INTERNATIONAL PACIFIC HALIBUT COMMISSION

100 years

MSE and Harvest Strategy Policy updates

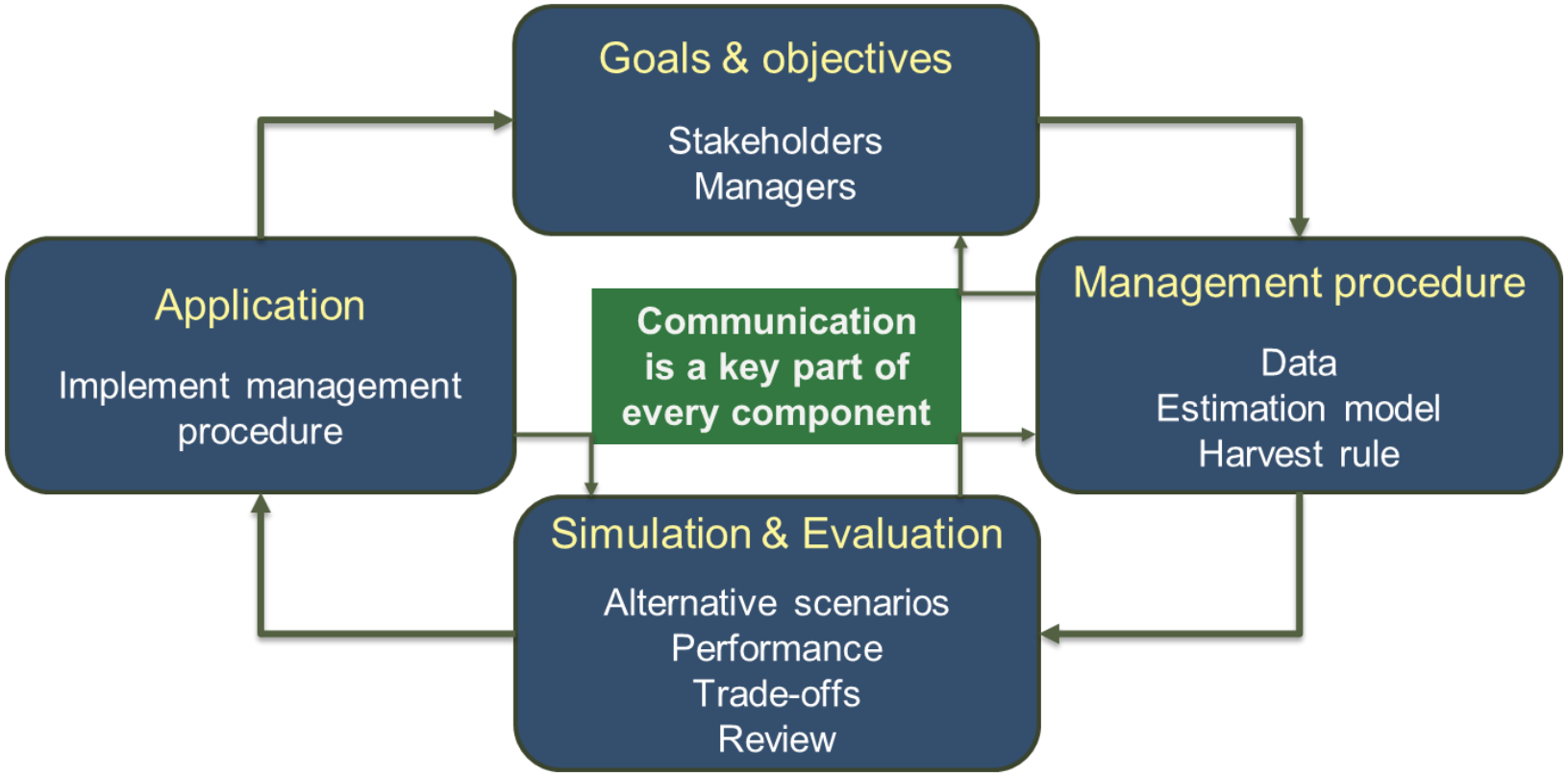
Agenda item: 6.1

IPHC-2024-AM100-11

(A. Hicks, I. Stewart, D. Wilson)

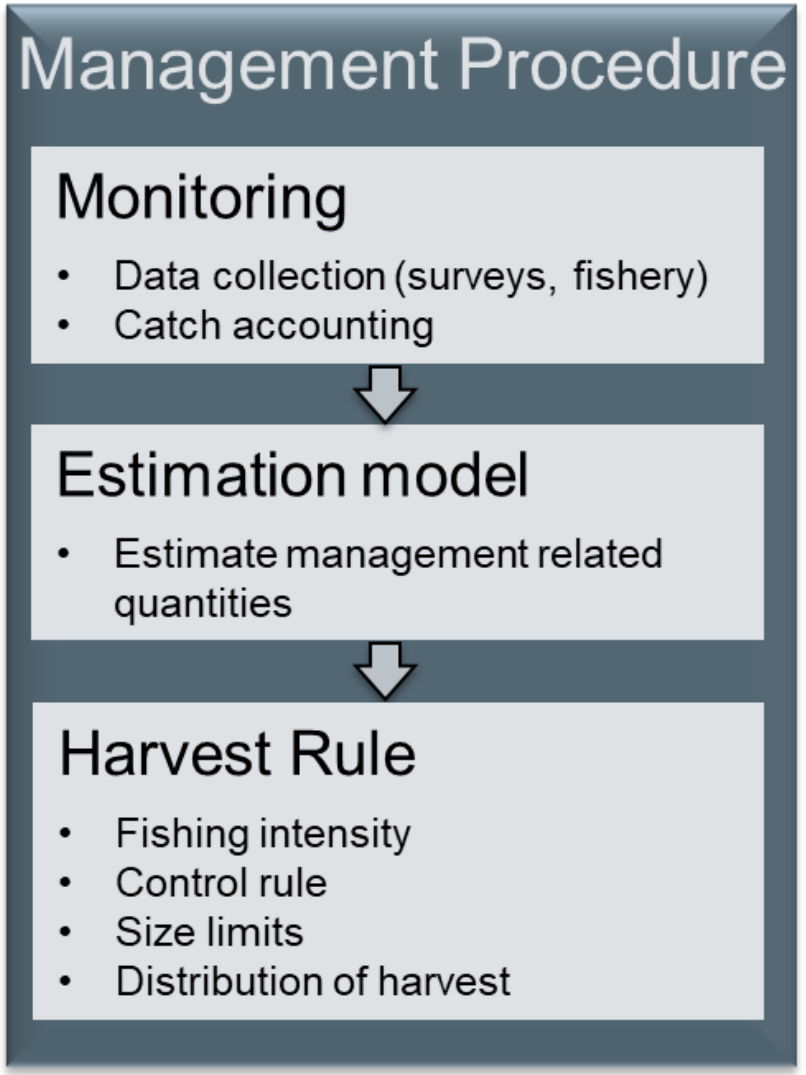
Management Strategy Evaluation (MSE)

a process to **evaluate** harvest strategies and develop a **management procedure** that is **robust** to **uncertainty** and **meets defined objectives**



Uses of MSE

- Evaluate many different elements of MPs
  - Size limits
  - Fishing intensity (i.e. SPR)
  - Assessment frequency
- Assist in the development a Harvest Strategy Policy
- Meet requirements of certification agencies
  - Marine Stewardship Council
- Design monitoring strategies
  - FISS designs
- Examine scenarios
    - Environmental effects



Harvest Strategy Policy

A framework for applying a consistent and transparent science-based approach to setting mortality limits while ensuring sustainability

- Policy and process for setting mortality limits
- Objectives and standards for management of the fishery
- Reference points
- Balancing risk, cost, and catch
- Rebuilding strategies
- Validation of the harvest strategy
- Joint management

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Harvest Strategy Policy Framework

IPHC-2023-SRB023-R, para. 30: *The SRB **RECOMMENDED** that the Commission consider revising the harvest policy to*

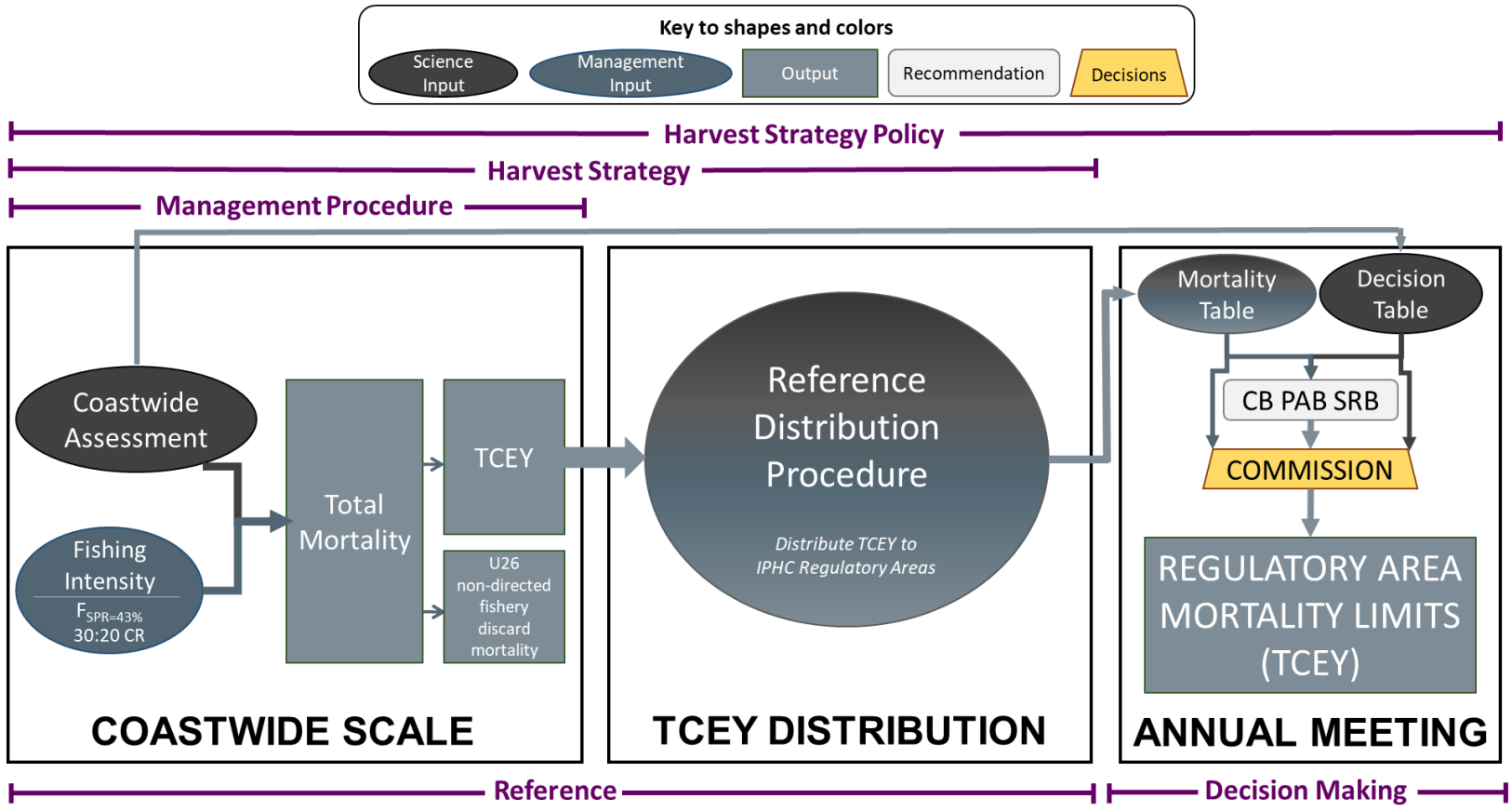
(i) determine coastwide TCEY via a formal management procedure and

(ii) negotiate distribution independently (e.g. during annual meetings).

Such separated processes are used in other jurisdictions (e.g. most tuna RFMOs, Mid Atlantic Fishery Management Council, AK Sablefish, etc.).

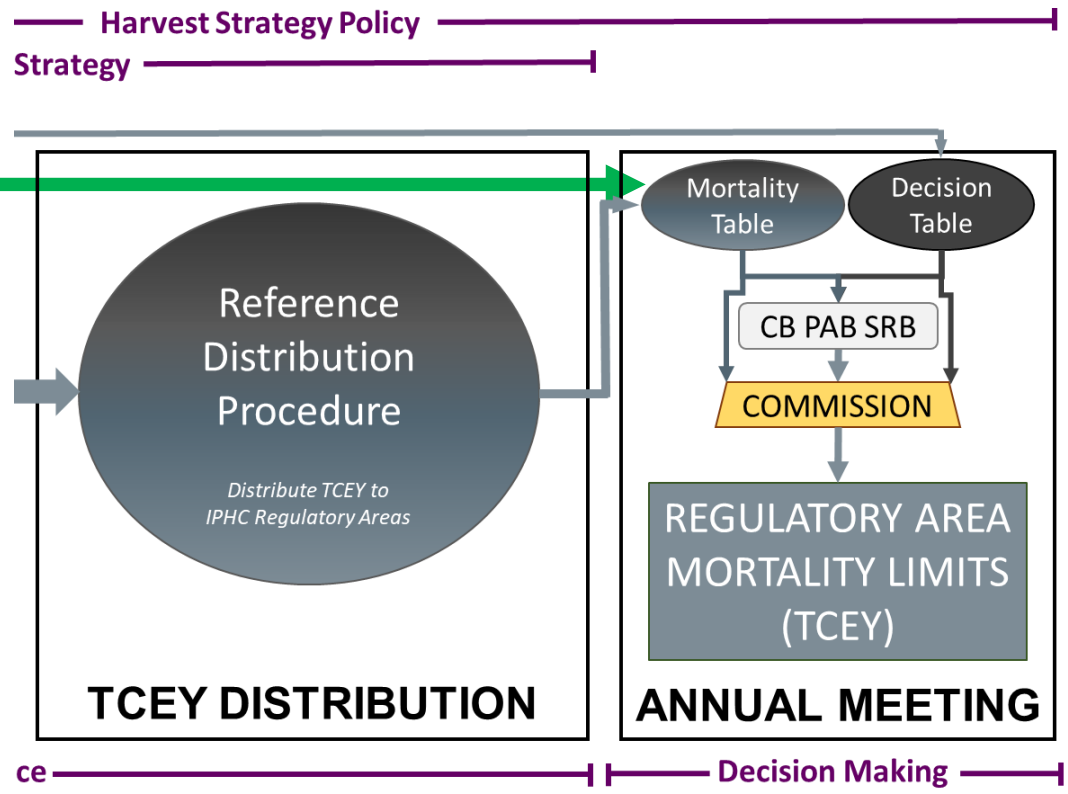
Harvest Strategy Policy Framework

- Management Procedure
  - A procedure that is formally specified and simulation tested
  - Coastwide TCEY
- Harvest Strategy
  - Process of determining endpoint management outcomes
  - May not entirely be a specific procedure
  - Reference mortality limits (TCEY) for each IPHC Regulatory Area
- Harvest Strategy Policy
  - Decision-making and potential departure from reference



TCEY Distribution Procedure

- Separating TCEY distribution can be part of the harvest strategy and decision-making
- MSE simulations represent this entire HSP framework
  - Simulation test the MP with other uncertainties
  - Integrate over distribution and decision-making uncertainty
- A defined reference distribution procedure may be useful to inform the decision-making process



Objectives and Performance Metrics

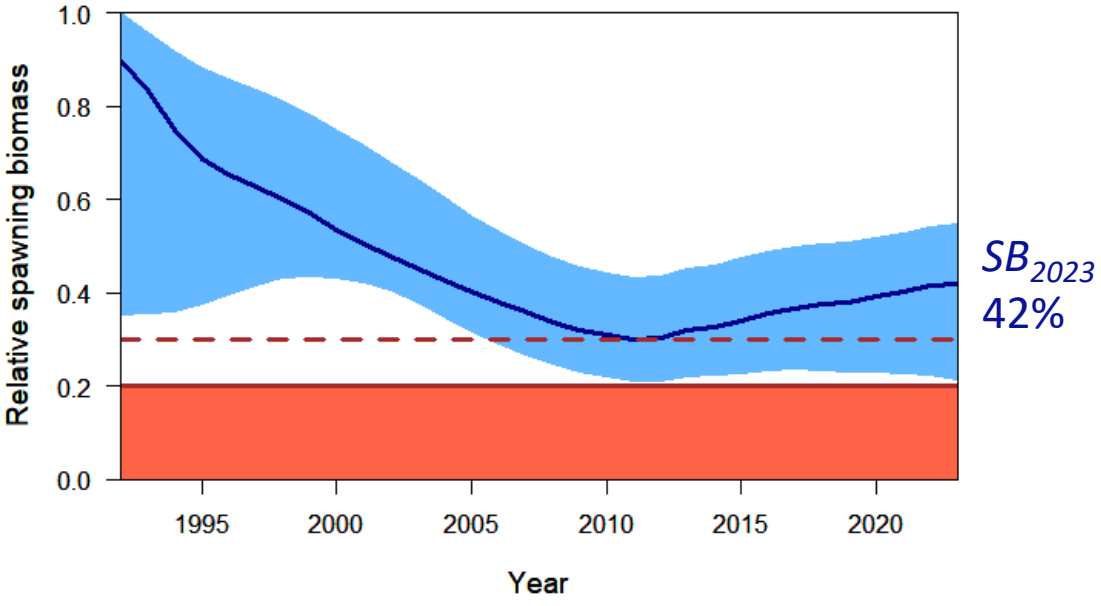
- Four priority coastwide objectives are currently endorsed for the MSE.
  a) Maintain the long-term coastwide female spawning stock biomass above a biomass limit reference point (B20%) at least 95% of the time.
  b) Maintain the long-term coastwide female spawning stock biomass above a biomass reference point (B36%) at least 50% of the time.
  c) Optimise average coastwide TCEY.
  d) Limit annual changes in the coastwide TCEY.

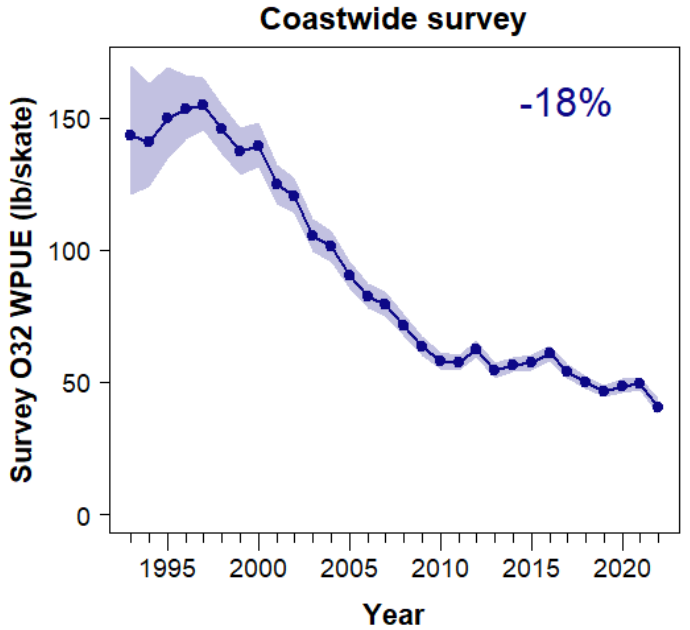
IPHC-2023-SRB023-R, para. 25. *The SRB **RECOMMENDED** that the Commission re-evaluate the target objective for long-term coastwide female spawning stock biomass given that estimated 2023 female spawning biomass (and associated WPUE), which was well-above the current target B36%, in part triggered harvest rate reductions from the interim harvest policy. Such ad-hoc adjustments limited the value of projections and performance measures from MSE.*

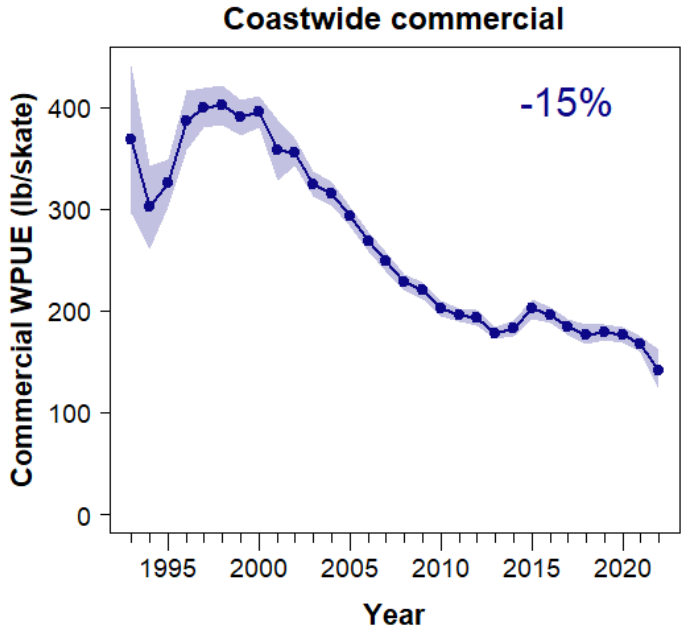
Potential new/replacement objective

2022 Stock Assessment Results

- Relative Spawning Biomass was above 36% in 2023
- 2022 FISS & Commercial WPUE lowest observed since 1993
- Productivity updated in stock assessment to be more consistent with data
  - Interim reference fishing intensity produced a 52.3 Mlb coastwide mortality limit







MSE Results

- Compare 2022 and 2023 OMs with similar MSE simulations
- SPR=43%

	Performance Metric	2022 OM	2023 OM
	Biological Sustainability		
Long-term	P(RSB<20%)	PASS	PASS
	Fishery Sustainability		
Long-term	P(RSB<36%)	0.31	0.35
Short-term	Median average TCEY	59.0	59.2
Short-term	Median AAV TCEY	18.8%	17.0%
	Additional		
Short-term	$P(SB_{2026\text{-}2035} < SB_{2023})$	0.17	0.29

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Potential new/replacement objective

- If low catch-rates and WPUE are a concern
  - May be prudent to consider an absolute biomass or WPUE objective
  - Could be added to priority objectives or replace $B_{36\%}$ objective
- A 1 in 3 chance that in 10 years the SB is less than now (reference SPR=43%)
  - A lower fishing intensity (higher SPR) would reduce this chance
    - 1 in 4 chance with SPR=46%
    - The MP could use a higher reference SPR and/or reduce fishing intensity when absolute spawning biomass is low, in addition to the 30:20 control rule
- Possibly a topic for MSAB to consider

MSE tasks necessary to complete an HSP document

- Evaluation of MP elements
  - *Focus on coastwide TCEY and incorporate uncertainty in TCEY distribution*
  - Multi-year assessment with an empirical rule in non-assessment years
  - Evaluate reference fishing intensities (i.e. SPR)
- Secretariat work with MSAB and SRB
  - Define exceptional circumstances
  - Define actions if exceptional circumstance declared
  - Potential new objective related to absolute biomass
- Possibly evaluate additional MP elements
  - Constraints on changes in the coastwide TCEY
  - Methods to smooth stock distribution
  - Specific distribution procedures

A coastwide MP for the HSP

- Current interim management procedure
  - Account for mortality of all sizes and from all sources
  - Annual stock assessment with decision tables
  - Reference $F_{SPR=43\%}$ determines coastwide mortality limit
- Investigations of MP elements
  - Biennial or triennial stock assessment with an empirical rule in non-assessment years
    - Empirical rule based on FISS WPUE
  - SPR level to meet objectives

		Assessment Frequency		
		Annual	Biennial	Triennial
SPR	56%			
	43%			
	30%			

Exceptional Circumstances

- An event that is beyond the expectations of the MSE evaluation
- Used to determine if specific actions should be taken to deviate from and re-examine the adopted harvest strategy
- Evaluate annually by comparing simulated MSE values to realized FISS estimates
- Clearly distinguish an exceptional Circumstance from unusual conditions
- Persistence necessary for an exceptional circumstance
- SRB reviews evidence of an Exceptional Circumstance and assists with response

IPHC-2023-SRB022-R (para. 28 and 29)

Defining Exceptional Circumstances (possibilities)

Defining

- Coastwide all-sizes FISS observations are beyond simulated FISS index
- Persistent for two or more consecutive years
- A new understanding or perception of the stock

Actions

- Identify why it occurred
- Decide what can be done to resolve it
- Conduct MSE simulations
- Consult with SRB and MSAB

Additional MSE tasks

- Use MSE to examine management outcomes related to changes in the FISS design
  - Likely to have a large effect on TCEY variability
  - Recommended by the SRB

SRB023–Rec.10 (para. 29) The SRB **RECOMMENDED** evaluating […] FISS uncertainty scenarios using the MSE framework. […]

SRB023–Rec.22 (para. 64) […]the SRB **RECOMMENDED** that the MSE include some scenarios in which the FISS is skipped […]. Such simulation scenarios would provide some indication of the potential scale of impacts on MP performance of maintaining long-term revenue neutrality of the FISS

Management Procedures to evaluate

PRIORITY

- Annual and Multi-year stock assessment MPs
- Fishing intensity (SPR values)
- FISS design scenarios

SECONDARY

- Constraints on the coastwide TCEY
- Stock distribution smoothing

ADDITIONAL

- Elements related to maintaining SB above an absolute threshold
- TCEY distribution procedures

Summary

- IPHC has a MSE framework for reasonably quick analysis
  - The 2023 OM is conditioned to the 2022 stock assessment and is valid for a few years
- A fishery objective related to absolute spawning biomass or FISS WPUE may be useful
- An HSP document could be adopted soon with the current interim harvest strategy
- Tasks to complete to bring forward a HSP document for adoption at AM101 can be done in 2024
  - Multi-year assessments and SPR values
  - Exceptional circumstances
- Additional evaluations of FISS survey designs using MSE to be done
  - As recommended by the SRB

Recommendation/s

1) **NOTE** paper IPHC-2023-IM099-11

2) **NOTE** that the SRB endorsed the 2023 operating model.

3) **NOTE** that MSE results using the updated 2023 OM are similar to past MSE results, thus past MSE results remain relevant.

4) **RECOMMEND** that the Secretariat, working with the MSAB and SRB, develop a new coastwide objective related to absolute spawning biomass or catch-rates, to either replace the current $B_{36\%}$ objective or be added as a fifth priority objective.

Recommendation/s

5) **RECOMMEND** the evaluation of multi-year management procedures along with fishing intensity

6) **RECOMMEND** the evaluation of FISS design scenarios using the MSE framework

7) **RECOMMEND** evaluating additional management procedure elements including: a) constraints on the coastwide TCEY, b) methods to smooth estimation of stock distribution, and c) procedures to provide a reference TCEY distribution

8) **RECOMMEND** that the Secretariat continue to work with the SRB and MSAB to define exceptional circumstances using FISS observations, biological observations, and new research

9) **RECOMMEND** that the Secretariat to continue to work with the SRB and MSAB to prescribe the actions to take when an exceptional circumstance is triggered

10) **RECOMMEND** definitions of and actions for exceptional circumstances be included in the harvest strategy policy following discussions with the MSAB and SRB

11) **RECOMMEND** that the Secretariat continue developing an updated Harvest Strategy Policy document, noting that an interim HSP could be adopted before AM101 and then updated with decisions regarding the assessment frequency and potentially a change to the reference fishing intensity


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