INTERNATIONAL PACIFIC HALIBUT COMMISSION

Considerations for the Management Strategy Evaluation Program of Work for 2026-2027

Agenda item: 4.2
IPHC-2026-MSAB022-07
(A. Hicks & I. Stewart)

Purpose

To provide the Management Strategy Advisory Board (MSAB) with an overview of work topics for the IPHC Management Strategy Evaluation (MSE) in 2026–2027.

Schedule of Harvest Strategy Policy events

Y: Task is done
x: Task may be done

Year	1	2	3	4	5	6	7	8
Example Year	2025	2026	2027	2028	2029	2030	2031	2032
FISS coastwide index	Y	Y	Y	Y	Y	Y	Y	Y
Full stock assessment	Y			Y			Y	
Update stock assessment		Y	Y		Y	Y		Y
Commission TCEY decision	Y	Y	Y	Y	Y	Y	Y	Y
MSE OM updated		Y			x			Y
MP re-evaluated		Y			x			Y
Exceptional circumstances checked	Y		Y	Y	x[1]	Y	Y	
- Consult with SRB and MSAB			x	x	x	x	x	
- Present to Commission			x	x	x	x	x	
- Re-evaluate MP due to EC			*	*	Y[2]	x*	x*	
Update HSP			x			x		

[1] The exceptional circumstance would be checked only if a new MSE OM was not updated.

[2] The MP would be re-evaluated as part of the normal three-year cycle due to an exceptional circumstance occurring in two sequential years.

* An exceptional circumstance can be declared after two sequential instances, thus re-evaluation of an MP would have a delay, unless recommended by the Commission outside of the normal process.

AM102: High Priority topics

IPHC-2026-AM102-R, para. 56. *The Commission **NOTED** that the 2026 MSE and HSP Program of Work will include the following high priority topics:*

a) *Update and recondition the MSE Operating Model in accordance with the schedule defined in the Harvest Strategy Policy;*

b) *Evaluate a range of SPR values to determine if the optimal reference coastwide fishing intensity is different than the current reference fishing intensity (F43%) defined in the HSP;*

c) *Investigate productivity regimes to determine how the Pacific halibut population and fisheries respond to different productivity regimes, if the optimal reference fishing intensity differs across productivity regimes, and how productivity regimes may be incorporated into a Management Procedure;*

d) *Further develop the Depleted concept and identify a limit reference point below which recovery of the Pacific halibut population would be uncertain.*

AM102: Low priority topics

IPHC-2026-AM102-R, para. 57. *The Commission **NOTED** that the 2026 MSE and HSP Program of Work will include the following low priority topics, which may not be completed before AM103:*

a) *Improve the estimation model used in the MSE framework to better characterize the stock assessment in the simulations;*
b) *Evaluate potential management actions to invoke when approaching a depleted limit reference point;*
c) *Evaluate additional elements of Management Procedures which may include a triennial assessment frequency, constraints and smoothers on the interannual change in the TCEY, and empirical rules to determine the reference TCEY in years without a stock assessment;*
d) *Determine reference points using the updated MSE Operating Model (e.g. FMSY and MSY);*
e) *Develop guidance documents for the Harvest Strategy Policy (e.g. specifications of a rebuilding plan).*

AM102: Other Notes

IPHC-2026-AM102-R, para. 58. *The Commission **NOTED** that the 2026 MSE and HSP Program of Work should not include topics related to the distribution of the TCEY, as this is part of the decision-making process and not part of the management procedure, as described in the Harvest Strategy Policy.*

IPHC-2026-AM102-R, para. 59. *The Commission **NOTED** that outcomes of the 2026 MSE workplan (e.g. an optimal fishing intensity) may be used to update the Harvest Strategy Policy in the future.*

High Priority Tasks

- Condition the MSE Operating Model (OM)
- Evaluate a range of SPR values (fishing intensity)
- Investigate productivity regimes
- Further develop the Depleted concept and identify a limit reference point

Condition the MSE Operating Model (OM)

- Four individual models of the OM are conditioned and will be reviewed by the SRB
- Next steps are to produce projections to understand their behavior and compare to previous OM individual models
- The conditioning process does not need to be repeated until after the next full stock assessment (every three years) or an exceptional circumstance occurs
  - New mortality, weight-at-age, and other data are incorporated each year
- See presentation IPHC-2026-MSAB022-06

Evaluate a range of SPR values (fishing intensity)

- Ensure that the reference fishing intensity continues to be the optimal fishing intensity to the meet the Commission priority objectives
- At MSAB021 a recommendation was made to evaluate a range of SPR values

IPHC-2025-MSAB021-R, para. 36: *The MSAB **REQUESTED** further evaluations of the following MP elements, after the OM is conditioned following the full 2025 stock assessment:*

a) fishing intensities including, but not limited to, SPRs of 40%, 43%, 46%, 52%, 55%, and 100% (no directed fishing); …

- This is a reasonable range of values, but can be extended

Investigate productivity regimes

- At MSAB021, statements were made regarding productivity regimes

IPHC-2026-MSAB021-R, para 19. *The MSAB **AGREED** that it would be useful to explore productivity regimes, their effect on the MSE results, and how it may assist in the selection of a management procedure.*

IPHC-2026-MSAB021-R, para 31. *The MSAB **NOTED** that simulation results with fixed weight-at-age and high or low Pacific Decadal Oscillation (PDO) (i.e. productivity regimes) were helpful to understand the variability, current stock status, and the implication of different MPs under different productivity regimes.*

IPHC-2026-MSAB021-R, para 39. *The MSAB **REQUESTED** conducting simulations assuming the following productivity regimes with a subset of the MPs from paras. 36 and 37 and all other sources of variability:*

a) low recruitment and low weight-at-age;

b) low recruitment and current weight-at-age;

c) high recruitment and low weight-at-age.

IPHC-2026-MSAB021-R, para 41. *The MSAB **REQUESTED** presenting dynamic unfished spawning biomass along with simulated spawning biomass, and trace plots (the purple plots in document IPHC-2025-MSAB021-06) with uncertainty for the productivity regimes at MSAB022 for productivity regimes described in para. 39, with SPRs of 43% and 52%.*

Three main concepts to explore relative to productivity

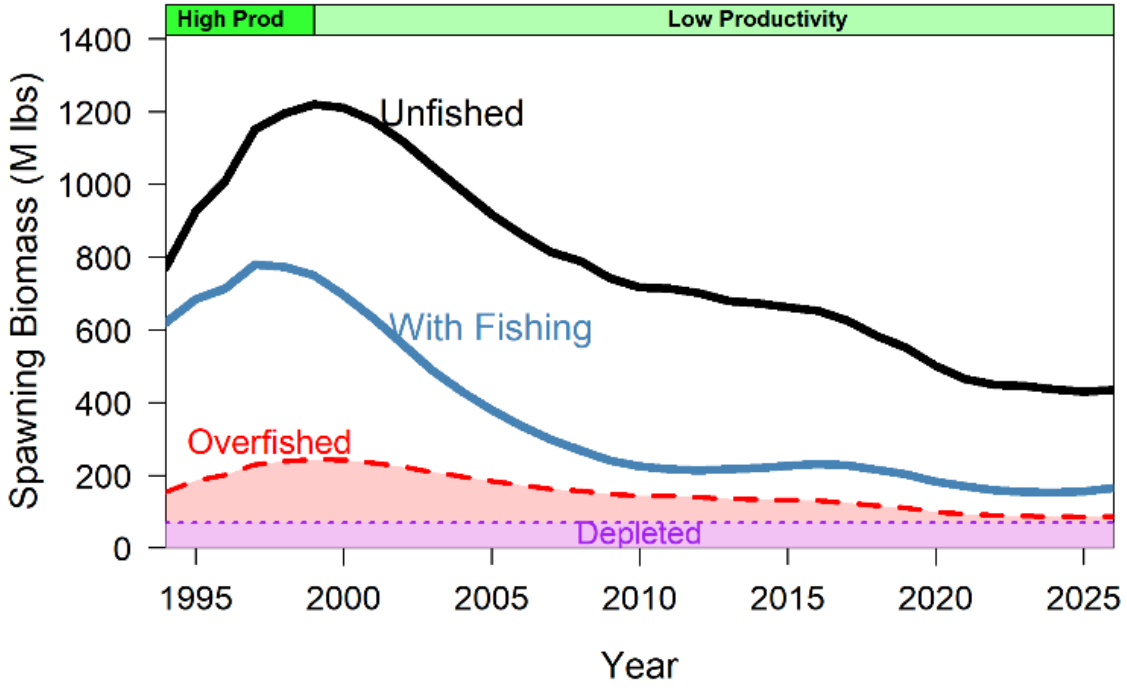
1. how the Pacific halibut population and fisheries respond to different productivity regimes,
2. if the optimal reference fishing intensity differs across productivity regimes, and
3. how productivity regimes may be incorporated into a Management Procedure

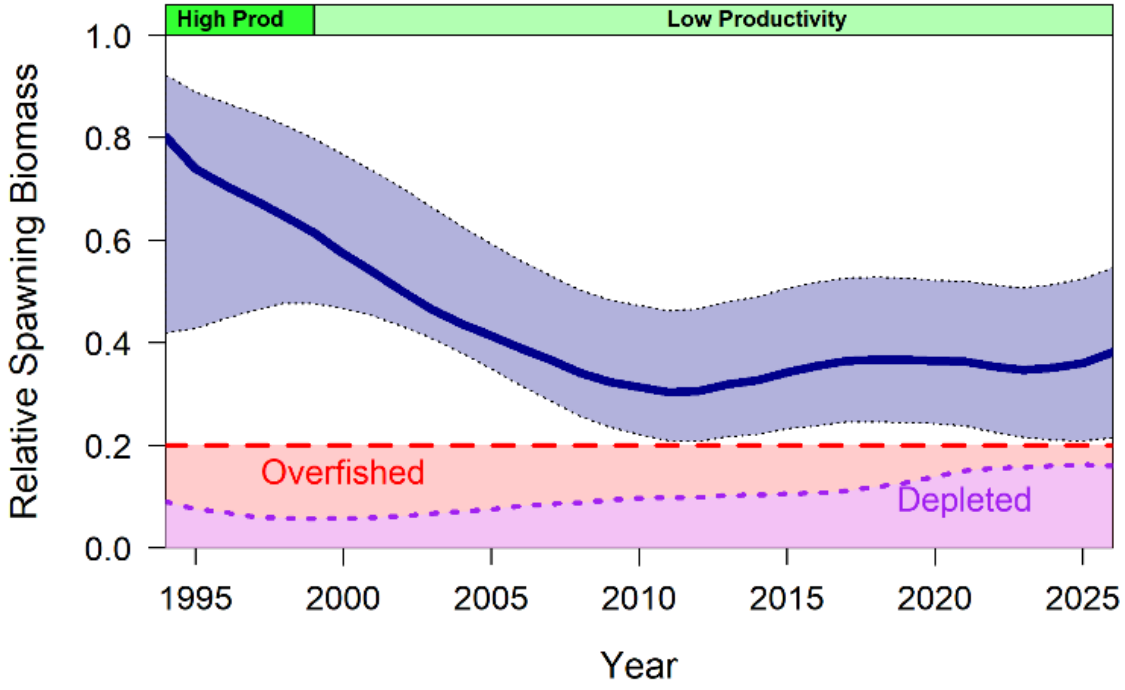
Steps to investigate productivity

1. Define productivity regimes
2. Use the new OM to conduct simulations assuming different productivity for a range of SPR values
3. Evaluate the effects of productivity on the optimal fishing intensity
4. Identify Management Procedures (MPs) to investigate that incorporate productivity
5. Determine effective methods to present the effects of productivity

Further develop the Depleted concept and identify a limit reference point

Depleted: The level of female spawning biomass below which the potential for recovery is uncertain





Simulations to identify a Depleted limit

- Conduct simulations with the new OM to identify a level of female spawning biomass below which the potential for recovery is uncertain
  - Low productivity, but maybe another productivity as well
  - Various depensatory spawner-recruit relationships
    - The recruits-per-spawner are reduced at very low spawning biomass

An exceptional circumstance related to Depleted

IPHC-2025-SRB027-R. para 21. *The SRB **RECOMMENDED** defining an "exceptional circumstance" if the stock is determined to be "depleted" as this state is unlikely to occur under the circumstances in which the HSP is implemented and may be indicative of a need for model revision*

Possible language:

- If the stock assessment determines that the stock is depleted in two or more consecutive years, an exceptional circumstance will be triggered

Low priority tasks

- Improve the estimation model in the MSE framework
- Evaluate potential management actions when approaching the depleted limit reference point
- Evaluate additional elements of Management Procedures
- Update estimates of reference points
- Develop guidance documents for the Harvest Strategy Policy
- *Incorporate autocorrelated recruitment in projections*
- *Update objectives and performance metrics*

In italics were not noted by Commission at AM102

Improve the estimation model

- The estimation model mimics the stock assessment in the simulations

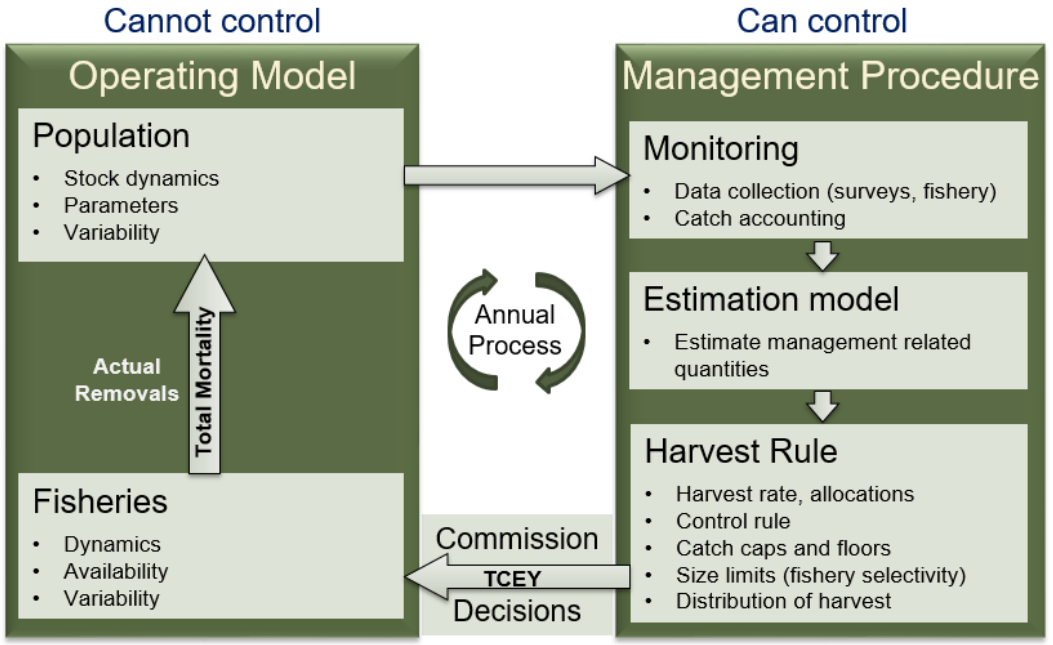
IPHC-2025-SRB027-R, para 24. *The SRB **RECOMMENDED** considering the development of an assessment model within the MSE framework. This would have multiple benefits including:*

a) *facilitating analysis of the economic consequences of reduced FISS sampling and the associated increased potential for bias in assessment-relevant metrics such as WPUE, the maturity schedule, size-at-age, and age composition.*

b) *Understanding the impacts of uncertainty in natural mortality on management performance.*

Improve the estimation model

- A Management Procedure consists of
  - Data generation
  - Estimation model
  - Harvest Rules
- Implementing a full ensemble stock assessment in the simulations is not feasible
- A simplified estimation model can still capture the necessary qualities of a stock assessment

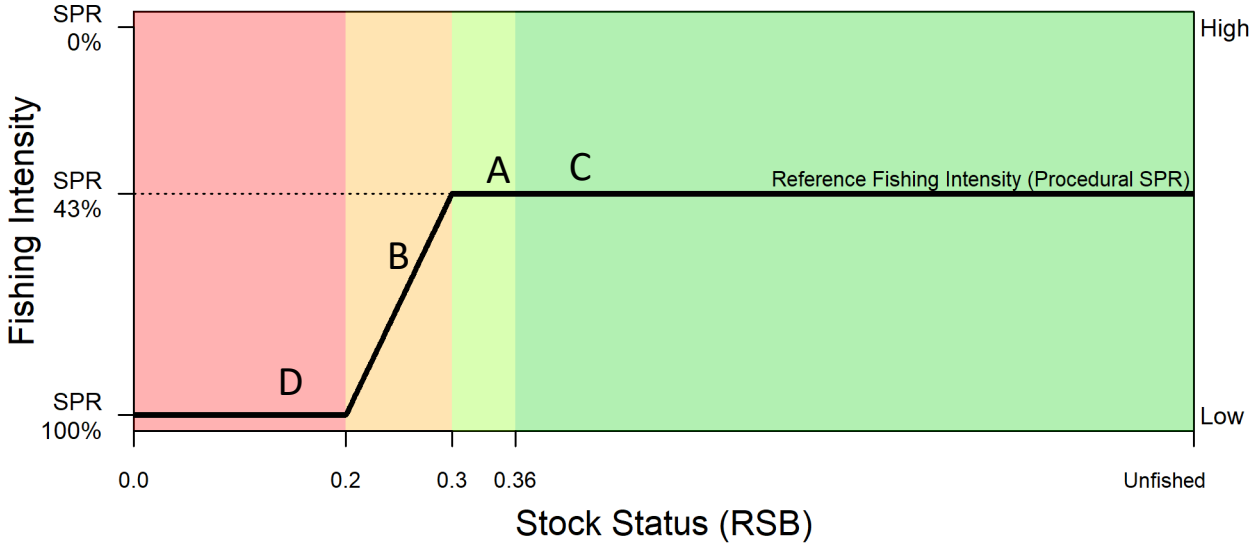


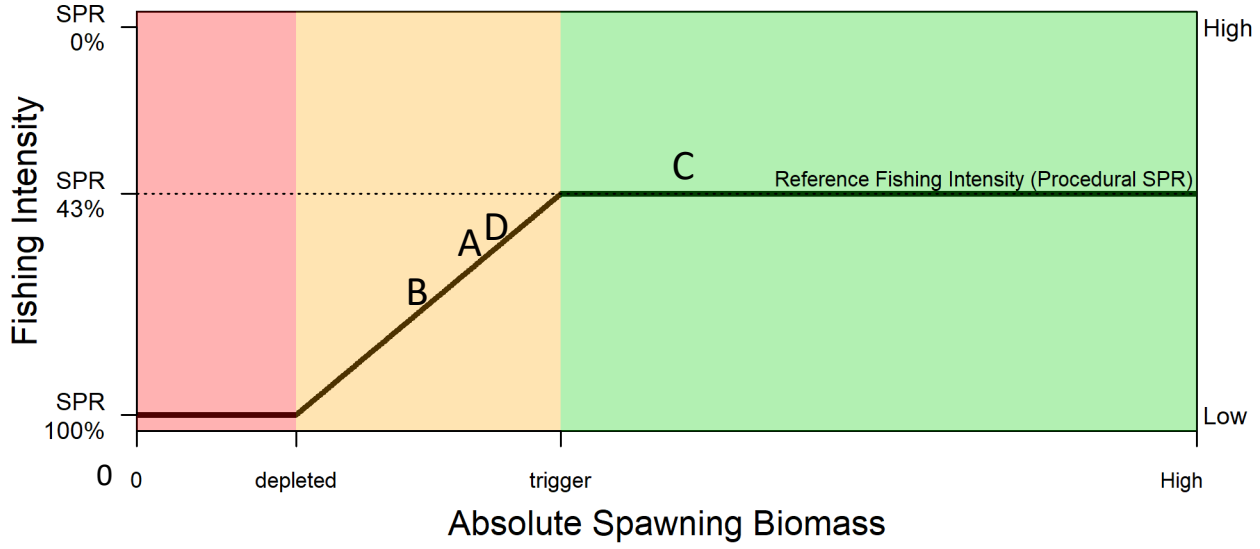
Evaluate potential management actions when approaching the depleted limit reference point

- Investigate management actions if the stock is approaching the depleted limit reference point
  - Determining this limit reference point is a high priority task
- Management actions could be
  - A control rule that reduces fishing intensity as the absolute spawning biomass approaches the depleted limit reference point
    - Could be used in addition to the current 30:20 control rule
  - Adjusting the reference fishing intensity based on the perceived productivity regime
  - …

Example of multiple control rules

- Example: Two control rules determining a reduction in fishing intensity
  - Ex A: CR1 says no reduction, CR2 says a 25% reduction
  - Ex B: CR1 says a 30% reduction, CR2 says a 50% reduction
  - Ex C: Both say no reduction
  - Ex D: CR1 says 100% reduction (no fishing), CR2 says 20% reduction





Example of multiple control rules

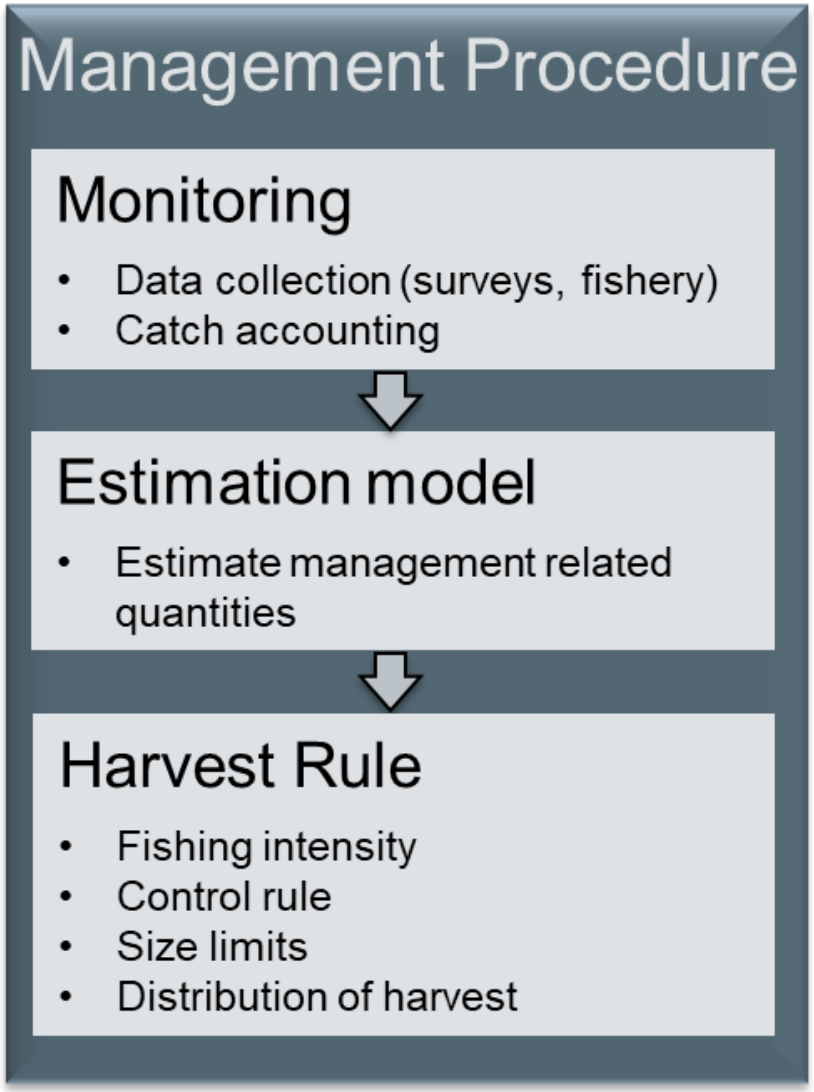
Some Potential Methods

1. Determine which one results in largest reduction in fishing intensity and use only that one
2. Average them by determining mean proportional reduction
3. Multiply them to combine the reduction

Example	Method 1 (max)	Method 2 (mean)	Method 3 (combine)
A (0% & 25%)	25%	12.5%	25%
B (30% & 50%)	50%	40%	65%
C (0% and 0%)	0% (none)	0% (none)	0% (none)
D (100% & 20%)	100% (no fishing)	60%	100% (no fishing)

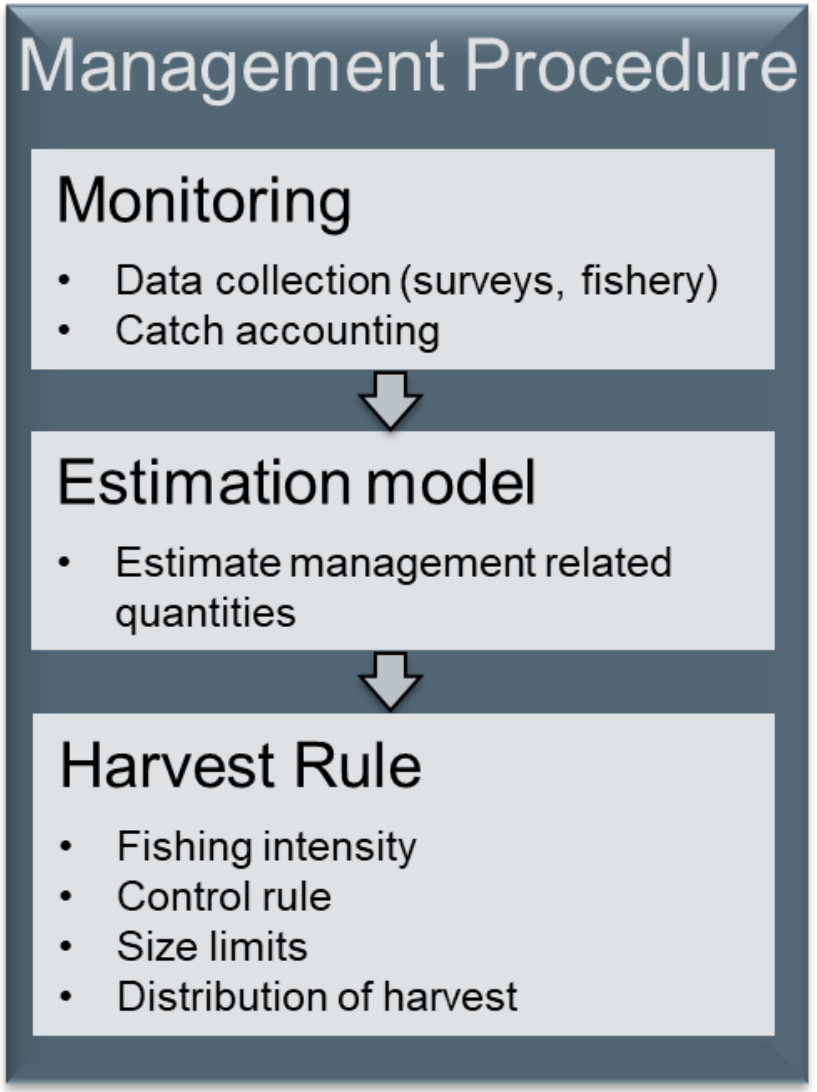
Evaluate additional elements of Management Procedures (MPs)

- The MSE framework is used to evaluate Management Procedures (MPs)
- An MP is a defined process to determine mortality limit(s)
  - Repeatable, can be coded for simulation
  - Composed of multiple elements
    - Fishing intensity
    - Assessment frequency and empirical management procedure
    - Constraints
    - FISS designs
- Current interim reference MP
  - SPR=43%, 30:20 control rule



Elements of MPs considered

- Fishing Intensity or SPR (many years)
- Constraints (many years)
- Assessment Frequency (many years)
- FISS designs (2024)
- Size limits (2022)
- Distribution procedures (2020, 2021)
- Control rule (2017-2019)



MP elements of interest to the MSAB

IPHC-2025-MSAB021-R, para 36. *The MSAB **REQUESTED** further evaluations of the following MP elements, after the OM is conditioned following the full 2025 stock assessment:*

a) *fishing intensities including, but not limited to, SPRs of 40%, 43%, 46%, 52%, 55%, and 100% (no directed fishing);*

b) *a triennial assessment frequency;*

c) *various empirical rules to determine the reference coastwide TCEY in non-assessment years;*

d) *control rules with triggers at higher values than $RSB_{30\%}$ or based on absolute spawning biomass relative to the spawning biomass estimated at the beginning of 2024.*

Constraints of interest to MSAB

IPHC-2025-MSAB021-R, para 37. *The MSAB **REQUESTED** evaluating constraints and smoothers, along with MP elements listed in para. 36, that would potentially reduce the interannual variability in the TCEY, including:*

a) *a 3-year rolling average (arithmetic or geometric) on the FISS O32 WPUE used in the empirical rule in a triennial stock assessment frequency;*

b) *constraints applied only to non-assessment years and/or applied only to assessment years;*

c) *a phase-in approach for the change in TCEY in assessment years;*

d) *using the trends in fishery CPUE and/or FISS WPUE to determine if a bigger reduction should be taken than suggested by the unconstrained reference TCEY to curtail further reductions in the SB.*

Past work on constraints

- Maximum change (e.g. 15%)
  - Would be worth looking at other percentages
  - When TCEY increases or decreases, or only when increasing
- Slow Up – Fast Down
  - TCEY can increase slowly, but can decrease quickly
  - Restricted change in both directions
- Slow Up – Full Down
  - TCEY can increase slowly, but can decrease quickly
  - Restricted change only when increasing

Update estimates of reference points

- MSY-based reference points were determined in 2019
  - IPHC-2019-SRB015-11 Rev_1
- Since then, there have been many updates to the stock assessment, the OM, and the data
- Repeating this analysis will ensure that the Harvest Strategy Policy (HSP) reflects current information

Develop guidance documents for the HSP

- The Harvest Strategy Policy (HSP) is a high-level document
- Some details are omitted for brevity
- Supplementary guidance documents can provide the more detail
  - Guidelines for developing a rebuilding plan for Pacific halibut if it was determined to be overfished
  - Other guidance documents as necessary
- These documents would then be considered by the Commission for adoption

Incorporate autocorrelated recruitment in projections

- Investigated autocorrelated recruitment in document IPHC-2025-SRB027-08
- Some evidence that it may be useful to include this in the MSE simulations
- Will discuss with the SRB if this is appropriate

Update objectives and performance metrics

- It is useful to revisit goals and objectives to clarify and/or add new ones
  - For example, objectives related to an absolute spawning biomass or a depleted level
- Also useful to review performance metrics related to objectives
- **IPHC-2025-SRB027-R, para 22.** *The SRB **RECOMMENDED** considering some fishery performance indicators that represent metrics directly observable by stakeholders, e.g. fishery CPUE*

Primary goals and objectives

General Objective	Measurable Objective	Measurable Outcome	Time-frame	Tolerance	Performance Metric
1.1. Keep female spawning biomass above a limit to avoid critical stock sizes and conserve spatial population structure	Maintain the long-term coastwide female relative spawning biomass above a biomass limit reference point ($RSB_{20\%}$) at least 95% of the time	RSB < Spawning Biomass Limit (RSB_{Lim}) RSB_{Lim}=20% unfished spawning biomass	Long-term	0.05	$P(RSB < RSB_{Lim})$ Fail if greater than 0.05
	Maintain a defined minimum proportion of female spawning biomass in each Biological Region	$p_{SB,2} > 5\%$ $p_{SB,3} > 33\%$ $p_{SB,4} > 10\%$ $p_{SB,4B} > 2\%$	Long-term	0.05	$P(p_{SB,R} < p_{SB,R,min})$

Primary goals and objectives

General Objective	Measurable Objective	Measurable Outcome	Time-frame	Tolerance	Performance Metric
2.1 Maintain spawning biomass at or above a level that optimizes fishing activities	Maintain the long-term coastwide female relative spawning biomass at or above a biomass reference point ($RSB_{36\%}$) 50% or more of the time	RSB<Spawning Biomass Reference (RSB_{Thresh}) RSB_{Thresh}=$RSB_{36\%}$ unfished spawning biomass	Long-term	0.50	$P(RSB < RSB_{Thresh})$ Fail if greater than 0.5

Green text indicates priority objectives

Primary goals and objectives

General Objective	Measurable Objective	Measurable Outcome	Time-frame	Tolerance	Performance Metric
2.2. Provide Directed Fishing Yield	Optimize average coastwide TCEY	Median coastwide TCEY	Short-term		Median $\overline{TCEY}$
	Optimize TCEY among Regulatory Areas	Median $TCEY_A$	Short-term		Median $\overline{TCEY_A}$
	Optimize the percentage of the coastwide TCEY among Regulatory Areas	Median $\%TCEY_A$	Short-term		Median $\overline{\left(\frac{TCEY_A}{TCEY}\right)}$
	Maintain a minimum TCEY for each Regulatory Area	Minimum $TCEY_A$	Short-term		Median Min(TCEY)
	Maintain a percentage of the coastwide TCEY for each Regulatory Area	Minimum $\%TCEY_A$	Short-term		Median Min(%TCEY)

Green text indicates priority objectives

Primary goals and objectives

General Objective	Measurable Objective	Measurable Outcome	Time-frame	Tolerance	Performance Metric
2.3. Limit Variability in Mortality Limits	Limit annual changes in the coastwide TCEY	Annual Change (AC) > 15% in any 3 years	Short-term		$P(AC_3 > 15\%)$
		Median coastwide Average Annual Variability (AAV)	Short-term		Median AAV
	Limit annual changes in the Regulatory Area TCEY	Annual Change (AC) > 15% in any 3 years	Short-term		$P(AC_3 > 15\%)$
		Average AAV by Regulatory Area (AAV_A)	Short-term		Median AAV_A

Green text indicates priority objectives

Summary

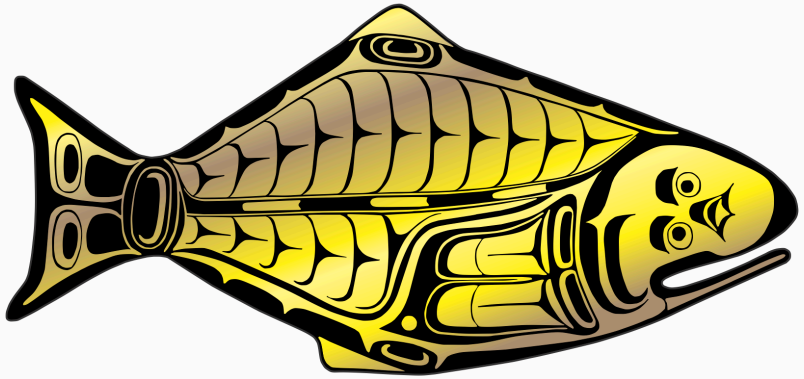
- High priority tasks
  - Condition the MSE Operating Model
  - Evaluate a range of SPR values
  - Investigate productivity regimes
  - Further develop the depleted concept and identify a limit reference point
- Low priority tasks
  - Improve the estimation model in the MSE framework
  - Evaluate potential management actions when approaching the depleted limit reference point
  - Evaluate additional elements of the Management Procedures
  - Update estimates of reference points
  - Develop guidance documents for the Harvest Strategy Policy
  - *Incorporate autocorrelated recruitment in projections*
  - *Update objectives and performance metrics*

Recommendations

That the MSAB:

1. **NOTE** paper IPHC-2026-MSAB022-07 that describes tasks included in the MSE Program of Work for 2026–2027.
2. **REQUEST** additional tasks to be included in the MSE Program of Work for 2026–2027.

INTERNATIONAL PACIFIC



HALIBUT COMMISSION

https://www.iphc.int/