

INTERNATIONAL PACIFIC



HALIBUT COMMISSION

Considerations for the Management Strategy Evaluation Program of Work for 2025-2026

Agenda item: 5.1
IPHC-2025-MSAB021-08
(A Hicks & I Stewart)



Overview

- Provide MSAB with some potential MSE-related topics to add to the Program of Work for 2025-2026
- Completed work summarized in [MSAB020-06](#) and [AM101-12](#)
- Potential topic areas
 - Continued discussion of objectives
 - Elements of Management Procedures
 - Reference Points and variability
 - OM development



Objectives

- Possible work topics
 - Provide recommendations to Commission on important objectives
 - Recommend a hierarchical structure for the objectives
 - Consider important regional and sector objectives
 - Performance metrics



Commission Priority Objectives

Priority Order

- a) Maintain Pacific halibut female spawning biomass, above a female spawning biomass limit where the risk to the stock is regarded as unacceptable (RSB_{LIM}), at least 95% of the time;
- ➔ b) Maintain Pacific halibut female spawning biomass, at least 50% of the time, at or above a female spawning biomass threshold (RSB_{THRESH}) that optimises fishing activities on a spatial and temporal scale relevant to the fishery;
- ➔ c) Optimise average coastwide yield given the constraints above;
- d) Limit annual changes in the coastwide mortality limit (TCEY) given the constraints above.

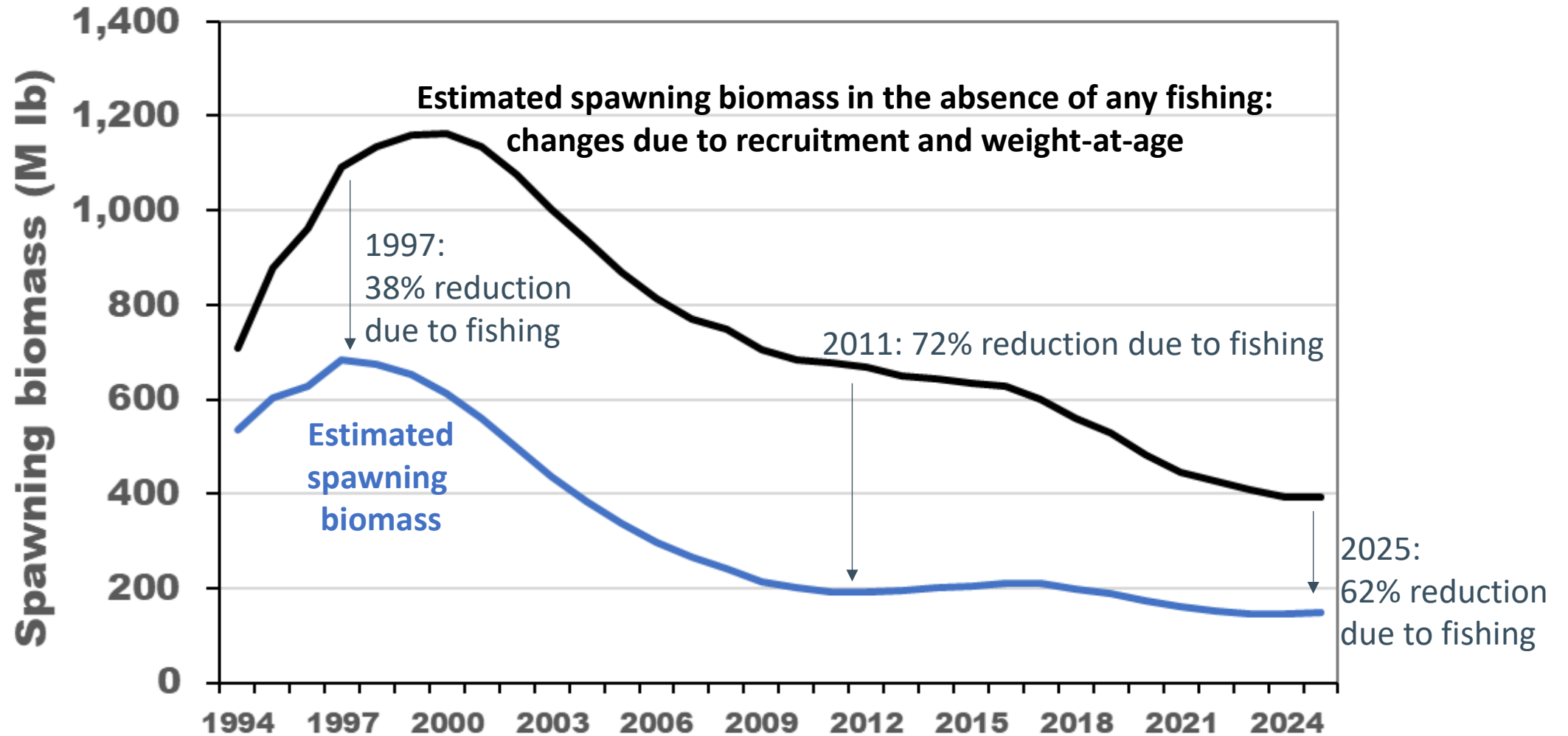


At or above $B_{36\%}$ (objective b)

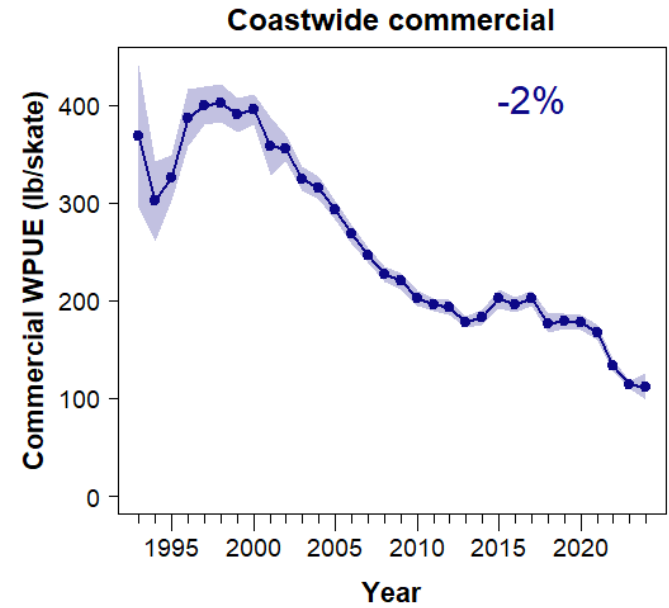
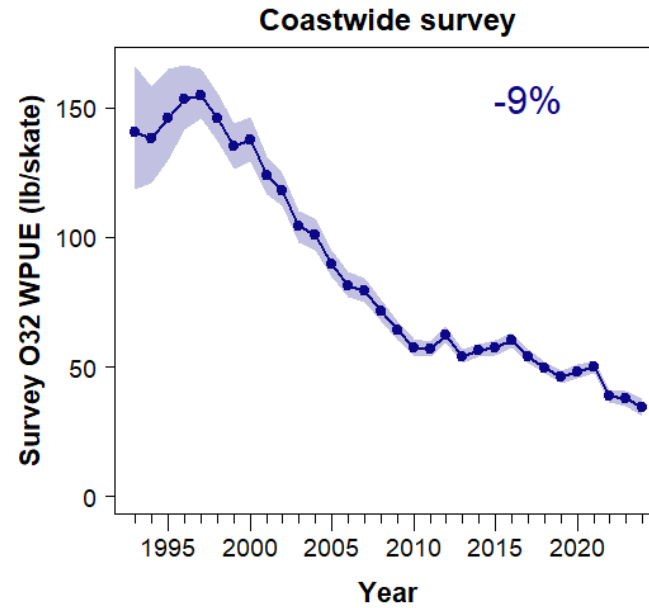
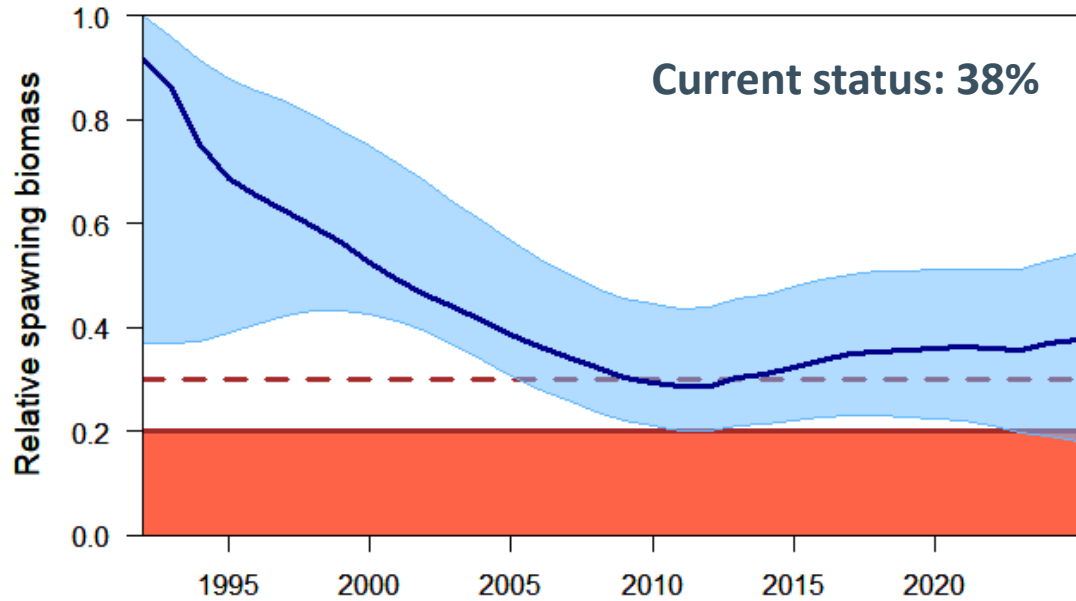
- $RSB_{36\%}$ is a proxy for Maximum Economic Yield (MEY)
- Relative Spawning Biomass was above 36% in 2025
 - Measuring the effect of fishing
 - Well above the conservation objective ($RSB_{20\%}$)
- 2024 FISS & Commercial WPUE lowest observed since 1993
 - Affected by the weight-at-age, recruitment, and fishing
 - Concern about catch-rates and level of spawning biomass
- Adopted coastwide TCEY less than that determined from the interim reference fishing intensity ($SPR=43\%$) in 2023, 2024, and 2025
- Catch-rates and absolute biomass seem to be important, especially when they are low, and even though stock status is above $RSB_{36\%}$



Stock status – measuring the effect of fishing



2024 Stock Assessment



Working towards a potential new objective

- [IPHC-2024-MSAB020-R](#), para 16. The MSAB **NOTED** that **a new objective to maintain the coastwide TCEY above a threshold** may be useful because
 - it is meaningful to stakeholders,
 - may define a minimum coastwide TCEY necessary for economic viability, and
 - may be a proxy for maintaining catch-rates and absolute spawning biomass above a threshold which may be important to stakeholders.
- [IPHC-2024-MSAB020-R](#), para 17. The MSAB **NOTED** that **the RSB_{36%} objective** (b in paragraph 12) is a useful objective because
 - it separates fishing effects from environmental effects on the stock,
 - scales with changes in productivity,
 - defines a desired relative spawning biomass to be at or above,
 - is based on a proxy for RSB_{MEY} and
 - is an objective that is often important to fishery certification agencies



An objective related to absolute spawning biomass

Pros	Cons
Higher spawning biomass likely correlates with a more efficient fishery (e.g. catch-rates).	Defining an appropriate threshold can be challenging.
Measures the actual amount of biomass rather than the biomass relative to an unfished level.	The threshold is dependent on external factors that may not be influenced by management decisions.
Maintaining a level of absolute biomass may ensure that successful reproduction can occur.	Area-specific absolute biomass may be more important than a coastwide absolute biomass.
Absolute biomass can represent a direct reference level that is meaningful to stakeholders.	Interpretation of an appropriate absolute biomass differs among stakeholders



Absolute Biomass: Conservation or Fishery Objective

Conservation	Fishery
Maintain population to support successful spawning	Maintain population to support desired catch-rates
Maintain population to support ecosystem functioning	Maintain a biomass that supports opportunities for all sectors
	Maintain a biomass that ranges across Biological Regions



Optimise average coastwide TCEY (objective c)

[IPHC-2024-SRB024-R](#), para 22. The SRB **RECOMMENDED** that the Commission *develop a more specific and quantifiable catch objective to replace Objective c* (from AM099–Rec.02) “Optimize average coastwide TCEY”.

- Optimise is vague and cannot be evaluated
 - Was originally chosen to provide flexibility during evaluation
- [IPHC-2024-MSAB020-R](#) (para. 14). The MSAB **RECOMMENDED** that
 - the Commission priority objective “optimise average coastwide TCEY” be changed to “**maximise average coastwide TCEY**” and that
 - **this objective along with the variability in yield objective be given equal consideration** to allow for the evaluation of trade-offs between these two objectives.



PURPOSE	TYPE	GOAL	GENERAL OBJECTIVE	MEASURABLE OBJECTIVE
LONG-TERM OVERARCHING OBJECTIVES DEFINING MPs TO AVOID	CONSERVATION	SUSTAINABILITY	1. KEEP FEMALE SPAWNING BIOMASS ABOVE A LIMIT TO AVOID CRITICAL STOCK SIZES	a) Maintain long-term coastwide female relative spawning biomass above a biomass limit reference point (RSB _{20%}) at least 95% of the time
	FISHERY	OPTIMISE FISHING ACTIVITIES AND OPPORTUNITIES	2. MAINTAIN SPAWNING BIOMASS AT OR ABOVE A LEVEL THAT SUPPORTS OPTIMAL FISHING ACTIVITIES AND OPPORTUNITIES	b) Maintain long-term coastwide female relative spawning biomass at or above a biomass threshold reference point (RSB _{36%}) 50% or more of the time.
c) Maintain long-term coastwide female absolute spawning biomass at or above a biomass threshold reference point				
SHORT-TERM MANAGEMENT OBJECTIVES DEFINING A REFERENCE MP	FISHERY	OPTIMISE YIELD	3. PROVIDE DIRECTED FISHING YIELD WHILE LIMITING VARIABILITY IN MORTALITY LIMITS	c) Maximise average coastwide TCEY
				d) Limit annual changes in the coastwide TCEY

Hierarchical objectives

1. Maintain the long-term coastwide Pacific halibut female relative spawning biomass, above a biomass limit reference point where the risk to the stock is regarded as unacceptable ($RSB_{20\%}$), at least 95% of the time;
2. Maintain the long-term coastwide Pacific halibut female relative spawning biomass, at least 50% of the time, at or above a threshold reference point that optimises fishing activities on a spatial and temporal scale relevant to the fishery ($RSB_{36\%}$);
3. Balance the trade-off between maximising the sustainable average coastwide yield and minimising annual changes in the coastwide mortality limit, given the constraints above .

LONG-TERM OVERARCHING OBJECTIVES DEFINING ACCEPTABLE MPs

1. SUSTAINABILITY	
GENERAL OBJECTIVE	MEASURABLE OBJECTIVE
KEEP FEMALE SPAWNING BIOMASS ABOVE A LIMIT TO AVOID CRITICAL STOCK SIZES	Maintain the long-term coastwide female relative spawning biomass above a biomass limit reference point ($RSB_{20\%}$) at least 95% of the time

2. OPTIMISE FISHING ACTIVITIES AND OPPORTUNITIES	
GENERAL OBJECTIVE	MEASURABLE OBJECTIVE
MAINTAIN SPAWNING BIOMASS AT OR ABOVE A LEVEL THAT SUPPORTS OPTIMAL FISHING ACTIVITIES AND OPPORTUNITIES	Maintain the long-term coastwide female relative spawning biomass at or above a biomass threshold reference point ($RSB_{36\%}$) 50% or more of the time.

SHORT-TERM MANAGEMENT OBJECTIVES INFORMING A REFERENCE MP	
3. OPTIMISE YIELD	
GENERAL OBJECTIVE	MEASURABLE OBJECTIVE
PROVIDE DIRECTED FISHING YIELD WHILE LIMITING VARIABILITY IN MORTALITY LIMITS	Balance the trade-off between maximising the sustainable average coastwide mortality limit and minimising annual changes in the coastwide mortality limit.



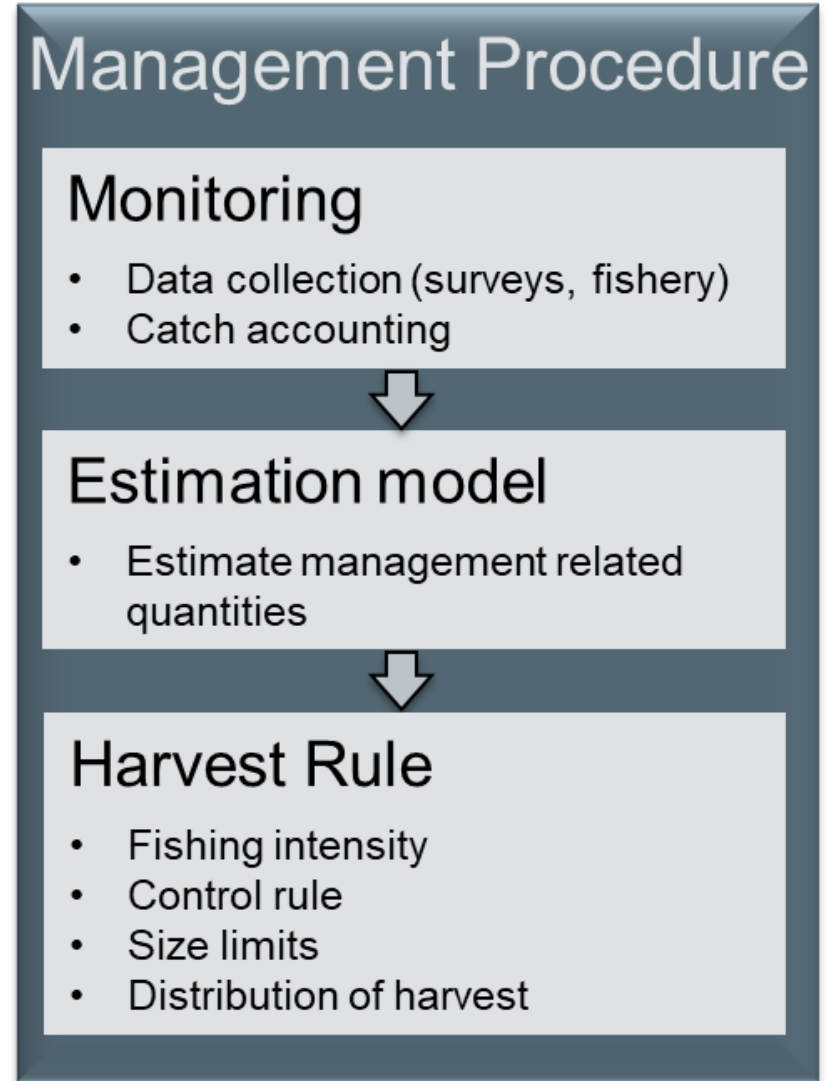
Discussion of objectives

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	$RSB < \text{Spawning Biomass Limit } (RSB_{Lim})$ $RSB_{Lim}=20\%$ 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	$p_{SB,2} > 5\%$ $p_{SB,3} > 33\%$ $p_{SB,4} > 10\%$ $p_{SB,AB} > 2\%$	Long-term	0.05	$P(p_{SB,R} < p_{SB,R,min})$
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	$RSB < \text{Spawning Biomass Reference } (RSB_{Thresh})$ $RSB_{Thresh}=RSB_{36\%}$ unfished spawning biomass	Long-term	0.50	$P(RSB < RSB_{Thresh})$ Fail if greater than 0.5
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 $\left(\frac{TCEY_A}{TCEY}\right)$
	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 $Min(\%TCEY)$
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



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)

Management Procedure

Monitoring

- Data collection (surveys, fishery)
- Catch accounting



Estimation model

- Estimate management related quantities



Harvest Rule

- Fishing intensity
- Control rule
- Size limits
- Distribution of harvest



MSAB020 Recommendations

IPHC-2024-MSAB020-R, para 41. *The MSAB RECOMMENDED updating the reference MP for one three-year cycle on a trial basis using a triennial stock assessment frequency (synchronised with the full stock assessment scheduled in 2025 to inform 2026 mortality limits). The coastwide TCEY would be based on $SPR=46\%$ in assessment years and based on the proportional change in the FISS O32 WPUE index in non-assessment years. The triennial stock assessment frequency may increase the median coastwide TCEY and reduce the interannual variability in the coastwide TCEY. A lower fishing intensity would also reduce the probability that the spawning biomass is less than the 2023 spawning biomass in the short- and long-term, and result in lower interannual variability as noted in paragraph 26.*

IPHC-2025-MSAB020-R, para 42: *The MSAB RECOMMENDED further evaluations of the following MP elements:*

- d) *A triennial assessment frequency with each of the three FISS designs;*
- e) *Various empirical rules to determine the reference coastwide TCEY in non-assessment years;*
- f) *Constraints on the interannual change in the reference coastwide TCEY, such as a maximum change in the coastwide TCEY of 15%, a slow-up fast down approach, or a fixed TCEY in non-assessment years.*



Reference points and understanding variability

- 2019 analysis showed that biomass-based reference points are affected by a change in environment
 - Reference points relative to dynamic unfished spawning biomass were not
- This analysis also supported B_{MSY} and B_{MEY} proxies
- After 2025 full assessment, it may be useful to reinvestigate
 - Productivity assumptions have changed
 - More sex-specific fishery data
 - Updated maturity



OM development

- A new OM will be conditioned in early 2026
 - Should focus be on preparing for that instead of new evaluations
- Some time will be needed to work on improvements
- If time is available, some major improvements could be made
 - Recode for speed and ease of use
 - Investigate modelling assumptions
 - Projected weight-at-age
 - Spatial and temporal maturity
 - Modelling various fisheries
 - Estimation model



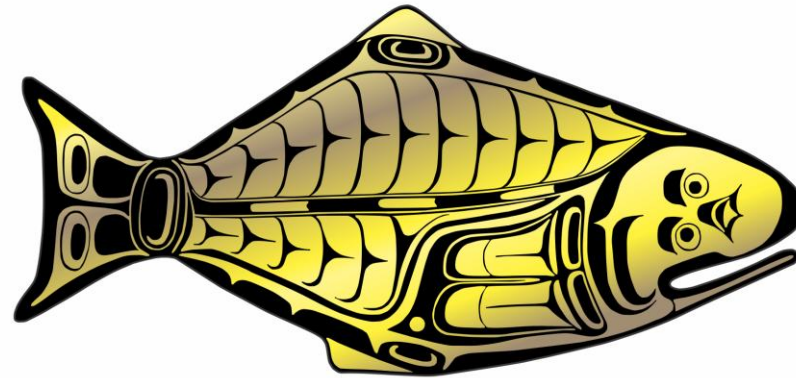
Recommendations

That the MSAB:

- 1) **NOTE** paper IPHC-2025-MSAB021-08, which details potential topics for an MSE Program of Work in 2025-2026, including topics related to objectives, management procedures, and further understanding variability.
- 2) **REQUEST** adding or updating an objective related to optimising fishing activities and opportunities to the priority objectives of the IPHC.
- 3) **REQUEST** further evaluations of the following MP elements: a) A triennial assessment frequency with each of the three FISS designs; b) Various empirical rules to determine the reference coastwide TCEY in non-assessment years; c) Constraints on the interannual change in the reference coastwide TCEY, such as a maximum change in the coastwide TCEY of 15%, a slow-up fast down approach, or a fixed TCEY in non-assessment years.
- 4) **REQUEST** conducting further analyses of reference points and the effects of recruitment regimes and variable weight-at-age after conditioning the OM following the full 2025 stock assessment.
- 5) **REQUEST** to update the OM after the completion of the full 2025 stock assessment.



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