INTERNATIONAL PACIFIC HALIBUT COMMISSION

MSE considerations for 2023-2025

Agenda Item 5
IPHC-2023-MSAB018-07
(A. Hicks)

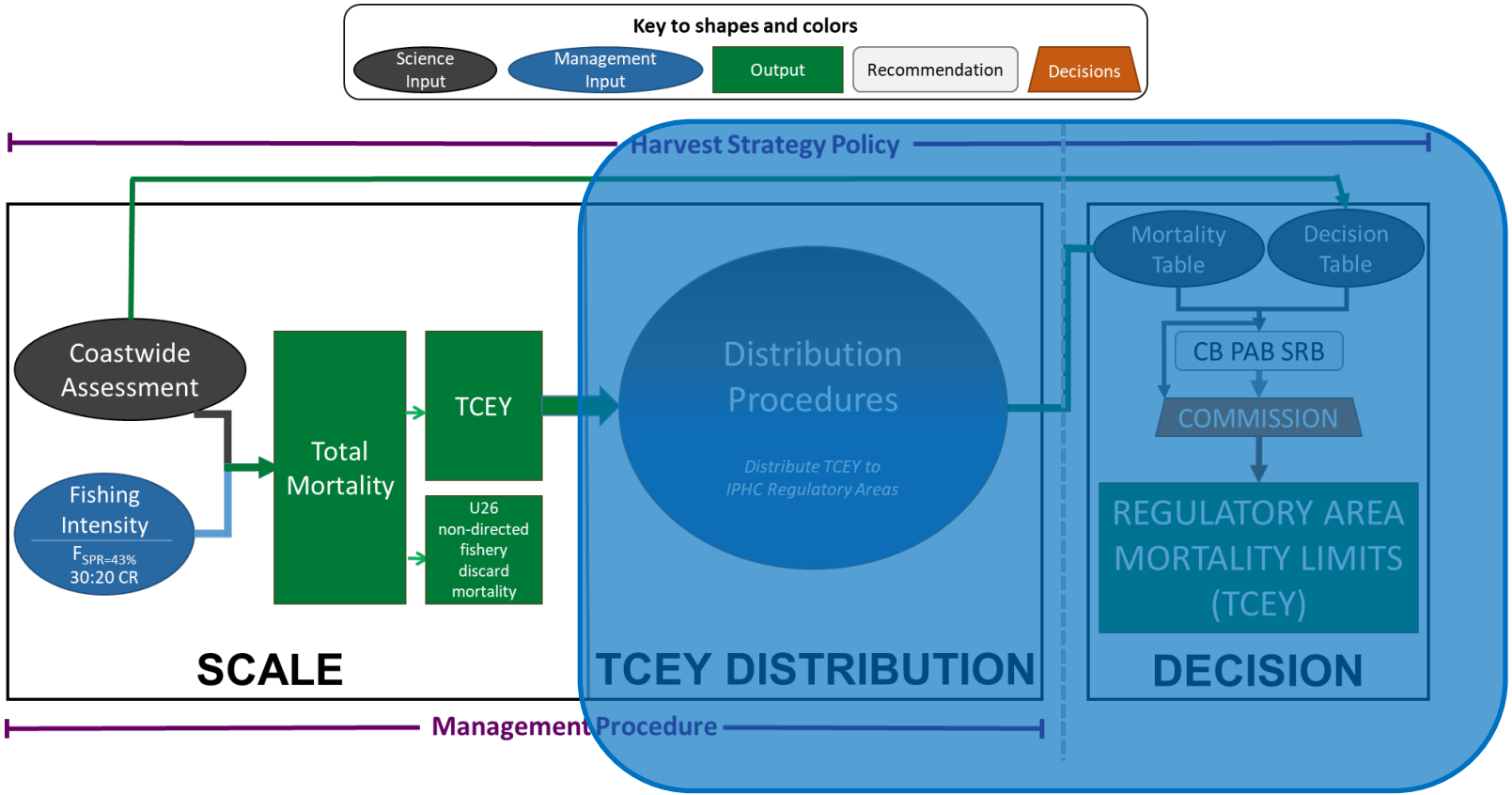
Outline

- Management Procedures (MPs)
- Objectives and performance metrics
- Exceptional circumstances
- A two-year MSE process

MPs at AM099

- Evaluation of size limits
  - AM099–Rec.03 (para. 84): The Commission **AGREED** sufficient analysis has been completed and **RECOMMENDED** not to change the current 32 inch size limit
- Evaluation of multi-year assessments
  - AM099–R (para. 85): The Commission **AGREED** that there is utility in continuing to explore multi-year stock assessment management procedures, in a manner consistent with the advice from SRB and MSAB
- Distribution procedures
  - AM099–R (para. 87)**:** The Commission **AGREED** that following agreement about a distribution procedure, the IPHC Secretariat and MSAB should reassess multi-year stock assessment management procedures, as well as coastwide elements of a management procedure such as the SPR value.

Illustration of current interim IPHC HSP



MPs: Multi-year stock assessment

- Conduct a stock assessment every 2nd, 3rd, etc. year
  - Three options for non-assessment years have been evaluated
    a) The same TCEY from the previous year for each IPHC Regulatory Area
    b) Updating the coastwide TCEY proportionally to the change in the coastwide FISS O32 WPUE and updating the distribution of the TCEY using FISS results and the applied distribution procedure
    c) Maintaining the same coastwide TCEY as the previous year but updating the distribution of the TCEY using FISS results and the applied distribution procedure

MPs: Multi-year stock assessment ideas

- Option (b) is a recommended option as it is responsive at the coastwide and IPHC Regulatory Area levels
- Is there interest in (a) and/or (c)?
- Other ideas?

MPs: Additional elements

- Exceptional circumstances
  - AM099–R (para. 88)**: NOTING** paragraph 60 from the 21st Session of the SRB (SRB021), the Commission **REQUESTED** the Secretariat develop a description of options to responding to exceptional circumstances that would trigger a stock assessment in nonassessment years and additional MSE analyses
  - SRB021-R (para 60): The SRB **RECOMMENDED** that Exceptional Circumstances be defined to determine whether monitoring information has potentially departed from their expected distributions generated by the MSE. Declaration of Exceptional Circumstances may warrant re-opening and revising the operating models and testing procedures used to justify a particular management procedure

Exceptional circumstance

- “monitoring information has potentially departed from their expected distributions generated by the MSE”
- An undesirable situation (e.g. low catch-rates) could trigger a stock assessment in non-assessment years, but would not necessarily be an exceptional circumstance
  - Can be defined as an element of a MP

MP: Trigger an assessment

- Some observed value was of concern
  - For example, FISS catch-rates were below a desirable level and the stock was last estimated above 30% of B_0
- If this was an assessment year, the assessment would provide advice
- If this was a non-assessment year, would it be worth doing an update assessment for more detailed advice?
- An element could be added to the MP that would indicate when an assessment should be done during a non-assessment year

TCEY decision at AM099

- TCEY decision
  - Advice from the 2022 full stock assessment (IPHC-2023-SA-01) using the current interim management procedure with an SPR of 43% was a coastwide TCEY of 52.0 Mlbs
  - Adopted a coastwide TCEY of 36.97 Mlbs
  - AM099–Rec.03 (para. 91): The Commission **NOTED** that the adopted mortality limits for each Contracting Party represent a 10.3% decrease from 2022
  - AM099–Rec.03 (para. 94): The Commission **NOTED** that the adopted mortality limits for 2023 correspond to a 38% probability of stock decline through 2024, and a 36% probability of stock decline through 2026.
- Can the reduction in fishing intensity be mimicked in a MP?

MP: A trigger to reduce fishing intensity

- If concerned about declining spawning biomass
  - Could modify trigger in current control rule (30%) to be higher (e.g. 40:20 or 50:20)
- If concerned about declining catch-rates (i.e. fishery performance)
  - Add a control rule related to FISS WPUE or fishery CPUE
    - If FISS WPUE is below some threshold, reduce fishing intensity

Potential MP elements

- Multi-year assessment with the TCEY in non-assessment years determined from the change in FISS WPUE and an assessment is triggered when the FISS WPUE is below some value, the FISS WPUE or NPUE changes by a considerable amount, or some other trigger.
- Additional reduction in the TCEY if the FISS WPUE is below some value to mimic decisions made at AM099. The probability of further decline in spawning biomass could be also included.
- Various SPR values and control rules to re-evaluate those elements with a newly updated OM (and possibly a distribution agreement).

Priority Coastwide Objectives (order of importance)

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 a female spawning stock biomass above a biomass limit reference point at least 95% of the time	SB < Spawning Biomass Limit (SB_{Lim}) SB_{Lim}=20% unfished spawning biomass	Long-term	0.05	$P(SB < SB_{Lim})$ Fail if greater than 0.05
2.1 Maintain spawning biomass at or above a level that optimizes fishing activities	Maintain the coastwide female spawning biomass at or above a biomass reference point at least 50% of the time	SB<Spawning Biomass Threshold (SB_{Thresh}) SB_{Thresh}=36% unfished spawning biomass	Long-term	0.50	$P(SB < SB_{36\%})$ Fail if greater than 0.50
2.2. Provide Directed Fishing Yield	Optimize average coastwide TCEY	Median coastwide TCEY	Short-term		Median $\overline{TCEY}$
2.3. Limit Variability in Mortality Limits	Limit annual changes in the coastwide TCEY	Median coastwide Average Annual Variability (AAV)	Short-term		Median AAV

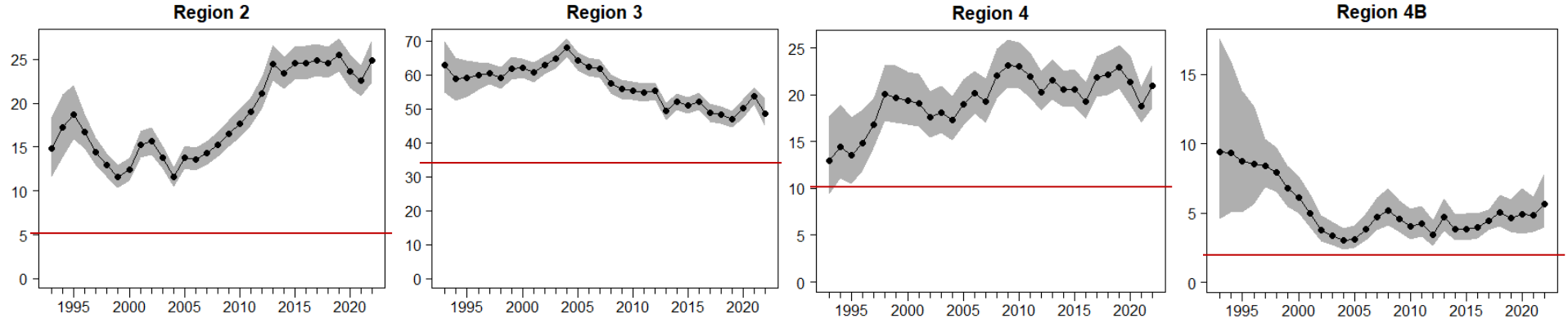
Primary Objectives

General Objective	Measurable Objective	Measurable Outcome
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 spawning stock biomass above a biomass limit reference point at least 95% of the time	B < Spawning Biomass Limit (B_{Lim}) B_{Lim}=20% unfished spawning biomass
	Maintain a defined minimum proportion of female spawning biomass in each Biological Region	$p_{SB,2} > 5\%$ $p_{SB,3} > 33\%$ $p_{SB,4} > 10\%$ $p_{SB,4B} > 2\%$
2.1 Maintain spawning biomass at or above a level that optimizes fishing activities	Maintain the long-term coastwide female spawning stock biomass at or above a biomass reference point ($B_{36\%}$) 50% or more of the time	B<Spawning Biomass Threshold (B_{Thresh}) B_{Thresh}=$B_{36\%}$ unfished spawning biomass

General Objective	Measurable Objective	Measurable Outcome
2.2. Provide Directed Fishing Yield	Optimize average coastwide TCEY	Median coastwide TCEY
	Optimize TCEY among Regulatory Areas	Median $TCEY_A$
	Optimize the percentage of the coastwide TCEY among Regulatory Areas	Median $\%TCEY_A$
	Maintain a minimum TCEY for each Regulatory Area	Minimum $TCEY_A$
	Maintain a percentage of the coastwide TCEY for each Regulatory Area	Minimum $\%TCEY_A$
2.3. Limit Variability in Mortality Limits	Limit annual changes in the coastwide TCEY	Annual Change (AC) > 15% in any 3 years
		Median coastwide Average Annual Variability (AAV)
	Limit annual changes in the Regulatory Area TCEY	Annual Change (AC) > 15% in any 3 years
		Average AAV by Regulatory Area (AAV_A)

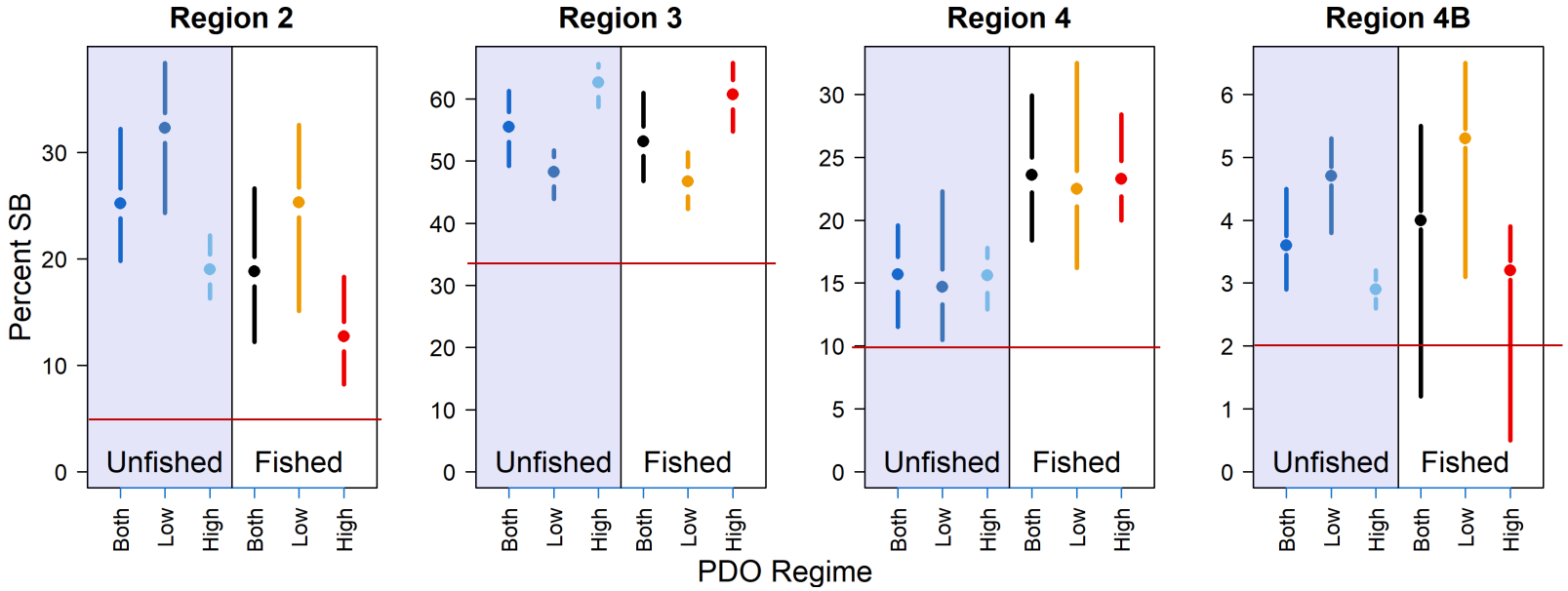
Historical stock distribution (observed)

Measurable Objective	Measurable Outcome
Maintain a defined minimum proportion of female spawning biomass in each Biological Region	$p_{SB,2} > 5\%$ $p_{SB,3} > 33\%$ $p_{SB,4} > 10\%$ $p_{SB,4B} > 2\%$



Projected stock distribution (simulated)

Measurable Objective	Measurable Outcome
Maintain a defined minimum proportion of female spawning biomass in each Biological Region	$p_{SB,2} > 5\%$ $p_{SB,3} > 33\%$ $p_{SB,4} > 10\%$ $p_{SB,4B} > 2\%$



Additional goals

3. Minimize discard mortality in directed fisheries.
   - The current MSE framework can provide meaningful performance metrics related to discard mortality in the directed fisheries
4. Minimize discards and discard mortality in non-directed fisheries (bycatch).
   - Non-directed discard mortality is modelled as a random factor that represents potential non-directed discard mortality
   - Is not a meaningful performance metric because its link to management choices is very weak

Additional performance metrics

http://shiny.westus.cloudapp.azure.com/shiny/sample-apps/MSE-Explorer/

Discussion: Objectives and Perf Metrics

- Consider discard mortality in directed fisheries?
- Are there additional performance metrics (statistics of interest)
  - Change in TCEY in non-assessment years vs assessment years
- Are the current primary objectives satisfactory
- Is there a new objective related to fishery performance/efficiency?
  - For example, maintain catch-rates above a certain level?

Exceptional Circumstances

- A process for deviating from an adopted MP (de Moor et al 2022)
- Monitoring information has potentially departed from their expected distributions generated by the MSE (SRB021)
  - Declaration of Exceptional Circumstances may warrant re-opening and revising the operating models and testing procedures used to justify a particular management procedure
- Should be defined using observations rather than model outputs and should be compared to the distribution generated by the MSE simulations
- Important to have clear definitions for when the agreed upon MP should be re-evaluated
- NOTE: FISS observations and assessment in 2022 were not outside of the distribution generated by the MSE simulations

de Moor CL, Butterworth DS, Johnston S. 2022. Learning from three decades of Management Strategy Evaluation in South Africa. ICES Journal of Marine Science. 79. 1843-1852

Potential exceptional circumstances

a) The coastwide all-sizes FISS WPUE or NPUE falls above the 97.5th percentile or below the 2.5th percentile of the MSE simulated FISS index.

b) The observed percentage of FISS all-sizes WPUE is above the 97.5th percentile or below the 2.5th percentile of the MSE simulated FISS index for each Biological Region. These data were used to condition the OM, so may be a reasonable choice.

c) The proportions-at-age in the coastwide or region-specific FISS observations are above the 97.5th percentile or below the 2.5th percentile of the simulated FISS proportions-at-age. Exactly how to make this comparison over all ages would have to be determined.

All-sizes index would be a better option because to calculate O32,
the OM needs to make an assumption how to split the observations into U32 and O32

Response to an exceptional circumstance

- Specify a MSE program of work
  - Review and possibly redo OM
  - Examine objectives
  - Identify MPs to evaluate in addition to current
  - Evaluate MPs with updated OM
- If a non-assessment year, conduct a stock assessment as well, if possible
  - Timing may be an issue

Two-year process for the MSE framework

- MSE process has matured at IPHC, thus a 2-year process is reasonable
- The SRB is also part of the process

Spring 2023 SRB meeting:

- Review MSAB outcomes
- Review technical aspects.
- Review primary objectives & PMs
- Review proposed MPs

Fall 2023 SRB meeting:

- Review preliminary simulation results
- Assist in narrowing down the MPs
- Guidance on communicating progress.

Spring 2024 SRB meeting:

- Review MSAB outcomes
- Review technical aspects
- Review primary objectives & PMs
- Review proposed MPs
- Guidance on communicating results.

Fall 2024 SRB meeting:

- Review simulation results
- Assist in narrowing down the MPs
- Guidance on communicating results

MSAB in the two-year process

MSAB considers methods and inputs to guide the MSE process

Spring 2023 MSAB meeting:

- Discuss objectives
- Identify MPs to evaluate
- Define performance metrics
- Interests and concerns of constituents
- Methods to disseminate MSE information to constituents.
- Fishery-related scenarios

Spring 2024 MSAB meeting:

- Further discussion of objectives
- Identify set of MPs
- Define performance metrics
- Interests and concerns of constituents
- Methods to disseminate MSE information to constituents.
- Fishery-related scenarios
- Elements and trade-offs to consider

Fall 2024 MSAB Informational Session (optional):

- Educational presentation on a specific part of the MSE process.
- Summary of primary objectives & MPs
- Presentation of results and evaluation.

Recommendations

1. The MSAB **NOTE** paper IPHC-2023-MSAB018-07 presenting potential management procedures to evaluate, objectives and performance metrics, a discussion of exceptional circumstances, and additional considerations for future MSE work.

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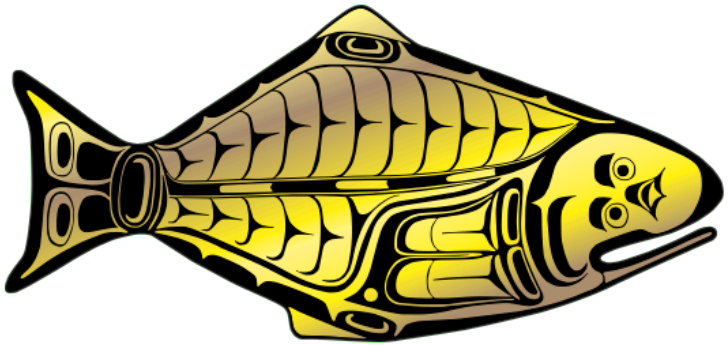

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