



Report of the 10th Session of the IPHC Management Strategy Advisory Board (MSAB10)

Seattle, Washington, U.S.A., 23-26 October 2017

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ACRONYMS

AAV	Average Annual Variability
dRSB	dynamic Relative Spawning Biomass
FCEY	Fishery Constant Exploitation Yield
F _{SPR}	The Fishing Intensity that results in an equilibrium Spawning Potential Ratio
HCR	Harvest Control Rule
IPHC	International Pacific Halibut Commission
MSAB	Management Strategy Advisory Board
OCP	Operational Control Point
RSB	Relative Spawning Biomass
SRB	Scientific Review Board
SPR	Spawning Potential Ratio
TCEY	Total Constant Exploitation Yield
U.S.A.	United States of America

HOW TO INTERPRET TERMINOLOGY CONTAINED IN THIS REPORT

This Report has been written using the following terms and associated definitions so as to remove ambiguity surrounding how particular paragraphs should be interpreted.

- Level 1: RECOMMENDED; RECOMMENDATION** (formal); **REQUESTED** (informal): A conclusion for an action to be undertaken, by the Commission, a Contracting Party, a subsidiary (advisory) body of the Commission and/or the IPHC Secretariat. *Note:* Subsidiary (advisory) bodies of the Commission must have their Recommendations and Requests formally provided to the next level in the structure of the Commission for its consideration/endorsement (e.g. from an Advisory Board to the Commission). The intention is that the higher body will consider the action for endorsement under its own mandate, if the subsidiary body does not already have the required mandate. Ideally, this should be task-specific and contain a timeframe for completion.
- Level 2: AGREED:** Any point of discussion from a meeting, which the IPHC body considers to be an agreed course of action covered by its mandate, which has not already been dealt with under Level 1 above; a general point of agreement among delegations/participants of a meeting which does not need to be elevated in the Commission's reporting structure.
- Level 3: NOTED/NOTING; CONSIDERED; URGED; ACKNOWLEDGED:** General terms to be used for consistency. Any point of discussion from a meeting, which the IPHC body considers to be important enough to record in a meeting report for future reference. Any other term may be used to highlight to the reader of an IPHC report, the importance of the relevant paragraph. Other terms may be used but will be considered for explanatory/informational purposes only and shall have no higher rating within the reporting terminology hierarchy than Level 3.

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EXECUTIVE SUMMARY

The 10th Session of the International Pacific Halibut Commission (IPHC) Management Strategy Advisory Board (MSAB10) was held in Seattle, Washington, U.S.A. from 23 to 26 October 2017. The MSAB consists of 20 board members, 19 of which attended the Session from the two (2) Contracting Parties. A total of five (5) individuals attended the Session as Observers. In addition, two (2) IPHC Commissioners were in attendance, Mr Paul Ryall (Canada) and Mr Bob Alverson (U.S.A.). The meeting was opened by the Co-Chairpersons, Mr Adam Keizer (Canada) and Ms Rachel Baker (U.S.A.).

The following are a subset of the complete recommendations/requests for action from the MSAB10, which are provided in full at [Appendix VII](#).

RECOMMENDATIONS

A review of the goals and objectives of the IPHC MSE process

MSAB10–Rec.01 ([para. 11](#)) The MSAB **AGREED** to further revise the goals, objectives, and performance metrics, as detailed at [Appendix IV](#), at MSAB11, and also **RECOMMENDED** that the Commission review and provide guidance on them at the 94th Session of the Commission, thereby providing clear direction for the IPHC Secretariat and MSAB for action in 2018.

Discussion of the performance metrics reported

MSAB10–Rec.02 ([para. 32](#)) The MSAB **RECOMMENDED** that future iterations of the simulations focus on the reduced range of SPR targets (greater than 40%, less than 55%) based on preliminary interpretation of results, and that 2% intervals between SPR values is sufficient to interpret future results.

MSAB Program of Work 2018-22

MSAB10–Rec.03 ([para. 41](#)) The MSAB **RECOMMENDED** the updated Program of Work provided at [Appendix VI](#), for the Commission's further consideration.

REQUESTS

Performance metrics for evaluation

MSAB10–Req.01 ([para. 15](#)) The MSAB **REQUESTED** that the IPHC Secretariat link the goals and objectives to each reported performance metric and provide a summary of key performance metrics over the range of Management Procedures evaluated for presentation to the Commission at the 93rd Interim Meeting and the 94th Annual Meeting.

Simulations to evaluate fishing intensity: A review of variability and scenarios

MSAB10–Req.02 ([para. 21](#)) **NOTING** the current simulated bycatch mortality probability distribution is unrelated to the total mortality in the operating model, the MSAB **REQUESTED** the IPHC Secretariat to consider alternative methods to simulate bycatch mortality at various Pacific halibut abundances.

1. OPENING OF THE SESSION

1. The 10th Session of the International Pacific Halibut Commission (IPHC) Management Strategy Advisory Board (MSAB10) was held in Seattle, Washington, U.S.A. from 23 to 26 October 2017. The MSAB consists of 20 board members, 19 of which attended the Session from the two (2) Contracting Parties. A total of five (5) individuals attended the Session as Observers. In addition, two (2) IPHC Commissioners were in attendance, Mr Paul Ryall (Canada) and Mr Bob Alverson (U.S.A.). The list of participants is provided at [Appendix I](#). The meeting was opened by the Co-Chairpersons, Mr Adam Keizer (Canada) and Ms Rachel Baker (U.S.A.).
2. The MSAB **NOTED** apologies received from the following board members: Mr Jim Lane (Canadian First Nations representative).

2. ADOPTION OF THE AGENDA AND ARRANGEMENTS FOR THE SESSION

3. The MSAB **ADOPTED** the Agenda as provided at [Appendix II](#). The documents provided to the MSAB10 are listed at [Appendix III](#).

3. IPHC PROCESS

3.1 MSAB membership

4. The MSAB **NOTED** paper IPHC-2017-MSAB10-03 which provided the current membership list and term expirations.

3.2 Outcomes of the 93rd Session of the IPHC Annual Meeting (AM093)

5. The MSAB **NOTED** paper IPHC-2017-MSAB10-04 which outlined the main outcomes of the 93rd Session of the Commission, specifically related to the MSAB, and **AGREED** to consider how best to provide the Commission with the information it has requested, throughout the course of the current MSAB meeting.

3.3 Outcomes of the 10th Session of the IPHC Scientific Review Board (SRB10)

6. The MSAB **NOTED** paper IPHC-2017-MSAB10-06, which provided the results of the 11th Session of the IPHC Scientific Review Board (SB11) relevant to the mandate of the MSAB, which included the following recommendations and requests:

SRB11–Rec.02 (para. 25) The SRB RECOMMENDED that the IPHC Secretariat and Management Strategy Advisory Board collaborate to:

- a) further clarify and improve the presentation of the Harvest Strategy Policy (Appendix IV). This would improve not only transparency of the existing interim harvest policy, but also of the MSE process for evaluating alternatives.*
- b) Review harvest policies from other bodies to develop an objectives hierarchy that explicitly prioritizes long-term conservation over short-/medium-term (e.g., 3-8 years) catch performance.*

SRB11–Rec.03 (para. 29) The SRB RECOMMENDED that the IPHC Secretariat hire a modeller/programmer to support MSE work so that timely feedback can be given the MSAB in the MSE process.

SRB11–Req.06 (para. 27) The SRB REQUESTED that a quasi-extinction threshold be established so that:

- a) simulation replicates can be flagged when projected spawning biomass drops below this threshold;*
- b) parameter sets causing quasi-extinction in the historical period can be dropped from the operating model initialization.*

4. SIZE LIMIT ANALYSIS FOR 2017: UPDATE

7. The MSAB **NOTED** paper IPHC-2017-MSAB10-07, which provided an evaluation of the current 32” (81.3 cm) Minimum Size Limit (MSL) in the directed commercial Pacific halibut fishery, and described likely changes to the Pacific halibut fishery under alternative minimum size limits.
8. The MSAB **AGREED** that further evaluation of MSLs within the MSE framework will divert resources from the current MSE Program of Work and thus, should not be incorporated at this time. Spatial modelling is considered by the MSAB to be a higher priority. The consequences of an MSL change include biological and operational uncertainties that cannot be assessed with available information. Determination and distribution of yield at various MSLs, and the value of the fishery as a result of changes in the MSL are examples of these uncertainties that cannot be assessed.
9. The MSAB **NOTED** that if a stakeholder group came forward with a specific adaptive management proposal on MSLs, it should be submitted for consideration at a future IPHC Annual Meeting.

5. GOALS, OBJECTIVES, AND PERFORMANCE METRICS

5.1 *A review of the goals and objectives of the IPHC MSE process*

10. The MSAB **NOTED** paper IPHC-2017-MSAB10-08 which provided a review of the goals and objectives.
11. The MSAB **AGREED** to further revise the goals, objectives, and performance metrics, as detailed at [Appendix IV](#), at MSAB11, and also **RECOMMENDED** that the Commission review and provide guidance on them at the 94th Session of the Commission, thereby providing clear direction for the IPHC Secretariat and MSAB for action in 2018.

5.2 *Performance metrics for evaluation*

12. The MSAB **NOTED** that the goal of the simulations is to produce metrics for multiple Management Procedures, which can be evaluated against the objectives defined by the MSAB. A table is a common way to display these metrics, but figures may be useful to evaluate trade-offs between objectives.
13. The MSAB **CONSIDERED** options to report the performance metrics and results from the simulations considered in paper IPHC-2017-MSAB10-09.
14. The MSAB **AGREED** that both tables and plots are preferred, while keeping the number of options presented to a more plausible range to effectively evaluate the trade-offs. Preferred performance metrics include those related to conservation (e.g. dynamic Relative Spawning Biomass, dRSB), fishery yield (e.g. median FCEY and total mortality), and fishery yield stability (e.g. FCEY Average Annual Variability, AAV).
15. The MSAB **REQUESTED** that the IPHC Secretariat link the goals and objectives to each reported performance metric and provide a summary of key performance metrics over the range of Management Procedures evaluated for presentation to the Commission at the 93rd Interim Meeting and the 94th Annual Meeting.
16. The MSAB **AGREED** on the importance of metrics that are meaningful to stakeholders. For example, performance metrics that report minimum number of mature females or a dRSB-based threshold.
17. The MSAB **URGED** that the reported performance metrics be categorized into metrics that (1) directly evaluate procedures against objectives (e.g. dRSB, AAV), and (2) that are useful for interpreting the behaviour of a procedure (e.g. time spent on the ramp of a harvest control rule).
18. The MSAB **URGED** that the performance metric associated with an objective is consistent with how the objective is stated.

6. HARVEST STRATEGY POLICY, PART 1: SIMULATIONS TO EVALUATE FISHING INTENSITY

19. The MSAB **NOTED** paper IPHC-2017-MSAB10-09 Rev_1 which provided an overview of the simulation framework to evaluate the fishing intensity and harvest control rules in the IPHC harvest strategy policy.

6.1 *A description of the closed-loop simulation framework*

Incorporated below

6.2 *A review of variability and scenarios*

20. The MSAB **CONSIDERED** the simulation framework and assumptions as described, sources of uncertainty and variability in the Operating Model, including weight-at-age and an environmental regime, and distribution of the Total Mortality to sectors.
21. **NOTING** the current simulated bycatch mortality probability distribution is unrelated to the total mortality in the operating model, the MSAB **REQUESTED** the IPHC Secretariat to consider alternative methods to simulate bycatch mortality at various Pacific halibut abundances.
22. The MSAB **AGREED** that additions to the simulation framework are required. These include adding variability to the simulated selectivities for all sectors (e.g. changes in selectivity of bycatch due to future management changes), incorporating time-varying maturity-at-age, improvements to simulating weight-at-age, using an estimation model to introduce estimation error (and data generation with error if necessary), and incorporate implementation variability in the simulations. The MSAB **REQUESTED** that these modifications be added to the simulation framework and assumptions.

6.3 *Management Procedures related to fishing intensity*

23. The MSAB **CONSIDERED** different combinations of elements in various management procedures which included values of SPR ranging from 25% to 60% and also including 100%, operational control points (OCPs) of the reduction of fishing intensity equal to 40:20 and 30:20, a maximum total mortality of 85 M lbs, and a minimum total mortality of 30 M lbs.
24. **NOTING** the need to prioritize conservation, yield, and stability objectives, the MSAB **AGREED** that SPR targets less than 40% and greater than 55% are inconsistent with the current objectives of maintaining the stock above 0.3dRSB and stability in FCEY.
25. The MSAB **AGREED** that the simulation model currently does not simulate potential estimation model error and thus portrays the most optimistic outcome (low risk and low variability). Although the results from these simulations are useful to identify management procedures that do not perform well, the results do not incorporate the feedback from an assessment model and its prediction error, which will result in additional asymmetric variability that will likely result in more precautionary choices to meet objectives.

6.4 *Closed-loop simulations results*

26. The MSAB **CONSIDERED** the long-term results looking at the outcomes of various management procedures and the trade-offs between them.
27. The MSAB **NOTED** the IPHC Secretariat definitions with regards to the meanings and implications of simulated model results/projections:
 - a) **Short-term: Population projections of 1-11 years from the point of stock recruitment.** This period is defined by the interaction of the maturity schedule and the availability of data. The information from the IPHC's fishery-independent setline survey lags recruitment by roughly seven years, due to the need for replicate observations of a year class and the fact that Pacific halibut are first observed between 5 and 6 years old. Pacific halibut are 50% mature between 11 and 12 years old. Therefore, to avoid introducing important dynamics created largely by yet unobserved ("electronic") fish in the projections, a maximum of four years (one for the current year, and three future years) are projected in the short term.
 - b) **Medium-term projections: Population projections of 12-50 years from the point of stock recruitment.** The medium term represents a period over which initial conditions remain important (unlike the long-term or equilibrium), but are insufficient to provide precision to the projections. This period therefore relies mainly on model/process assumptions for which predictive skill is low to nonexistent. Therefore, this period should be considered of much lower value for decision making purposes.

- c) **Long-term projections: Population projections of 50+ years from the point of stock recruitment.** Long-term results represent equilibrium conditions resulting from harvesting consistently using the define management procedure. The period of time needed to simulate to achieve equilibrium depends on the biology of the stock and the periodicity of environmental factors that it responds to. The current closed-loop simulations suggest that a period slightly longer than 100 years is necessary to remove the effects of variable weight-at-age and recruitment regimes.

28. The MSAB **NOTED** that potential time periods of stakeholder interest for evaluation include very short- (1-3 from current year, similar to short in [para. 27](#)), short- (3-10 from current year), medium- (11-20 from current year), and long-term (equilibrium, similar to long-term in [para. 27](#)).
29. **CONSIDERING** the need to determine appropriate methods for producing and reporting short-term, medium-term, and long-term results, the MSAB **REQUESTED** the IPHC Secretariat to review literature of past MSEs with regard to principles to help define appropriate time periods, consider the development of informative methods, and communicate any concerns at the MSAB11 meeting.
30. The MSAB **AGREED** that recent realized SPRs are within the range of target SPRs described in [para. 24](#), and **REQUESTED** that the management procedures described in MSAB09-R should continue to be evaluated under the revised simulation framework.
31. **CONSIDERING** the effect that operational control points (OCPs) have on the conservation, yield, and stability objectives, the MSAB **REQUESTED** that in addition to 30:20 and 40:20, additional OCPs should be evaluated as determined at subsequent meetings.

7. EVALUATING THE MANAGEMENT PROCEDURES

7.1 *Discussion of the performance metrics reported*

32. The MSAB **RECOMMENDED** that future iterations of the simulations focus on the reduced range of SPR targets (greater than 40%, less than 55%) based on preliminary interpretation of results, and that 2% intervals between SPR values is sufficient to interpret future results.

7.2 *Discussion of the results and trade-offs*

33. **NOTING** that clear and consistent communication with stakeholders and managers is necessary, the MSAB **AGREED** that the IPHC Secretariat should undertake a review of communication material to be prepared by MSAB members.

7.3 *Recommendations to bring to 2018 Annual Meeting (AM094)*

Incorporated throughout

8. HARVEST STRATEGY POLICY, PART 2: ADDRESSING STOCK AND TOTAL CONSTANT EXPLOITATION YIELD (TCEY) DISTRIBUTION

34. The MSAB **NOTED** paper IPHC-2017-MSAB10-10 which provided an update on discussions and ideas related to science inputs and management procedures for distributing the TCEY across the IPHC Convention Area, and describes a harvest strategy policy that includes distributing the TCEY and addresses the task assigned to the IPHC Secretariat and the MSAB at the 2017 Annual Meeting (AM093) to initiate a process to develop alternative, biologically based stock distribution strategies for consideration by the Commission and its subsidiary bodies.
35. The MSAB **CONSIDERED** the proposal for stock distribution to operate on the Regions defined in paper IPHC-2017-MSAB10-10.
36. The MSAB **CONSIDERED** if the TCEY distribution framework could potentially meet a goal of preserving biocomplexity, and **AGREED** that biocomplexity must be defined and objectives be developed to evaluate this goal.

8.1 Review procedures to distribute the TCEY among IPHC Regulatory Areas

37. **NOTING** the order of operations in the proposed TCEY distribution procedure, the MSAB **AGREED** that the order of stock distribution and TCEY distribution procedures is a management choice that could be evaluated.
38. The MSAB **NOTED** that the order of operations in the proposed TCEY distribution procedure will be subject to review at future MSAB meetings and that the specific components require further definition.
39. The MSAB **AGREED** that the output of the TCEY distribution procedure should be a catch table describing mortality in each IPHC Regulatory Area ([Appendix V](#)).

8.2 Recommendations to bring to the 2018 Annual Meeting (AM094)*Incorporated throughout***9. MSAB PROGRAM OF WORK 2018-22**

40. The MSAB **NOTED** paper IPHC-2017-MSAB10-11 which provided an update on the 5-year MSE Program of Work (2018-22), given current Commission directives.
41. The MSAB **RECOMMENDED** the updated Program of Work provided at [Appendix VI](#), for the Commission's further consideration.

10. OTHER BUSINESS**10.1 IPHC meetings calendar (2018-20): MSAB**

42. **NOTING** the annual IPHC meetings calendar (2017-19) adopted by the Commission at its 93rd Session in 2017, and the revised MSE Program of Work discussed during the current meeting, the MSAB **AGREED** that moving forward, the MSAB meetings should move to a three (3) to four (4) day format, dependent on content.
43. The MSAB **AGREED** that MSAB11 should take place from 7-10 May 2018, and the MSAB12 take place from 22-25 October 2018, and **REQUESTED** that the IPHC Secretariat include these dates in the IPHC meetings calendar for the Commissions consideration

10.2 Steering Committee

44. The MSAB **RECALLED** that the members of the MSAB Steering Committee are as follows, and that their terms shall expire at the close of the 13th Session of the MSAB in 2019:

Canada	United States of America
Mr Adam Keizer	Ms Rachel Baker
Mr Jim Lane	Ms Michele Culver
Mr Chris Sporer	Ms Peggy Parker

11. REVIEW OF THE DRAFT AND ADOPTION OF THE REPORT OF THE 10TH SESSION OF THE IPHC MANAGEMENT STRATEGY ADVISORY BOARD (MSAB10)

45. The report of the 10th Session of the IPHC Management Strategy Advisory Board (IPHC-2017-MSAB10-R) was **ADOPTED** on 26 October 2017, including the consolidated set of recommendations and/or requests arising from MSAB09, provided at [Appendix VII](#).

APPENDIX I

**LIST OF PARTICIPANTS FOR THE 10TH SESSION OF THE IPHC MANAGEMENT STRATEGY
ADVISORY BOARD (MSAB10)**

Officers

Co-Chairperson (Canada)	Co-Chairperson (United States of America)
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Mr. Roger Kanno , DFO	Ms Ruth Christiansen , United Catcher Boats
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APPENDIX II**AGENDA FOR THE 10TH SESSION OF THE IPHC MANAGEMENT STRATEGY ADVISORY BOARD
(MSAB10)****Date:** 23–26 October 2017**Location:** Seattle, Washington, U.S.A.**Venue:** IPHC Training Room, Salmon Bay**Time:** 23rd: 12:00-17:00; 24th-26th: 09:00-17:00 daily**Co-Chairpersons:** Mr Adam Keizer (Canada) and Ms Rachel Baker (U.S.A.)

- 1. OPENING OF THE SESSION**
- 2. ADOPTION OF THE AGENDA AND ARRANGEMENTS FOR THE SESSION**
- 3. IPHC PROCESS**
 - 3.1. MSAB membership
 - 3.2. Outcomes of the 93rd Session of the IPHC Annual Meeting (AM093)
 - 3.3. Update on the actions arising from the 9th Session of the MSAB (MSAB09)
 - 3.4. Outcomes of the 10th Session of the Scientific Review Board (SRB10)
- 4. SIZE LIMIT ANALYSIS FOR 2017: Update**
- 5. GOALS, OBJECTIVES, AND PERFORMANCE METRICS**
 - 5.1. A review of the goals and objectives of the IPHC MSE process
 - 5.2. Performance metrics for evaluation
- 6. HARVEST STRATEGY POLICY, PART 1: SIMULATIONS TO EVALUATE FISHING INTENSITY**
 - 6.1. A description of the closed-loop simulation framework
 - 6.2. A review of variability and scenarios
 - 6.3. Management procedures related to fishing intensity
 - 6.4. Closed-loop simulations results
- 7. EVALUATING THE MANAGEMENT PROCEDURES**
 - 7.1. Discussion of the performance metrics reported
 - 7.2. Discussion of the results and trade-offs
 - 7.3. Recommendations to bring to 2018 Annual Meeting (AM094)
- 8. HARVEST STRATEGY POLICY, PART 2: ADDRESSING STOCK AND TOTAL CONSTANT EXPLOITATION YIELD (TCEY) DISTRIBUTION**
 - 8.1. Review procedures to distribute the TCEY among IPHC Regulatory Areas
 - 8.2. Recommendations to bring to the 2018 Annual Meeting (AM094)
- 9. MSAB PROGRAM OF WORK 2018-22**
 - 9.1. Priorities for 2018
 - 9.2. Priorities for 2019-22
- 10. OTHER BUSINESS**
 - 10.1. IPHC meetings calendar (2017-19): MSAB

**11. REVIEW OF THE DRAFT AND ADOPTION OF THE REPORT OF THE 10th SESSION OF
THE IPHC MANAGEMENT STRATEGY ADVISORY BOARD (MSAB10)**

APPENDIX III**LIST OF DOCUMENTS FOR THE 10TH SESSION OF THE MANAGEMENT STRATEGY ADVISORY BOARD (MSAB10)**

Document	Title	Availability
IPHC-2017-MSAB10-01	Agenda & Schedule for the 10 th Session of the IPHC Management Strategy Advisory Board (MSAB10)	✓ 24 July 2017 ✓ 23 Oct 2017
IPHC-2017-MSAB10-02	List of Documents for the 10 th Session of the IPHC Management Strategy Advisory Board (MSAB10)	✓ 24 July 2017 ✓ 23 Oct 2017
IPHC-2017-MSAB10-03	2017 MSAB Membership: Update (IPHC Secretariat)	✓ 14 Sept 2017
IPHC-2017-MSAB10-04	Outcomes of the 93 rd Session of the IPHC Annual Meeting (AM093) (IPHC Secretariat)	✓ 24 Sept 2017
IPHC-2017-MSAB10-05	Withdrawn	Withdrawn
IPHC-2017-MSAB10-06	Outcomes of the 11 th Session of the IPHC Scientific Review Board (SRB11) (IPHC Secretariat)	✓ 10 Oct 2017
IPHC-2017-MSAB10-07	Evaluation of the IPHC's 32" minimum size limit (I. Stewart & A. Hicks)	✓ 24 Sept 2017
IPHC-2017-MSAB10-08	Goals, Objectives, and Performance Metrics for the IPHC Management Strategy Evaluation (MSE) (A. Hicks)	✓ 24 Sept 2017
IPHC-2017-MSAB10-09 Rev_1	Simulations to Evaluate Fishing Intensity (A. Hicks)	✓ 10 Oct 2017 ✓ 17 Oct 2017
IPHC-2017-MSAB10-10	Ideas on estimating stock distribution and distributing catch for Pacific halibut fisheries (A. Hicks & I. Stewart)	✓ 24 Sept 2017
IPHC-2017-MSAB10-11	MSAB Program of Work for MSAB related activities 2018-22 (A. Hicks)	✓ 24 Sept 2017
<i>Information papers</i>		
IPHC-2017-MSAB10-INF01	MSAB10 Agenda notes	✓ 19 Oct 2017

**APPENDIX IV
MEASURABLE OBJECTIVES AND ASSOCIATED PERFORMANCE METRICS**

Biological Sustainability				
Measurable Objective	Outcome	Time-frame	Probability	Performance Metrics
Maintain a minimum of number of mature female halibut coast-wide	Number of mature female halibut less than a threshold	10 year period, long-term	0.01	Median average number of mature female halibut
Avoid very low stock sizes	$dRSB < \text{Limit of control rule}$	10 year period, long-term	0.05	$P(dRSB < \text{Limit})$
Mostly avoid low stock sizes	$dRSB < \text{Threshold of control rule}$	10 year period, long-term	0.25	$P(dRSB < \text{Threshold})$
When $\text{Limit} < \text{Estimated Biomass} < \text{Threshold}$, limit the probability of declines	SSB declines when $20\% < RSB < 30\%$	10 year period, long-term	0.05 – 0.5, depending on est. stock status	$P(SSB_{i+1} < SSB_i)$ given $20\% < RSB < 30\%$
Spawning Biomass	An absolute measure	10 year period, long-term	NA	Median \overline{RSB}

Fishery Sustainability, Stability, and Access				
Measurable Objective	Outcome	Time-frame	Probability	Performance Metrics
Maintain directed fishing opportunity	Fishery is open	Each year	0.05	$P(FCEY = 0)$
Maximize yield in each regulatory area		Each year	0.5	
Maintain median catch	Within $\pm 10\%$ of 1993-2012 average	Within 5 yrs, 10 yr per, long term		$P(FCEY > 110\% \text{ or } FCEY < 90\%)$
Maintain average catch	$> 70\%$ of historical 1993-2012 average	10 year period, long-term	0.1	$P(FCEY < 70\%)$
Limit annual changes in TAC, coast-wide and/or by Regulatory Area	Change in FCEY $< 15\%$	10 year period, long-term		$P\left(\frac{FCEY_{i+1} - FCEY_i}{FCEY_i} > 15\%\right)$
Absolute	FCEY	10 year period, long-term	NA	Median \overline{FCEY}
Absolute	Variability in FCEY	10 year period, long term		Average Annual Variability (AAV)

Minimize wastage				
Measurable Objective	Outcome	Time-frame	Probability	Performance Metrics
Wastage in the longline fishery	$< 10\%$ of annual catch limit	10 year period, Long-term	0.25	$P(\text{wastage} > 10\%FCEY)$

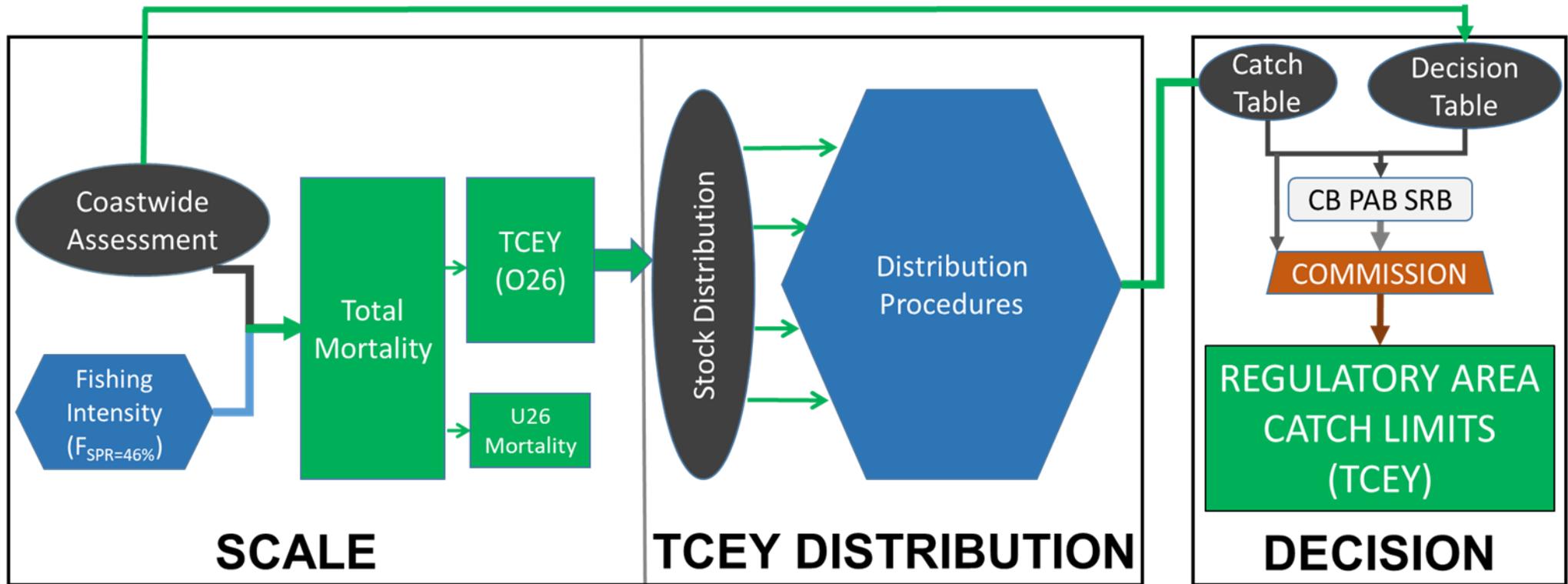
Absolute	Wastage	10 year period, Long-term		Median <i>wastage</i>
Minimize bycatch and bycatch mortality				
Measurable Objective	Outcome	Time-frame	Probability	Performance Metrics
Serve consumer needs				
Measurable Objective	Outcome	Time-frame	Probability	Performance Metrics
Preserve biocomplexity				
Measurable Objective	Outcome	Time-frame	Probability	Performance Metrics

APPENDIX V

REVISED: HARVEST STRATEGY POLICY PROCESS



Harvest Strategy Policy



APPENDIX VI
MSE PROGRAM OF WORK (2018-22): TIMELINE

May 2018 Meeting
Review Goals
Look at results of SPR
Review Performance Metrics
Identify Scale MP's
Review Framework
Identify Preliminary Distribution MP's
October 2018 Meeting
Review Goals
Complete results of SPR
Review Performance Metrics
Identify Scale MP'S
Verify Framework
Identify Distribution MP's
Annual Meeting 2019
Recommendation on Scale
Present possible distribution MP's
May 2019 Meeting
Review Goals
Spatial Model Complexity
Identify MP's (Distn Scale)
Review Framework
October 2019 Meeting
Review Goals
Spatial Model Complexity
Identify MP's (Distn Scale)
Review Framework
Review multi-area model development
Annual Meeting 2020
Update on progress
May 2020 Meeting
Review Goals
Review multi-area model
Review preliminary results
October 2020 Meeting
Review Goals
Review preliminary results
Annual Meeting 2021
Recommendations on Scale and Distribution

APPENDIX VII
**CONSOLIDATED SET OF RECOMMENDATIONS AND REQUESTS OF THE 10TH SESSION OF THE
IPHC MANAGEMENT STRATEGY ADVISORY BOARD (MSAB10)**
RECOMMENDATIONS
A review of the goals and objectives of the IPHC MSE process

MSAB10–Rec.01 ([para. 11](#)) The MSAB **AGREED** to further revise the goals, objectives, and performance metrics, as detailed at [Appendix IV](#), at MSAB11, and also **RECOMMENDED** that the Commission review and provide guidance on them at the 94th Session of the Commission, thereby providing clear direction for the IPHC Secretariat and MSAB for action in 2018.

Discussion of the performance metrics reported

MSAB10–Rec.02 ([para. 32](#)) The MSAB **RECOMMENDED** that future iterations of the simulations focus on the reduced range of SPR targets (greater than 40%, less than 55%) based on preliminary interpretation of results, and that 2% intervals between SPR values is sufficient to interpret future results.

MSAB Program of Work 2018-22

MSAB10–Rec.03 ([para. 41](#)) The MSAB **RECOMMENDED** the updated Program of Work provided at [Appendix VI](#), for the Commission’s further consideration.

REQUESTS
Performance metrics for evaluation

MSAB10–Req.01 ([para. 15](#)) The MSAB **REQUESTED** that the IPHC Secretariat link the goals and objectives to each reported performance metric and provide a summary of key performance metrics over the range of Management Procedures evaluated for presentation to the Commission at the 93rd Interim Meeting and the 94th Annual Meeting.

Simulations to evaluate fishing intensity: A review of variability and scenarios

MSAB10–Req.02 ([para. 21](#)) **NOTING** the current simulated bycatch mortality probability distribution is unrelated to the total mortality in the operating model, the MSAB **REQUESTED** the IPHC Secretariat to consider alternative methods to simulate bycatch mortality at various Pacific halibut abundances.

MSAB10–Req.03 ([para. 22](#)) The MSAB **AGREED** that additions to the simulation framework are required. These include adding variability to the simulated selectivities for all sectors (e.g. changes in selectivity of bycatch due to future management changes), incorporating time-varying maturity-at-age, improvements to simulating weight-at-age, using an estimation model to introduce estimation error (and data generation with error if necessary), and incorporate implementation variability in the simulations. The MSAB **REQUESTED** that these modifications be added to the simulation framework and assumptions.

Closed-loop simulations results

MSAB10–Req.04 ([para. 29](#)) **CONSIDERING** the need to determine appropriate methods for producing and reporting short-term, medium-term, and long-term results, the MSAB **REQUESTED** the IPHC Secretariat to review literature of past MSEs with regard to principles to help define appropriate time periods, consider the development of informative methods, and communicate any concerns at the MSAB11 meeting.

MSAB10–Req.05 ([para. 30](#)) The MSAB **AGREED** that recent realized SPRs are within the range of target SPRs described in [para. 24](#), and **REQUESTED** that the management procedures described in MSAB09-R should continue to be evaluated under the revised simulation framework.

MSAB10–Req.06 ([para. 31](#)) **CONSIDERING** the effect that operational control points (OCPs) have on the conservation, yield, and stability objectives, the MSAB **REQUESTED** that in addition to 30:20 and 40:20, additional OCPs should be evaluated as determined at subsequent meetings.

IPHC meetings calendar (2018-20): MSAB

MSAB10–Req.07 ([para. 43](#)) The MSAB **AGREED** that MSAB11 should take place from 7-10 May 2018, and the MSAB12 take place from 22-25 October 2018, and **REQUESTED** that the IPHC Secretariat include these dates in the IPHC meetings calendar for the Commissions consideration.