

# Harvest strategies - the future of tuna fisheries management in the western and central Pacific

Nan Yao,<sup>1</sup> Robert Scott,<sup>2</sup> Finlay Scott<sup>3</sup> and Paul Hamer<sup>4</sup>

*The world's largest tuna fishery is in the western and central Pacific Ocean (WCPO). Four main tuna species – skipjack, albacore, yellowfin and bigeye – are targeted by diverse fleets and fishing methods, contributing to the complexity of managing this immense fishery. For many countries in the WCPO, tuna fisheries are crucial for their economies, livelihoods and culture. However, tuna stocks will only be a dependable and renewable resource if they are managed responsibly. Poor management could lead to overexploitation of tuna stocks in the WCPO, which would have dire consequences for many Pacific Island countries.*

The regional fisheries management organisation with oversight of tuna fisheries management in the region is the Western and Central Pacific Fisheries Commission (WCPFC). WCPFC has been working on building sustainable fisheries for tuna species for several decades. Under the current management framework, stock assessments, conducted by scientists using data collected by member countries through various means (e.g. observer and tagging programmes and fishery logbooks), are used to inform management decisions and measure performance against objectives. Management decisions may include measures such as limits on catches or fishing effort, or time-area closures. This approach has several limitations, however. One of the challenges is that WCPFC's membership comprises a diverse group of stakeholders with different, sometimes competing, objectives. The complex negotiations relating to management actions can become contentious and time consuming. The current management framework can also be reactive, and often focuses on achieving short-term goals at the expense of long-term objectives.

## WCPFC harvest strategy roadmap – driving forward with stakeholders at the wheel

To better manage this multi-billion-dollar fishery and enable small island developing states in the Pacific to retain the benefits from the fisheries that operate in their waters, a long-term strategy is required. In response, in 2014 the WCPFC agreed to a work plan for adopting a “harvest strategy” approach for the four key tuna species (CMM 2014-06).<sup>5</sup> Since then, the Pacific Community (SPC), which is WCPFC's scientific services provider, has been working to support the development of the harvest strategy approach. The work includes development of technical tools and robust science to inform the development of harvest strategies combined with a comprehensive stakeholder engagement programme to ensure that all WCPFC members can actively contribute to developing strategies that will impact their fisheries. It's their fishery after all!

The latest development of the harvest strategy was presented to the 17<sup>th</sup> WCPFC Scientific Committee meeting in August 2021. The framework for skipjack is well advanced and the results of evaluations of a range of candidate management procedures has been presented to stakeholders. The framework for South Pacific albacore is fully operational and has been used to evaluate a number of exploratory management procedures. Preliminary trials of the mixed fishery framework, for a simplified scenario, indicate that the conceptual approach being explored is tractable. The development of the harvest strategy is led by stakeholders.

## What is a harvest strategy and what are its benefits?

A harvest strategy is a framework that specifies the management actions in a fishery for a given species, or group of species (at the stock or management unit level) that are necessary to achieve agreed biological, ecological, economic and/or social management objectives. A central idea is that of “pre-determined” management actions. These actions are agreed on in advance, and specify what action to take given the estimated status of the stock. By determining, in advance, the management actions that should be taken for a given stock status, a harvest strategy reduces the need for negotiations, and leaves more time for focusing on other important aspects of fisheries management. It also means greater stability for industry by ensuring that appropriate management action can be taken without delay. It makes the process of managing the fishery more responsive and predictable, and thus provides all stakeholders with certainty and a clear, long-term vision of a sustainable stock and fishery.

Importantly, the development of the harvest strategy is a stakeholder-led process in which stakeholders are actively involved in all key decisions relating to the design, testing and implementation of the strategy. The harvest strategy approach provides managers with clear guidance to determine the best path forward for the fishery in order

<sup>1</sup> Fisheries Scientist, SPC. Email: [nany@spc.int](mailto:nany@spc.int)

<sup>2</sup> Senior Fisheries Scientist, SPC. Email: [robertsc@spc.int](mailto:robertsc@spc.int)

<sup>3</sup> Senior Fisheries Scientist, SPC. Email: [finlays@spc.int](mailto:finlays@spc.int)

<sup>4</sup> Principal Fisheries Scientist, SPC. Email: [paulh@spc.int](mailto:paulh@spc.int)

<sup>5</sup> <https://www.wcpfc.int/doc/wcpfc17-atf-h/indicative-work-plan-adoption-harvest-strategies-under-cmm-2014-06>

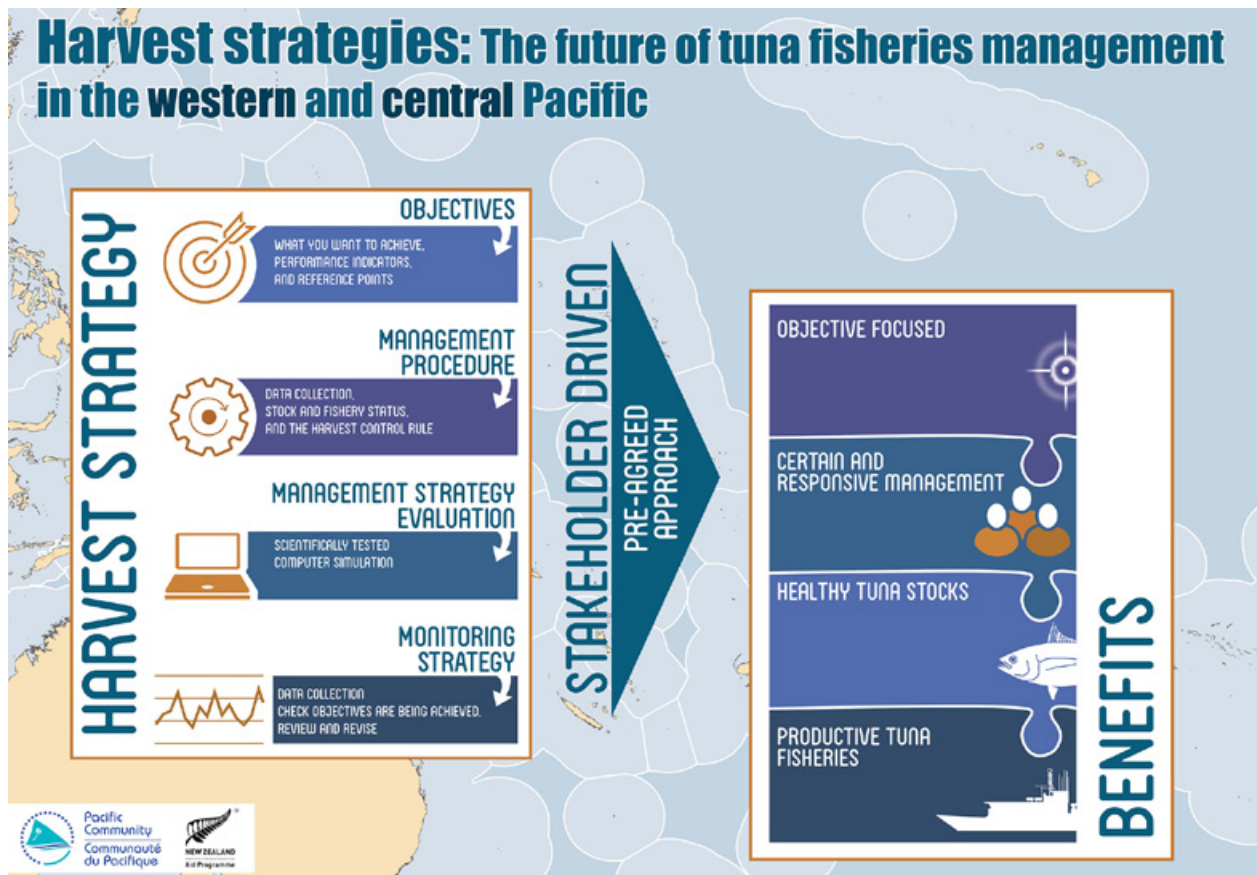


Figure 1. Key components of a harvest strategy and expected benefits. The harvest strategy framework consists of four components: objectives, management procedures, a management strategy evaluation, and a monitoring strategy. All the components of the harvest strategy are agreed upon and work together to ensure a sustainable future for the WCPO's key tuna species.

to meet the objectives. A key step in the development of a harvest strategy is stakeholder capacity building, to ensure that all stakeholders are equipped with the necessary skills to actively participate in the process.

## Developing a harvest strategy for skipjack tuna: an example

The development of a harvest strategy starts with stakeholders identifying management objectives for the fishery. For skipjack, a candidate list of management objectives for the tropical purse-seine fishery was proposed by stakeholders at a dedicated WCPFC workshop.<sup>6</sup> These objectives are high-level and conceptual in nature; for example, “maximise economic yield from the fishery”. The next step involves developing performance indicators for the objectives that describe in more detail how the objectives will be measured. For example, average expected catch may be considered as a useful indicator for maximising the economic yield from the fishery. One of the more challenging elements of the harvest strategy to develop is the management procedure, which pre-determines what management action is recommended under certain stock levels to achieve the objectives. The management procedure includes data collection, the approach that uses the data to estimate the stock status, and a control rule, often re-

ferred to as the harvest control rule. The harvest control rule is often the component of a harvest strategy that receives the most attention by stakeholders as it determines under what stock status should fishing pressure (i.e. catch or effort) be increased or decreased and by how much.

Before selecting and implementing a management procedure, many candidate procedures should be tested to see which is most likely to achieve the agreed-on management objectives. This testing process involves extensive computer simulations of the dynamics of the fisheries system to test the expected future performance of the management procedure in terms of achieving objectives. This integral step is called management strategy evaluation (MSE). MSE also incorporates uncertainties in the estimation of stock status to understand which of the various management procedures will work over a broad range of possible uncertainty. This provides greater confidence that a particular management procedure will perform adequately even when the information on stock status is imperfect.

SPC has developed a decision-making tool for stakeholders to explore and compare the performance of alternative candidate management procedures. This tool is called: performance indicators and management procedures explorer or PIMPLE.<sup>7</sup> Using PIMPLE, stakeholders can explore the possible outcomes from adopting different

<sup>6</sup> WCPFC 13 Summary Report, Attachment M - <https://meetings.wcpfc.int/file/6118/download>

<sup>7</sup> PIMPLE (for skipjack) - <https://ofp-sam.shinyapps.io/pimple/>

management procedures for skipjack tuna and select the ones that have the best chance of meeting their objectives.

Even when stakeholders and WCPFC members have selected and implemented their preferred management procedure, this is not the end of the harvest strategy. While the procedure is operating, a monitoring strategy is required to regularly track the performance of the fishery and compare it to the expected performance of the management procedure as predicted by the MSE. If the procedure is not working as expected, for example if stock abundance becomes too low or even too high, then revisions to the management procedure may need to be made to better optimise it. In other words, it is pre-agreed, but not “set and forget” and it definitely is not set in stone.

## Stakeholder engagement

During harvest strategy development, stakeholders are required to make a range of informed decisions. Therefore, capacity building work is integral to preparing them to drive the process. Since 2018, SPC, along with the Pacific Islands Forum Fisheries Agency, has conducted in-country national harvest strategy workshops in Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Marshall Islands, New Caledonia, Papua New Guinea, Solomon Islands and Tonga. This work has continued but moved online since the introduction of travel restrictions in 2020 (due to COVID-19), with online national workshops having been conducted for Palau, Solomon Islands and Tuvalu. The workshops do not assume any prior specialist knowledge, and provide participants with an introduction to the harvest strategy approach. Interactive activities that use a range of different training tools allow participants to explore the development and performance of management procedures. (See links below for further information.)



Interactive activities at an in-person capacity building workshop in Papua New Guinea. This activity imitates the process of identifying the objectives by stakeholders and furthers participants' understanding of the objectives. Image: Finlay Scott, ©SPC

Developing harvest strategies can appear complex at first. The workshops have been particularly successful at reaching a large number of members and demystifying many of the concepts that are often not as difficult as they seem; so far, across 17 workshops, over 260 people have been involved. Participants have reported significant improvements in their knowledge and understanding of harvest strategies by the end of the training. Feedback from participants also informs the continual efforts to improve the workshops. Ultimately, capacity building efforts will give way to a two-way dialogue between scientists and fishery managers as stakeholders increasingly take command of the development, make key decisions, and implement harvest strategies for the management of their fisheries.

## Find out more

To further enable learning opportunities outside the workshops, SPC has also prepared posters, online learning materials, and videos for stakeholders to dig even deeper into the harvest strategy world! To find out more, contact our team or visit the Slack channel: [tropicaltunamse.slack.com](https://tropicaltunamse.slack.com)

## Useful links:

- Introduction to Harvest Control Rules (<https://ofp-sam.shinyapps.io/amped-intro-hcr/>)
- Introduction to Performance Indicators (<https://ofp-sam.shinyapps.io/amped-intro-indicators/>)
- Comparing Performance of Management Procedures (<https://ofp-sam.shinyapps.io/ampedcomparing-performance/>)
- PIMPLE (for skipjack) (<https://ofp-sam.shinyapps.io/pimple/>)
- SPAMPLE (for South Pacific albacore) (<https://ofp-sam.shinyapps.io/spample/>)

## Further reading

WCPFC. 2014. Conservation and management measures to develop and implement a harvest strategy approach for key fisheries and stocks in the WCPO. CMM 2014-16. Available at: <https://www.wcpfc.int/doc/cmm-2014-06/conservation-and-management-measures-develop-and-implement-harvest-strategy-approach>

Scott R., Scott F., Yao N., Hamer P., Pilling G. and Hampton J. 2021. Recent progress in the technical development of harvest strategies for WCPFC stocks and fisheries. SC17-MI-WP-03. Available at: <https://meetings.wcpfc.int/node/12580>