Report of the 12th Session of the IPHC Management Strategy Advisory Board (MSAB012)

Seattle, Washington, U.S.A., 22-25 October 2018

DISTRIBUTION:
Participants in the Session
Members of the Commission
IPHC Secretariat

BIBLIOGRAPHIC ENTRY
IPHC 2018. Report of the 12th Session of the IPHC Management Strategy Advisory Board (MSAB012). Seattle, Washington, U.S.A., 22-25 October 2018. *IPHC–2018–MSAB012–R, 28 pp.*

INTERNATIONAL PACIFIC HALIBUT COMMISSION

Contact details:

International Pacific Halibut Commission
2320 W. Commodore Way, Suite 300
Seattle, WA, 98199-1287, U.S.A.
Phone: +1 206 634 1838
Fax: +1 206 632 2983
Email: admin@iphc.int
Website: http://iphc.int/

ACRONYMS

AAV	Average Annual Variability
CPUE	Catch-per-unit-effort
CV	Coefficient of Variation
dRSB	dynamic Relative Spawning Biomass
FCEY	Fishery Constant Exploitation Yield
FISS	Fishery-independent setline survey
F_{SPR}	The Fishing Intensity that results in an equilibrium Spawning Potential Ratio
HCR	Harvest Control Rule
IPHC	International Pacific Halibut Commission
MP	Management Procedure
MSAB	Management Strategy Advisory Board
MSE	Management Strategy Evaluation
RSB	Relative Spawning Biomass
SB	Spawning Biomass
SRB	Scientific Review Board
SPR	Spawning Potential Ratio
TCEY	Total Constant Exploitation Yield
TM	Total Mortality
U.S.A.	United States of America
WPUE	Weight-per-unit-effort

DEFINITIONS

A set of working definitions are provided in the IPHC Glossary of Terms and abbreviations: https://iphc.int/the-commission/glossary-of-terms-and-abbreviations

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 a subsidiary body 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.

TABLE OF CONTENTS

EXECUTIVE SUMMARY

The 12th Session of the International Pacific Halibut Commission (IPHC) Management Strategy Advisory Board (MSAB012) was held in Seattle, Washington, U.S.A. from 22 to 25 October 2018. The MSAB consists of 21 board members, 18 of which attended the Session from the two (2) Contracting Parties. A total of four (4) individuals attended the Session as Observers. In addition, three (3) IPHC Commissioner's were in attendance, Mr Paul Ryall (Canada), Mr Bob Alverson (USA) and Mr Richard Yamada (USA).

The following are a subset of the complete recommendations/requests for action from the MSAB012, which are provided in full at Appendix VII.

RECOMMENDATIONS

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

MSAB012–Rec.01 (para. 20) The MSAB **NOTED** the refined objectives provided by the ad-hoc working group (contained in paper IPHC-2018-MSAB012-06), and **RECOMMENDED** prioritizing a single conservation objective over fishery measurable objectives (Table 1).

Table 1. Priority objectives phrased as measurable outcomes used to evaluate MSE results. The first objective is prioritized over the others.

MEASURABLE OUTCOME	TIME-FRAME	TOLERANCE
SB < Spawning Biomass Limit (SB_{Lim}) SB_{Lim}=20% spawning biomass	Long-term	0.10
Relative AAV	Short-term	
Average Annual Variability (AAV) > 15%	Short-term	0.25
Maximize average TCEY coastwide	Short-term	

Performance metrics for evaluation

MSAB012–Rec.02 (para. 24) The MSAB **RECOMMENDED** that performance-metrics for the short-term span 4-13 years, medium-term span 14-23 years, and the long-term span 91-100 years, be reported to understand how the management procedures may rank differently in the different periods of the forward simulations.

Closed-loop simulation results to investigate coastwide fishing intensity

MSAB012–Rec.03 (para. 37) The MSAB **RECOMMENDED** that a coastwide fishing intensity SPR should not be lower than 40% nor higher than 46%, with a target SPR of 42%-43% with a 30:20 HCR. Rationale for this recommendation is provided in paragraph 38.

REQUESTS

Closed-loop simulation results to investigate coastwide fishing intensity

MSAB012–Req.03 (para. 40) The MSAB **REQUESTED** that additional MPs components be considered to meet the objective of catch stability. The IPHC Secretariat may consider the following MPs, but is **ENCOURAGED** to explore other options to report at MSAB013.

a) 25:10 control rule, and other control rules, as possible, potentially including 30:10 and 30:15 and 30:20;

b) Multi-year quotas, defined as setting the TCEY in one year and sticking with the same TCEY in one or more following years, noting that AAV may not be an appropriate metric to measure variability;

c) Limiting change in catch limits from the previous year to +/-15% per year, in addition to other relevant percentages, with the goal of finding MPs that meet the main objectives;

d) Limiting change in catch limits from the previous year to a maximum increase of 15% per year with no limit on decreasing the catch limit;

e) Slow up (33% of the change in TCEY), fast down (-50% of the change in TCEY).

Identify preliminary MPs related to distribution

MSAB012–Req.05 (para. 54) The MSAB **REQUESTED** that an additional management procedure be considered to define allocations and a catch limit floor that reduces catch limits in a stair-step manner during times of large abundance changes.

1. OPENING OF THE SESSION

1. The 12th Session of the International Pacific Halibut Commission (IPHC) Management Strategy Advisory Board (MSAB012) was held in Seattle, Washington, U.S.A. from 22 to 25 October 2018. The MSAB consists of 21 board members, 18 of which attended the Session from the two (2) Contracting Parties. A total of four (4) individuals attended the Session as Observers. In addition, three (3) IPHC Commissioner's were in attendance, Mr Paul Ryall (Canada), Mr Bob Alverson (USA), and Mr Richard Yamada (USA). The list of participants is provided at Appendix I.
2. The MSAB **NOTED** apologies received from the following board members: Mr Robert Hauknes (Canadian Commercial harvester representative), Mr Tom Marking (USA sport fishing representative and Martin Paish (Canadian sport fishing representative).
3. The MSAB **RECALLED** that the primary objectives of MSAB, as described in Appendix V, para. 2 of the IPHC Rules of Procedure (2017) are as follows:

    a) define clear measurable objectives and performance measures for the fishery;

    b) define candidate management strategies, which include aspects of the fishery that can be managed (e.g. regulatory requirements); and

    c) advise IPHC staff about plausible scenarios for investigation, which include aspects of the fishery that cannot be managed by the IPHC (e.g. environmental conditions and removals under the management authority of a domestic management agency).

    d) gather and clearly articulate the interests and concerns of constituents and incorporate them into the MSAB's discussions;

    e) encourage and allow members to test tentative ideas and exploratory suggestions without prejudice to future discussions;

    f) represent information, views, and outcomes of the MSAB discussions to external parties accurately and appropriately;

    g) encourage the understanding and support of their constituencies for the MSAB process and for consensus positions developed by MSAB.

4. **NOTING** paragraph 3, the MSAB **RECALLED** that the Management Strategy Evaluation process is a stakeholder informed, scientifically driven process.

2. ADOPTION OF THE AGENDA AND ARRANGEMENTS FOR THE SESSION

5. The MSAB **ADOPTED** the Agenda as provided at Appendix II. The documents provided to the MSAB012 are listed at Appendix III.

3. IPHC PROCESS

3.1 MSAB Membership

6. The MSAB **NOTED** paper IPHC-2018-MSAB012-03 Rev_1 which provided the current membership list and term expirations for the MSAB. The full membership list is provided at Appendix IV:
7. The MSAB **WELCOMED** the following new MSAB members appointed by the Commission:

    a) Mr Matt Damiano: USA Treaty tribes representative

    b) Mr Joseph Morelli: USA Processor representative

8. The MSAB **WELCOMED** the following government members appointed by ADFG:

    a) James Hasbrouck: USA government representative, ADFG.

3.2 Update on the actions arising from the 11th Session of the MSAB (MSAB011)

9. The MSAB **NOTED** paper IPHC-2018-MSAB012-04 which provided an opportunity to consider the progress made during the inter-sessional period in relation to the recommendations and requests of the 11th Session of the IPHC Management Strategy Advisory Board (MSAB011).

10. The MSAB **AGREED** to consider and revise as necessary, the actions arising from the MSAB011, and for these to be combined with any new actions arising from the MSAB012.

3.2.1 *Additional Commission directives*

11. The MSAB **NOTED** that the Commission met for its annual Work Meeting (WM2018) in September 2018. At that meeting, the Commission developed several additional directives for the MSAB012 as follows:

> *"The Commission **RECOMMENDED** that the MSAB:*
>
> *a) focus its efforts on providing a recommendation on the level of the coast-wide fishing intensity for IM094 in November 2018. This work on the scale portion of the harvest strategy policy should be prioritized over work on distribution.*
>
> *b) While it is recognized that the MSAB has spent considerable time and effort in developing objectives for evaluating management procedures, for the purpose of expediting a recommendation on the level of the coast-wide fishing intensity, and noting SRB11–Rec.02 to develop an objectives hierarchy, the MSAB is requested to evaluate management procedure performance against objectives that prioritize long-term conservation over short-/medium-term (e.g. 3-8 years) catch performance. Where helpful in accelerating progress on scale, the MSAB is requested to constrain objectives to (1) maintain biomass above a limit to avoid critical stock sizes, (2) maintain a minimum average catch, and (3) limit catch variability."*

3.3 Review of the outcomes of the 13th Session of the IPHC Scientific Review Board (SRB013)

12. The MSAB **NOTED** paper IPHC-2018-MSAB012-05, which provided the outcomes of the 13th Session of the IPHC Scientific Review Board (SRB013) relevant to the mandate of the MSAB, which were provided for reference.

13. The MSAB **AGREED** with the SRB that objectives should be hierarchal, include a combination of long-term and short-term timeframes, and be computed from the MSE simulation framework, noting that the goal of the MSE process is to rank the relative performance of management procedures.

14. The MSAB **AGREED** with the SRB that the current stock assessment process is distinct from the MSE process.

15. The MSAB **NOTED** that a phase-in of procedures to transition from the status quo to a recommended management procedure may be useful.

16. The MSAB **NOTED** that the stock assessment decision table may also be useful in understanding the 1-3 year consequences of a management procedure, given it is used for decision-making.

17. The MSAB **AGREED** with the SRB that this is an iterative process, but **NOTED** that the results presented at MSAB012 provide insight into management procedures that are likely to meet the conservation and fishery objectives related to coastwide scale.

4. GOALS, OBJECTIVES, AND PERFORMANCE METRICS

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

18. The MSAB **NOTED** paper IPHC-2018-MSAB012-06 which provided a review of the goals and objectives of the IPHC MSE process, and to consider the directives from the Commission, including the consideration of additional objectives related to distributing the TCEY.

19. The MSAB **NOTED** that the additional directives regrading objectives that arose from the 2018 IPHC Work Meeting (WM2018; see para. 11) align with the refined objectives provided by the ad-hoc working group.

20. The MSAB **NOTED** the refined objectives provided by the ad-hoc working group (contained in paper IPHC-2018-MSAB012-06), and **RECOMMENDED** prioritizing a single conservation objective over fishery measurable objectives (Table 1).

Table 1. Priority objectives phrased as measurable outcomes used to evaluate MSE results. The first objective is prioritized over the others.

MEASURABLE OUTCOME	TIME-FRAME	TOLERANCE
SB < Spawning Biomass Limit (SB_{Lim}) SB_{Lim}=20% spawning biomass	Long-term	0.10
Relative AAV	Short-term	
Average Annual Variability (AAV) > 15%	Short-term	0.25
Maximize average TCEY coastwide	Short-term	

21. The MSAB **AGREED** that statistics of interest are useful when evaluating management procedures and **REQUESTED** that they continue to be reported.

4.2 Performance metrics for evaluation

22. The MSAB **NOTED** the performance metrics, including statistics of interest, reported in IPHC-2018-MSAB012-07 Rev_1.
23. The MSAB **REQUESTED** that the same metrics are calculated for the recreational sector as are calculated for the commercial sector and be reported for subsequent evaluations.
24. The MSAB **RECOMMENDED** that performance-metrics for the short-term span 4-13 years, medium-term span 14-23 years, and the long-term span 91-100 years, be reported to understand how the management procedures may rank differently in the different periods of the forward simulations.

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

25. The MSAB **NOTED** paper IPHC-2018-MSAB011-07 Rev_1 which provided an update on the progress of the IPHC Management Strategy Evaluation process to investigate fishing intensity, and to present results of the closed-loop simulations.

5.1 A description of the closed-loop simulation framework

26. **NOTING** the current simulation framework for the MSE, the MSAB **AGREED** that the changes made (bycatch mortality, recreational mortality, and time-varying commercial selectivity) improve the simulation framework.
27. The MSAB **NOTED** the importance of periodic check-ins to update the simulation framework with current knowledge as part of the iterative MSE process.

5.2 A review of variability and scenarios

28. The MSAB **NOTED** that the results presented at MSAB012 included four levels of estimation error (none, 0.10, 0.15, and 0.20) and four levels of autocorrelation (0.0, 0.2, 0.4, and 0.6). An estimation error of 0.15 and an autocorrelation was considered the default based on investigations of the current stock assessment models.

5.3 Closed-loop simulation results to investigate coastwide fishing intensity

29. The MSAB **NOTED** that the Management Procedures (MPs) requested by the MSAB at MSAB011 consisted of SPR values from 0.3 to 0.56 and control rules of 30:20 and 40:20.
30. The MSAB **NOTED** that additional MPs were presented for evaluation that consisted of SPR values and a control rule of 25:10. An additional MP with no control rule was presented.
31. The MSAB **NOTED** that additional MPs incorporating a constant catch with 30:20 or 40:20 control rules were presented.

32. The MSAB **NOTED** that sensitivities with different levels of estimation error, autocorrelation, fixed weight-at-age, fixed recruitment regime (high or low), low and high bycatch, and bycatch selectivity shifted to younger fish were presented to determine the robustness of the management procedures.

33. The MSAB **NOTED** the results of two MPs that limit the change of TM: (1) an MP that limits the maximum change in TM in either direction to 15%, and (2) an MP that limits the maximum increase in the TM to 15%, with no limit on the maximum decrease.

34. The MSAB **REVIEWED** the performance metrics related to the objectives in Appendix V, for MPs with SPR ranging from 0.3 to 0.56 in combination with 40:20, 30:20, 25:10 HCRs, and without an HCR, and **NOTED** the following:

    a) All of these MPs meet the primary long-term conservation objective of maintaining the spawning biomass above a biomass limit of 20 percent at least 90 percent of the time, except for the MPs without an HCR and for the highest fishing intensity investigated (F_{SPR} = 0.30);

    b) While some of the MPs result in lower average annual variability (AAV), none of them achieves the specific AAV measurable outcome of more than 15 percent less than 25% of the time; however, MPs with a control rule of 25:10 produce the lowest AAV values in the short, medium, and long-term timeframes;

    c) the performance of MPs across different SPR values is relative to the corresponding harvest control rule (HCR) and that there are trade-offs associated with various HCRs and SPR values, particularly with regard to AAV and coastwide TM.

35. The MSAB **NOTED** that an HCRs is a useful way to help meet the conservation objective (SB > 0.2) is met at all fishing intensities investigated.

36. **NOTING** that a 40:20 HCR results in a lower yield and higher AAV when compared to other HCRs, the MSAB **AGREED** MPs for current consideration be limited to 30:20 and 25:10 HCRs.

37. The MSAB **RECOMMENDED** that a coastwide fishing intensity SPR should not be lower than 40% nor higher than 46%, with a target SPR of 42%-43% with a 30:20 HCR. Rationale for this recommendation is provided in paragraph 38.

38. The MSAB **AGREED** on the rationale for paragraph 37 as follows:

    a) that at fishing intensities greater than SPR 40%, AAV appears to increase at a faster rate, with little gain in yield; and

    b) at fishing intensities greater than SPR 40%, Pr(SB<SB30) and Pr(SB<20) increased; and

    c) fishing intensities lower than SPR 46% yield appears to decrease at a faster rate, with little gain to conservation and stability objectives; and

    d) that conservation risk is lower under the 30:20 HCR than for a 25:10 HCR, although the probability of a directed fishery closure is greater than under the 25:10 HCR; and

    e) that median total mortality is lower, and median AAV is higher under a 30:20 HCR across all SPRs considered compared to the 25:10 HCRs.

39. **NOTING** paragraph 34(b), the MSAB ranked the MPs relative to one another in terms of median AAV in TM. To meet the AAV objective, additional MPs to limit the percent change TM limit from the previous year were also discussed.

40. The MSAB **REQUESTED** that additional MPs components be considered to meet the objective of catch stability. The IPHC Secretariat may consider the following MPs, but is **ENCOURAGED** to explore other options to report at MSAB013.

    a) 25:10 control rule, and other control rules, as possible, potentially including 30:10 and 30:15 and 30:20;

    b) Multi-year quotas, defined as setting the TCEY in one year and sticking with the same TCEY in one or more following years, noting that AAV may not be an appropriate metric to measure variability;

c) Limiting change in catch limits from the previous year to +/-15% per year, in addition to other relevant percentages, with the goal of finding MPs that meet the main objectives;

d) Limiting change in catch limits from the previous year to a maximum increase of 15% per year with no limit on decreasing the catch limit;

e) Slow up (33% of the change in TCEY), fast down (-50% of the change in TCEY).

41. The MSAB **CONSIDERED** the objectives described in Table 2 in making its recommendation in Paragraph 37.

Table 2. Priority objectives phrased as measurable outcomes used to evaluate MSE results and results for SPR values from 46% to 40% using a 30:20 control rule for each objective. Pass/Fail or change in the metric are reported to reflect the ranking of management procedures.

MEASURABLE OUTCOME	TIME-FRAME	TOLERANCE	SPR 46%	SPR 44%	SPR 42%	SPR 40%
SB < Spawning Biomass Limit (SB_{Lim}) SB_{Lim}=20% spawning biomass	Long-term	0.10	Pass	Pass	Pass	Pass
Median AAV	Short-term		Min	+0.9%	+1.8%	+3.2%
Average Annual Variability (AAV) > 15%	Short-term	0.25	Fail	Fail	Fail	Fail
Maximize average TCEY coastwide (Median TM)	Short-term		-9.9% diff	-6.3% diff	-3.4% diff	Max

42. The MSAB **NOTED** additional statistics of interest over the long-term in making its recommendation in Paragraph 37, described in Table 3.

Table 3. Statistics of interest used for the evaluation of MSE with results for SPR values from 46% to 40% using a control rule of 30:20.

STATISTIC OF INTEREST	TIME-FRAME	SPR 46%	SPR 44%	SPR 42%	SPR 40%
Median realized SPR	Long-term	47.4%	45.9%	44.5%	43.5%
SB < Spawning Biomass Limit (SB_{Lim}) SB_{Lim}=20% spawning biomass	Long-term	<0.01	<0.01	<0.01	<0.01
Median AAV	Long-term	18.4%	19.4%	21.1%	23.9%
Probability Average Annual Variability (AAV) > 15%	Long-term	0.722	0.771	0.813	0.847
Maximize average TCEY coastwide (Median TM, Mlbs)	Long-term	38.0	38.5	39.0	39.6
Median relative spawning biomass	Long-term	39.7%	37.9%	36.5%	35.0%
Probability SB<30% in a year	Long-term	0.031	0.065	0.094	0.142
Probability SB<30% in at least 1 of 10 years	Long-term	0.070	0.149	0.202	0.307
Probability commercial allocation = 0 in a year	Long-term	0.034	0.046	0.051	0.063
Probability commercial allocation = 0 in at least 1 of 10 years	Long-term	0.147	0.192	0.233	0.283

75th percentile of TM	Long-term	63.5	65.3	65.9	68.4
Probability TM<34 Mlbs in a year	Long-term	0.448	0.435	0.426	0.432
Probability TM<34 Mlbs in at least 1 of 10 years	Long-term	0.633	0.641	0.661	0.681
Probability Directed < 50.6 Mlbs* in a year	Long-term	0.7212	0.7078	0.6958	0.6819
Probability Directed < 50.6 Mlbs* in at least 1 of 10 years	Long-term	0.8550	0.8470	0.8500	0.8530

*70% of average TM from 1993-2012

43. The MSAB **REQUESTED** that the IPHC Secretariat provide a report at MSAB013 of IPHC research and other relevant research (to the extent possible) activities related to relationships between population dynamics and environmental conditions, noting that the IPHC 5-year research plan is available on the IPHC website, to aid in the discussion of hypotheses that are plausible to include in the MSE process.

44. The MSAB **NOTED** that the MSE framework is an appropriate way to explore how management procedures perform under potential future environmental conditions given plausible hypotheses about such relationships.

45. The MSAB **NOTED** paragraph 39 of the SRB013 report which states:

> *"The SRB NOTED that the biological research activities being undertaken by the IPHC Secretariat should help to define hypotheses associated with processes that affect plausible states of nature for the assessment and MSE process (e.g. climate effects on growth and recruitment)." (IPHC-2018-SRB013-R, para. 39)."*

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

46. The MSAB **NOTED** paper IPHC-2018-MSAB012-08 which provided an update on discussions and ideas related to science inputs and management procedures for distributing the Total Constant Exploitation Yield (TCEY) across the IPHC Convention Area.

6.1 Discussion of distribution goals

47. The MSAB **NOTED** that the ad-hoc working group did not refine objectives related to distribution of TCEY, but differentiated between current objectives related to scale and distribution.

48. The MSAB **ACKNOWLEDGED** the importance and continued support among members for the following principle: conserving spatial population structure by applying a precautionary approach and using bioregions. This would be maintained as a general objective in Appendix V.

6.2 Review the framework to investigate distributing the TCEY among IPHC Regulatory Areas and evaluate against objectives

49. The MSAB **NOTED** the distribution framework and the separation of scientific and management elements of distribution procedures.

50. The MSAB **NOTED** that catch limit decisions are based on TCEY (O26), therefore using "all-sizes" WPUE from the FISS space-time model is more congruent with regional stock distribution.

6.3 Identify preliminary MPs related to distribution

51. The MSAB **NOTED** the MPs that are currently listed for consideration, as follows:

    a) Relative harvest rates.

    b) O32:O26 ratios.

    c) Trends in setline survey WPUE by IPHC Regulatory Area.

d) Trends in modelled setline survey WPUE by biological region.

e) Trends in fishery CPUE.

f) Smoothing algorithms on area-specific catch limits.

g) Percentage allocation with a floor (i.e. minimums of 1.5 Mlbs in 2A and 1.7 Mlbs in 4CDE).

h) A maximum SPR with catch distribution by IPHC Regulatory Area determined from the modelled setline survey WPUE.

i) Coastwide TCEY target and maximum calculated; distribution by target, but with ability to adjust TCEY up to the maximum.

52. The MSAB **AGREED** that an ad-hoc working group would be formed to recommend elements of management procedures for the distribution of TCEY. The working group will organize the management procedures listed in paper IPHC-2018-MSAB012-08 with respect to the framework of five steps for distributing TCEY to bioregions and regulatory areas listed in Section 3.4 of paper IPHC-2018-MSAB012-08. The members of the ad-hoc working group will be: Bruce Gabrys, Peggy Parker, Dan Falvey, Chris Sporer, Glenn Merrill, Scott Mazzone, Jim Lane, Adam Keizer, and Carey McGilliard. The working group will meet electronically between the AM095 and MSAB013 and the meeting will be facilitated by the IPHC Secretariat.

53. The MSAB **URGED** members to document candidate management procedures and share any such MPs with the ad-hoc working group prior to MSAB013, via the IPHC Secretariat. The 95th Session of the IPHC Annual Meeting (AM095) will be a key engagement point for this task.

54. The MSAB **REQUESTED** that an additional management procedure be considered to define allocations and a catch limit floor that reduces catch limits in a stair-step manner during times of large abundance changes.

55. The MSAB **REQUESTED** that the IPHC Secretariat and the MSAB continue to develop the concept of a 'fishery footprint', as previously considered in IPHC-2015-MSAB006-R, in part to consider how it may be incorporated into a MP.

7. MSAB PROGRAM OF WORK 2019-23

56. The MSAB **NOTED** paper IPHC-2018-MSAB012-09 which provided an update on the 5-year MSE Program of Work (2019-23), given current Commission directives.

57. The MSAB **NOTED** the delivery dates of January 2019 for coastwide results and January 2021 for the MSE results, including Scale and Distribution components of the management procedure for potential adoption by the Commission and subsequent implementation.

58. The MSAB **ENDORSED** the Program of Work provided at Appendix VI.

8. OTHER BUSINESS

8.1 IPHC meetings calendar (2019-21)

59. The MSAB **NOTED** the annual IPHC meetings calendar (2019-21) adopted by the Commission at its 94th Session in 2018, as published on the IPHC website.

60. The MSAB **NOTED** the indication from the IPHC Secretariat that the MSAB may not need the four (4) days currently scheduled for MSAB013 (6-9 May 2019).

8.2 IPHC Rules of Procedure (2017)

61. **NOTING** the proposed revisions to the IPHC Rules of Procedure presented by the IPHC Secretariat, the MSAB **AGREED** to the following:

a) ***Intersessional process and ad-hoc working groups: Steering Committee*** (Section V, para. 10): given the changes to the MSAB in recent years, there is no longer a need for a Steering Committee and this section should be removed;

b) ***Reports and Records*** (Section VI, para. 12): currently, the drafting of the MSAB report is the responsibility of the Co-Chairpersons, with the Steering Committee being delegated some of that responsibility. With the changes agreed to above, and the need for standardisation among all of the Commission's subsidiary bodies, para. 12 of the Rules of Procedure (2017) should be standardised to those of the other subsidiary bodies of the Commission.

62. The MSAB **AGREED** that support for rapporteuring will be determined tentatively during each MSAB meeting for the next MSAB meeting, and confirmed at the commencement of each meeting.

9. REVIEW OF THE DRAFT AND ADOPTION OF THE REPORT OF THE 12TH SESSION OF THE IPHC MANAGEMENT STRATEGY ADVISORY BOARD (MSAB012)

63. The report of the 12th Session of the IPHC Management Strategy Advisory Board (IPHC-2018-MSAB012–R) was **ADOPTED** on 25 October 2018, including the consolidated set of recommendations and/or requests arising from MSAB012, provided at Appendix VII.

APPENDIX I
LIST OF PARTICIPANTS FOR THE 12TH SESSION OF THE IPHC MANAGEMENT STRATEGY ADVISORY BOARD (MSAB012)

Officers

Co-Chairperson (Canada)	Co-Chairperson (United States of America)
Mr Adam **Keizer**: adam.keizer@dfo-mpo.gc.ca	Dr Carey **McGilliard**: Carey.McGilliard@noaa.gov

MSAB Members

Canada	United States of America
Ms Ann-Marie **Huang:** Ann-Marie.Huang@dfo-mpo.gc.ca	Mr Craig **Cross**: craigc@starboats.com
Mr Adam **Keizer**: adam.keizer@dfo-mpo.gc.ca	Ms Michele **Culver**: Michele.Culver@dfw.wa.gov
Mr Jim **Lane**: jim.lane@nuuchahnulth.org	Mr Matt **Damiano**: mdamiano@nwifc.org
Mr Brad **Mirau**: brad@aerotrading.ca	Mr Dan **Falvey**: myriadfisheries@gmail.com
Mr Chris **Sporer**: chris.sporer@phma.ca	Mr Bruce **Gabrys**: gabryscpa@mtaonline.net
	Mr James **Hasbrouck**: james.hasbrouck@alaska.gov
	Mr Jeff **Kauffman**: jeff@spfishco.com
	Mr Scott **Mazzone**: smazzone@quinault.org
	Dr Carey **McGilliard**: Carey.McGilliard@noaa.gov
	Mr Glenn **Merrill**: glenn.merrill@noaa.gov
	Mr Joseph **Morelli**: jmorelli@spcsales.com
	Mr Per **Odegaard**: vanseeodegaard@hotmail.com
	Ms Peggy **Parker**: peggyparker616@gmail.com
Absentees	**Absentees**
Mr Robert **Hauknes**: robert_hauknes@hotmail.com	Mr Tom **Marking**: tmmarking@gmail.com
Mr Martin **Paish**: martinpaish1@gmail.com	

Commissioners

Canada	United States of America
Mr Paul **Ryall**: Paul.Ryall@dfo-mpo.gc.ca	Mr Robert (Bob) **Alverson**: RobertA@fvoa.org
	Mr Richard **Yamada**: richard@alaskareel.com

Observers

Canada	United States of America
	Ms Ruth **Christiansen**, United Catcher Boats: ruth.christiansen78@gmail.com
	Ms Keeley **Kent** – NOAA-Fisheries: keeley.kent@noaa.gov
	Mr Frank **Lockhart**, NOAA-Fisheries: frank.lockhart@noaa.gov
	Ms Sarah **Webster**, Alaska Department of Fish and Game: sarah.webster@alaska.gov

IPHC Secretariat

Name	Position and email
Dr David **Wilson**	Executive Director, david@iphc.int
Mr Stephen **Keith**	Assistant Director, steve@iphc.int

Dr Allan **Hicks**	Quantitative Scientist, allan@iphc.int
Dr Ian **Stewart**	Quantitative Scientist, ian@iphc.int

APPENDIX II
AGENDA FOR THE 12TH SESSION OF THE IPHC MANAGEMENT STRATEGY ADVISORY BOARD (MSAB012)

Date: 22-25 October 2018
Location: Seattle, Washington, U.S.A.
Venue: IPHC Training Room
Time: 22nd: 12:00-17:00; 23rd-25th: 09:00-17:00 daily
Co-Chairpersons: Mr. Adam Keizer (Canada) and Dr. Carey McGilliard (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. Update on the actions arising from the 11th Session of the MSAB (MSAB011)
   - 3.3. Review of the outcomes of the 13th Session of the Scientific Review Board (SRB013)

4. **GOALS, OBJECTIVES, AND PERFORMANCE METRICS**
   - 4.1. A review of the coastwide goals and objectives of the IPHC MSE process
   - 4.2. Performance metrics for evaluation

5. **HARVEST STRATEGY POLICY, PART 1: SIMULATIONS TO EVALUATE FISHING INTENSITY**
   - 5.1. A description of the closed-loop simulation framework
   - 5.2. A review of variability and scenarios
   - 5.3. Closed-loop simulation results to investigate coastwide fishing intensity

6. **HARVEST STRATEGY POLICY, PART 2: ADDRESSING STOCK AND TOTAL CONSTANT EXPLOITATION YIELD (TCEY) DISTRIBUTION**
   - 6.1. Discussion of distribution goals
   - 6.2. Review the framework to investigate distributing the TCEY among IPHC Regulatory Areas and evaluate against objectives
   - 6.3. Identify preliminary MPs related to distribution

7. **MSAB PROGRAM OF WORK (2019-23)**

8. **OTHER BUSINESS**
   - 8.1. IPHC meetings calendar (2019-21)
   - 8.2. IPHC Rules of Procedure (2017)

9. **REVIEW OF THE DRAFT AND ADOPTION OF THE REPORT OF THE 12th SESSION OF THE IPHC MANAGEMENT STRATEGY ADVISORY BOARD (MSAB012)**

APPENDIX III
LIST OF DOCUMENTS FOR THE 12TH SESSION OF THE MANAGEMENT STRATEGY ADVISORY BOARD (MSAB012)

Document	Title	Availability
IPHC-2018-MSAB012-01	Draft: Agenda & Schedule for the 12th Session of the IPHC Management Strategy Advisory Board (MSAB012)	✓ 23 July 2018 ✓ 21 September 2018
IPHC-2018-MSAB012-02	Draft: List of Documents for the 12th Session of the IPHC Management Strategy Advisory Board (MSAB012)	✓ 21 September 2018 ✓ 18 October 2018
IPHC-2018-MSAB012-03 Rev_1	MSAB Membership and Officers (IPHC Secretariat)	✓ 21 September 2018 ✓ 18 October 2018
IPHC-2018-MSAB012-04	Update on the actions arising from the 10th Session of the MSAB (MSAB011) (IPHC Secretariat)	✓ 21 September 2018
IPHC-2018-MSAB012-05	Outcomes of the 12th Session of the IPHC Scientific Review Board (SRB012) (IPHC Secretariat)	✓ 16 October 2018
IPHC-2018-MSAB012-06	Goals, Objectives, and Performance Metrics for the IPHC Management Strategy Evaluation (MSE) (A. Hicks)	✓ 21 September 2018
IPHC-2018-MSAB012-07 Rev_1	IPHC Management Strategy Evaluation to Investigate Fishing Intensity (A. Hicks & I. Stewart)	✓ 22 September 2018 ✓ 16 October 2018
IPHC-2018-MSAB012-08	Ideas on estimating stock distribution and distributing catch for Pacific halibut fisheries (A. Hicks & I. Stewart)	✓ 22 September 2018
IPHC-2018-MSAB012-09	IPHC Secretariat Program of Work for MSAB Related Activities 2019-23 (A. Hicks)	✓ 21 September 2018
Information papers		
Nil	Nil	Nil

APPENDIX IV
MSAB MEMBERSHIP

Membership category	Member	Canada	U.S.A.	Current Term commence-ment	Current Term expiration
Commercial harvesters (6-8)					
1	Sporer, Chris	CDN Commercial		9-May-17	8-May-21
2	Hauknes, Robert	CDN Commercial		9-May-17	8-May-21
3	Vacant	CDN Commercial			
4	Vacant	CDN Commercial			
5	Gabrys, Bruce		USA Commercial	9-May-17	8-May-21
6	Kauffman, Jeff		USA Commercial	9-May-17	8-May-19
7	Odegaard, Per		USA Commercial	9-May-17	8-May-21
8	Falvey, Dan		USA Commercial	9-May-17	8-May-21
First Nations/ Tribal fisheries (2-4)					
1	Lane, Jim	CDN First Nations		9-May-17	8-May-21
2	Vacant	CDN First Nations			
3	Mazzone, Scott		USA Treaty Tribes	9-May-17	8-May-19
4	Damiano, Matt		USA Treaty Tribes	20-Jun-18	19-Jun-22
Government Agencies (4-8)					
1	Keizer, Adam	DFO		9-May-17	08-May-19
2	Huang, Ann-Marie	CDN Science Advisor		10-May-18	09-May-22
3	Vacant	DFO			
4	Merrill, Glenn		NOAA-Fisheries	7-May-18	06-May-22
5	McGilliard, Carey		USA Science Advisor	9-May-17	08-May-21
6	Culver, Michele		PFMC	9-May-17	08-May-21
7	Cross, Craig		NPFMC	9-May-17	08-May-21
8	Hasbrouck, James		ADFG	12-Oct-18	11-Oct-22
Processors (2-4)					
1	Parker, Peggy	US/CDN Processing	US/CDN Processing	9-May-17	08-May-19
2	Mirau, Brad	CDN Processing		9-May-17	08-May-19
3	Morelli, Joseph		USA Processing	29-Aug-18	28-Aug-22
4	Vacant		CDN Processing		
Recreational/ Sport fisheries (2-4)					
1	Paish, Martin	CDN Sport Fishing Advisory Board		9-May-17	08-May-21
2	Marking, Tom		USA Sport fishing (CA)	9-May-17	08-May-19

Membership category	Member	Canada	U.S.A.	Current Term commence-ment	Current Term expiration
3	Vacant		USA sportfishing (AK)		
4	Vacant		Open		

APPENDIX VA
PRIMARY OBJECTIVES AND ASSOCIATED PERFORMANCE METRICS

Primary objectives for the evaluation of Management Procedures (MPs) on coastwide scale

GENERAL OBJECTIVE	MEASURABLE OBJECTIVE	MEASURABLE OUTCOME	TIME-FRAME	TOLERANCE	PERFORMANCE METRIC
1.1. KEEP BIOMASS ABOVE A LIMIT TO AVOID CRITICAL STOCK SIZES Biomass Limit	Maintain a minimum female spawning stock biomass above a biomass limit reference point at least 90% of the time	SB < Spawning Biomass Limit (SB_{Lim}) SB_{Lim}=20% spawning biomass	*Long-term*	0.10	$P(SB < SB_{Lim})$
2.1. LIMIT CATCH VARIABILITY	Limit annual changes in the coastwide TCEY	Average Annual Variability (*AAV*) > 15%	Short-term	0.25	$P(AAV > 15\%)$
2.2. MAXIMIZE DIRECTED FISHING YIELD	*Maximize average TCEY coastwide*	*Median coastwide TCEY*	*Short-term*	*STATISTIC OF INTEREST*	*Median* $\overline{TCEY}$

APPENDIX VB
ADDITONAL OBJECTIVES AND ASSOCIATED PERFORMANCE METRICS

GOAL: Biological Sustainability

GENERAL OBJECTIVE	MEASURABLE OBJECTIVE	MEASURABLE OUTCOME	TIME-FRAME	TOLERANCE	PERFORMANCE METRIC
REPORT A METRIC THAT IS BASED ON NUMBERS OF PACIFIC HALIBUT	*An absolute measure*	*Number of mature female halibut*	*Long-term*	*STATISTIC OF INTEREST*	*Median Number of Mature Females*
REPORT A METRIC INDICATING THE SPAWNING BIOMASS EXPECTED TO BE ABOVE 50% OF THE TIME (I.E., AN IMPLIED TARGET)	*An absolute measure*	*Spawning Biomass*	*Long-term*	*STATISTIC OF INTEREST*	*Median* $\overline{SB}$
REPORT A METRIC THAT GIVES AN INDICATION HOW OFTEN THE BIOMASS IS BELOW THE FISHERY TRIGGER	*Maintain a biomass that is above the biomass limit and not on the ramp a high percentage of the time*	B < Spawning Biomass Limit (Fishery Trigger) Fishery Trigger=30% spawning biomass	*Long-term*	*STATISTIC OF INTEREST*	$P(SB < Fish_{Trig})$
CONSERVE SPATIAL POPULATION STRUCTURE					

GOAL: Optimize directed fishing opportunities.

GENERAL OBJECTIVE	MEASURABLE OBJECTIVE	MEASURABLE OUTCOME	TIME-FRAME	TOLERANCE	PERFORMANCE METRIC
2.1. LIMIT CATCH VARIABILITY	Limit annual changes in the coastwide TCEY	*AAV*	*Long-term*	*STATISTIC OF INTEREST*	*AAV and variability*
		Change in TCEY > 15% in any year	*Short-term*	*STATISTIC OF INTEREST*	$\frac{TCEY_{i+1} - TCEY_i}{TCEY_i}$
	Limit annual changes in the TCEY for each Regulatory Area	Average Annual Variability by Regulatory Area (AAV_A) > 15%	Long-term	0.25	$P(AAV > 15\%)$
		AAV_A	*Long-term*	*STATISTIC OF INTEREST*	*AAV and variability*
		Change in TCEY by Regulatory Area > 15% in any year	*Short-term*	*STATISTIC OF INTEREST*	$\frac{TCEY_{i+1} - TCEY_i}{TCEY_i}$
	Gain insight into the additional variability in the TCEY when on the ramp	*AAV while on the ramp*	*Long-term*	*STATISTIC OF INTEREST*	*AAV given estimated SB < SB_{Trig}*
		Percent of time "on the ramp" (estimated stock status is below the fishery trigger; SB_{trig}) *SB_{Trig} to be evaluated (e.g., 30% or 40%)*	*Long-term*	*STATISTIC OF INTEREST*	$P(\widehat{SB} < SB_{Trig})$

GENERAL OBJECTIVE	MEASURABLE OBJECTIVE	MEASURABLE OUTCOME	TIME-FRAME	TOLERANCE	PERFORMANCE METRIC
2.2. MAXIMIZE DIRECTED FISHING YIELD	Maintain TCEY above a minimum level coastwide	Coastwide TCEY < $TCEY_{min}$	Long-term Short-term	?? ??	$P(TCEY < TCEY_{min})$
	Maximize high yield (TCEY) opportunities coastwide	*Coastwide TCEY > 50.6 Mlbs (70% of 1993-2012 average)*	*Long-term* *Short-term*	*STATISTIC OF INTEREST*	$P(TCEY < 50.6\ Mlbs)$
	Present the range of coastwide TCEY that would be expected	*Range of coastwide TCEY*	*Long-term* *Short-term*	*STATISTIC OF INTEREST*	*5^{th} and 75^{th} percentiles of TCEY*
	Maximize average TCEY by Regulatory Area	*Median coastwide TCEY*	*Long-term* *Short-term*	*STATISTIC OF INTEREST*	*Median* $\overline{TCEY}$
	Maintain TCEY above a minimum level by Regulatory Area	$TCEY_A < TCEY_{A,min}$	Long-term Short-term	?? ??	$P(TCEY < TCEY_{min})$
	Maximize high yield (TCEY) opportunities by Regulatory Area	*$TCEY_A$ > 50.6 Mlbs (70% of 1993-2012 average)*	*Long-term* *Short-term*	*STATISTIC OF INTEREST*	$P(TCEY < 50.6\ Mlbs)$
	Present the range of TCEY by Regulatory Area that would be expected	*Range of TCEY by Regulatory Area*	*Long-term* *Short-term*	*STATISTIC OF INTEREST*	*5^{th} and 75^{th} percentiles of TCEY*
MINIMIZE POTENTIAL FOR NO CATCH LIMIT FOR THE DIRECTED COMMERCIAL FISHERY	*Minimize fishery closures*	*Directed commercial allocation = 0*	*Long-term* *Short-term*	*STATISTIC OF INTEREST*	*P(Directed Mort = 0)*

GOAL: Minimize Discard Mortality

GENERAL OBJECTIVE	MEASURABLE OBJECTIVE	MEASURABLE OUTCOME	TIME-FRAME	TOLERANCE	PERFORMANCE METRICS
3.1. HARVEST EFFICIENCY	Discard mortality is a small percentage of the longline fishery annual catch limit	>10% of annual catch limit	Long-term Short-term	0.25	$P(DM > 10\%FCEY)$
ABSOLUTE MEASURE	*Absolute*	*Discard Mortality (DM)*	*Long-term* *Short-term*	***NA***	*Median* $\overline{DM}$

GOAL: Minimize Bycatch Mortality

GENERAL OBJECTIVE	MEASURABLE OBJECTIVE	MEASURABLE OUTCOME	TIME-FRAME	TOLERANCE	PERFORMANCE METRICS

APPENDIX VI
MSE PROGRAM OF WORK (2019-23)

May 2018 MSAB Meeting
Review Goals
Look at results of SPR
Review Performance Metrics
Identify Scale MP's
Review Framework
Identify Preliminary Distribution MP's
October 2018 MSAB 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 MSAB Meeting
Evaluate additional Scale MP's
Review Goals
Spatial Model Complexity
Identify MP's (Distn Scale)
Review Framework
October 2019 MSAB 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 MSAB Meeting
Review Goals
Review multi-area model
Review preliminary results
October 2020 MSAB Meeting
Review Goals
Review preliminary results
Annual Meeting 2021
Presentation of first complete MSE product to the Commission Recommendations on Scale and Distribution MP

APPENDIX VII
CONSOLIDATED SET OF RECOMMENDATIONS AND REQUESTS OF THE 12TH SESSION OF THE IPHC MANAGEMENT STRATEGY ADVISORY BOARD (MSAB012)

RECOMMENDATIONS

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

MSAB012–Rec.01 (para. 20) The MSAB **NOTED** the refined objectives provided by the ad-hoc working group (contained in paper IPHC-2018-MSAB012-06), and **RECOMMENDED** prioritizing a single conservation objective over fishery measurable objectives (Table 1).

Table 1. Priority objectives phrased as measurable outcomes used to evaluate MSE results. The first objective is prioritized over the others.

MEASURABLE OUTCOME	TIME-FRAME	TOLERANCE
SB < Spawning Biomass Limit (SB_{Lim}) SB_{Lim}=20% spawning biomass	Long-term	0.10
Relative AAV	Short-term	
Average Annual Variability (AAV) > 15%	Short-term	0.25
Maximize average TCEY coastwide	Short-term	

Performance metrics for evaluation

MSAB012–Rec.02 (para. 24) The MSAB **RECOMMENDED** that performance-metrics for the short-term span 4-13 years, medium-term span 14-23 years, and the long-term span 91-100 years, be reported to understand how the management procedures may rank differently in the different periods of the forward simulations.

Closed-loop simulation results to investigate coastwide fishing intensity

MSAB012–Rec.03 (para. 37) The MSAB **RECOMMENDED** that a coastwide fishing intensity SPR should not be lower than 40% nor higher than 46%, with a target SPR of 42%-43% with a 30:20 HCR. Rationale for this recommendation is provided in paragraph 38.

REQUESTS

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

MSAB012–Req.01 (para. 21) The MSAB **AGREED** that statistics of interest are useful when evaluating management procedures and **REQUESTED** that they continue to be reported.

Performance metrics for evaluation

MSAB012–Req.02 (para. 23) The MSAB **REQUESTED** that the same metrics are calculated for the recreational sector as are calculated for the commercial sector and be reported for subsequent evaluations.

Closed-loop simulation results to investigate coastwide fishing intensity

MSAB012–Req.03 (para. 40) The MSAB **REQUESTED** that additional MPs components be considered to meet the objective of catch stability. The IPHC Secretariat may consider the following MPs, but is **ENCOURAGED** to explore other options to report at MSAB013.

a) 25:10 control rule, and other control rules, as possible, potentially including 30:10 and 30:15 and 30:20;

b) Multi-year quotas, defined as setting the TCEY in one year and sticking with the same TCEY in one or more following years, noting that AAV may not be an appropriate metric to measure variability;

c) Limiting change in catch limits from the previous year to +/-15% per year, in addition to other relevant percentages, with the goal of finding MPs that meet the main objectives;

d) Limiting change in catch limits from the previous year to a maximum increase of 15% per year with no limit on decreasing the catch limit;

e) Slow up (33% of the change in TCEY), fast down (-50% of the change in TCEY).

MSAB012–Req.04 (para. 43) The MSAB **REQUESTED** that the IPHC Secretariat provide a report at MSAB013 of IPHC research and other relevant research (to the extent possible) activities related to relationships between population dynamics and environmental conditions, noting that the IPHC 5-year research plan is available on the IPHC website, to aid in the discussion of hypotheses that are plausible to include in the MSE process.

Identify preliminary MPs related to distribution

MSAB012–Req.05 (para. 54) The MSAB **REQUESTED** that an additional management procedure be considered to define allocations and a catch limit floor that reduces catch limits in a stair-step manner during times of large abundance changes.

MSAB012–Req.06 (para. 55) The MSAB **REQUESTED** that the IPHC Secretariat and the MSAB continue to develop the concept of a ‘fishery footprint’, as previously considered in the 2015 IPHC Report of Assessment and Research Activities, page 238, in part to consider how it may be incorporated into a MP.