



INTERNATIONAL PACIFIC
HALIBUT COMMISSION

IPHC–2023–MSAB018–00
Last Update: 21 April 2023

**18th Session of the IPHC Management Strategy
Advisory Board (MSAB018) – *Compendium of
meeting documents***

24-25 May, 2023, Seattle, WA, USA

Commissioners

Canada	United States of America
Paul Ryall	Jon Kurland
Neil Davis	Robert Alverson
Peter DeGreef	Richard Yamada

Executive Director

David T. Wilson, Ph.D.

DISTRIBUTION: IPHC WEBSITE
LAST UPDATE: 21 April 2023

BIBLIOGRAPHIC ENTRY

IPHC 2023. 18th Session of the IPHC Management Strategy Advisory Board (MSAB018) - Compendium of meeting documents. Int. Pac. Halibut Comm.



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**DRAFT: AGENDA & SCHEDULE FOR THE 18th SESSION OF THE IPHC
MANAGEMENT STRATEGY ADVISORY BOARD (MSAB018)**

Date: 24-25 May 2023

Location: Electronic/Online

Venue: Adobe Connect - Please [Register here](#)

Time: 09:00-17:00 (24th), 09:00-15:00 (25th) PDT

Co-Chairpersons: Mr. Adam Keizer (DFO) & Dr. Pete Hulson (NOAA)

Notes:

- **Document deadline:** 24 April 2023 (30 days prior to the opening of the Session)
- All sessions are open to observers and the general public, unless the Commission specifically decides otherwise.

1. OPENING OF THE SESSION

2. ADOPTION OF THE AGENDA AND ARRANGEMENTS FOR THE SESSION

- *IPHC-2023-MSAB018-01: Agenda & Schedule for the 18th Session of the IPHC Management Strategy Advisory Board (MSAB018)*
- *IPHC-2023-MSAB018-02: List of Documents for the 18th Session of the IPHC Management Strategy Advisory Board (MSAB018)*

3. IPHC PROCESS

- 3.1. MSAB Membership (D. Wilson)
 - *IPHC-2023-MSAB018-03: MSAB Membership (D. Wilson)*
- 3.2. Update on the actions arising from the 17th Session of the MSAB (MSAB017) (A. Hicks)
 - *IPHC-2023-MSAB018-04: Update on the actions arising from the 17th Session of the MSAB (MSAB017) (IPHC Secretariat)*
- 3.3. Outcomes of the 99th Session of the IPHC Annual Meeting (AM099) (A. Hicks)
 - *IPHC-2023-MSAB018-05: Outcomes of the 99th Session of the IPHC Annual Meeting (AM099) (D. Wilson & A. Hicks)*

4. MANAGEMENT STRATEGY EVALUATION UPDATES

- 4.1. Updates to the MSE framework to investigate management procedures for Pacific halibut fisheries (A. Hicks)
- 4.2. Updates to evaluations of the current interim harvest policy (A. Hicks)
 - *IPHC-2023-MSAB018-06: Updates to evaluations of the current interim harvest policy (A. Hicks & I. Stewart)*

5. MANAGEMENT STRATEGY EVALUATION PROGRAM OF WORK (2023-2025)

- 5.1. Potential management procedures to simulate and evaluate (A. Hicks)
- 5.2. Primary MSE objectives and associated performance metrics (A. Hicks)

- 5.3. Additional considerations for the MSE process and harvest strategy policy
(A. Hicks)
 - *IPHC-2023-MSAB018-07: Considerations for the Management Strategy Evaluation Program of Work for 2023-2025 (A. Hicks & I. Stewart)*

6. OTHER BUSINESS

7. REVIEW OF THE DRAFT AND ADOPTION OF THE REPORT OF THE 18TH SESSION OF THE IPHC MANAGEMENT STRATEGY ADVISORY BOARD (MSAB018)



Wednesday 24 May 2023		
Time	Agenda item	Lead (support)
08:30-09:00	Connect electronically and troubleshoot connections	IPHC Secretariat
09:00-09:15	1. Opening of the Session	Co-Chairpersons
09:15-09:30	2. Adoption of the agenda and arrangements for the Session	Co-Chairpersons
09:30-10:15	3. IPHC Process 3.1. MSAB Membership 3.2. Update on the actions arising from the 17 th Session of the MSAB (MSAB017) 3.3. Outcomes of the 99 th Session of the IPHC Annual Meeting (AM099)	D. Wilson A. Hicks A. Hicks
10:15-10:30	Break	
10:30-12:00	4. Management Strategy Evaluation Updates 4.1. Updates to the MSE framework to investigate management procedures for Pacific halibut fisheries 4.2. Updates to evaluations of the current interim harvest policy	A. Hicks
12:00-13:00	Lunch	
13:00-15:00	5. Management Strategy Evaluation Program of Work (2023-2025) 5.1. Potential management procedures to simulate and evaluate	A. Hicks (Co-Chairpersons)
15:00-15:15	Break	
15:15-16:00	5. Management Strategy Evaluation Program of Work (2023-2025) 5.2. Primary MSE objectives and associated performance metrics	A. Hicks (Co-Chairpersons)
16:00-17:00	MSAB Drafting Session	MSAB drafting group

Thursday 25 May 2023		
Time	Agenda item	Lead (support)
08:30-09:00	Connect electronically and troubleshoot connections	IPHC Secretariat
09:00-10:00	Review of Day 1 and discussion of draft report from Day 1	Co-Chairpersons
10:00-10:30	5. Management Strategy Evaluation Program or Work (2023-2025) Additional considerations for the MSE process and harvest strategy policy (A. Hicks)	A. Hicks (Co-Chairpersons)
10:30-10:45	Break	
10:45-11:15	6. Other Business	
11:15-12:00	MSAB drafting session	MSAB drafting group
12:00-13:00	Lunch	
13:00-15:00	7. Review of the Draft and Adoption of the Report of the 18th Session of the IPHC Management Strategy Advisory Board (MSAB018)	Co-Chairpersons (A. Hicks)



**LIST OF DOCUMENTS FOR THE 18th SESSION OF THE IPHC
MANAGEMENT STRATEGY ADVISORY BOARD (MSAB018)**

Meeting documents	Title	Availability
IPHC-2023-MSAB018-01	Agenda & Schedule for the 18 th Session of the IPHC Management Strategy Advisory Board (MSAB018)	✓ 9 Mar 2023 ✓ 21 Apr 2023
IPHC-2023-MSAB018-02	List of Documents for the 18 th Session of the IPHC Management Strategy Advisory Board (MSAB018)	✓ 10 Apr 2023 ✓ 21 Apr 2023
IPHC-2023-MSAB018-03	MSAB membership (D. Wilson)	✓ 10 Apr 2023
IPHC-2023-MSAB018-04	Update on actions arising from the 17 th Session of the MSAB (MSAB017) (IPHC Secretariat)	✓ 10 Apr 2023
IPHC-2023-MSAB018-05	Outcomes of the 99 th Session of the IPHC Annual Meeting (AM099) (A. Hicks)	✓ 10 Apr 2023
IPHC-2023-MSAB018-06	Updates to evaluations of the current interim harvest policy (A. Hicks & I. Stewart)	✓ 21 Apr 2023
IPHC-2023-MSAB018-07	Considerations for the Management Strategy Evaluation Program of Work for 2023-2025 (A. Hicks & I. Stewart)	✓ 21 Apr 2023



MSAB Membership 2023

PREPARED BY: IPHC SECRETARIAT (10 APRIL 2023)

PURPOSE

To provide the Management Strategy Advisory Board (MSAB) with an updated membership list as of 10 April 2023.

BACKGROUND

Rule II of Appendix V [Management Strategy Advisory Board (MSAB) – Terms of Reference and Rules of Procedure] of the IPHC Rules of Procedure (2023), states:

3. The MSAB will include the following interests (in alphabetical order): harvesters (commercial, sport, and subsistence), fisheries managers, processors, science advisors and other experts as required may be represented, and be facilitated by the IPHC Secretariat. Upon request, the IPHC shall cover the travel costs, in accordance with IPHC travel policies, for non-State and non-Federal board members, to attend one (1) MSAB session each year.

4. The term of MSAB members will be four years, and members may serve additional terms at the discretion of the IPHC.

DISCUSSION

At the 99th Session of the IPHC Annual Meeting (AM099), the Commission made the following agreements related to MSAB membership.

IPHC-2023-AM099-R, para. 69. *The Commission **AGREED** that the Management Strategy Evaluation process and the Management Strategy Advisory Board continue to support the Commission's management of the stock and fishery by providing the means to define fishery objectives and evaluate the performance of management measures against these objectives. The two Contracting Parties have reviewed MSAB membership with the intention of ensuring that the MSAB represents the diversity of interests and remains at a manageable size.*

IPHC-2023-AM099-R, para. 70. *The Commission **AGREED** that term appointments can continue to be renewed without limit at the discretion of the Commissioners.*

IPHC-2023-AM099-R, para. 71. *The Commission **AGREED** that current MSAB membership terms which expired on 31 December 2022 should be renewed for up to four (4) years to facilitate staggered term expiry among members.*

[IPHC-2023-AM099-R](#), para. 72. The Commission **NOTED** that there are vacancies within the current membership, and **AGREED** that there will not be active solicitations to fill these vacancies. The MSAB process remains open to observers, including to people who may be interested in applying for an appointment to the MSAB at a later date.

Provided at [Appendix A](#) are the current MSAB membership and term expirations, taking into account the AM099 decisions detailed above. Term expirations were staggered by two years for continuity.

RECOMMENDATION/S

That the MSAB **NOTE** paper IPHC-2023-MSAB018-03 which details the MSAB membership and term expirations as of 10 April 2023.

APPENDICES

[Appendix A](#): MSAB Membership as of 10 April 2023

APPENDIX A
MANAGEMENT STRATEGY ADVISORY BOARD (MSAB) MEMBERSHIP
 (AS OF 10 APRIL 2023)

Membership category	Member	Canada	U.S.A.	Current Term commencement	Current Term expiration
Commercial harvesters (6-8)					
1	Sporer, Chris	CDN Commercial		9-May-17	31-Dec-26
2	Hauknes, Robert	CDN Commercial		9-May-17	31-Dec-24
3	Grout, Angus	CDN Commercial		3-Dec-19	31-Dec-26
4	Held vacant	CDN Commercial			Held vacant
5	Held vacant		USA Commercial		Held vacant
6	Odegaard, Per		USA Commercial	9-May-17	31-Dec-24
7	Falvey, Dan		USA Commercial	9-May-17	31-Dec-26
8	Johnson, James		USA Commercial	17-Apr-19	31-Dec-24
First Nations/ Tribal fisheries (2-4)					
1	Lane, Jim	CDN First Nations		9-May-17	31-Dec-26
2	Held vacant	CDN First Nations			Held vacant
3	Mazzone, Scott		USA Treaty Tribes	9-May-19	31-Dec-24
4	Held vacant		USA Treaty Tribes		Held vacant

Government Agencies (4-8)					
1	Keizer, Adam	DFO		9-May-19	31-Dec-26
2	Huang, Ann-Marie	CDN Science Advisor		10-May-18	31-Dec-24
3	Held vacant	DFO			Held vacant
4	Iverson, Kurt		NOAA-Fisheries		31-Dec-26
5	Hulson, Pete		USA Science Advisor	13-Jul-22	31-Dec-24
6	Hall, Heather		PFMC		31-Dec-26
7	Bush, Karla		NPFMC	25-Oct-21	31-Dec-24
8	Webster, Sarah		ADFG	24-Sep-19	31-Dec-26
Processors (2-4)					
1	Parker, Peggy	US/CDN Processing	US/CDN Processing	9-May-19	31-Dec-24
2	Held vacant	CDN Processing			Held vacant
3	Held vacant	CDN Processing			Held vacant
4	Held vacant		USA Processing		Held vacant
5	Drobnica, Angel		USA Processing	17-Apr-19	31-Dec-26
Recreational/ Sport fisheries (2-4)					
1	Ashcroft, Chuck	CDN Sportfishing		17-Apr-19	31-Dec-24
2	Held vacant	CDN Sportfishing			Held vacant
3	Marking, Tom		USA Sportfishing (CA)	9-May-19	31-Dec-26
4	Braden, Forrest		USA sportfishing (AK)	17-Apr-19	31-Dec-24



Update on the Actions Arising from the 17th Session of the IPHC Management Strategy Advisory Board (MSAB017)

PREPARED BY: IPHC SECRETARIAT (10 APRIL 2023)

PURPOSE

To provide the Management Strategy Advisory Board (MSAB) with an opportunity to consider the progress made during the intersessional period, on the recommendations/requests arising from the MSAB017.

BACKGROUND

At the MSAB017, the members recommended/requested a series of actions to be taken by the IPHC Secretariat, as detailed in the MSAB017 meeting report ([IPHC-2022-MSAB017-R](#)) available from the IPHC website, and as provided in [Appendix A](#).

DISCUSSION

During the 18th Session of the MSAB (MSAB018), efforts will be made to ensure that any recommendations/requests for action are carefully constructed so that each contains the following elements:

- 1) a specific action to be undertaken (deliverable);
- 2) clear responsibility for the action to be undertaken (such as the IPHC Staff or MSAB officers);
- 3) a desired time frame for delivery of the action (such as by the next session of the MSAB or by some other specified date).

RECOMMENDATION/S

That the MSAB:

- 1) **NOTE** paper IPHC-2023-MSAB018-04, which provided the MSAB with an opportunity to consider the progress made during the inter-sessional period, in relation to the consolidated list of recommendations/requests arising from the previous MSAB meeting (MSAB017).
- 2) **AGREE** to consider and revise the actions as necessary, and to combine them with any new actions arising from MSAB018.

APPENDICES

Appendix A: Update on actions arising from the 17th Session of the IPHC Management Strategy Advisory Board (MSAB017)

APPENDIX A
**Update on actions arising from the 17th Session of the IPHC Management Strategy
 Advisory Board (MSAB017)**

RECOMMENDATIONS

Action No.	Description	Update
MSAB017– Rec.1 (para 41)	If the Commission wishes for further evaluation of size limits, the MSAB RECOMMENDED that the evaluation include the consideration of impacts of alternative size limits specific to IPHC Regulatory Areas, alternate distribution procedures (e.g. all-sizes stock distribution), and the development of additional metrics related to value and efficiency of the commercial fishery	Completed The Commission considered size limits and recommended to not change the current 32-inch size limit (AM099-Rec.03)
MSAB017– Rec.2 (para. 49)	If the Commission wishes for further evaluation of multi-year assessments the MSAB RECOMMENDED further evaluation of the multi-year assessments to understand the drivers of inter-annual variability in the TCEY and changes in the TCEY specific to assessment years and non-assessment years.	Completed The Commission considered multi-year assessment results and agreed that there is utility in continuing to explore multi-year stock assessment management procedures (AM099-R, para 85 and para. 86).
MSAB017– Rec.3 (para. 53)	The MSAB RECOMMENDED that future evaluations of size limits, multiyear assessments, and other management procedures include elements that reduce interannual variability in the coastwide and area-specific TCEY. For example: a) Constraints on the change in the coastwide TCEY (e.g. a maximum of 15% in either direction); b) Averaging the stock distribution over recent years (e.g. 3 years)	Completed Although no specific direction was provided for the elements of management procedures to evaluate, the Commission agreed that following an agreement on a distribution procedure, coastwide elements of a MP should be evaluated (AM099-R, para. 87)

REQUESTS

Action No.	Description	Update
MSAB017– Req.1 (para 12)	<p>NOTING the proposed amendments to the MSAB Terms of Reference and Rules of Procedure, the MSAB REQUESTED the Commission note the following comments:</p> <p>a) Membership continuity through various aspects of the Program of Work is desirable;</p> <p>b) Term limits should be staggered, wherever feasible, to facilitate continuity within the Board;</p> <p>c) Continuity would be well served by first term limits remaining at four (4) years, with subsequent terms at two (2) years, and without a limit on the number of terms that could be served by an individual board member. Some members expressed that term renewal limits were not supported as they would likely undercut consistency, member expertise, and contributions to the MSE process;</p> <p>d) Should the Commission decide to limit the number of terms a member may serve, it should consider more than two (2) terms as a limit; IPHC-2022-MSAB017-R Page 5 of 22</p> <p>e) Should the number of term limits be implemented, the Commission is requested to clarify how current members would be impacted, noting some have been on the board for greater than 10-13 years.</p>	<p>Completed</p> <p>The Commission made a number of agreements related to MSAB membership that are outlined in document IPHC-2023-MSAB018-04.</p>
MSAB017– Req.2 (para 17)	<p>The MSAB REQUESTED the following minor amendments to the MSAB Rules of Procedure be incorporated in the current update:</p> <p>a) Review terminology throughout and ensure consistency, e.g.: Fisheries vs fishery; Session vs meeting;</p> <p>b) Para. 3: Change ‘employees’ to ‘board members’ at the end of para. 3;</p> <p>c) Para. 7: Co-Chairpersons: no limit to the number of co-chairperson terms</p>	<p>Completed</p> <p>The Commission updated the IPHC Terms of Reference.</p>
MSAB017– Req.3 (para 28)	<p>The MSAB NOTED that objective 2.1 is stated as a target that has also been interpreted as a threshold and REQUESTED clarification from the Commission</p>	<p>In progress</p> <p>The Secretariat continues to work with Commissioners, party agencies, and the SRB to determine appropriate language and interpretation of this objective.</p>



Outcomes of the 99th Session Of The IPHC Annual Meeting (AM099)

PREPARED BY: IPHC SECRETARIAT (10 APRIL 2023)

PURPOSE

To provide the MSAB with the outcomes of the 99th Session of the IPHC Annual Meeting (AM099) relevant to the mandate of the MSAB.

BACKGROUND

The agenda of the 99th Session of the IPHC Annual Meeting (AM099) included items relevant to the MSAB.

DISCUSSION

During the course of the 99th Session of the IPHC Annual Meeting (AM099) the Commission made a number of specific recommendations and requests for action regarding the MSE process. Relevant sections from the report of the meeting are provided in [Appendix A](#) for the MSAB's consideration.

RECOMMENDATION

That the MSAB:

- 1) **NOTE** paper IPHC-2023-MSAB0018-05 which details the outcomes of the 99th Session of the IPHC Annual Meeting (AM099) relevant to the mandate of the MSAB.

APPENDICES

[Appendix A](#): Excerpts from the 99th Session of the IPHC Annual Meeting (AM099) Report ([IPHC-2023-AM099-R](#)).

APPENDIX A
Excerpt from the 99th Session of the IPHC Annual Meeting (AM099) Report
(IPHC-2023-AM099-R)

RECOMMENDATIONS

IPHC Management Strategy Evaluation: update

- AM099–Rec.02 (para. 76) The Commission **RECOMMENDED** that for the purpose of a comprehensive and intelligible Harvest Strategy Policy (HSP), four coastwide objectives should be documented within the HSP, in priority order:
- 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 at or above a biomass reference point (B36%) 50% or more of the time.
 - c) Optimise average coastwide TCEY.
 - d) Limit annual changes in the coastwide TCEY.
- AM099–Rec.03 (para. 84) The Commission **AGREED** sufficient analysis has been completed and **RECOMMENDED** not to change the current 32 inch size limit.

REQUESTS

IPHC Management Strategy Evaluation: update

- AM099–Req.06 (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 non-assessment years and additional MSE analyses.
- IPHC-2022-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.*



Updates to evaluations of the current interim harvest policy

PREPARED BY: IPHC SECRETARIAT (A. HICKS, I. STEWART; 21 APRIL 2023)

PURPOSE

To provide the Management Strategy Advisory Board (MSAB) with additional evaluations performed since the 17th Session of the IPHC Management Strategy Advisory Board (MSAB017) and improvements to the MSE framework.

BACKGROUND

Evaluations of size limits and multi-year assessments were completed in 2022 and provided at the 99th Session of the IPHC Annual Meeting (AM099) in document [IPHC-2023-AM099-13](#). Some additional simulations for a small set of management procedures (MPs) were performed between MSAB017 and AM099 to reduce Monte Carlo error (e.g, increase the precision of the performance metrics). Additionally, some additional scenarios were simulated that assumed the PDO was always high or always low.

The fisheries in the operating model (OM) are specified by IPHC Regulatory Area because many of the Commission objectives used to evaluate MPs are specific to IPHC Regulatory Areas and the OM is spatially structured by Biological Region. This makes it necessary to distribute the TCEY across the fisheries to appropriately remove biomass from each Biological Region and allow for the calculation of necessary performance metrics. Even though distribution procedures are not currently being evaluated and there is no specific agreement on a single distribution procedure, they are part of the MP and need to be included in the simulations. Therefore, these simulations follow Commission advice from the 12th Special Session of the IPHC (SS012) and integrate over five distribution procedures.

[IPHC-2022-SS012-R](#), para 11: *The Commission RECOMMENDED the following five distribution procedures to be used in the management strategy evaluation of size limits and multi-year assessments, noting that these distribution procedures are for analytical purposes only and are not endorsed by both parties, thus would be reviewed in the future if the Commission wishes to evaluate them for implementation.*

- a) *Baseline based on recent year O32 FISS results, relative harvest rates of 1.0 for IPHC Regulatory Areas 2-3A, relative harvest rates of 0.75 for IPHC Regulatory Areas 3B-4, and no application of the current interim agreements for 2A and 2B;*
- b) *Baseline based on recent year O32 FISS results, relative harvest rates of 1.0 for IPHC Regulatory Areas 2-3A, relative harvest rates of 0.75 for IPHC Regulatory Areas 3B-4, and current interim agreements for 2A and 2B;*

c) *Baseline based on recent year O32 FISS results with 1.65 Mlbs to 2A and 20% of the coastwide TCEY to 2B;*

d) *Baseline based on recent year O32 FISS results, relative harvest rates of 1.0 for IPHC Regulatory Areas 2-3, 4A, and 4CDE, a relative harvest rate of 0.75 for IPHC Regulatory Area 4B, and no agreements for 2A and 2B;*

e) *Baseline based on recent year O32 FISS results, relative harvest rates of 1.0 for IPHC Regulatory Areas 2-3, 4A, and 4CDE, a relative harvest rate of 0.75 for IPHC Regulatory Area 4B, and current interim agreements for IPHC Regulatory Areas 2A and 2B*

Three of the five distribution procedures contain agreements for IPHC Regulatory Areas 2A and 2B (b, c, and e). Decision-making variability for these two areas is set to zero when agreements are in place.

This document describes the results from the additional simulations and discusses further improvements to the MSE framework.

ADDITIONAL SIMULATIONS FOR AM099

The simulations for MSAB017 and AM099 integrated four individual models in the OM and five distribution procedures. For each model and each distribution procedure, the same set of randomly generated values are used (e.g. future recruitments, weight-at-age, PDO, etc.) so that one combination of OM model and distribution procedure does not randomly overwhelm the results, and comparisons would be meaningful across models, if desired. However, this results in a reduced effective sample size (replicates) compared to a truly random process. These concerns are alleviated with more replicates, but each replicate takes hours, resulting in a trade-off between precision of the results and time spent running simulations.

For MSAB017, 500 replicates were performed for most management procedures (see <http://shiny.westus.cloudapp.azure.com/shiny/sample-apps/IPHC-MSE-MSAB017/>). Therefore, there were 25 replicates for each OM model and distribution procedure combination. This provided insights into the performance of many MPs, but may not be an accurate representation of the distribution of potential outcomes.

The number of replicates was increased to 1100 (55 for each combination) for a small set of MPs to present at AM099 (see <http://shiny.westus.cloudapp.azure.com/shiny/sample-apps/IPHC-MSE-AM099/>). This small set included three (3) size limits (none, 26-inches, and 32-inches that are labelled MP-A0, MP-A26, and MP-A32, respectively), three biennial assessment options (Table 1) with a 32-inch size limit (labeled MP-Ba32, MP-Bb32, and MP-Bc32), and one option with a triennial assessment (option b in Table 1) and a 32-inch size limit (labelled MP-Tb32). These seven (7) MPs were all projected with an SPR equal to 43% and simulated decision-making variability (only on the distribution of the TCEY). Five of the MPs (MP-A0, MP-A26, MP-A32, MP-Bb32, and MP-Tb32) were also simulated with no decision-making variability. All results can be viewed on the [MSE Explorer for AM099](#), and some results are presented in [IPHC-2023-AM099-13](#). Some insights are provided here.

Table 1. Three options for setting the TCEY in non-assessment years for the multi-year management procedures.

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.

Focusing on the five MPs and four objectives shown in Table 2, the differences are minor. However, greater differences were observed in long-term performance metrics related to the TCEY. For example, the long-term median average TCEY for MP-A32 was 72.1 Mlbs with 500 replicates, but was 62.2 Mlbs with 1100 replicates. Overall, the interpretations and comparisons from MSAB017 are valid and consistent with the updated results presented at AM099.

Table 2. Results of five MPs with 500 replicates (MSAB017) and 1100 replicates (AM099). The first two performance metrics (probabilities) are long-term statistics and the second two (TCEY) are short-term (4-14 years).

MP name	MP-A0	MP-A26	MP-A32	MP-Bb32	MP-Tb32
Assessment Frequency	Annual	Annual	Annual	Biennial	Triennial
Size Limit	0	26	32	32	32
Empirical Rule	-	-	-	b	b
500 replicates					
P(RSB<20%)	PASS	PASS	PASS	PASS	PASS
P(RSB<36%)	0.143	0.143	0.148	0.156	0.225
Median TCEY	60.1	59.8	58.2	58.5	58.4
Median AAV TCEY	18.0%	18.2%	18.5%	19.0%	14.2%
1100 replicates					
P(RSB<20%)	PASS	PASS	PASS	PASS	PASS
P(RSB<36%)	0.174	0.174	0.180	0.164	0.197
Median TCEY	60.5	59.9	58.3	58.5	58.3
Median AAV TCEY	17.2%	17.5%	17.8%	17.0%	14.1%

EFFECTS OF THE PDO ON REFERENCE POINTS AND DISTRIBUTION

Document [IPHC-2019-SRB015-11](#) showed that, for Pacific halibut, biomass-based reference points, such as MSY and B_0 , are affected by a change in environmental regime, but relative reference points, such as relative spawning biomass (RSB) and SPR_{MSY} , are similar across regimes. This indicates that a consistent SPR-based management regime is likely robust across different environmental regimes. Analyses presented in this document looking at high and low PDO regimes shows similar results, and also provides performance metrics specific to the IPHC MSE.

The median relative spawning biomass (RSB) when fishing at an SPR equal to 43% was similar for the high and low PDO scenarios (Table 3 and Figure 1). However, even though the median was near 36%, there was a higher probability that the RSB was less than 36% for the low PDO scenario. The long-term median TCEY was 18% less for the low PDO scenario and 18% more for the high PDO scenario when compared to the median TCEY for the base simulations that modelled PDO regime shifts. Short-term median TCEYs were less different. Inter-annual variability in the TCEY was similar across the PDO scenarios.

Table 3. Performance metrics related to primary objectives for scenarios with modeled cycles of PDO (both), always low PDO (Low), and always high PDO (High) with an annual assessment, estimation error, and decision-making variability. Long-term results are shown for all performance metrics and short-term (4–13 years) results are also shown for fishery sustainability TCEY metrics.

MP name	MP-A32	MP-A32	MP-A32
PDO	Both	Low	High
SPR	0.43	0.43	0.43
Replicates	1100	1100	1100
Long-Term Metrics			
Median RSB	38.8%	38.3%	39.4%
P(RSB _y <20%)	<0.001	<0.001	<0.001
P(RSB<36%)	0.180	0.231	0.114
Median TCEY	62.21	50.88	73.35
P(any3 change TCEY > 15%)	0.852	0.844	0.832
Median AAV TCEY	16.3%	16.9%	16.4%
Short-term Metrics (4-13 yrs)			
Median TCEY	58.3	56.0	61.7
P(any3 change TCEY > 15%)	0.906	0.895	0.896
Median AAV TCEY	17.8%	17.6%	17.6%

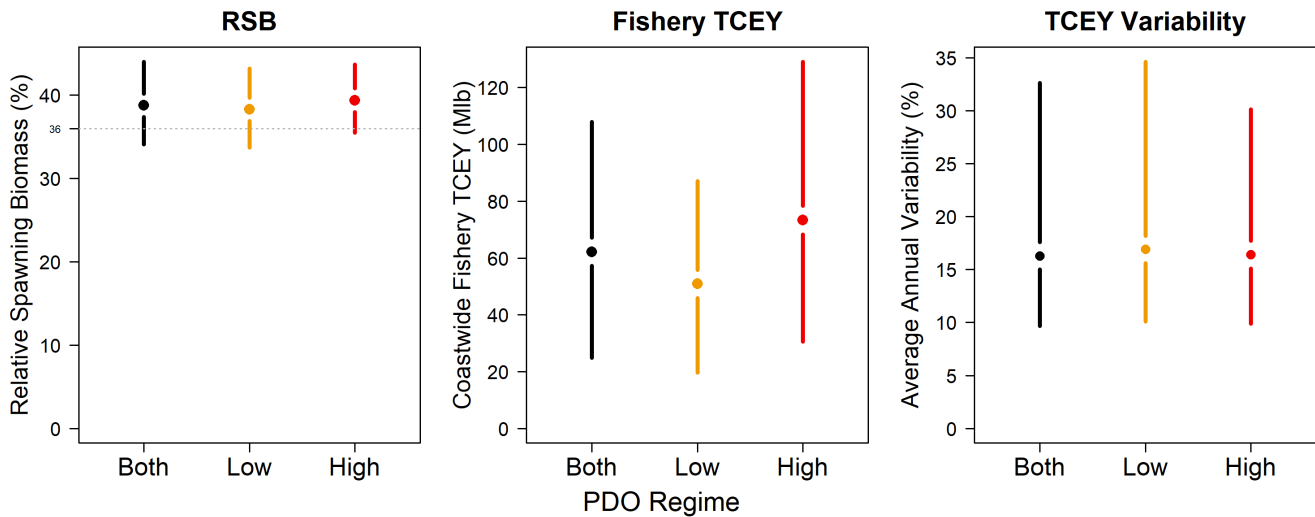


Figure 1. Long-term Relative Spawning Biomass (RSB), TCEY, and AAV for the base simulations modelling PDO regime shifts and the low and high PDO scenarios. The target RSB objective of 36% is shown as a horizontal dashed line.

The percentage of spawning biomass in each Biological Region is affected by fishing under an SPR-based management procedure integrated over five distribution procedures (Figure 2). The distribution of spawning biomass across the Biological Regions is also affected by the PDO regime because movement, recruitment distribution, and average recruitment are dependent on the PDO regime. Region 2 shows a reduction in the percentage of spawning biomass with fishing, and the low PDO results in a higher percentage. Region 3 shows a slight reduction in the percentage of spawning biomass with fishing and a higher percentage of spawning biomass with a high PDO. Region 4 shows a higher percentage of spawning biomass with fishing and is largely unaffected by the PDO regime. Region 4B has variable results with fishing and across PDO regimes.

Even though we cannot “manage” the PDO regime, it is useful to understand the effects of the PDO regime on the results, allowing for the separation of the effects of fishing from the effects of the environment. For Pacific halibut, the environment sometimes may have a larger effect on the distribution of spawning biomass than fishing does (at an SPR of 43% using the five distribution procedures defined earlier).

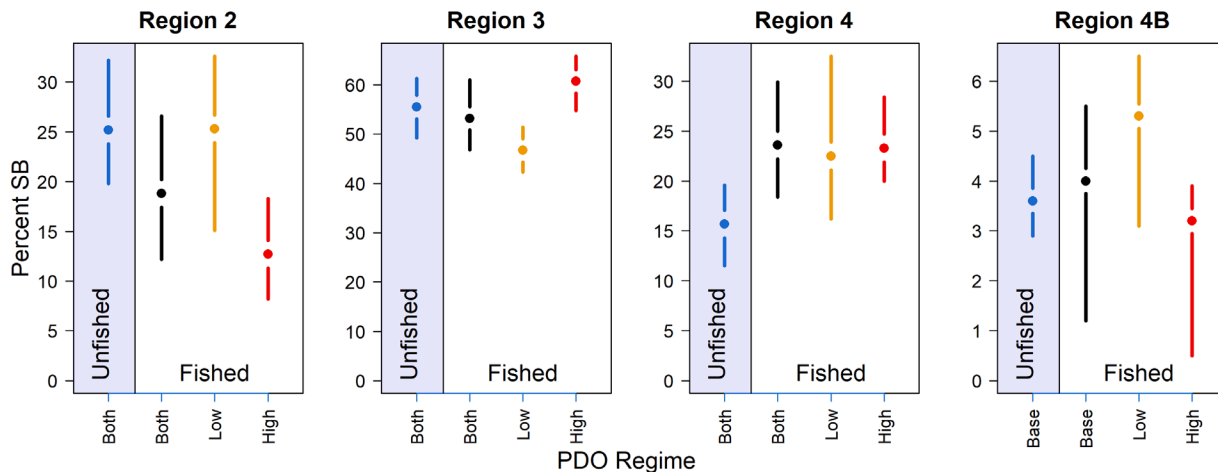


Figure 2. Percentage of spawning biomass in each Biological Region for an unfished population and for a fished population.

SPECIFYING OBJECTIVES

The Commission defined a small set of priority coastwide objectives and associated performance metrics for current evaluations.

[IPHC-2023-AM099-R](#), para. 76. The Commission **RECOMMENDED** that for the purpose of a comprehensive and intelligible Harvest Strategy Policy (HSP), four coastwide objectives should be documented within the HSP, in priority order:

- Maintain the long-term coastwide female spawning stock biomass above a biomass limit reference point (B20%) at least 95% of the time.
- Maintain the long-term coastwide female spawning stock biomass at or above a biomass reference point (B36%) 50% or more of the time.
- Optimise average coastwide TCEY.
- Limit annual changes in the coastwide TCEY.

[IPHC-2023-AM099-R](#), para. 77. The Commission **AGREED** that the performance metrics associated with the objectives in Paragraph 76 are:

- P(RSB): Probability that the long-term Relative Spawning Biomass (RSB) is less than the Relative Spawning Biomass Limit, failing if the value is greater than 0.05.
- P(RSB<36%): Probability that the long-term RSB is less than the Relative Spawning Biomass Reference Point, failing if the value is greater than 0.50.
- Median TCEY: the median of the short-term average TCEY over a ten-year period, where the short-term is 4-14 years in the future.
- Median AAV TCEY: the average annual variability of the short-term TCEY determined as the average difference in the TCEY over a ten-year period.

These priority objectives and performance metrics (also presented in [Table 4](#)) come from a larger list of objectives which includes objectives specific to Biological Regions and IPhC Regulatory Areas.

UPDATING THE OPERATING MODEL

The evaluations presented at AM099 and in this document were based on an operating model consisting of four multi-region models that were conditioned using data, results, and assumptions from the 2021 stock assessment ([IPHC-2022-SA-01](#)). Two of these OM models used high values of natural mortality (M) based on the two stock assessments that estimated M (0.195 for females and 0.174 for males), and two models used low values of natural mortality (M) based on the two stock assessments that assumed a fixed value for female M (0.15 for females and 0.146 estimated for males). MSE projections were integrated over these four models.

At AM099, a full stock assessment was also presented that estimated natural mortality in three out of four of the models in the ensemble ([IPHC-2023-SA-01](#)), as opposed to only two models in previous years. The new estimate of female M in the model that previously fixed female M was greater than the previous fixed value of 0.15. Comparison of 2022 ensemble stock assessment results with previous stock assessments indicates that the estimates of spawning biomass from the 2022 ensemble were consistent with those from the 2012-2021 assessments. However, projections were more optimistic because of the increase in estimated productivity of the stock resulting from 3 out of 4, rather than 2 out of 4 models, with higher natural mortality.

Updating the model in the OM (medAAF_lowM) that corresponded to the previous assessment model with a fixed M that was subsequently estimated in the 2022 assessment would result in different outcomes, but the comparison across MPs is likely to be similar since all MPs would contain the update. Furthermore, the MSE simulations included variability in natural mortality, thus even with a change in the median value of M there will still be some overlap with past simulations.

[Figure 3](#) shows that the median average long-term relative spawning biomass is similar for each model in the OM, but the median average short-term TCEY differs for the areas-as-fleets model with a higher M (medAAF). The median TCEY is likely to increase when replacing the medAAF_lowM with an areas-as-fleets model in the OM based on the recent 'short AAF' model in the stock assessment. The value of M is not the sole driver of the increase in TCEY, as seen with the low TCEY in the medCW model. Other parameters, such as unfished recruitment (R_0) also affect productivity and yield.



Table 4. Priority coastwide 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 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	$P(SB < SB_{Lim})$ PASS/FAIL
2.1 Maintain spawning biomass around a level that optimizes fishing activities	Maintain the coastwide female spawning biomass above a biomass target reference point at least 50% of the time	SB < Spawning Biomass Target (SB _{Targ}) SB _{Targ} =36% unfished spawning biomass	Long-term	0.50	$P(SB < SB_{Targ})$
2.3. Provide Directed Fishing Yield	Optimize average coastwide TCEY	Median coastwide TCEY	Short-term		Median \overline{TCEY}
2.2. Limit Variability in Mortality Limits	Limit annual changes in the coastwide TCEY	Median coastwide Average Annual Variability (AAV)	Short-term		Median AAV

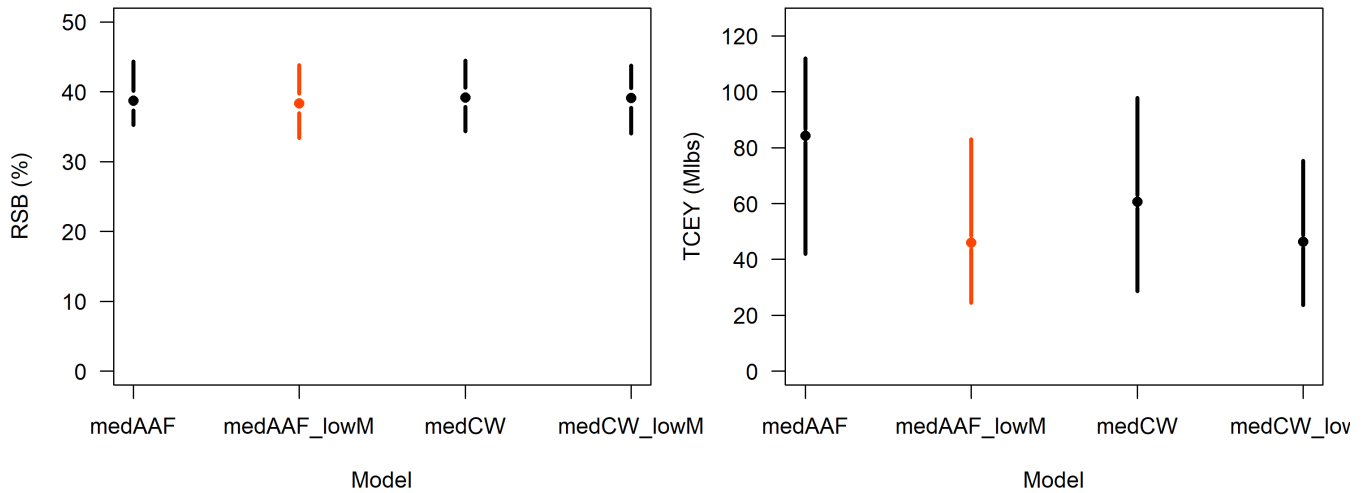


Figure 3. Median (circle) and 5th and 95th quantiles (lines) for long-term relative spawning biomass and short-term TCEY for each model in the OM. The medAAF_lowM model (red) would be updated to use a higher natural mortality to correspond to the 2022 stock assessment.

The reference SPR of 43% has been supported by the MSAB for a number of reasons, such as to avoid triggering the control rule and to reduce interannual variability in the TCEY. The similarities of the relative spawning biomass in [Figure 3](#) suggest that an updated OM would not change the basis for an SPR of 43%. However, once the OM is updated to correspond to the 2022 stock assessment, simulations will be performed to investigate this.

RECOMMENDATION/S

- 1) The MSAB **NOTE** paper IPHC-2023-MSAB018-06 presenting simulations performed since MSAB017, priority objectives defined by the Commission, and potential outcomes after updating the operating model.
- 2) The MSAB **NOTE** that additional simulations beyond those presented at MSAB017 resulted in more precise and slightly different values of the performance metrics, but the comparisons between management procedures remained the same.
- 3) The MSAB **NOTE** that different PDO regimes (i.e. always high or always low)
 - a. had little effect on the priority conservation objective, but low PDO resulted in low TCEYs and high PDO resulted in high TCEYs;
 - b. affected the long-term distribution of spawning biomass differently in each Biological Region and;
 - c. may have as much or a larger effect on the long-term distribution of spawning biomass in each Biological Region than fishing with the current interim harvest strategy policy does.

APPENDICES

Nil



Considerations for the Management Strategy Evaluation Program of Work for 2023-2025

PREPARED BY: IPHC SECRETARIAT (A. HICKS, I. STEWART; 21 APRIL 2023)

PURPOSE

To provide the MSAB with potential management procedures to simulate, how exceptional circumstances are part of the MSE process, a discuss of objectives and performance metrics, and future planning of MSE work.

INTRODUCTION

The MSE Program of Work for 2021-2023 was completed and delivered at the 99th Session of the IPHC Annual Meeting (AM099; see [IPHC-2023-AM099-13](#)). The MSE framework was improved and results investigating size limits and multi-year assessments were presented. Pertinent to size limits and multi-year assessments, the Commission agreed to the following.

[IPHC-2023-AM099-R](#), para. 84: The Commission **AGREED** sufficient analysis has been completed and **RECOMMENDED** not to change the current 32 inch size limit. 85.

[IPHC-2023-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.

The Commission also requested some investigation of exceptional circumstances, especially with respect to multi-year assessments.

[IPHC-2023-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 non-assessment years and additional MSE analyses.

[IPHC-2022-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*

As noted by the SRB above, an exceptional circumstance is a defined event that would result in re-examination of the MSE process to determine if an update to the evaluation of management procedures is necessary. An exceptional circumstance, in an MSE context, is not usually defined to trigger an action within the management procedure, but a trigger can be defined such that action does take place. An example is the 30:20 control rule which defines a reduction in the

fishing intensity when stock status is less than 30%. A similar trigger could be defined that indicates an assessment should be done in a year when one was normally not scheduled.

Without an agreed upon distribution procedure, the recent MSE simulations integrated over five potential distribution procedures (see IPHC-2023-MSAB018-06). The Commission acknowledged that a distribution procedure has not been agreed upon at this time and provided the following.

[IPHC-2023-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.

The advice from the 2022 full stock assessment ([IPHC-2023-SA-01](#)) using the current interim management procedure with an SPR of 43% was a TCEY of 52.0 Mlbs. This TCEY was higher than expected from previous assessments largely because natural mortality (*M*) was estimated higher than a previously fixed value in one of four models in the ensemble, thus increasing the perceived productivity of the stock. In contrast to this optimistic advice, the coastwide FISS index of O32 WPUE was at its lowest value observed in the time-series, declining by 8% from the previous year, and a TCEY of 52.0 Mlbs in 2023 would have a 75% chance of a lower spawning biomass in 2024. The Commission departed from the current interim management procedure and chose a TCEY of 36.97 Mlbs, noting

[IPHC-2023-AM099-R](#), 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.

Although the status of the stock was above the target spawning biomass of 36% and had a small chance (25%) of falling below 30% at any TCEY up to 60 Mlbs, the Commission decided to reduce the TCEY from the TCEY determined using the reference harvest level.

This document considers the responses from the Commission during AM099 that are related to the MSE. Potential management procedures are discussed that incorporate multi-year assessments, a trigger to conduct an assessment in a non-assessment year, and control rules that may lead to a management procedure mimicking the TCEY decision made at AM099. Potential objectives related to the TCEY decision made at AM099 are also discussed. Exceptional circumstances are defined and then additional considerations for the MSE program of work are presented.

MANAGEMENT PROCEDURES

The current interim management procedure consists of a scale component to determine the coastwide TCEY which is then passed through a distribution procedure to distribute the TCEY to each IPHC Regulatory Area ([Figure 1](#)). Many elements make up each of these components. A decision process occurs at the end of the harvest strategy policy where the final TCEYs for each IPHC Regulatory Area may deviate from those determined by the management procedure, as seen at AM099.

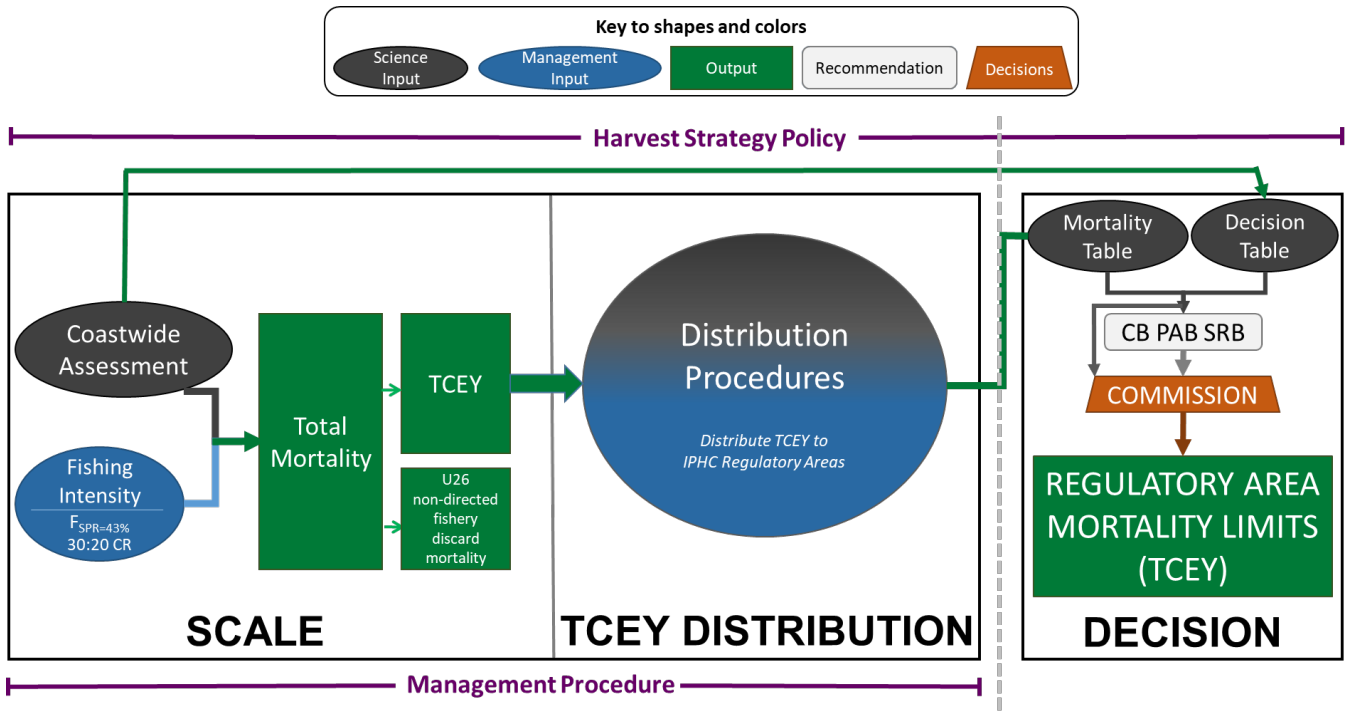


Figure 1. Illustration of the Commission interim IPHC harvest strategy policy (reflecting paragraph ID002 in [IPHC-2020-CR-007](#)) showing the coastwide scale and TCEY distribution components that comprise the management procedure. The distribution procedure is currently undefined. The decision component is the Commission decision-making process, which considers inputs from many sources.

The coastwide Total Mortality (TM) is determined from an SPR-based fishing intensity, which is reduced when stock status is less than 30% and effectively set to zero when stock status is less than 20% (called the 30:20 control rule). The coastwide TCEY is determined by subtracting the U26 non-directed fishery discard mortality. Additional elements can easily be added to the MP to evaluate using the MSE framework.

Multi-year MPs use a simple procedure in years without an assessment to determine the TCEY. This simple procedure can be based on the FISS WPUE and adjust the TCEY up or down in proportion to the change in the FISS WPUE, thus reflecting the trend in abundance. If there is an additional concern of being at low catch-rates or below a specific FISS WPUE, a trigger could be added to reduce the TCEY even further or to trigger an assessment in a year when one normally would not occur. There would be little time to conduct an assessment after the survey results came in, however.

In paragraph 88 of the Report from AM099 ([IPHC-2023-AM099-R](#); see above), “exceptional circumstances that would trigger a stock assessment in non-assessment years” was mentioned. It may be preferable to define this trigger as part of the management procedure because an exceptional circumstance, in the classic MSE sense, is when an observation is made outside of what was simulated in the closed-loop simulations of the MSE, requiring the MSE simulations to

be reconsidered. Putting a trigger to conduct an assessment in the management procedure allows it to be evaluated as part of the MSE process.

At AM099, the Commission decided to depart from the reference SPR and choose a lower TCEY. Paragraph 94 of [IPHC-2023-AM099-R](#) (see above) suggests that the Commission was not willing to accept a high chance of further declines in the spawning biomass. If that was the case, the 30:20 control could be revised to avoid going to low levels, although the decision was probably a combination of many factors which may include low catch rates, continually declining indices, a recent series of poor recruitment, mostly relying on one year class, and low weight-at-age.

An element can be added to the management procedure that would account for any of these factors. If low catch-rates and declining indices was an important factor in the decision to reduce the TCEY, the management procedure may incorporate an additional control rule based on the FISS O32 WPUE. For example, the fishing intensity (or TCEY) could be linearly reduced when the FISS O32 WPUE is below some value. Various values could be tested to produce the desired performance. However, that performance may depend on a new objective related to catch-rates or FISS WPUE (see the Objectives section below).

In summary, potential elements of MPs to evaluate with the MSE include

- 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.

OBJECTIVES AND PERFORMANCE METRICS

Document IPHC-2023-MSAB018-06 for this meeting presented the four Commission-recommended priority objectives and associated performance metrics. The MSAB has previously defined a set of primary objectives, and associated performance metrics, which includes some area-specific objectives as well ([Appendix A](#)). These primary objectives have been used in past evaluations. Furthermore, the MSE Explorer has options to select many performance metrics beyond those defined by the primary objectives. These have been called statistics of interest in the past, meaning they are performance metrics without a specific objective defined by a measure, time-frame, and tolerance.

The primary objectives are a subset of two defined goals

1. Biological Sustainability (also referred to as conservation goal)
 - 1.1. Keep female spawning biomass above a limit to avoid critical stock sizes and conserve spatial population structure.
2. Optimise directed fishing opportunities (also referred to as fishery goal)
 - 2.1. Maintain spawning biomass at or above a level that optimises fishing activities
 - 2.2. Provide directed fishing yield
 - 2.3. Limit variability in mortality limits

Details of the primary goals and objectives defined by the Commission, along with performance metrics, are shown in Appendix A, renumbered to reflect the priority order as recommended by the Commission in paragraph 76 of [IPHC-2023-AM099-R](#) (see document IPHC-2023-MSAB018-06).

One measurable objective that can use refinement is the Biological Region-specific objective “maintain a defined minimum proportion of female spawning biomass in each Biological Region.” The purpose of this objective is to conserve population structure because it is not known how each Biological Region contributes to the sustainability of the stock in each IPHC Regulatory Area or Biological Region. Allowing the spawning biomass to get too low in one Biological Region may result in unintended consequences. Proportions were defined *ad hoc* for each Biological Region based on historical estimates of distribution ([Figure 2](#)), but recent MSE results were never able to meet the objective for Biological Region 4B due to a large amount of variability (e.g. the “Both” for the “Fished” run in [Figure 3](#)). Further investigation of the percentage of spawning biomass in Biological Region 4B under scenarios of persistent low PDO and persistent high PDO ([Figure 3](#)) show that the percentage of spawning biomass in Biological Region 4B is much more variable when fished than when not fished, and the “high” PDO results in lower percentages of spawning biomass in that region, sometimes less than 1%.

There are many solutions to alleviate this issue and find MPs that meet the objective of maintaining coastwide spawning biomass in Biological Region 4B.

- a) Determine a new value for the minimum percentage in Biological Region 4B (currently 2%).
- b) Adjust the tolerance to a value great than 5%.
- c) Find a management procedure that will meet the current objective. This would likely be achieved by lowering the relative harvest rate in IPHC Regulatory Area 4B.

As noted above, the Commission decision at AM099 to depart from the reference SPR and choose a lower TCEY (paragraph 94 of [IPHC-2023-AM099-R](#)) suggests that the Commission was not willing to accept a high chance of further declines in the spawning biomass. This indicates that there is potentially an undefined objective. This may be related to catch-rates or the FISS WPUE, or indicate that the Commission would be willing to operate at a lower fishing intensity (i.e. higher SPR). It may be useful to the MSAB to identify potential objectives or performance metrics that may assist in evaluating management procedures to identify ones that would satisfy this concern of declining spawning biomass. Some examples are

- a) The FISS O32 (or all sizes) WPUE does not fall below a specified value with a defined tolerance. This could be a proxy for fishery catch-rates.
- b) If the FISS O32 (or all sizes) WPUE falls below a specified value, the spawning biomass recovers at a certain rate with a defined tolerance, recovers to a value within a certain time-frame with a defined tolerance, or has a specified chance of increasing.
- c) When stock status is below a threshold, the spawning biomass recovers at a certain rate with a defined tolerance, recovers to a value within a certain time-frame with a defined tolerance, or has a specified chance of increasing.

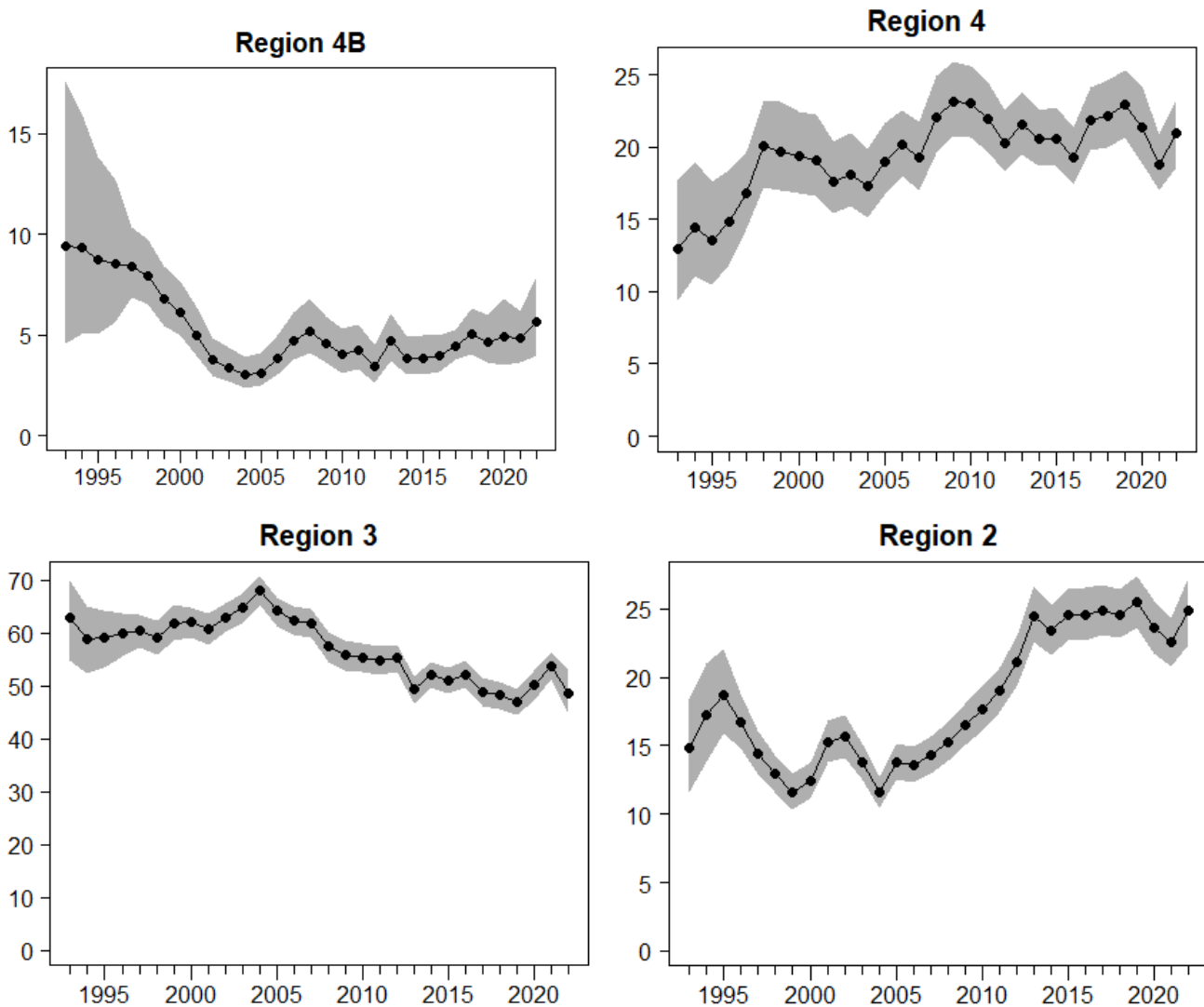


Figure 2. Estimated percent stock biomass in each Biological Region, with 95% credible intervals, from the space-time model using FISS data.

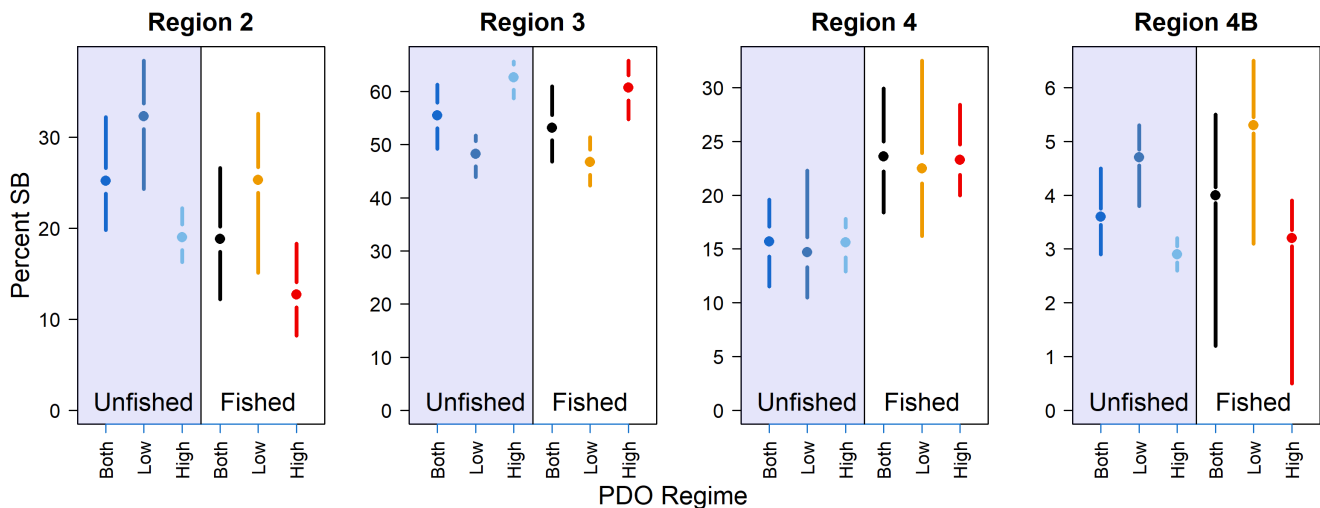


Figure 3. Percentage of spawning biomass in each Biological Region when fished with an SPR of 43% and when not fished. The PDO is modelled with low and high periods in “Both”, is persistently low in “Low”, and is persistently high in “High”.

There are two other goals, with undefined objectives, that were defined by the MSAB early in the process.

3. Minimize discard mortality in directed fisheries.
4. Minimize discards and discard mortality in non-directed fisheries (bycatch).

These goals, related to discard mortality in directed fisheries and non-directed fisheries, have not yet been specifically considered in the MSE but are identified by the MSAB as important to consider in the future. The current MSE framework can provide meaningful performance metrics related to discard mortality in the directed fisheries, but non-directed discard mortality is modelled as a random factor that represents potential non-directed discard mortality, but is not a meaningful performance metric because its link to management choices is very weak.

Many performance metrics are provided in the [MSE explorer](#) under additional metrics (and most defined on the help page). There may be additional performance metrics of interest to the MSAB, or some performance metrics could be removed to simplify the choices.

EXCEPTIONAL CIRCUMSTANCES

An exceptional circumstance is defined as a process for deviating from an adopted MP (de Moor et al. 2022). The IPHC interim harvest strategy policy has a decision-making step after the MP ([Figure 1](#)), thus the Commission may deviate from an adopted MP. The SRB originally used this definition of exceptional circumstances, but provided clarity at SRB021 to fit within the IPHC process.

[IPHC-2020-SRB017-R](#), para. 27. The SRB **AGREED** with conclusions of the independent peer reviewer that:

- d) the IPHC Secretariat establish a formal process for determining whether Exceptional Circumstances exist in a given year that would justify deviating from the harvest control rule.

[IPHC-2022-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

These two statements indicate that exceptional circumstances should be defined using observations rather than model outputs and should be compared to the distribution generated by the MSE simulations. If the observation(s) are outside of that range, revising the MSE framework and conducting additional simulations should be considered. It is important to have clear definitions for when the agreed upon MP should be re-evaluated.

The Commission may have interpreted the continued decline in abundance indices and projected spawning biomass seen at AM099 as an exceptional circumstance, but this is within the distribution of simulations from the MSE. Figure 4 shows that in the near-term, the spawning biomass has a chance of continuing to decline (the 5th percentile shows a decline before subsequently increasing). However, after a few years of projections, the spawning biomass is very likely to increase. In the long-term, it is not unlikely that the spawning biomass would be at levels seen recently, according to these simulations with an SPR of 43%.

Given the SRB statements, potential exceptional circumstances could be as follows.

- a) The coastwide all-sizes FISS WPUE or NPUE falls above the 97.5th percentile or 2.5th percentile of the simulated FISS index.
- b) The observed percentage of FISS all-sizes WPUE is above the 97.5th percentile or 2.5th percentile of the 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 2.5th percentile of the simulated FISS proportions-at-age. Exactly how to make this comparison over all ages would have to be determined.

The 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.

If a multi-year MP was implemented and an exceptional circumstance occurred in a year without a stock assessment, it may be useful to specify that a stock assessment would be completed as soon as possible along with the re-examination of the MSE.

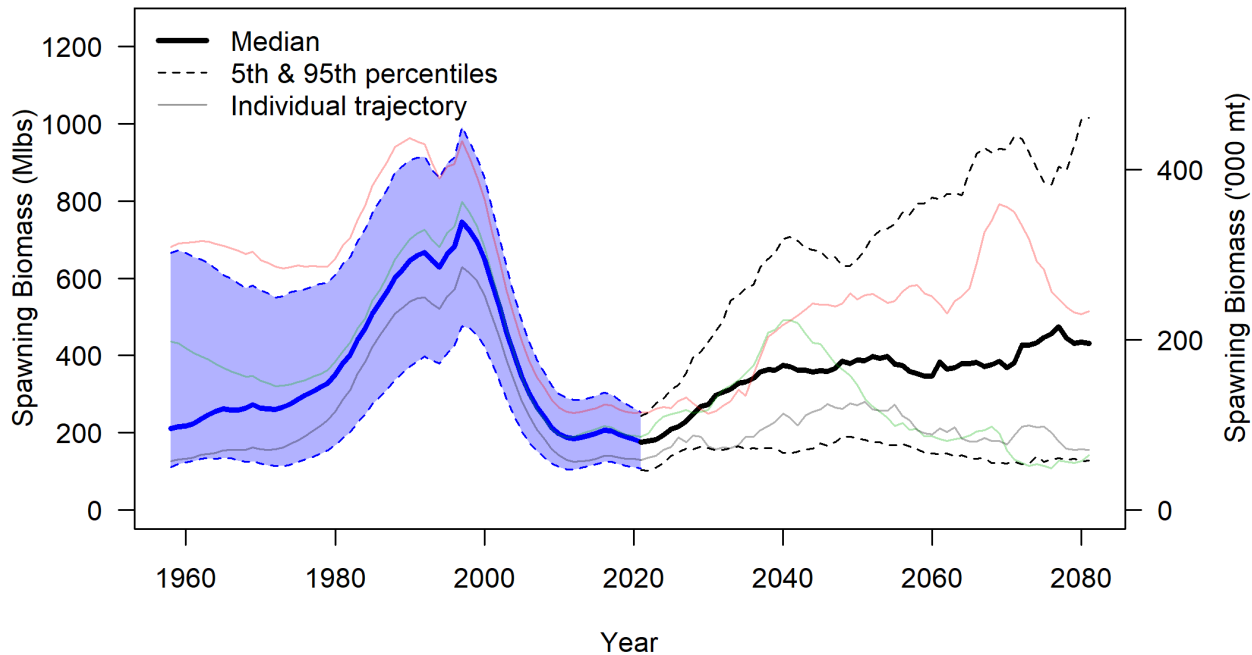


Figure 4. Median, 5th percentile, and 95th percentile of projected spawning biomass when using an SPR of 43%. Three individual trajectories (chosen ad hoc) are shown as thin lines to provide an idea of the variability in one trajectory over the entire period.

ADDITIONAL CONSIDERATIONS FOR FUTURE MSE WORK

There may be other considerations for future MSE work to discuss at MSAB018. One task that will be done is to update the OM, as specified in document IPHC-2023-MSAB018-06, and then re-evaluate SPR values and the 30:20 control rule. In fact, before any evaluations of MPs, the OM should be updated based on the most recent stock assessment.

TWO-YEAR PROCESS FOR THE MSE

An MSE process may take one to 4 years, but because the MSE process at IPHC has matured and an MSE framework is in place, the timeframe for presenting results to the Commission on these topics is likely to take two years. How advisory bodies may engage in the MSE process over the next two years, and what that may entail is described next.

Scientific Review Board

The SRB reviews the technical aspects of the MSE, trusting that the MSE developers are correctly implementing those details. The SRB also plays an important role in reviewing objectives and making sure that performance metrics are appropriate and correct. The Secretariat also works with the SRB to determine effective and succinct ways to present results to the Commission.

Two SRB meetings each year works well with the MSE process. SRB engagement in 2023 and 2024 may occur as follows.

Spring 2023 SRB meeting:

- Review outcomes of the Spring MSAB meeting.
- Review any technical aspects of the MSE framework that have not been reviewed before.
- Review the set of primary objectives and performance metrics to be used for evaluation.
- Review proposed MPs for evaluation and identify if the set should be narrowed or expanded.

Fall 2023 SRB meeting:

- Review preliminary simulation results including those related to questions of scientific interest and of interest to decision-makers.
- Assist in narrowing down the MPs to a succinct set to present to the Commission.
- Provide guidance on communicating progress.

Spring 2024 SRB meeting:

- Review outcomes of the Spring MSAB meeting.
- Review any technical aspects of the MSE framework that have not been reviewed before.
- Review the set of primary objectives and performance metrics to be used for evaluation.
- Review proposed MPs for evaluation and identify if the set should be narrowed or expanded.
- Provide guidance on methods for communicating results.

Fall 2024 SRB meeting:

- Review the simulation results including those related to questions of scientific interest and of interest to decision-makers.
- Assist in narrowing down the MPs to a succinct set to present to the Commission.
- Provide further guidance on communicating results.

Management Strategy Advisory Board

The MSAB may best serve the Commission by considering methods and inputs for the MSE process. One meeting per year would be sufficient, although adding in an information session when appropriate may be useful to keep MSAB members informed as they prepare for the Interim and Annual Meetings. Engagement with the MSAB in 2023 and 2024 may be as follows.

Spring 2023 MSAB meeting:

- Discuss a broad set of objectives for use in the MSE process.
- Using guidance from the Commission, identify specific management procedures for simulation and evaluation that may be presented to the Commission.
- Define performance metrics to be used to evaluate the current MPs.
- Articulate interests and concerns of constituents related to the MPs being considered.
- Identify methods to disseminate current MSE information to constituents.
- Provide suggestions of fishery-related scenarios that may be used in the simulations to represent uncertainty about aspects of the fisheries that cannot be or are not managed.

Spring 2024 MSAB meeting:

- Further discussion of a broad set of objectives for use in the MSE process.
- Using guidance from the Commission and preliminary results from 2023, identify specific management procedures for simulation and evaluation that may be presented to the Commission at AM101. Possibly prioritize the MPs to help identify a smaller set to be considered by the Commission.
- Define performance metrics to be used to evaluate the current MPs.
- Articulate interests and concerns of constituents related to the MPs being considered.
- Identify methods to disseminate current MSE information to constituents.
- Provide suggestions of fishery-related scenarios that may be used in the simulations to represent uncertainty about aspects of the fisheries that cannot be or are not managed.
- Provide guidance on potential elements and trade-offs to consider when evaluating results.

Fall 2024 MSAB Informational Session (optional):

- Receive an educational presentation on a specific part of the MSE process.
- Receive a summary of the primary objectives and MPs currently being considered.
- Receive a presentation of results and evaluation.

REFERENCES

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.

RECOMMENDATION/S

- 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.

APPENDICES

[Appendix A](#): Primary objectives defined by the Commission for the MSE

[Appendix B](#): Supplementary material

APPENDIX A

PRIMARY OBJECTIVES DEFINED BY THE COMMISSION FOR THE MSE

Table I.1. Primary objectives, evaluated over a simulated ten-year period, accepted by the Commission at the 7th Special Session of the Commission (SS07). Objective 1.1 is a biological sustainability (conservation) objective and objectives 2.1, 2.2, and 2.3 are fishery objectives. Priority objectives are shown in green text.

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 spawning stock biomass above a biomass limit reference point at least 95% of the time	$B < \text{Spawning Biomass Limit } (B_{Lim})$ $B_{Lim} = 20\% \text{ unfished spawning biomass}$	Long-term	0.05	$P(SB < SB_{Lim})$
	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	$P(p_{SB,R} < p_{SB,R,min})$
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	$B < \text{Spawning Biomass Target } (B_{Targ})$ $B_{Targ} = B_{36\%} \text{ unfished spawning biomass}$	Long-term	0.50	$P(SB < SB_{Targ})$
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 $\left(\frac{\overline{TCEY_A}}{\overline{TCEY}}\right)$
	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

APPENDIX B
SUPPLEMENTARY MATERIAL

The MSE technical document (IPHC-2022-MSE-01) and is available on the IPHC MSE page (<https://www.iphc.int/management/science-and-research/management-strategy-evaluation>).

The MSE Explorer will also be updated with additional results.

(<http://shiny.westus.cloudapp.azure.com/shiny/sample-apps/MSE-Explorer/>).