Summary of a U.S. Stakeholder Meeting on North Pacific Swordfish Management
April 22, 2026 Virtual

Pacific Islands Regional Office

On April 22, 2026, the National Marine Fisheries Service (NMFS) Pacific Islands Regional Office hosted a webinar to build stakeholder capacity on international management of North Pacific swordfish (NP SWO) and to gather input from U.S. stakeholders on potential inputs for a Management Strategy Evaluation (MSE) for NP SWO. NMFS posed a series of focus questions to participants related to the development of candidate inputs to inform the MSE, including management objectives, performance indicators, reference points, and harvest control rule (HCR) design. The discussion also addressed operational considerations, including geographic scope, fisheries to be included in the MSE, and preferred management outputs. Meeting materials from the webinar including a background paper and presentation slides, are included Appendices I and II, respectively.

Management Objectives and Performance Indicators

Participants expressed support for the use of the four categories (safety, status, stability, and yield) in developing potential management objectives for the NP SWO MSE and noted that this framework has been effective in other MSE processes for identifying tradeoffs among management approaches. Another participant expressed support for using the management objectives developed for North Pacific albacore as a template for developing management objectives for NP SWO. A participant also noted the importance for MSE testing of having quantifiable objectives to easily be able to evaluate performance in the MSE.

With respect to stock status, participants generally agreed that the stock is currently in a healthy condition, with the spawning stock biomass above maximum sustainable yield (MSY) levels for the duration of the assessment period, and fishing intensity generally below the value of fishing mortality expected to produce MSY. A participant indicated that maintaining biomass at MSY levels as is currently included in HS 2016-01 may not be an appropriate objective given the stock is at biomass levels much greater than MSY levels, and suggested that an alternative management objective could be to maintain the stock above a limit reference point (LRP) with a high probability. NMFS also noted in response to a question that SSB_{MSY} for NP SWO is 17% SSB_0, and equates to approximately 16,000 mt.

One participant emphasized the importance of fishery performance, particularly catch per unit effort (CPUE). While the stock is healthy, CPUE in the Hawaii longline (HILL) fishery has declined over the past decade. Participants expressed interest in including objectives aimed at improving or stabilizing CPUE, while acknowledging uncertainty regarding the drivers of this

decline, including potential environmental changes, shifts in fish distribution, and operational constraints such as area closures and gear requirements. A participant noted that geographically the Hawaii longline fleet fishes some distance away from the other fleets, and so reducing catch for other fleets would be unlikely to translate to increases for the U.S. fleet.

On stability, a participant asked what trends there were for CPUE for other fleets. NMFS responded that CPUE declines have also been observed in other fleets and some of those fishermen have been moving away from targeting SWO. NMFS noted that increased costs (e.g., fuel and bait) may also be other factors influencing CPUE, and that there have been shifts in the location of the North Pacific transition zone which may influence CPUE if fishing effort has not similarly shifted.

Discussion of yield was limited; however, some participants emphasized the importance of maintaining or expanding fishing opportunities, particularly given the current healthy stock status. These participants noted that management objectives should allow for potential increases in fishing effort or catch under favorable conditions.

Participants further emphasized the need for clearly defined and quantifiable performance indicators to evaluate management strategies within the MSE framework. Suggested indicators included CPUE, biomass relative to reference points, catch levels, and fish size. Participants noted that it may be helpful to compare trends in biomass over the last ten years, and how catch levels have changed between fisheries targeting and incidentally catching NP SWO. A participant noted concern over how incidental catch will be addressed within the MSE. NMFS noted that the ISC provided a response to NC several years ago on the proportion of catch between N of 20°N (which was assumed to be targeted catch) and from the equator to 20°N (assumed incidental) and the split was approximately 50/50 so there is a lot of incidental catch of NP SWO.

In discussions about potential reference periods or baselines, a participant noted that the current WCPFC CMM references 2008-2010 and questioned the rationale for that time period. This participant suggested reviewing CPUE for the Hawaii longline fleet to consider if there is a different time period that might be better, and noted concerns that if reference periods are not selected carefully that they could negatively impact catch/effort limits in the future. NMFS noted that NP SWO catches have been declining over the past two decades so it may be useful to contemplate the desired baseline period and the reason for using that baseline period. Another participant noted that information on Hawaii longline CPUE is available in the Western Pacific Regional Fishery Management Council Stock Assessment and Fishery Evaluation reports, CPUE was highest recently in 2017 and that several seasons have been truncated as exceedances of the turtle caps resulted in closures of the shallow set fishery.

Reference Points

On consideration of candidate reference points, participants discussed both LRP and target reference points (TRP) for NP SWO.

NMFS and participants discussed that the Western and Central Pacific Fisheries Commission (WCPFC) has established guidance indicating that for stocks where there is high confidence in biological factors (Tier 1), MSY-based reference points may serve as default LRPs. Some participants supported the addition of a biomass-based reference point, noting that the current harvest strategy specifies a fishing mortality-based LRP (F_{MSY}). A participant suggested an LRP candidate of 20% of unfished spawning biomass (SSB_0), consistent with reference points used for other highly migratory species. Another participant noted that the domestically minimum stock size threshold for NP SWO is less than MSY levels.

Regarding TRPs, participants supported evaluating a range of candidate values through the MSE process. It was noted that in MSE processes for NP albacore and Pacific bluefin tuna (PBF), a range of candidate TRPs have been tested and depending on other factors, it can make a big difference on the performance of the HCRs. A participant noted the NP SWO has similar life history characteristics as flatfish, and so may consider evaluating reference points similar to those considered for groundfish on the West Coast. NMFS noted the MSE is a good opportunity to see what would happen under various scenarios. One participant suggested considering depletion-based reference points (e.g., 20–25% SSB_0), while others indicated that TRPs lower than current biomass levels may be appropriate to allow for increased fishing opportunities. Participants also noted that MSY-based reference points may change over time due to shifts in fleet composition and selectivity, and that depletion-based reference points may offer greater stability.

Harvest Control Rule Design

Participants expressed general support for using a HCR that contains a threshold reference point where the TRP and and threshold levels are not the same. The goal would be to have fishing intensity or catch levels aim for the target and have a threshold control point lower than that TRP. NMFS added that there can be variability around the stock due to a variety of factors so it is important to build in some flexibility in catch/intensity levels and targets/thresholds, before a greater management action is triggered. The concept of a threshold has been incorporated into other stocks that have had MSE's developed for them.

Several participants supported the inclusion of stability clauses to limit interannual variability (e.g., within 5-10% but not to exceed 10%) to reduce economic disruption and improve predictability for fishing operations, though it was noted that such constraints should be tested within the MSE to ensure they do not reduce responsiveness to changes in stock status.

With respect to management outputs, participants expressed a preference for catch-based controls over effort-based measures. Participants noted that catch limits may provide a more direct and transparent mechanism for controlling fishing mortality, while also allowing flexibility to increase catch when stock conditions are favorable. However, some participants acknowledged challenges in translating fishing intensity into management measures, particularly given differences in fishing practices across fleets.

A participant asked if the MSE will evaluate both model-based and empirical rules. NMFS stated that at present no decisions have been made, but they believe it will be a model-based HCR.

Other operational Considerations

Participants provided input on several operational aspects of the MSE including the duration of the management period, fisheries managed through the MSE, control outputs, and geographic scope.

On management period duration, some participants suggested that a three-year period may be more appropriate than longer intervals, such as five years. It was also noted that the management period does not necessarily need to align with the stock assessment cycle.

Regarding fisheries to be included in the MSE, a participant inquired what percentage of catch of NP SWO occurs in the eastern Pacific Ocean. NMFS noted that this would need to be calculated based on the proportion of data from two RFMOs (WCPFC and Inter-American Tropical Tuna Commission (IATTC)). It was also noted that there may be some overlap between fleets catching SWO incidentally, particularly in fisheries south of 20°N, and it will need to be important to consider any exceptional circumstances that trigger additional action to occur if the assumptions were not correct. The importance of accounting for both targeted and incidental catch in the MSE was highlighted and management strategies should consider total fishing mortality across all fleets.

Participants also raised questions about how fishing intensity should be defined and measured, particularly given differences in gear types, fishing practices, and the relative contribution of incidental catch. It was noted that effort may not be directly comparable across fleets, and that additional work may be needed to develop appropriate metrics. A participant noted that they appreciated that the current limits in the CMM create a buffer as it is based on the number of longline limited entry permits available, but acknowledged that if reductions needed to occur, catch might be easier to control.

Participants discussed the geographic scope of the MSE, including uncertainties related to stock boundaries and whether to incorporate catches of SWO in the north eastern Pacific Ocean for management consideration. Some participants noted that while most catch occurs within the WCNPO, there are areas of overlap with other management jurisdictions that may warrant consideration. One participant supported having the ability to use catch as a control and have it be applied if necessary on non-targeting fisheries/fleets.

International Coordination

Participants discussed the potential for coordination between the WCPFC and the IATTC in developing a harvest strategy for NP SWO. Some participants expressed support for a coordinated, Pacific-wide approach, particularly in relation to maintaining Marine Stewardship Council (MSC) certification.

However, other participants cautioned that coordination with the IATTC should not delay progress within the WCPFC, noting that the WCPFC is further advanced in developing a harvest strategy for NP SWO. Participants indicated that a parallel or phased approach to coordination may be appropriate.

Next Steps

NMFS intends to continue soliciting input from stakeholders and advisory bodies, including the Permanent Advisory Committee to the U.S. Section to the WCPFC. Based on input received from this meeting and the aforementioned advisory body, the United States will consider its positions and potentially any proposals for the upcoming WCPFC Northern Committee meeting (July 13-14, 2026).

APPENDIX I

Developing Candidate Inputs to Inform a Management Strategy Evaluation for North Pacific swordfish

Introduction

U.S. stakeholders have expressed an interest in strengthening the Western and Central Pacific Fisheries Commission (WCPFC) harvest strategy for North Pacific swordfish (NP SWO) fisheries. Specifically, there is interest in engaging in a management strategy evaluation (MSE) to select a harvest control rule (HCR). In 2025, the United States proposed and the WCPFC Northern Committee (NC) agreed to initiate a MSE for this stock. The NC tasked the International Scientific Committee for Tuna and Tuna-Like Species (ISC) to develop a work plan for conducting the MSE for NC's review in 2026. The NC also tasked itself to discuss candidate operational management objectives in 2026. After NC21 concluded, the funding for a contractor to assist with the technical MSE work was secured. This funding, however, is time-limited so MSE work needs to be completed by 2028. The United States believes that it is important for NC to provide ample guidance on inputs to the MSE so that the ISC can begin work on preliminary analyses.

Meeting Objectives

The goals of this webinar are 1) to build stakeholder capacity on harvest strategies and MSEs and 2) to gather stakeholder feedback on potential inputs for the MSE, specifically:

- Operational management objectives
- Performance indicators
- Reference points, and
- Harvest control rules
- Other operational considerations

Background on Western and Central North Pacific Swordfish

In 2023, the ISC conducted a stock assessment for NP SWO. This assessment used stock boundaries reflecting the presence of several stocks of swordfish in the Pacific, including in the southwest Pacific, southeastern Pacific, and western and central north Pacific ocean (WCNPO) (Figure 1).

The WCNPO and North Eastern Pacific Ocean (N EPO) were assessed as a North Pacific-wide stock (NP SWO) in 2023. The ISC found for the NP SWO stock that recent fishing intensity ($F_{2019\text{-}2021}$) was half the value of fishing mortality expected to produce maximum sustainable yield (MSY), and that recent spawning stock biomass (SSB) levels (2019–2021) were 213% higher than estimated SSB levels at MSY.

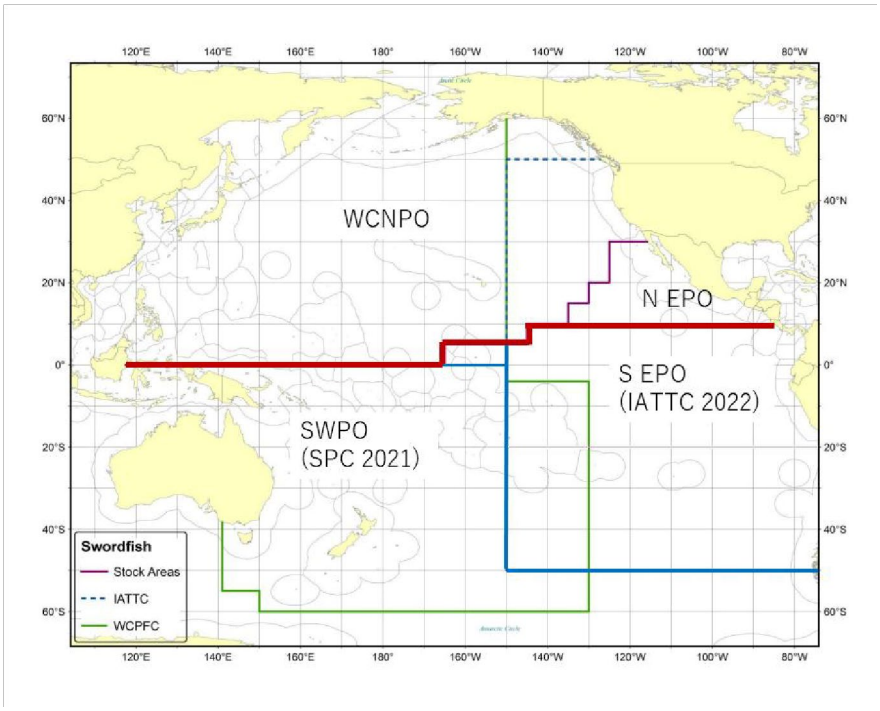


Figure 1. Western and Central North Pacific Ocean, Southwest Pacific Ocean, and South Eastern Pacific Ocean swordfish stock boundaries. The 2023 North Pacific swordfish assessment included the WCNPO swordfish stock and fish caught in the N EPO area. (ISC 2023)

NP SWO are primarily targeted in shallow sets from longline vessels from the United States, Japan, and Chinese Taipei. These fisheries tend to be seasonal and located around the subtropical convergence zone around 35-45°N. NP SWO are also incidentally caught by longline fleets from the United States, Japan, Chinese Taipei, China, and Korea targeting tropical tuna. NP SWO are also targeted in the Chinese Taipei and US harpoon fisheries, although these catches tend to be small and occur primarily within each member's EEZ.

The boundaries for WCNPO SWO indicate that international management for this stock is shared between the WCPFC and the Inter-American Tropical Tuna Commission (IATTC).
Within the WCPFC, WCNPO SWO is one of three designated "northern stocks[1]" and the WCPFC NC has management responsibility for "northern stocks."

In 2022, WCPFC adopted a Conservation and Management Measure (CMM) for NP SWO, which was slightly updated in 2023 (CMM 2023-03). This measure applies north of 20°N in the WCPFC Convention Area. For fisheries taking >200 tonnes/year in the Convention Area, the CMM limits fishing effort to the 2008-2010 average. Annual catch and effort reporting is

[1] The WCPFC designated Pacific bluefin tuna, North Pacific albacore and North Pacific swordfish as "northern stocks."

required for the Convention Area and across the North Pacific for fisheries subject to the cap, by gear.

Overview of Harvest Strategies and Management Strategy Evaluation

Harvest strategies, also called management procedures (MPs), are a set of pre-agreed rules that determine what fishery managers must do based on the current condition (status) of the fish population. These actions are designed to help the fishery achieve its specific goals, known as management objectives (like maximizing catch, ensuring stable harvests, and/or keeping the stock at a desired level).

Many Regional Fishery Management Organizations (RFMOs), such as the WCPFC and IATTC, are now switching to this approach. They use MSE analyses to help develop management procedures.

MSE is a process of "stress testing" different potential management procedures through computer simulations of how the fish stock and fishery operate. The goal of MSE is to select a HCR that is likely to provide satisfactory performance and achieve the fishery's long-term objectives across a wide range of uncertain future circumstances.

HCRs include reference points, which are benchmarks that define when the stock has reached a desirable or undesirable state. For example, a Limit Reference Point (LRP) tells us when a stock has reached an undesirable level. A Target Reference Point (TRP) defines the amount of fishing that would achieve a desirable stock size.

Stakeholder input (like the input we are gathering at this workshop) define the goals that inform the inputs of the MSE process, and allow us to select a MP that meets those goals.

In 2014, the WCPFC adopted CMM 2014-06 (updated in 2022) on Establishing a Harvest Strategy for Key Fisheries and Stocks in the Western and Central Pacific Ocean. This CMM recognized the utility of developing harvest strategies as a best practice approach to fisheries management decision making.

CMM 2022-03 describes six elements that should be included in a harvest strategy and these elements are as follows:

1. Management Objectives: Defined operational objectives, including timeframes, for the fishery or stock
2. Reference Points: Target and limit reference points for each stock
3. Acceptable Levels of Risk: likelihood of breaching limit reference points
4. Monitoring Strategy: how we will assess performance against reference points
5. Harvest Control Rules: actions to be taken that aim to achieve the target reference point and avoid the limit reference point

6. Management Strategy Evaluation: An evaluation of the proposed HCRs against management objectives, including risk assessment

WCPFC adopted a harvest strategy for NP SWO in 2019, which established the LRP for the exploitation rate (F-limit) of F_{MSY}. However, this harvest strategy was not developed using an MSE process, and contains provisions that acknowledge that additional guidance from the NC could help refine various elements contained within the harvest strategy. The IATTC does not currently have a harvest strategy or management measure for NP SWO.

As noted above, this webinar is soliciting input on management objectives, reference points and HCRs which will be used in a MSE.

Management Objectives and Performance Indicators

Management objectives describe the overarching goals for the stock and fishery, and the current management objective contained in WCPFC HS 2016-01 for NP SWO is as follows:

> *The management objective is to support thriving swordfish fisheries in the North Pacific while maintaining the stock size at levels capable of producing maximum sustainable yield. The Northern Committee will develop more refined management objectives.*

The MSE process is an opportunity to consider refining the current management objectives as well as consider additional objectives if desired. Some common categories of management objectives used in other MSEs include status (ability to maintain desired stock size), safety (risk of breaching undesirable levels), stability (maintaining consistency in catch or effort limits between management periods) and yield (maximizing catch). In order to evaluate whether management objectives can be met particularly for MSE purposes, it is important to design them into operational objectives (i.e., objectives that are more specific and measurable).

While management objectives define the goals for the fishery, performance indicators are also needed to evaluate how the candidate reference points and HCRs work towards achieving the overarching management objectives. Performance indicators are ways to quantitatively define management objectives. See Appendices I and II for examples of operational management objectives and performance indicators that were used in MSEs for NP albacore (NP ALB) and Pacific bluefin tuna (PBF), respectively.

Questions for stakeholders

1. **What management objectives or categories of management objectives would you like to be considered for the WCNPO SWO MSE?**
2. **Is there interest in translating or modifying the current management objectives from the NP SWO harvest strategy into operational management objectives for the MSE?**

3. **Are there specific performance indicators that you would like to see developed to evaluate the performance of desired management objectives?**

4. **If there is a desire to reference catch or biomass levels relative to a historical period, is there a preferred set of years or time period?**

Reference Points

The following section gives a brief summary of general information on limit and target reference points from the WCPFC and IATTC, and other types of reference points.

Limit Reference Points (LRPs)

WCPFC8 agreed to a working definition of an LRP that contained the following characteristics:

- *they define a state of the fishery that is considered to be undesirable and which management action should avoid;*

- *the probability of breaching an LRP should be very low;*

- *management actions should be taken before the fishery falls below or is at risk of falling below an LRP.*

WCPFC8 also established a hierarchical approach to identify key LRPs for key target species, and NP SWO has been identified as a Level 1 stock.[2] Therefore, appropriate metrics for LRPs include F_{MSY} and B_{MSY}.[3]

The WCPFC has adopted an F-based LRP for NP SWO of F_{MSY}. However, it has not adopted a biomass-based LRP to date. Assuming that we still believe that NP SWO is a Level 1 stock, a default biomass-based LRP could be SSB_{MSY}, which roughly equates to $17\%SSB_0$.

The IATTC does not currently have a LRP for NP SWO, but has adopted the following LRP for tropical tunas in the IATTC Convention Area: $F_{0.5R0}$ (fishing mortality that causes spawning biomass to be reduced to $S_{0.5R0}$ with steepness of 0.75) and $SSB_{0.5R0}$ (spawning biomass corresponding to that which produces a 50% reduction in recruitment as calculated in a Beverton-Holt spawner-recruit model with steepness of 0.75). This limit translates to $7.7\%SSB_0$.

[2] See https://www.wcpfc.int/sustainability/harvest-strategy for more information on WCPFC's hierarchical approach for identifying LRPs for key target species.

[3] B_{MSY} is the long-term average biomass able to produce MSY and that is achieved by fishing at F_{MSY}. F_{MSY} is a fishing mortality rate that, if applied constantly, would result in B_{MSY} and MSY on average over the long term.

Domestically, the Fishery Management Plan for the U.S. West Coast Fisheries for Highly Migratory Species (HMS FMP) and Fishery Ecosystem Plan for Pelagic Fisheries of the Western Pacific Region (Pelagics FEP) use the concept of minimum stock size threshold (MSST) corresponding to the level of biomass below which the stock is considered to be overfished. MSST is calculated as the greater of:

$B_{MSST} = (1\text{-}M)B_{MSY}$ when M (natural mortality) ≤ 0.5, or $B_{MSST} = 0.5B_{MSY}$ when $M > 0.5$.

For NP SWO, natural mortality is age-specific in the assessment and is assumed to be 0.5 for calculating MSST. As a result, MSST is defined as 0.5 x SSB_{MSY}, which represents the domestic overfished threshold, and translates to a depletion of about $8.5\%SSB_0$.

While not currently the case, there could be conflicting interpretations of the status of the stock if there were different LRPs adopted by the IATTC and WCPFC, as well as potential conflicts when compared to domestic metrics. Defining a common LRP for both sides of the Pacific (IATTC and WCPFC) may be beneficial to consider in this MSE process.

Target Reference Points (TRPs)

Neither the WCPFC nor the IATTC have adopted TRPs for NP SWO. The WCPFC's CMM 2022-03 defines TRPs as "*targets intended to meet management objectives"* and the IATTC offered a similar definition of a TRP in Resolution C-16-02:

> *"A target reference point is a management objective based on a level of spawning biomass (S_{TARGET}) or a fishing mortality rate (F_{TARGET}) that should be achieved and maintained"*

For reference, the fishing mortality ($F_{\%SPR}$) in 2019-2021 was estimated to produce a level of 43%SPR.[4] The SPR for this stock historically has ranged from 23.5% (1998) to 44.3% (2021).

Other Reference Points

Some harvest strategies have identified additional reference points or control points in their HCRs. For example, the HCR used for NP ALB also identifies an Fmin and a threshold reference point (ThRP). Other HCRs do not identify these per se as reference points, but as control points, or some level at which management control shifts at that particular point.

[4] The Spawning Potential Ratio (SPR) measures the fish stock's current reproductive potential compared to its maximum potential if it were never fished. In this example, the fishing pressure in 2019-2021 reduced the stock's ability to reproduce to 43% of what it would be without fishing.

Questions for stakeholders

5. **What suggestions do you have for candidate target reference points?**

6. **The current harvest strategy for NP SWO specifies an F-based limit reference point, but not a biomass-based limit reference point? How important is it to define the latter?**

7. **What additional candidate reference points would you like considered? (For example, ThRP or Fmin)?**

Harvest Control Rule Design

HCRs specify levels of fishing that can occur based on the status of the stock, and may be model-based or empirically-based.

To date, some of the HCR shapes discussed within the WCPFC have a ramped shape (commonly referred to as a "hockey stick") as shown in Figure 2. Some HCRs discussed in the WCPFC have a stepped and ramped shape (commonly referred to as a "Hillary step") where there are several control points where management changes (Figure 3). Examples of the "hockey stick" HCRs are those developed for NP ALB and PBF. Examples of the "Hilary step" HCR are those developed for WCPO skipjack and south Pacific (SP) ALB. In all of these HCRs, generally fishing intensity (y axis) prescribed by the HCR increases as stock biomass (x axis) increases and decreases if stock biomass decreases.

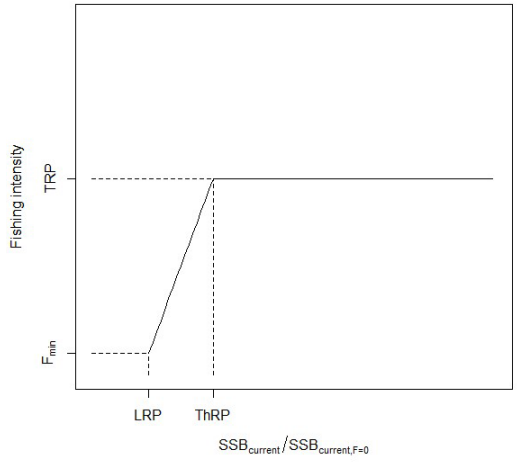


Figure 2: The HCR for NP ALB is an example of the "hockey stick" HCR shape.

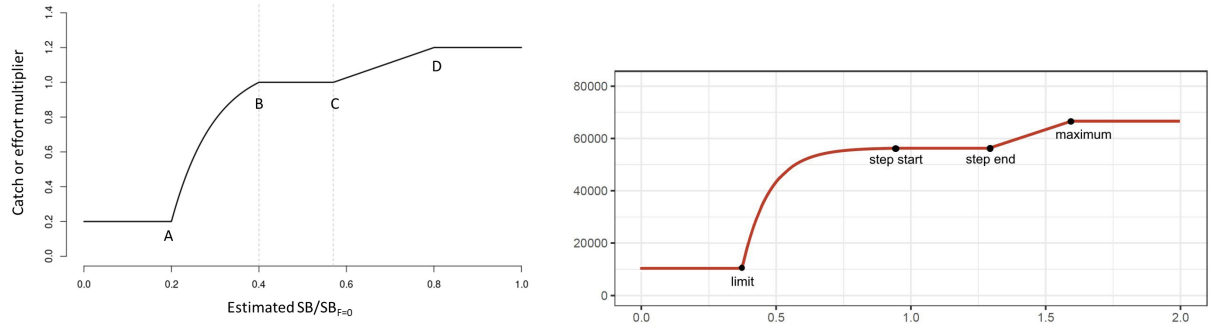


Figure 3. Example of "Hillary Step" HCR shape. The HCR adopted in the WCPO skipjack MP is shown on the left, and the WCPFC SP ALB MP shape is shown on the right.

HCRs may use adopted reference points as control points (ie: trigger management changes) or not. For example, a MP may adopt a LRP that does not trigger any changes in fishing, but is only a reference that tells us when the stock is in trouble. An HCR may also be developed with ThRPs where action is taken at levels that differ from the adopted LRP or TRP.

HCRs may also contain clauses that change the output of the HCR, generally for stability purposes. This places limits on the maximum change to the output between management periods. Several harvest strategies and MPs adopted by the WCPFC contain stability meta-rules. For example, the WCPO skipjack MP limits change to 10% between management periods, the NP ALB harvest strategy limits change to 20% between management periods, and the SP ALB MP limits changes to 5% decrease and 10% increase between management periods.

Questions for stakeholders

8. **What is your preferred HCR shape to evaluate?**

9. **Should the HCR shapes incorporate candidate reference points or other control points?**

10. **What other control rules - e.g., stability clauses should be considered?**

Other operational considerations

In designing the MSE for NP SWO, there are several other operational considerations that could be helpful to define including the following:

Duration of management periods

To date, the duration of the management periods for other WCPFC stocks with harvest strategies is linked to the stock assessment cycle, which for NP ALB, SP ALB and WCPO skipjack is generally every three years. Billfish assessments are generally conducted every five years.

Fisheries to be managed by the harvest strategy

An MSE should incorporate all aspects of fishing mortality, but managers can decide what fisheries will be managed within the MSE. The NP ALB harvest strategy applies to all fleets harvesting NP ALB, whereas other MSEs are more targeted in the fisheries managed. For example, the SP ALB MP applies to longline and troll fisheries.

Control mechanisms

Another important aspect to consider is the control mechanism of the output. In other words, will the output be fishing intensity, a scalar, total allowable catch (TAC), total allowable effort (TAE), or a combination of TAC and TAE? The NP ALB harvest strategy evaluated fishing intensity whereas the output for the SP ALB harvest strategy is catch, and the output of the skipjack harvest strategy is a scalar that applies to catch or effort relative to some baseline conditions.

Geographic scope

Finally, the geographic scope of the MSE is another important component to consider. The 2023 stock assessment used some new stock boundaries, and evaluated stock status including and excluding the northern EPO section. The geographic scope of the MSE can be pan-Pacific such as was done for NP ALB and is currently being done for PBF. This would involve international stakeholders who also harvest this stock in the EPO, such as Mexico. or the management output can be narrowed, for example with the SP ALB MP which simply incorporated assumptions on catch levels for the EPO.

Questions for stakeholders

11. What should the duration of the management period be for NP SWO?

12. What fisheries should be managed through the MSE (all fisheries or specific gears)?

13. What should the control output be (e.g., fishing intensity, catch, effort, etc.)?

14. What should the geographic scope be that the MSE applies to?

Next Steps

NMFS intends to develop a meeting report summarizing feedback received during the webinar.

This meeting report will be shared with meeting participants as well as with the Permanent Advisory Committee (PAC), the advisory group to the U.S. section to the WCPFC. Based on input received from this webinar and from PAC, the United States may consider developing a paper for submission to the WCPFC NC to facilitate discussion on inputs to the MSE at its July meeting.

Questions for stakeholders

15. **The WCPFC NC agreed to initiate the MSE for WCNPO SWO with the objective of revising the WCPFC harvest strategy. Is there interest in developing a pan-Pacific harvest strategy for WCNPO SWO?**

Appendix I North Pacific albacore

North Pacific albacore tuna MSE Management Objectives and related Performance indicators

Management Objective	Label	Performance Indicator
1. Maintain SSB above the limit reference point	Odds SSB > LRP; *this MSE tested the three LRP's below (20%SSB0, 7.7%SSB0, and equilibrium 7.7%SSB0)*	Probability that SSB in any given year of the MSE forward simulation is above the LRP
	Odds SSB > 20%SSB0	Probability that SSB in any given year of the MSE forward simulation is above the 20% of dynamic unfished SSB.
	Odds SSB > 7.7%SSB0	Probability that SSB in any given year of the MSE forward simulation is above 7.7% of dynamic unfished SSB.
	Odds SSB > equilibrium 7.7%SSB0	Probability that SSB in any given year of the MSE forward simulation is above the 7.7% of equilibrium unfished SSB.
2. Maintain depletion of total biomass around historical average depletion	Odds depletion > minimum historical	Probability that depletion in any given year of the MSE forward simulation is above minimum historical (2006-2015) depletion.
4. Maintain catches above average historical catch	Odds catch >historical	Probability that catch in any given year of the MSE forward simulation is above average historical (1981-2010) catch.

	Odds medium term catch > historical	Probability that catch averaged over years 7-13 of the simulation is above average historical (1981-2010) catch.
	Odds long term catch > historical	Probability that catch averaged over years 20-30 of the simulation is above average historical (1981-2010) catch.
5. Change in total allowable catch between years should be relatively gradual	Catch stability	Probability that a decrease in TAC (or catch for mixed control) is <30% between consecutive assessment periods (once every 3 years), excluding years where TAC=0.
	Odds of no management change	Probability of SSB > $SSB_{threshold}$
6. Maintain fishing intensity (F) at the target value with reasonable variability	F_{target}/F	F_{target}/F

***** *It should also be noted that management objective #3 (maintain historical 2006-2015 harvest ratios of each fishery) was not evaluated because there were no allocation rules specific to each fishery. Instead, harvest ratios of each fishery were assumed to be maintained at the average of 1999–2015, according to the agreement at the 3rd ISC NPALB MSE Workshop. Thus, performance relative to management objective #3 does not vary between HCRs.*

Appendix II Pacific Bluefin Management Objectives and Performance Indicators

List of management objectives and performance indicators put forward by the JWG and used in the PBF management strategy evaluation. SSB refers to spawning stock biomass, LRP to limit reference point, and F to fishing mortality, measured as 1-SPR where SPR is the spawning potential ratio, the ratio of the cumulative spawning biomass that an average recruit is expected to produce over its lifetime when the stock is fished at the current fishing level to the cumulative

spawning biomass that could be produced by an average recruit over its lifetime if the stock was unfished. FTARGET is the target reference point based on fishing mortality.

Category	Management Objective	Performance Indicator
Safety	There should be a less than 20%* probability of the stock falling below the LRP	Probability that SSB< LRP in any given year of the evaluation period
Status	To maintain fishing mortality at or below FTARGET with at least 50% probability	-Probability that F≤FTARGET in any given year of the evaluation period -Probability that SSB is below the equivalent biomass depletion levels associated with the candidates for FTARGET
Stability	To limit changes in overall catch limits between management periods to no more than 25%, unless the ISC has assessed that the stock is below the LRP	-Percent change upwards in catches between management periods excluding periods when SSB<LRP -Percent change downwards in catches between management periods excluding periods when SSB<LRP
Yield	Maintain an equitable balance in proportional fishery impact between the WCPO and EPO	Median fishery impact (in %) on SSB in the terminal year of the evaluation period by fishery and by WCPO fisheries and EPO fisheries
	To maximize yield over the medium (5-10 years) and long (10-30 years) terms, as well as average annual yield from the fishery	-Expected annual yield over 5-10 years of the evaluation period, by fishery -Expected annual yield over 10-30 years of the evaluation period, by fishery
		-Expected annual yield in any given year of the evaluation period, by fishery

	To increase average annual catch in all fisheries across WCPO and EPO	

*The acceptable levels of risk may vary depending on the LRP selected, but should be no greater than 20%.

APPENDIX II

U.S. Stakeholder Meeting on North Pacific Swordfish Management

April 22, 2026

Meeting Logistics

- Please mute when not speaking
- Raise your hand if you would like to speak
- Please state your name and affiliation when speaking
- We will solicit comment after specific sections.
- Focus questions are contained within the background paper for this meeting.

Meeting Objectives

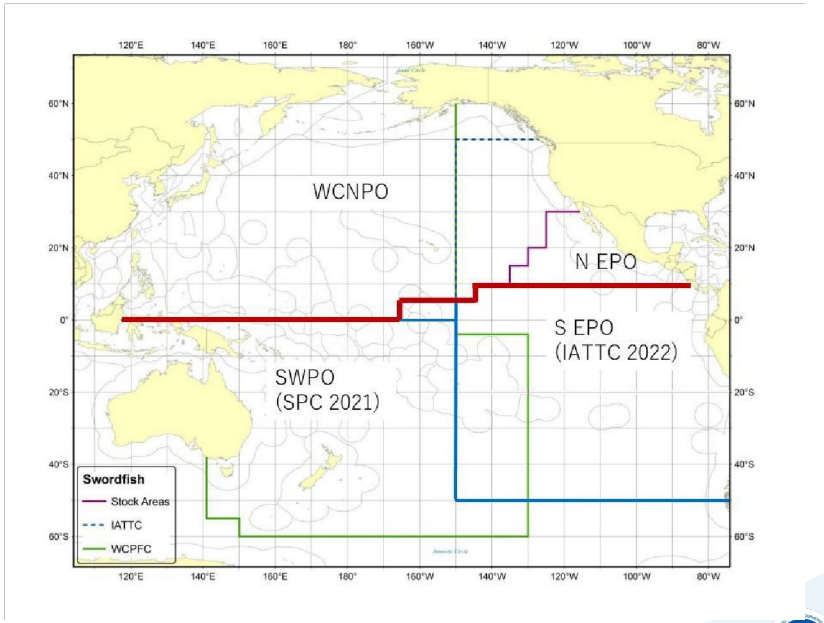
1. Build stakeholder capacity on international management of North Pacific swordfish (NP SWO) - specifically, harvest strategies and management strategy evaluations (MSEs)
2. Solicit feedback on potential inputs for an WCNPO SWO MSE
   a. Management objectives and Performance Indicators
   b. Reference Points
   c. Harvest Control Rules

d. Other operational considerations

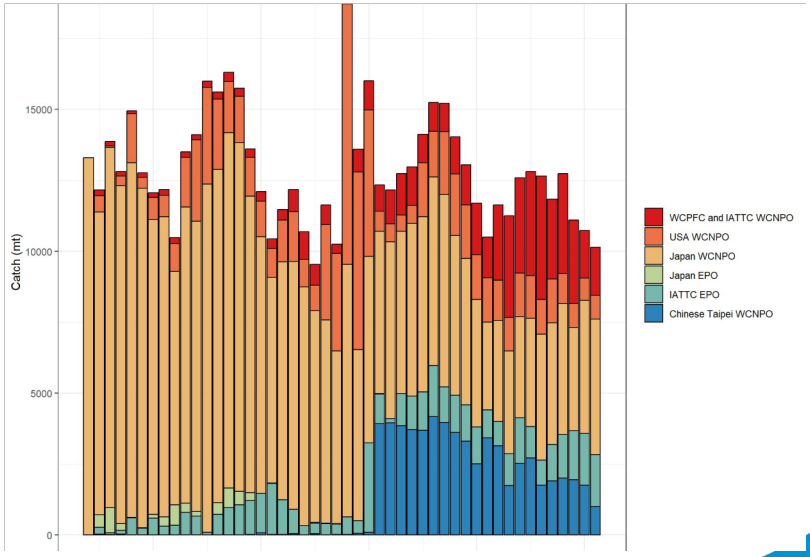
Overview of Stock Status, Fisheries and

International Management of North Pacific Swordfish

Pacific Swordfish Stocks



Annual Catch of NP SWO

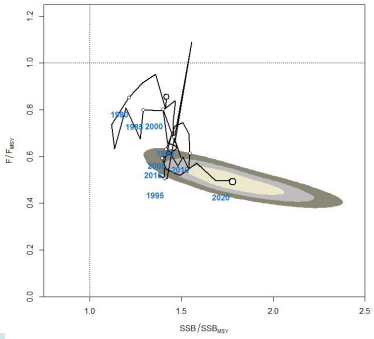


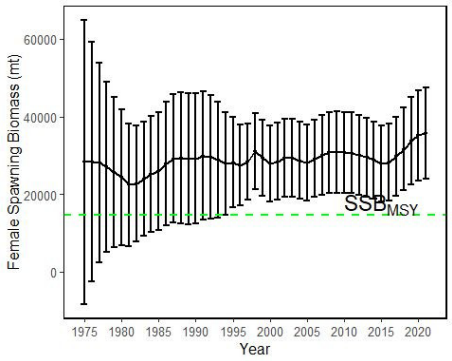
NP SWO Status

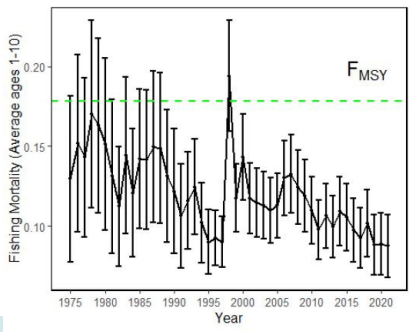
$F_{2019\text{-}2021}/F_{MSY} = 0.5$

$SSB_{2019\text{-}2021}/SSB_{MSY} = 2.13$

SPR – 43%







International Management

- WCPFC adopted a harvest strategy for NP SWO in 2019 (WCPFC HS 2016-01)
- WCPFC adopted CMM 2023-03
  - Applies north of 20 N in the WCPFC area
  - Limits fishing effort to 2008-2010 average for fisheries taking >200 tons/year
    - US limited to maximum number of limited entry permits available during 2008-2010
- IATTC has not adopted any resolutions for NP SWO

Overview of Harvest Strategies and Management Strategy Evaluation

WCPFC CMM 2022-03

- First adopted a CMM on Establishing a Harvest Strategy for Key Fisheries and Stocks in the WCPO in 2014.
- Describes elements that should be included in a harvest strategy
- Management Objectives
- Reference Points
- Acceptable Levels of Risk

Harvest Strategies

- Also referred to as management procedures
- Specify pre-determined management actions depending on the status of stocks to achieve management objectives for a fishery
  - *For example: maximizing catch, ensuring stable harvests, and/or keeping the stock at a desired level*
- Monitoring Strategy
- Harvest Control Rules
- Management Strategy Evaluation

What is Management Strategy Evaluation?

• A flight simulator for fishery management • If a harvest strategy does not perform adequately in a computer simulation we should not expect it to work in the real world







NOAA FISHERIES

Management Strategy Evaluation (MSE)

- MSE models how potential management scenarios might be anticipated to affect the stock and fisheries using computer simulations of how the fish stock and fishery operate.
- MSE results demonstrate options that would likely provide satisfactory performance and achieve the fishery's long-term objectives across a wide range of uncertain future circumstances.
- Stakeholder input important for defining the inputs for the MSE process.

Strengthening the NP SWO Harvest Strategy

- Existing harvest strategy is not very robust
- Interest by US stakeholders to strengthen the harvest strategy, specifically through an MSE
- MSC certifications require fisheries managed by RFMOs to have a harvest strategy informed by an MSE • NC has had experience with MSEs for NP albacore and Pacific bluefin tuna, and updating harvest strategies informed by those MSEs

WCPFC Harvest Strategy 2016-01: Harvest Strategy for NP SWO Fisheries

- Adopted by WCPFC in 2019
- Not based on an MSE - developed as a starting point for management for NP swordfish
- Applies in the WCPFC Area north of 20 N
- Contains sections for relevant elements as outlined in CMM 2022-03
- Acknowledges in several areas that the NC should develop more refined management objectives and if more refined management objectives and reference points are specified, to work to evaluate performance through an MSE if appropriate

Initiating an MSE for NP SWO

- NC21 agreed to initiate an MSE for NP SWO
- Requested ISC to begin technical work on an

MSE once capacity is provided • Tasked ISC to develop a detailed workplan and present to NC in 2026, outlining steps and timeline to conduct and complete an MSE • Tasked NC to discuss candidate operational management objectives for WCNPO SWO in 2026

Status of MSE

- Post NC21 funding secured for a contractor to provide technical MSE support
  - Contract is time limited - technical support for MSE ends in 2028!

Purpose of Today's Webinar

- Gather U.S. stakeholder input to help develop candidate inputs for the MSE
  • Management objectives and performance indicators • Reference Points • Harvest Control Rules
- Other operational considerations

- ISC is developing a workplan to be discussed at NC • ISC will be requesting NC to provide as much guidance as possible in order to begin technical work on the MSE

U.S. Objectives

- Support ISC to conduct and complete the MSE work • Acknowledging the time constraints with funding support the NC providing ISC with greater guidance on candidate inputs so that preliminary work on the MSE can begin

Management Objectives and Performance Indicators

What are management objectives?

- Describe the overarching goals for the stock and fishery
- Current NP SWO management objective:
- *The management objective is to support thriving swordfish fisheries in the North Pacific while maintaining the stock size at levels capable of producing maximum sustainable yield. The Northern Committee will develop more refined management objectives.*

Performance Indicators

- Quantitatively define management objectives

Example - North Pacific Swordfish

- **HS 2016-01**
- *"maintain…the stock at levels capable of producing maximum sustainable yield"*

Management Objective Considerations

- MSE is opportunity to re-evaluate current contents of the harvest strategy including management objectives and envision development of a more

robust harvest strategy and management for NP SWO

- What categories of management objectives should be considered?
- Safety
- Status
- Stability
- Yield

- **Potential Operational Management Objective:**
- Maintain SSB at or above SSB_{MSY} with at least 50% probability

- **Potential Performance Indicator:**
- The probability that SSB is greater than or equal to SSB_{MSY} in any given year of the evaluation period

Management Objectives developed for North Pacific Albacore MSE

Management Objective	Label	Performance Indicator
1. Maintain SSB above the limit reference point	Odds SSB > LRP; *this MSE tested the three LRP's below (20%SSB0, 7.7%SSB0, and equilibrium 7.7%SSB0*	Probability that SSB in any given year of the MSE forward simulation is above the LRP
	Odds SSB > 20%SSB0	Probability that SSB in any given year of the MSE forward simulation is above the 20% of dynamic unfished SSB.
	Odds SSB > 7.7%SSB0	Probability that SSB in any given year of the MSE forward simulation is above 7.7% of dynamic unfished SSB.
	Odds SSB > equilibrium 7.7%SSB0	Probability that SSB in any given year of the MSE forward simulation is above the 7.7% of equilibrium unfished SSB.

Management Objectives developed for North Pacific Albacore MSE

2. Maintain depletion of total biomass around historical average depletion	Odds depletion > minimum historical	Probability that depletion in any given year of the MSE forward simulation is above minimum historical (2006-2015) depletion.
4. Maintain catches above average historical catch	Odds catch >historical	Probability that catch in any given year of the MSE forward simulation is above average historical (1981-2010) catch.
	Odds medium term catch > historical	Probability that catch averaged over years 7-13 of the simulation is above average historical (1981-2010) catch.
	Odds long term catch > historical	Probability that catch averaged over years 20-30 of the simulation is above average historical (1981-2010) catch.

Management Objectives developed for North Pacific Albacore MSE

5. Change in total allowable catch between years should be relatively gradual	Catch stability	Probability that a decrease in TAC (or catch for mixed control) is <30% between consecutive assessment periods (once every 3 years), excluding years where TAC=0.
	Odds of no management change	Probability of SSB > $SSB_{threshold}$
6. Maintain fishing intensity (F) at the target value with reasonable variability	F_{target}/F	F_{target}/F

Management Objectives and Performance Indicators used in Pacific Bluefin Tuna MSE

Category	Management Objective	Performance Indicator
Safety	There should be a less than 20%* probability of the stock falling below the LRP	Probability that SSB< LRP in any given year of the evaluation period
Status	To maintain fishing mortality at or below FTARGET with at least 50% probability	-Probability that F≤FTARGET in any given year of the evaluation period -Probability that SSB is below the equivalent biomass depletion levels associated with the candidates for FTARGET
Stability	To limit changes in overall catch limits between management periods to no more than 25%, unless the ISC has assessed that the stock is below the LRP	-Percent change upwards in catches between management periods excluding periods when SSB<LRP -Percent change downwards in catches between management periods excluding periods when SSB<LRP
Yield	Maintain an equitable balance in proportional fishery impact between the WCPO and EPO	Median fishery impact (in %) on SSB in the terminal year of the evaluation period by fishery and by WCPO fisheries and EPO fisheries
	To maximize yield over the medium (5-10 years) and long (10-30 years) terms, as well as average annual yield from the fishery	-Expected annual yield over 5-10 years of the evaluation period, by fishery -Expected annual yield over 10-30 years of the evaluation period, by fishery -Expected annual yield in any given year of the evaluation period, by fishery
	To increase average annual catch in all fisheries across WCPO and EPO	

Focus Questions #1 - 4

- **What management objectives or categories of management objectives would you like to be considered for the WCNPO SWO MSE?**
- **Is there interest in translating or modifying the current management objectives from the NP SWO harvest strategy into operational management objectives for the MSE?**
- **Are there specific performance indicators that you would like to see developed to evaluate the performance of desired management objectives?**
- **If there is a desire to reference catch or biomass levels relative to a historical period, is there a preferred set of years or time period?**

Reference Points

WCPFC and Limit Reference Points (LRP)

- LRP Working Definition
- *they define a state of the fishery that is considered to be undesirable and which management action should avoid;*
- *the probability of breaching an LRP should be very low;*
- *management actions should be taken before the fishery falls below or is at risk of falling below an LRP.*

WCPFC and NP SWO LRP

- NP SWO defined as a Level 1 stock
- LRP should be F_{MSY} and B_{MSY}
- HS 2016-01 specifies LRP for NP SWO as F_{MSY}

IATTC and domestic considerations

- IATTC
  - No adopted LRP for NP SWO
  - Adopted an LRP for 7.7% SSB_0 for tropical tunas

- US Fishery Management Plan for U.S. West Coats Fisheries for Highly Migratory species (HMS FMP) and Fishery Ecosystem Plan for Pelagic Fisheries of the Western Pacific Region (Pelagics FEP)
  - MSST = 8.5%SSB_0

Target Reference Point (LRP)

- WCPFC definition of TRP
  - *"targets intended to meet management objectives"*

- IATTC definition
  - *"A target reference point is a management objective based on a level of spawning biomass (STARGET) or a fishing mortality rate (FTARGET) that should be achieved and maintained."*

- *F%SPR in 2019-2021 = 43%SPR*

Other Reference Points

- F_{min}
- Threshold reference point (ThRP)

Focus Question #5 - 7

- **What suggestions do you have for candidate target reference points?**

- **The current harvest strategy for NP SWO specifies an F-based reference point, but not a biomass-based limit reference point? How important is it to define the latter?**

- **What additional candidate reference points would you like considered? (For example, ThRP or Fmin)?**

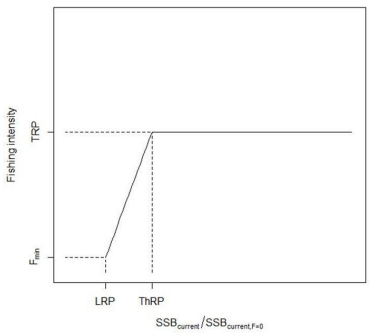
Harvest Control Rules Design

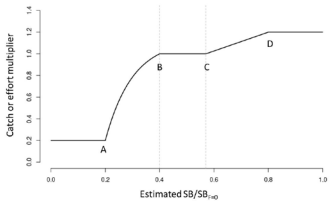
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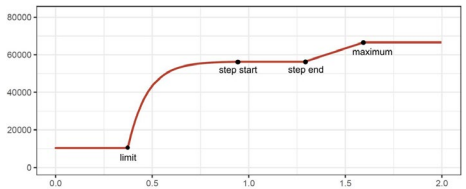
Reference Points/Control Points

Shape (e.g., hockey stick, Hillary step)

Stability Clauses







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Harvest Control Rule Design

Harvest Control Rules (HCRs)

- Specify levels of fishing that can occur based on the status of the stock, and may be model or empirically-based

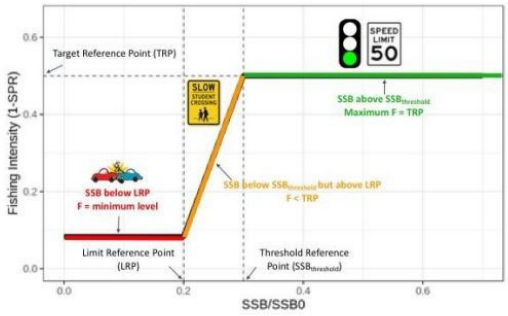


Figure 2. Example of a generic harvest control rule (HCR) tested in the NPALB MSE. SSB0 on the x-axis refers to dynamic unfished SSB (SSB0_d).

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Focus Question #8-10

- **What is your preferred HCR shape to evaluate?**

- **Should the HCR shapes incorporate candidate reference points or other control points?**
- **What other control rules - e.g., stability clauses should be considered?**

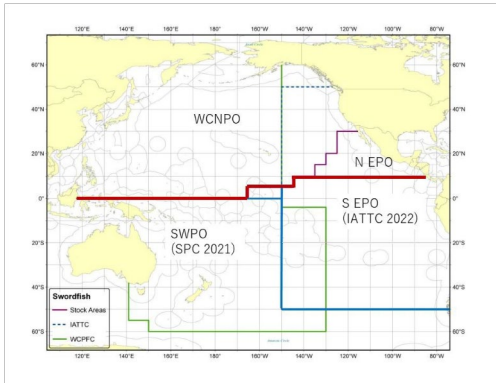
- **What should the duration of the management period be for NP SWO?**
- **What fisheries should be managed through the MSE (all fisheries or specific gears)?**
- **What should the control output be (e.g., fishing intensity, catch, effort, etc.)?**

May 26	Meeting of the Permanent Advisory Commitee to Advise the U.S. Commissioners to the WCPFC (virtual)
June 29	Northern Committee Proposals Due
July 13-14	22nd Regular Session of the WCPFC Northern Committee (Nagasaki, Japan)

Other Operational Considerations

Other Operational Considerations

- Duration of management periods
- Fisheries to be managed by the harvest strategy
- Control Mechanisms
- Geographic Scope of the MSE



Focus Question #11-14

Next Steps

- **What should the geographic scope be that the MSE applies to?**

Focus Question #15

- The WCPFC NC agreed to initiate the MSE for WCNPO SWO with the objective of revising the WCPFC harvest strategy. Is there interest in developing a pan-Pacific harvest strategy for WCNPO SWO?

Thank you!

Questions?

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