Pacific saury in a market

Photo: Raiana McKinney

Restoring Pacific saury to a predictable and productive fishery

Modernizing management through adoption of a harvest control rule followed by a management procedure will put the stock back on a path to prosperity.

PACIFIC SAURY IS A SMALL, SHORT-LIVED FISH that plays a big role in the North Pacific Ocean. While being a culturally significant autumnal food fish in some areas of the region and the target of commercially important fisheries, it plays an indispensable role in the North Pacific ecosystem as a key forage species for larger predators, notably some tunas, salmon, sharks, marine mammals and seabirds.

Members of the North Pacific Fisheries Commission (NPFC) are focused on improving the status of Pacific saury, a stock that is heavily overfished and has experienced overfishing for much of a decade, though overfishing may no longer be occurring. Adopting proactive, science-based management via an interim harvest control rule (HCR), followed by a full

management procedure (MP), provides the best possible chance to recover Pacific saury and put it on the path to long-term sustainability.

Where adopted elsewhere, these pre-agreed, carefully tested approaches have generated positive results. Depleted stocks have been rebuilt, while allowing catches to increase. Industry has seen greater predictability and stability in fish production. And managers have been able to choose strategies that are predicted to perform well against potential changes in the population, fishery, and environment.

"Our mandate is to develop an interim HCR to meet a 2024 deadline using a simple MSE framework. However, population dynamics of Pacific saury are difficult to predict, even for short timeframes, which means that the fully specified MP developed in the next round should be not only proactive, as all MPs are, but also reactive to rapid and unpredictable changes."

Dr. Toshihide Kitakado,
Professor, Tokyo University of Marine Science and Technology; Chair of SSC PS and co-chair of SWG MSE PS

Members of the NPFC have committed themselves to a two-phase approach to modernizing their management of Pacific saury. In 2021, the Commission agreed to adopt an interim HCR at its meeting in April 2024, and then consider development of a full management procedure (also called a harvest strategy). Importantly, NPFC created a dedicated working group, reporting to the Commission, to promote dialogue among scientists, managers and stakeholders, a hallmark of the process to develop MPs.

A PLAN FOR A BETTER FISHERY: TOWARD AN INTERIM HCR AND THEN MANAGEMENT PROCEDURE

MEMBERS OF THE NPFC ARE FOCUSED ON THE FIRST OF THEIR TWO TASKS – developing the interim HCR. It will be part of a decision-making framework with pre-approved management actions to respond to changes in the stock. As part of that work, NPFC will agree on a vision for the stock in the near term that includes agreeing on objectives for the fishery (currently under consideration in order of priority are: the recovery of the stock, followed by avoiding an unsustainable state of the stock, and then achieving high and stable catches year-to-year) and setting a desirable target of biomass and/or fishing mortality (currently envisioned as B_{MSY} and F_{MSY}, plus or minus 20%).

The HCR, a set of pre-agreed rules to set fishing opportunities when the biomass is above, below or within the target range, is intended to rebuild and then maintain the stock at the desirable level. A computer simulation, called Management Strategy Evaluation (MSE), is testing the performance of the HCR against several scenarios and uncertainties in the fishery to allow managers to assess whether the HCR would achieve the agreed objectives or if the plan needs adjustments.

The work to develop the interim HCR is laudable with clear benefits for the fishery. It's a significant steppingstone to a full MP. The difference is that longer term objectives for the fishery should be included in the MP, and in addition to the HCR, the MP should include a pre-agreed data collection and monitoring strategy that is closely coupled to management

5 reasons to adopt management procedures

Management Procedures:

1. Have had **proven success** in rebuilding and sustaining fisheries around the world.
2. Bring **greater predictability and stability** to seafood industries and the market.
3. Put the **fishery managers in the driver's seat** by taking a proactive, rather than reactive, approach to setting fishery management objectives.
4. Are a **future-proofing step**, ensuring the fishery can deliver on its long-term sustainability and economic objectives while adapting to changes in the environment, and worth the upfront investment of time and effort that will pay off in the long run.
5. Are able to **account for scientific uncertainty**, thereby providing greater clarity on how a strategy might perform given a range of plausible events.

decisions. The MSE on which the MP is based should consider a greater number of uncertainties and alternative HCRs suited to managing the higher variability of such a short-lived stock. The move would also cater to improvements in the stock assessment model that are under development. With these components working together, managers would be able to more confidently choose the strategy that would achieve ecological and economic benefits and be more robust to future environmental changes affecting the fishery, like climate change. Due to its built-in review process via its monitoring plan, the MP can be adjusted in the future to respond to changes in management objectives or new information.

TIME FOR ACTION

AGREEING ON THE INTERIM HCR in 2024 is a matter of urgency. Pacific saury remains at a historically low level of depletion. The 2022 stock assessment estimated that the average biomass is less than half the level needed to produce maximum sustainable yield. Meanwhile, the fishery is changing; environmental changes caused by climate change may have damaged the reproductive capacity of this stock by pushing the spawning ground away from the coast where plankton is more abundant. This may have contributed to

"Given the importance of the Pacific saury for fisheries and human diet, the move toward a harvest control rule/ management procedure must be addressed in parallel with the need for the collection of reliable scientific data and information. Climate change is negatively impacting the reproduction of this species. Unless this fishery is managed in a much more precautionary way, we cannot expect the rebuilding of this stock."

Masa Miyahara,
Representative, afc.masa (All Fish Consulting)

Components of a management procedure

- **Management objectives:** Formally adopted, measurable goals for the fishery, such as an abundant population and high catch, and the timeline and likelihood of achieving them.
- **Reference points:** Benchmarks used to compare the current status of a fishery management system against a desirable (target reference point) or undesirable (limit reference point) state. Often defined in management objectives.
- **Performance indicators:** A quantitative expression of a management objective used to evaluate how well the objectives are being achieved. For example, the average catch level over a 10-year period.
- **Management strategy evaluation (MSE):** A computer simulation-based, analytical framework used to evaluate and compare the performance of alternative management procedures relative to the pre-specified management objectives.
- **Harvest control rule (HCR):** A pre-agreed rule that sets fishing opportunities (catch limit, effort limit, etc.) based on selected indicators (s) of stock status.
- **Monitoring protocol:** The data collection plan for gathering the information needed to evaluate stock status to drive the HCR and monitor MP performance, including exceptional circumstances.
- **Stock status assessment:** The model-based or empirical process used to evaluate stock status using the data collected in the monitoring protocol to trigger the HCR management action.
- **Exceptional circumstances:** Rare and unforeseen events that were not tested by MSE or that the MP was not designed to manage. Or when monitoring indicates the MP is not meeting objectives.

the lower stock size and shifted the location of the most productive fishing grounds.

International cooperation through the NPFC is possible. It has yielded results already. The first North Pacific total allowable catch (TAC) for saury took effect in 2020. Fishing mortality has been reduced. Overfishing likely has stopped. But without tools like HCRs and MPs, management hasn't been able to react quickly enough. The TAC has been reduced twice, including a 25% reduction that took effect in 2023. However, given the current low level of biomass, even that lower TAC is still larger than the amount that would be allowed if fishing mortality was set to the rate that would achieve the maximum sustainable

"Pacific saury plays a vital role in the ecological balance in the North Pacific and are a crucial resource for both marine biodiversity and regional economies. To ensure the long-term health of these fisheries, it is imperative to embrace science-based and sustainable management practices, particularly through the implementation of effective harvest strategies."

Jung-re Riley Kim,
Head of Fisheries Negotiation Unit, International Cooperation Division, Ministry of Ocean and Fisheries, Republic of Korea

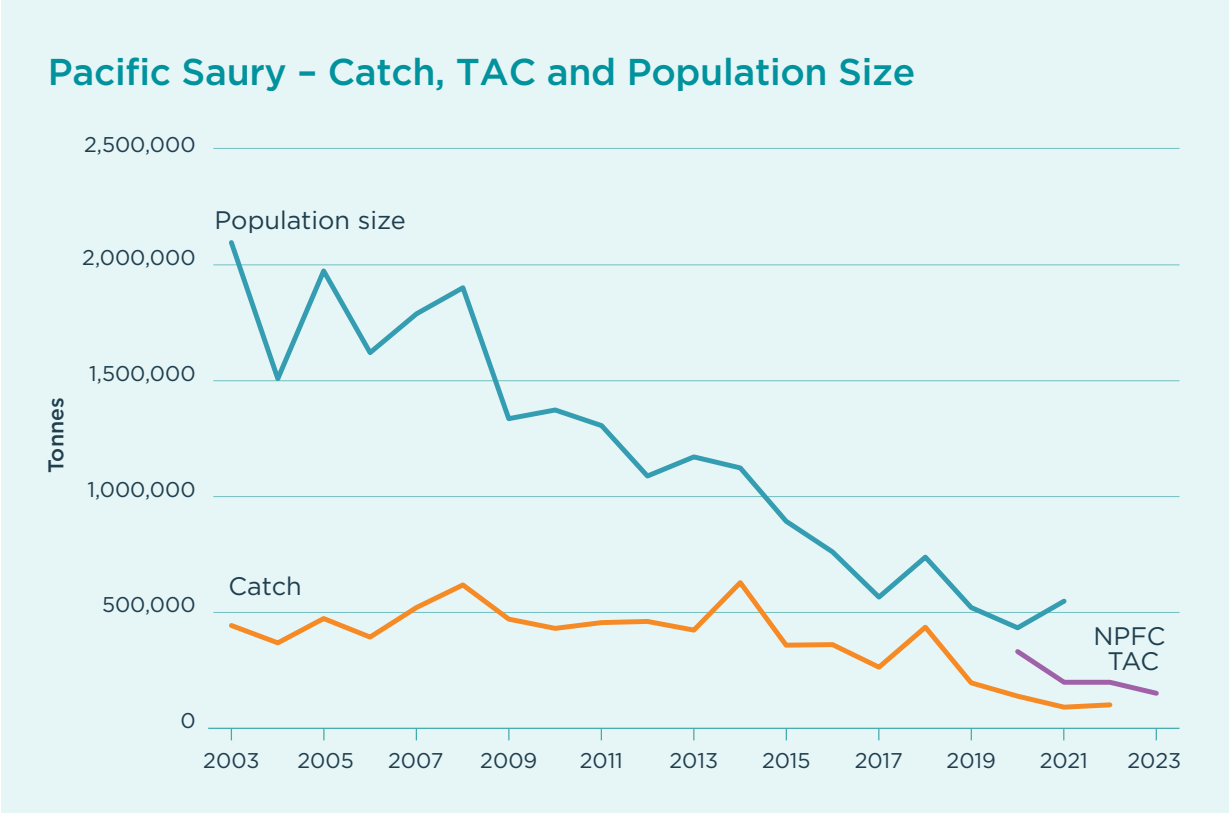


Figure 1. Catch, total allowable catch (TAC) for the NPFC Convention Area, and population size of Pacific saury over the past two decades.

yield (FMSY). Therefore, NPFC's existing management measure (that is, CMM 2023-08) sets a TAC that is still likely too high to enable recovery of the stock and, perhaps just as importantly, is too inflexible to react to rapid changes in biomass, particularly for a species with a two-year lifespan.

The NPFC Scientific Committee has recommended the Commission consider an HCR that reduces fishing mortality in a linear way when biomass falls below a target. The interim HCR would create a more transparent approach to management, and it would ensure that all participants know the 'rules of the game' before it is played, reducing the need for protracted, and ad-hoc negotiations on a TAC after a change is detected in the fishery.

"Implementing a MSE has been identified as a priority for Pacific saury by NPFC Members. This approach can now take advantage of advanced modelling to account for a range of environmental factors and uncertainty as we continue to see changes in the marine environment. This will provide greater understanding of how saury is expected to respond to fishing activity in different scenarios and help build a resilient management approach, starting with an interim HCR."

Dr. Robert Day,
Executive Secretary, North Pacific Fisheries Commission

Such a 'hockey-stick' HCR is used successfully in many fisheries around the world. Australia adopted that simple HCR form as part of a MP for its southern and eastern scalefish and shark fishery, a complex multi-species fishery. Application of the management procedure starting in 2005 is regarded as a success, streamlining the process to agree on TACs for the fishery and reducing the contentious nature of that discussion. Canada adopted a management procedure for British Columbia sablefish in 2010 that quickly arrested a decline in biomass. The sablefish HCR dictates that catches should decline linearly starting when the biomass falls below 60% of B_{MSY} and should reach zero at 40% of B_{MSY}. Biomass stopped declining, and as a result, female spawning stock biomass for 2022 was estimated to be well above the level associated with maximum sustainable yield.

MODERNIZING NPFC FISHERIES

AS ONE OF THE NEWER REGIONAL FISHERY MANAGEMENT ORGANIZATIONS, convening for the first time in 2015, NPFC has an opportunity to make use of the most modern and effective practices. It is notable that the 2022 report of the first performance review of the NPFC recommended the development of HCRs and MPs for all of NPFC's priority stocks, including Pacific saury. The work to develop the interim HCR has proceeded smoothly with members cooperating to provide feedback on its components. Once the

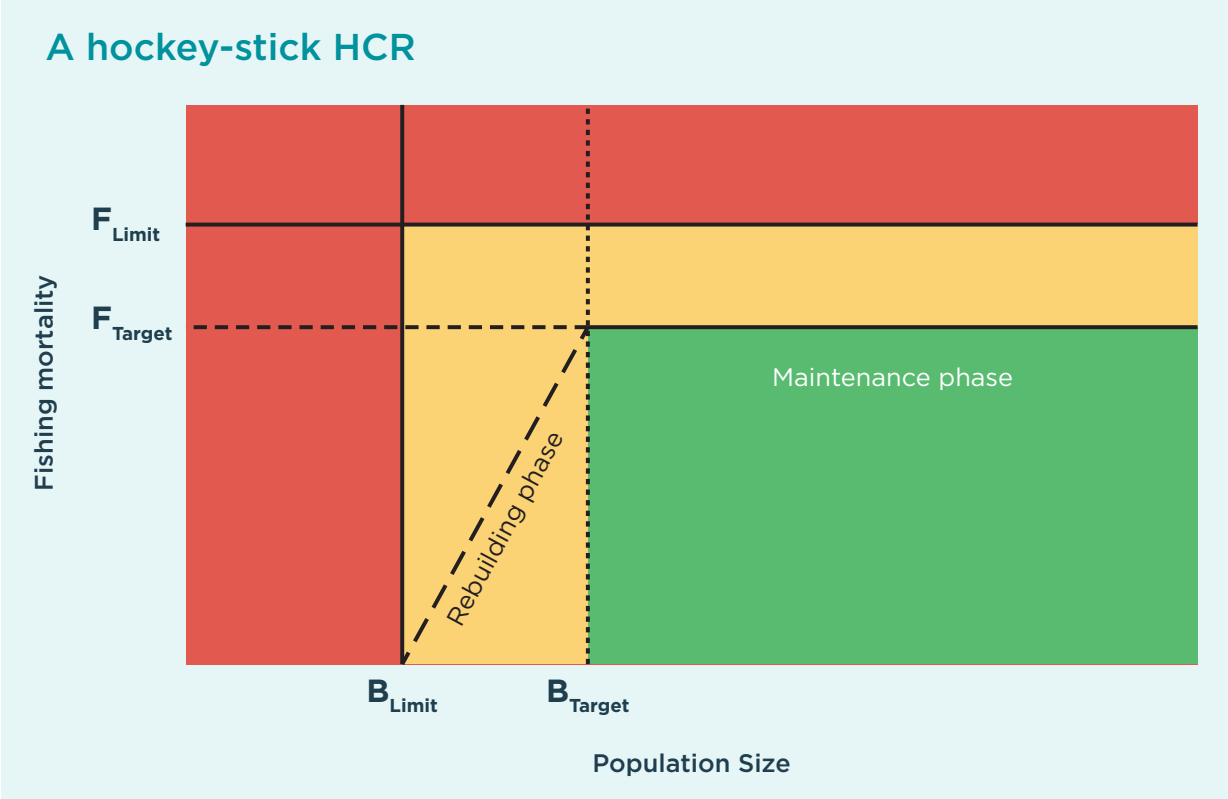


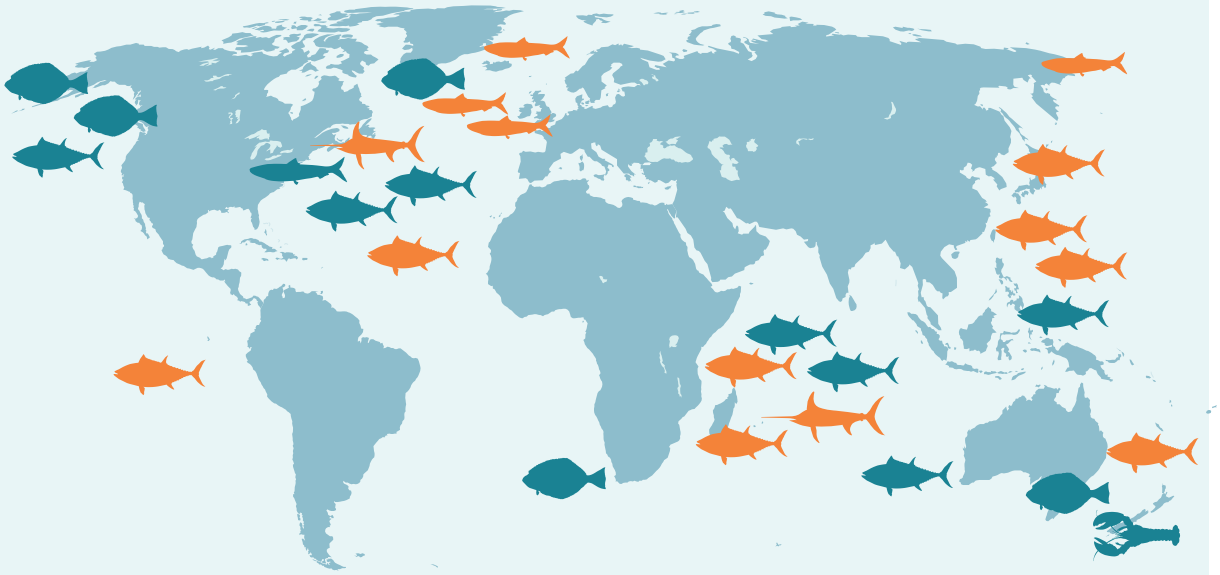
Figure 2. A generic example of a 'hockey-stick' harvest control rule, which decreases fishing mortality linearly between the target and limit population sizes. This is the type of HCR being considered for Pacific saury.

interim HCR is in place, it will be critical to continue that momentum by developing the full MP. Although the interim HCR will be an improvement over the status quo, the full MP is necessary to future-proof management against a wider range of uncertainties than what is being considered in the current MSE for the interim HCR. The upfront investment in resources will pay off in the long-term by placing Pacific saury on a path to providing for a more predictable and profitable fishery. The plight of Pacific saury – and its importance to the North Pacific food webs and coastal economies – is too critical to postpone action.

> *"For the Japanese, Pacific saury is a typical fish that graces their autumn tables. In autumn, Japanese restaurants and even French restaurants, such as ours, compete to include it on their menus, offering dishes to enjoy the arrival of autumn. However, in the past few years, due to declining stocks, there have been almost no fish in the market, and when there have been, they have only been small, skinny specimens. We hope that international resource management will be pushed forward as soon as possible and that saury stocks will recover."*
>
> **Ippei Matsumoto,**
> **Chefs for the Blue / La Paix**

Case studies of harvest strategies in global fisheries

Harvest strategies are in place or being developed for a broad diversity of fisheries around the world - predators and prey, surface species and bottomfish, international and domestic.



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