trigger exceptional circumstances in the MPs for other stocks. Potential exists for fishing levels set by an MP for one stock to exceed levels required to achieve management targets for another. To the extent possible this will be accounted for in the simulation testing of the mixed fishery approach. By testing each MP under scenarios that represent the possible outcomes of other MPs, the potential for such conflicts can be reduced, though not eliminated completely. In addition, there may be events that could trigger exceptional circumstances across more than one MP. For example, significant increases in fishing effort in areas outside the control of WCPFC MPs could have catch implications for several species. Similarly, unforeseen climate events may impact productivity for several stocks. Ultimately, the status of yellowfin may determine the overall success of the mixed fishery approach and by extension the performance of the individual stock MPs. This highlights the importance of effective monitoring for all MPs, and in particular for yellowfin, to identify events that may require further analyses to examine their implications, and hence whether exceptional circumstances need to be triggered.

MP sequence

SC21 also noted that the order of MP application should be considered in the further development of the mixed fishery approach. However, this is unlikely to be an issue once the overall framework is in place. Whilst a sequential approach has been taken for the development and first implementation of stock specific MPs, once all three have been adopted and implemented, and the rolling schedule of MP runs ensues, no one MP will take precedence over another.

Strategic guidance on harvest strategy development

The challenging time scale for the adoption and implementation of management procedures under the WCPFC harvest strategy approach means there are limited opportunities for substantive discussion on key elements and critical guiding input from managers. Whilst the seven-month period between the annual meeting of the Commission and the Scientific Committee allows time for complex and computationally intensive evaluations to be undertaken, it provides no opportunity for input from CCMs until the latter part of the year, and hence limited time for further analyses when additional information to support management decisions might be requested.

As noted in WCPFC22-2025-25, given the agreed deadline for adoption of a BET MP in 2026, the Commission may wish to consider mechanisms and opportunities to provide strategic guidance throughout 2026.

Acknowledgments

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