



---

26 September 2019

**IPHC CIRCULAR 2019-020**

Dear Commissioners,

**SUBJECT: REPORT OF THE 15<sup>th</sup> SESSION OF THE IPHC SCIENTIFIC REVIEW BOARD (SRB015)**

In accordance with Rule 15 (Reports and Records) of the IPHC Rules of Procedure (2019), I am pleased to provide you with the final Report of the 15<sup>th</sup> Session of the IPHC Scientific Review Board (SRB015), IPHC-2019-SRB015-R, which was adopted today, the 26 September 2019. Please distribute as you see fit.

The report is also available for download from the IPHC website: <https://www.iphc.int/>

Yours sincerely

David T. Wilson, Ph.D.

Executive Director, IPHC

**Attachments:**

**Attachment I:** Report of the 15<sup>th</sup> Session of the IPHC Scientific Review Board (SRB015), IPHC-2019-SRB015-R



## **Report of the 15<sup>th</sup> Session of the IPHC Scientific Review Board (SRB015)**

---

Seattle, Washington, U.S.A., 24-26 September 2019

### Commissioners

Canada	United States of America
Paul Ryall	Chris Oliver
Neil Davis	Robert Alverson
Peter DeGreef	Richard Yamada

### Executive Director

David T. Wilson, Ph.D.

---

#### **DISTRIBUTION:**

Participants in the Session  
Members of the Commission  
IPHC Secretariat

#### **BIBLIOGRAPHIC ENTRY**

IPHC 2019. Report of the 15<sup>th</sup> Session of the IPHC  
Scientific Review Board (SRB015). Seattle, Washington,  
U.S.A., 24-26 September 2019.  
*IPHC–2019–SRB015–R, 18 pp.*

---



The designations employed and the presentation of material in this publication and its lists do not imply the expression of any opinion whatsoever on the part of the International Pacific Halibut Commission (IPHC) concerning the legal or development status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

This work is protected by copyright. Fair use of this material for scholarship, research, news reporting, criticism or commentary is permitted. Selected passages, tables or diagrams may be reproduced for such purposes provided acknowledgment of the source is included. Major extracts or the entire document may not be reproduced by any process without the written permission of the Executive Director, IPHC.

The IPHC has exercised due care and skill in the preparation and compilation of the information and data set out in this publication. Notwithstanding, the IPHC, its employees and advisers, assert all rights and immunities, and disclaim all liability, including liability for negligence, for any loss, damage, injury, expense or cost incurred by any person as a result of accessing, using or relying upon any of the information or data set out in this publication, to the maximum extent permitted by law including the International Organizations Immunities Act.

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: [secretariat@iphc.int](mailto:secretariat@iphc.int)  
Website: <http://iphc.int/>



---

## ACRONYMS

AM	Annual Meeting
CDN	Canada
IPHC	International Pacific Halibut Commission
MSAB	Management Strategy Advisory Board
MSE	Management Strategy Evaluation
SB	Spawning Biomass
SRB	Scientific Review Board
TCEY	Total Constant Exploitable Yield
U.S.A.	United States of America

## DEFINITIONS

A set of working definitions are provided in the IPHC Glossary of Terms and abbreviations:  
<https://www.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; ADOPTED** (formal); **REQUESTED; ENDORSED** (informal): A conclusion for an action to be undertaken, by a Contracting Party, a subsidiary (advisory) body of the Commission and/or the IPHC Secretariat.
- Level 2: AGREED:** Any point of discussion from a meeting which the Commission 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 Commission 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

REPORT OF THE 15 <sup>TH</sup> SESSION OF THE IPHC SCIENTIFIC REVIEW BOARD (SRB015) .....	1
TABLE OF CONTENTS.....	4
EXECUTIVE SUMMARY .....	5
1. OPENING OF THE SESSION .....	7
2. ADOPTION OF THE AGENDA AND ARRANGEMENTS FOR THE SESSION .....	7
3. IPHC PROCESS.....	7
3.1 SRB annual workflow.....	7
3.2 Update on the actions arising from the 14 <sup>th</sup> Session of the SRB (SRB014).....	7
3.3 Outcomes of the 95 <sup>th</sup> Session of the IPHC Annual Meeting (AM095) .....	7
3.3.1 Discard mortality in non-directed fisheries .....	8
3.4 Observer updates .....	8
4. INDEPENDENT EXTERNAL PEER REVIEW OF THE IPHC STOCK ASSESSMENT .....	8
5. IPHC FISHERY-INDEPENDENT SETLINE SURVEY (FISS).....	9
5.1 Methods for spatial setline survey modelling – Program of work for 2019.....	9
6. PACIFIC HALIBUT STOCK ASSESSMENT: 2019 .....	9
6.1 Data source development.....	10
6.2 Modelling updates.....	10
7. MANAGEMENT STRATEGY EVALUATION: UPDATE .....	11
7.1 Updates to MSE framework and closed-loop simulations .....	12
7.2 MSAB Program of Work and delivery of timeline for 2019-21.....	12
8. BIOLOGICAL AND ECOSYSTEM SCIENCE PROGRAM RESEARCH UPDATES .....	12
8.1 Five-year research plan and management implications: update .....	12
8.2 Progress on ongoing research projects .....	12
9. OTHER BUSINESS.....	13
9.1 Life history modeler .....	13
9.2 MSE external peer review .....	13
9.3 SRB meeting calendar.....	13
10. REVIEW OF THE DRAFT AND ADOPTION OF THE REPORT OF THE 15 <sup>TH</sup> SESSION OF THE IPHC SCIENTIFIC REVIEW BOARD (SRB015) .....	13
APPENDIX I LIST OF PARTICIPANTS FOR THE 15 <sup>TH</sup> SESSION OF THE IPHC SCIENTIFIC REVIEW BOARD (SRB015)	14
APPENDIX II AGENDA FOR THE 15 <sup>TH</sup> SESSION OF THE IPHC SCIENTIFIC REVIEW BOARD (SRB015).....	15
APPENDIX III LIST OF DOCUMENTS FOR THE 15 <sup>TH</sup> SESSION OF THE IPHC SCIENTIFIC REVIEW BOARD (SRB015)	16
APPENDIX IV CONSOLIDATED SET OF RECOMMENDATIONS AND REQUESTS OF THE 15 <sup>TH</sup> SESSION OF THE IPHC SCIENTIFIC REVIEW BOARD (SRB015) .....	17



## EXECUTIVE SUMMARY

The 15<sup>th</sup> Session of the International Pacific Halibut Commission (IPHC) Scientific Advisory Board (SRB015) was held in Seattle, WA, U.S.A. from 24-26 September 2019. The SRB consists of five (5) board members, required to be independent of the Contracting Parties. Two (2) individuals attended the Session as Observers. The meeting was opened by the Chairperson, Dr Sean Cox (Canada), and the Executive Director, Dr David Wilson, who welcomed participants to Seattle.

The following are a subset of the complete recommendations/requests for action from the SRB015, which are provided in full at [Appendix IV](#).

## RECOMMENDATIONS

### *Discard mortality in non-directed fisheries*

SRB015-Rec.01 ([para. 10](#)) The SRB **RECOMMENDED** that the analysis of the effects of historical discard mortality in non-directed fisheries ('bycatch'), be interpreted with caution, as there are multiple methods for evaluating how bycatch in non-directed fisheries impact stock productivity and biomass over time. The estimated rates of bycatch impact on directed fishery changed over time in part due to the variability in recruitment and/or sublegal abundance relative to the vulnerable stock. The choice of the appropriate method will depend on how the results feed into management advice.

SRB015-Rec.02 ([para. 11](#)) The SRB **RECOMMENDED** that, if a bycatch management strategy is a priority for the Commission, then the MSE process would be a more appropriate venue for evaluating methods of bycatch accounting for reasons outlined at SRB012:

*"NOTING the request for "replay" analyses, the SRB AGREED that "what if" questions about past behaviour are not appropriate for stock assessment models because those analyses do not adequately reflect the information available at the time or information feedbacks to future decision over time. An MSE analysis, on the other hand is specifically designed to answer "what if" questions under particular future scenarios while properly accounting for stock assessment errors in response to changing information."* (IPHC-2018-SRB012-R, para. 23)

### *Pacific halibut stock assessment: 2019*

SRB015-Rec.04 ([para. 34](#)) **NOTING** the discussion of recommendations arising from the external peer review of the IPHC stock assessment (Section 4), the SRB **RECOMMENDED** that the IPHC Secretariat:

- a) Update data weighting for the 2019 assessment;
- b) For SRB016:
  - i. evaluate the types of weightings (e.g., Dirichlet-multinomial) for compositional data;
  - ii. advise on the impact of data re-weighting as new information arises. This could be more sensitive as new sex-composition data are included;
  - iii. keep apprised of new software developments (e.g. CAPAM meeting in NZ) and report on potential future directions (e.g. if alternatives provide improved Bayesian integration or adaptations for simulation testing etc.).

### *Management Strategy Evaluation: Goals, Objectives and Performance Metrics*

SRB015-Rec.05 ([para. 41](#)) The SRB **RECOMMENDED** that if the original objective to have annual mortality limits related to local abundances was of broad interest to the Commission, then candidate management procedures be developed and tested in which regional



mortality limits are set annually in proportion to modelled survey abundance trends by IPHC Regulatory Area (noting that splitting regions into Regulatory Areas would require assumptions about within-region abundance proportions).

***Management Strategy Evaluation: Dynamic reference points***

SRB015–Rec.06 ([para. 45](#)) The SRB **RECOMMENDED** that the MSAB define objectives independently of the management procedures used to achieve them and, instead, focus on the outcomes/consequences they wish to avoid (e.g. low catch, fishery closures, large drops in TCEY, public perceptions of poor stock status).

***Management Strategy Evaluation: Updates to MSE framework and closed-loop simulations***

SRB015–Rec.07 ([para. 51](#)) The SRB **RECOMMENDED** that the Commission develop a standard criterion for achieving a limited set of (or one over-arching) objectives. This would ensure that any candidate management procedure achieves common goals with differences in trade-offs between risks and benefits. Doing so will improve the efficiency of the iterative approach that is required for MSE.



## 1. OPENING OF THE SESSION

1. The 15<sup>th</sup> Session of the International Pacific Halibut Commission (IPHC) Scientific Review Board (SRB015) was held in Seattle, Washington, U.S.A. from 24 to 26 September 2019. The list of participants is provided at [Appendix I](#). The meeting was opened by the Chairperson, Dr Sean Cox (Canada), and the Executive Director, Dr David Wilson, who welcomed participants to Seattle.
2. The SRB **RECALLED** its mandate, as detailed in Appendix VIII, Sect. I, para. 1-3 of the IPHC Rules of Procedure (2019):
  1. *The Scientific Review Board (SRB) shall provide an independent scientific peer review of Commission science/research proposals, programs, and products, including but not limited to:*
    - a. *Stock assessment;*
    - b. *Management Strategy Evaluation;*
    - c. *Migration;*
    - d. *Reproduction;*
    - e. *Growth;*
    - f. *Discard survival;*
    - g. *Genetics and Genomics;*
  2. *Undertake periodic reviews of science/research strategy, progress, and overall performance.*
  3. *Review the recommendations arising from the MSAB and the RAB.*

## 2. ADOPTION OF THE AGENDA AND ARRANGEMENTS FOR THE SESSION

3. The SRB **ADOPTED** the Agenda as provided at [Appendix II](#). The documents provided to the SRB are listed in [Appendix III](#). Participants were reminded that all documents for the meeting were published on the IPHC website, 30 days prior to the Session: <https://www.iphc.int/venues/details/15th-session-of-the-iphc-scientific-review-board-srb015>.

## 3. IPHC PROCESS

### 3.1 *SRB annual workflow*

4. The SRB **RECALLED** that the core purpose of the SRB015 is to review progress on the IPHC science program, including specific products, and to provide guidance for the delivery of products to the Commission at its Interim Meeting in November 2019, and Annual Meeting in February 2020.

### 3.2 *Update on the actions arising from the 14<sup>th</sup> Session of the SRB (SRB014)*

5. The SRB **NOTED** paper IPHC-2019-SRB015-03, which provided the SRB 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 SRB meeting (SRB014).
6. The SRB **AGREED** to consider and revise the actions as necessary, and to combine them with any new actions arising from SRB015 into a consolidated list for future reporting.

### 3.3 *Outcomes of the 95<sup>th</sup> Session of the IPHC Annual Meeting (AM095)*

7. The SRB **NOTED** paper IPHC-2019-SRB015-04 which detailed the outcomes of the 95<sup>th</sup> Session of the IPHC Annual Meeting (AM095), relevant to the mandate of the SRB, and **AGREED** to consider how best to provide the Commission with the information it has requested, throughout the course of the current SRB meeting.





### 3.3.1 Discard mortality in non-directed fisheries

8. The SRB **NOTED** paper IPHC-2019-SRB015-12, which provided an analysis of the effects of historical discard mortality in non-directed fisheries ('bycatch').
9. The SRB **NOTED** that the estimates of the effects of discard mortality in non-directed fisheries have varied among historical analyses, and that the results of the current analysis are generally on a consistent scale.
10. The SRB **RECOMMENDED** that the analysis of the effects of historical discard mortality in non-directed fisheries ('bycatch'), be interpreted with caution, as there are multiple methods for evaluating how bycatch in non-directed fisheries impact stock productivity and biomass over time. The estimated rates of bycatch impact on directed fishery changed over time in part due to the variability in recruitment and/or sublegal abundance relative to the vulnerable stock. The choice of the appropriate method will depend on how the results feed into management advice.
11. The SRB **RECOMMENDED** that, if a bycatch management strategy is a priority for the Commission, then the MSE process would be a more appropriate venue for evaluating methods of bycatch accounting for reasons outlined at SRB012:

*"NOTING the request for "replay" analyses, the SRB AGREED that "what if" questions about past behaviour are not appropriate for stock assessment models because those analyses do not adequately reflect the information available at the time or information feedbacks to future decision over time. An MSE analysis, on the other hand is specifically designed to answer "what if" questions under particular future scenarios while properly accounting for stock assessment errors in response to changing information."* (IPHC-2018-SRB012-R, para. 23)

### 3.4 Observer updates

12. The SRB **NOTED** updates from the two Contracting Party science advisors, who provided brief overviews of some of the points of clarification being sought from the present SRB meeting. These included, but were not limited to: 1) explanations of FISS trends in comparison to fishery trends; 2) degrees of spatial and temporal connectivity among areas/regions; 3) consideration of MSY-based and MEY-based reference points; 4) juvenile (pre-reproductive) Pacific halibut population changes; 5) options for distributing the TCEY spatially; 6) consideration of Kobe-style status plots; 7) Accountability and responsibilities for mortalities; 8) FISS rationalisation; 9) climate change; and 10) justifications for using biological regions in comparison to IPHC Regulatory Areas.
13. The SRB **NOTED** the valuable contributions of the science advisors to the process, especially given they attend most IPHC meetings.

## 4. INDEPENDENT EXTERNAL PEER REVIEW OF THE IPHC STOCK ASSESSMENT

14. The SRB **NOTED** paper IPHC-2019-SRB015-13, which provided the SRB with an opportunity to further consider the independent peer review of the IPHC Stock Assessment for Pacific halibut.
15. The SRB **RECALLED** that at the 95<sup>th</sup> Session of the IPHC Annual Meeting (AM095), the Commission made the following recommendation regarding a peer review of the IPHC stock assessment:

### *Peer review process for IPHC science products*

AM095-Rec.10 (para. 129) *The Commission **RECOMMENDED** that the IPHC Secretariat develop terms of reference for a consultant to undertake a peer review of the IPHC Pacific halibut stock assessment, for implementation in early 2019. The terms of reference and budget shall be endorsed by the Commission inter-sessionally.*



16. The SRB **NOTED** that the Commission directed the IPHC Secretariat via Commission decisions **AM095-Rec.10** and **IPHC-2019-ID001** (shown below) to:

*a) 95<sup>th</sup> Session of the IPHC Annual Meeting (AM095) – 1 February 2019*

**AM095-Rec.10** ([para. 129](#)) “The Commission **RECOMMENDED** that the IPHC Secretariat develop terms of reference for a consultant to undertake a peer review of the IPHC Pacific halibut stock assessment, for implementation in early 2019. The terms of reference and budget shall be endorsed by the Commission inter-sessionally.”

*b) 2019 Inter-sessional decision – 17 April 2019*

**IPHC-2019-ID001:** The Commission **ENDORSED** the “Open call for expressions of interest: Independent peer reviewer for the IPHC stock assessment”

17. The SRB **NOTED** that the report by the independent consultant was provided to the Commission and SRB on 2 August 2019, via [IPHC Circular 2019-16](#).

18. The SRB **AGREED** that the external peer review (IPHC-2019-SRB015-13) was of a high quality and appreciated the completeness of the document.

19. The SRB **RECOMMENDED** that as was the case in the 2019 external peer review, any future external review would also benefit from an in-person review component. The biannual peer review that the SRB undertakes should continue as a complimentary element, thereby providing ongoing verification for the Commission.

20. The SRB **AGREED** that in light of scientific advances in the field, the SRB continue to be involved in developing the terms of reference for future stock assessment, scientific, and other technical reviews.

## **5. IPHC FISHERY-INDEPENDENT SETLINE SURVEY (FISS)**

### *5.1 Methods for spatial setline survey modelling – Program of work for 2019*

21. The SRB **NOTED** paper IPHC-2019-SRB015-05, which provided an update on the inputs to the survey modelling approach for 2019.

22. The SRB **NOTED** paper IPHC-2019-SRB015-06, which provided a response to SRB requests from SRB014 (IPHC-2019-SRB014-R) regarding methods for a rationalised IPHC fishery-independent setline survey (FISS).

23. The SRB **NOTED** that this research topic is focused on developing criteria to determine when it is appropriate to revisit areas that are not sampled every year. The space-time model was used to project Coefficient of Variation (CV) forward to aid in this study.

24. The SRB **NOTED** the presentation and was encouraged by the innovative approach taken to develop statistics for evaluating the efficiency of the FISS.

25. The SRB **REQUESTED** that the IPHC Secretariat further develop the approach in collaboration with the SRB to specifically address the issue of potential bias in the indices caused by areas that are unsampled in some years. A draft manuscript was made available, which provided details on aspects of this research, and the SRB looks forward to reviewing this prior to the SRB016, in 2020.

## **6. PACIFIC HALIBUT STOCK ASSESSMENT: 2019**

26. The SRB **NOTED** paper IPHC-2019-SRB015-07, which provided a response to requests made during SRB014 (IPHC-2019-SRB014-R), held in June 2019, and to provide the SRB with an update of the 2019 assessment development and preliminary results.



---

### 6.1 Data source development

27. The SRB **NOTED** that two new or revised sources of data were already included in the 2019 stock assessment:
- a) Sex-ratio at age information from the 2017 commercial fishery landings;
  - b) A revised time-series of Numbers-Per-Unit-Effort from the space-time model including revised criteria for determining a station to be ineffective based on observed or suspected whale depredation (more strict relative to historical analyses).
28. The SRB **NOTED** that the final 2019 stock assessment would contain:
- a) The 2018 estimated sex-ratio at age for the directed commercial fishery landings;
  - b) Updated information for 2018 data sources, where available;
  - c) Standard data inputs for 2019 including:
    - i. Mortality estimates from all sources;
    - ii. the FISS modelled index, age composition information, and mean weight data;
    - iii. Commercial fishery catch-per-unit-effort and age data.

### 6.2 Modelling updates

29. The SRB **NOTED** that there had been no changes to the preliminary assessment since SRB014.
30. The SRB **NOTED** the results of the evaluation of FISS age data in informing the estimated link coefficients for the Pacific Decadal Oscillation in the two long time series models, which suggested the parameter estimates were not driven exclusively by the modelled survey information.
31. The SRB **NOTED** the profiles describing the effect of alternative values for steepness in each of the four models comprising the ensemble. The coastwide long times series model showed the greatest sensitivity in spawning biomass, with little difference in the likelihood over the range from 0.75 to 1.0. The short time series models showed no difference in SSB, but estimates of recent recruitment varied as a function of steepness.
32. The SRB **NOTED** the sensitivity analysis of steepness and saw no need to include an additional nested steepness component in the ensemble for the coastwide long time series model.
33. The SRB **REQUESTED** that for SRB016 (2020), the IPHC Secretariat:
- a) provide a more detailed evaluation and profile of steepness values. Specifically, this should show the different data and model components that inform the steepness parameter, and also the interaction with sigmaR. This should also help inform the SRR relationship to be used in the operating model for MSE work;
  - b) consider examining the relative impact of different fleets (sources of mortality) on historical SSB (e.g. set fleet x  $F = 0$ , replay, then fleet x and y, etc.).
34. **NOTING** the discussion of recommendations arising from the external peer review of the IPHC stock assessment (Section 4), the SRB **RECOMMENDED** that the IPHC Secretariat:
- a) Update data weighting for the 2019 assessment;
  - b) For SRB016:
    - i. evaluate the types of weightings (e.g., Dirichlet-multinomial) for compositional data;
    - ii. advise on the impact of data re-weighting as new information arises. This could be more sensitive as new sex-composition data are included;
    - iii. keep apprised of new software developments (e.g. CAPAM meeting in NZ) and report on potential future directions (e.g. if alternatives provide improved Bayesian integration or adaptations for simulation testing etc.).



35. The SRB **NOTED** the presentation of alternative methods for reporting stock status with regard to fishing intensity and relative biomass (phase plots) and their utility in summarising results recognising that the Commission's current management strategy and should not be interpreted in the context of other management strategies.
36. The SRB **REQUESTED** that values related to stock status from the assessment be distinguished from MSE presentations (e.g. probabilities of avoiding a threshold based on operating model simulations).

## 7. MANAGEMENT STRATEGY EVALUATION: UPDATE

37. The SRB **NOTED** paper IPHC-2019-SRB015-09 which provided the SRB with an update on the IPHC MSE process including defining objectives, results for management procedures related to coastwide fishing intensity, a framework for distributing the TCEY, and a program of work.

### *Goals, Objectives and Performance Metrics*

38. The SRB **NOTED** paper IPHC-2019-SRB015-INF01, which provided the outcomes of the Ad-hoc Working Group on ideas to Refine Goals, Objectives, and Performance Metrics for the IPHC Management Strategy Evaluation (MSE).
39. **NOTING** the new objectives provided in paper IPHC-2019-SRB015-09, and that objectives for minimum catch levels by IPHC Regulatory Area may be useful for evaluating management procedures, the SRB **AGREED** that proportional shares are a different concept and should also be defined for each IPHC Regulatory Area to examine trade-offs.
40. The SRB **NOTED** the proposed objective to have annual mortality limits related to local abundances. While this could provide transparency from a policy perspective, it ignores the biological realities of movement and other processes that remain poorly understood at both coastwide and Regulatory Area scales.
41. The SRB **RECOMMENDED** that if the original objective to have annual mortality limits related to local abundances was of broad interest to the Commission, then candidate management procedures be developed and tested in which regional mortality limits are set annually in proportion to modelled survey abundance trends by IPHC Regulatory Area (noting that splitting regions into Regulatory Areas would require assumptions about within-region abundance proportions).

### *Dynamic reference points*

42. The SRB **NOTED** paper IPHC-2019-SRB015-11 Rev\_1, which provided an evaluation of dynamic reference points for Pacific halibut.
43. The SRB **NOTED** that a precautionary  $RSB_{MSY}$  proxy of 30% of unfished spawning biomass, putting a proxy for  $RSB_{MEY}$  between 36% and 44%, could provide a reasonable range of values for the coastwide objective to maintain the spawning biomass around a target (objective 2.1B).
44. The SRB **NOTED** that candidate control rule development is an iterative process, and that:
- a) use of the trigger from the control rule in coastwide objective 2.1A (*Maintain the female spawning biomass above a trigger reference point at least 80% of the time*) conflates the objective and management procedure;
  - b) avoiding a spawning biomass limit of 20% unfished with a tolerance of 0.05 is a potential conservation objective based on the analysis of MSY-related reference points and is consistent with some international standards;
  - c) SPR values between 38% and 48% could satisfy the coastwide conservation objective and the biomass target objective based on a proxy for  $SB_{MEY}$  between 36% and 44%, and the stability objective may be met by applying one of two constraints: a maximum annual change in the mortality limit of 15% or a slow-up fast-down approach.





45. The SRB **RECOMMENDED** that the MSAB define objectives independently of the management procedures used to achieve them and, instead, focus on the outcomes/consequences they wish to avoid (e.g. low catch, fishery closures, large drops in TCEY, public perceptions of poor stock status).

*7.1 Updates to MSE framework and closed-loop simulations*

46. The SRB **NOTED** paper IPhC-2019-SRB015-10 Rev\_1, which provided technical details of the IPhC MSE framework.
47. The SRB **AGREED** on the valuable contribution provided by the conceptual model and mapping reviewing the different life-history phases and putative movement and settlement patterns, and **ENCOURAGED** presenting this more broadly, linking to existing IPhC data archives, and also highlighting specific gaps in knowledge. In particular, this is useful for guiding operating model specifications.
48. The SRB **NOTED** the yield-per-recruit analysis and the changes in relative estimated  $F_{0.1}$  among Biological Regions in the recent year compared to the past three decades and that this analysis along with a general understanding of the life-history of Pacific halibut in each Biological Region suggests that eastern areas may be able to sustain higher harvest rates than western areas, at least in some years.
49. The SRB **NOTED** that the distribution framework consisting of a coastwide TCEY distributed to Biological Regions based on stock distribution, relative fishing intensities, and other allocation adjustments, and then distributed to IPhC Regulatory Areas based on other data, observations, or agreement is a useful starting point for developing management procedures to distribute the TCEY.
50. The SRB **REQUESTED** that the initial performance of the above proposals for candidate management procedures be evaluated and presented at the SRB016 in 2020. At that time the appropriateness of different performance measures and objectives could be more carefully evaluated.
51. The SRB **RECOMMENDED** that the Commission develop a standard criterion for achieving a limited set of (or one over-arching) objectives. This would ensure that any candidate management procedure achieves common goals with differences in trade-offs between risks and benefits. Doing so will improve the efficiency of the iterative approach that is required for MSE.

*7.2 MSAB Program of Work and delivery of timeline for 2019-21*

52. The SRB **NOTED** that the full MSE results will be provided to the SRB for review no later than at the 17<sup>th</sup> Session of the SRB in September 2020 (SRB017), and that these results, including scale and distribution management procedures, will be presented to the Commission at the 97<sup>th</sup> Session of the Annual Meeting (AM097), in January 2021.

## 8. BIOLOGICAL AND ECOSYSTEM SCIENCE PROGRAM RESEARCH UPDATES

*8.1 Five-year research plan and management implications: update*

53. The SRB **NOTED** paper IPhC-2019-SRB015-08 which provided the SRB with an update on current progress on research projects conducted and planned within the [IPHC's 5-year Biological and Ecosystem Science Research Plan \(2017-21\)](#).

*8.2 Progress on ongoing research projects*

54. The SRB **NOTED** the progress on ongoing research projects contemplated within the IPhC's five year research plan (2017-21) involving:
- a) The use of life-stage, age-specific distribution data, and modelling approaches to examine pelagic larval dispersal and connectivity between in the Gulf of Alaska and the Bering Sea using an individual-based biophysical model and to track the movement of Pacific halibut up to 6-years of age using annual age-based distributions and a spatio-temporal modeling approach;



- b) Progress on the characterisation of the annual progression of ovarian development and of field maturity stages in female Pacific halibut and plans to investigate maturity in a spatial scale;
- c) Progress on the development of useful growth physiological markers for monitoring real-time growth patterns in Pacific halibut;
- d) Progress on investigating the relationship between capture or handling conditions and injuries and physiological stress levels sustained in Pacific halibut caught by longline gear;
- e) Continuing efforts to generate a first complete draft of the Pacific halibut genome.

55. The SRB **NOTED** future research (2020) aimed at improving understanding of population structure by collecting samples from spawning grounds with which to conduct studies to investigate the genetic structure of the Pacific halibut population.

56. **NOTING** paper IPhC-2019-SRB015-08 “*Report on Current and Future Biological Research Activities*” and presentations made by the IPhC Secretariat regarding current and plans for future research, the SRB **COMMENDED** the IPhC Secretariat for communicating their vision pertaining to relationships among ongoing and proposed research and IPhC stock assessment and management objectives. The SRB also **NOTED** the timeline on research projects and that more constructive and direct guidance could be provided on biological research if detailed study designs, methods, and results were the focus of future SRB presentations and supporting documents; and that an inventory of available data (including from NMFS and DFO) be compiled to guide biological research.

## 9. OTHER BUSINESS

### 9.1 Life history modeler

57. The SRB **NOTED** the draft terms of reference and position description for a Life history modeller position at the IPhC Secretariat, and **AGREED** to provide additional comments inter-sessionally, so that the final version could be considered by the Commission at its 95<sup>th</sup> Session of the Interim Meeting (IM095), in November 2019.

### 9.2 MSE external peer review

58. The SRB **NOTED** the draft terms of reference and position description for an external MSE peer reviewer, and **AGREED** to provide additional comments inter-sessionally, so that the final version could be considered by the Commission at its 95<sup>th</sup> Session of the Interim Meeting (IM095), in November 2019.

### 9.3 SRB meeting calendar

59. The SRB **NOTED** the dates for meetings of the SRB as follows:

Meeting	No.	2020 Dates	No.	2021 Dates	No.	2022 Proposed Dates
Scientific Review Board (SRB)	16 <sup>th</sup>	23-25 June	18 <sup>th</sup>	22-24 June	20 <sup>th</sup>	21-23 Jun
	17 <sup>th</sup>	22-24 Sept	19 <sup>th</sup>	21-23 Sept	21 <sup>st</sup>	20-22 Sep

## 10. REVIEW OF THE DRAFT AND ADOPTION OF THE REPORT OF THE 15<sup>TH</sup> SESSION OF THE IPhC SCIENTIFIC REVIEW BOARD (SRB015)

60. The SRB **ACKNOWLEDGED** the outstanding service and contribution of Dr Marc Mangel to the SRB and wished him well in his retirement.

61. The report of the 15<sup>th</sup> Session of the IPhC Scientific Review Board (IPHC-2019-SRB015-R) was **ADOPTED** on 26 September 2019, including the consolidated set of recommendations and/or requests arising from SRB015, provided at [Appendix IV](#).

---

**APPENDIX I**  
**LIST OF PARTICIPANTS FOR THE 15<sup>TH</sup> SESSION OF THE**  
**IPHC SCIENTIFIC REVIEW BOARD (SRB015)**

**SRB Members**

Dr Sean <b>Cox</b> :	<a href="mailto:spcox@sfu.ca">spcox@sfu.ca</a> ; Associate Professor, School of Resource and Environmental Management, Simon Fraser University, 8888 University Dr., Burnaby, B.C., Canada V5A 1S6
Dr James <b>Ianelli</b> :	<a href="mailto:jim.ianelli@noaa.gov">jim.ianelli@noaa.gov</a> ; Research Scientist, National Marine Fisheries Service-NOAA, 7600 Sand Pt Way NE, Seattle, WA, U.S.A., 98115
Dr Sven <b>Kupschus</b> :	<a href="mailto:sven.kupschus@cefas.co.uk">sven.kupschus@cefas.co.uk</a> ; Principal Fisheries Research Scientist, CEFAS, Pakefield Road, Lowestoft NR33 0HT, UK
Dr Marc <b>Mangel</b> :	<a href="mailto:msmangel@ucsc.edu">msmangel@ucsc.edu</a> ; Distinguished Research Professor and Director, Center for Stock Assessment Research, University of California, Santa Cruz, CA, U.S.A., 95064
Dr Kim <b>Scribner</b> :	<a href="mailto:scribne3@msu.edu">scribne3@msu.edu</a> ; Professor, Department of Fisheries and Wildlife, Michigan State University, 2E Natural Resources Building, East Lansing, MI, U.S.A., 48824

**Observers**

<b>Canada</b>	<b>United States of America</b>
Ms Ann-Marie <b>Huang</b> : <a href="mailto:Ann-Marie.Huang@dfo-mpo.gc.ca">Ann-Marie.Huang@dfo-mpo.gc.ca</a>	Dr Carey <b>McGilliard</b> : <a href="mailto:carey.mcgilliard@noaa.gov">carey.mcgilliard@noaa.gov</a>

**IPHC Secretariat**

<b>Name</b>	<b>Position and email</b>
Dr David <b>Wilson</b>	Executive Director, <a href="mailto:david.wilson@iphc.int">david.wilson@iphc.int</a>
Dr Piera <b>Carpi</b>	MSE Researcher, <a href="mailto:piera.carpi@iphc.int">piera.carpi@iphc.int</a>
Dr Allan <b>Hicks</b>	Quantitative Scientist, <a href="mailto:allan.hicks@iphc.int">allan.hicks@iphc.int</a>
Mr Andy <b>Jasonowicz</b>	Research Biologist, <a href="mailto:andy.jasonowicz@iphc.int">andy.jasonowicz@iphc.int</a>
Mr Stephen <b>Keith</b>	Assistant Director, <a href="mailto:stephen.keith@iphc.int">stephen.keith@iphc.int</a>
Dr Tim <b>Loher</b>	Research Scientist, <a href="mailto:tim.loher@iphc.int">tim.loher@iphc.int</a>
Dr Josep <b>Planas</b>	Biological and Ecosystem Sciences Branch Manager, <a href="mailto:josep.planas@iphc.int">josep.planas@iphc.int</a>
Ms Lauri <b>Sadorus</b>	Research Biologist, <a href="mailto:lauri.sadorus@iphc.int">lauri.sadorus@iphc.int</a>
Dr Ian <b>Stewart</b>	Quantitative Scientist, <a href="mailto:ian.stewart@iphc.int">ian.stewart@iphc.int</a>
Dr Ray <b>Webster</b>	Quantitative Scientist, <a href="mailto:ray.webster@iphc.int">ray.webster@iphc.int</a>



---

**APPENDIX II**  
**AGENDA FOR THE 15<sup>TH</sup> SESSION OF THE**  
**IPHC SCIENTIFIC REVIEW BOARD (SRB015)**

**Date:** 24-26 September 2019

**Location:** Seattle, Washington, U.S.A.

**Venue:** IPHC Board Room, Salmon Bay

**Time:** 12:00-17:00 (24<sup>th</sup>), 09:00-17:00 (25<sup>th</sup>), 09:00-17:00 (26<sup>th</sup>)

**Chairperson:** Dr Sean Cox (Simon Fraser University)

**Vice-Chairperson:** Nil

- 1. OPENING OF THE SESSION**
- 2. ADOPTION OF THE AGENDA AND ARRANGEMENTS FOR THE SESSION**
- 3. IPHC PROCESS**
  - 3.1. SRB annual workflow (D. Wilson)
  - 3.2. Update on the actions arising from the 14<sup>th</sup> Session of the SRB (SRB014) (D. Wilson)
  - 3.3. Outcomes of the 95<sup>th</sup> Session of the IPHC Annual Meeting (AM095) (D. Wilson)
  - 3.4. Observer updates (e.g. Science Advisors)
- 4. INDEPENDENT EXTERNAL PEER REVIEW OF THE IPHC STOCK ASSESSMENT**
- 5. IPHC FISHERY-INDEPENDENT SETLINE SURVEY (FISS)**
  - 5.1. Methods for spatial setline survey modelling – results to date for 2019 (R. Webster)
- 6. PACIFIC HALIBUT STOCK ASSESSMENT: 2019**
  - 6.1. Data source development (I. Stewart)
  - 6.2. Modelling updates (I. Stewart)
- 7. MANAGEMENT STRATEGY EVALUATION: UPDATE**
  - 7.1. Updates to MSE framework and closed-loop simulations (A. Hicks)
  - 7.2. MSAB Program of Work and delivery timeline for 2019-21 (A. Hicks)
- 8. BIOLOGICAL AND ECOSYSTEM SCIENCES RESEARCH UPDATES**
  - 8.1. Five-year research plan and management implications: Update (J. Planas)
  - 8.2. Progress on ongoing research projects (J. Planas)
- 9. OTHER BUSINESS**
  - 9.1. Life history modeler
  - 9.2. MSE external peer review
  - 9.3. SRB meeting calendar
- 10. REVIEW OF THE DRAFT AND ADOPTION OF THE REPORT OF THE 15<sup>TH</sup> SESSION OF THE IPHC SCIENTIFIC REVIEW BOARD (SRB015)**





**APPENDIX III**  
**LIST OF DOCUMENTS FOR THE 15<sup>TH</sup> SESSION OF THE**  
**IPHC SCIENTIFIC REVIEW BOARD (SRB015)**

Document	Title	Availability
IPHC-2019-SRB015-01	Agenda & Schedule for the 15 <sup>th</sup> Session of the Scientific Review Board (SRB015)	✓ 26 Jun 2019 ✓ 16 Aug 2019
IPHC-2019-SRB015-02	DRAFT: List of Documents for the 15 <sup>th</sup> Session of the Scientific Review Board (SRB015)	✓ 16 Aug 2019 ✓ 25 Aug 2019 ✓ 10 Sep 2019
IPHC-2019-SRB015-03	Update on the actions arising from the 14 <sup>th</sup> Session of the SRB (SRB014) (IPHC Secretariat)	✓ 20 Aug 2019
IPHC-2019-SRB015-04	Outcomes of the 95 <sup>th</sup> Session of the IPHC Annual Meeting (AM095) (D. Wilson)	✓ 16 Aug 2019
IPHC-2019-SRB015-05	Update on inputs to space-time modelling of survey data for 2019 (R. Webster)	✓ 24 Aug 2019
IPHC-2019-SRB015-06	Methods for spatial survey modelling – program of work for 2019 (R. Webster)	✓ 24 Aug 2019
IPHC-2019-SRB015-07	Updates on the development of the 2019 stock assessment (I. Stewart, A. Hicks)	✓ 24 Aug 2019
IPHC-2019-SRB015-08	Report on current and future biological research activities (J. Planas, T. Loher, L. Sadorus, C. Dykstra, J. Forsberg)	✓ 16 Aug 2019
IPHC-2019-SRB015-09	An update on the IPHC Management Strategy Evaluation (MSE) process for SRB015 (A. Hicks, P. Carpi, S. Berukoff, I. Stewart)	✓ 24 Aug 2019
IPHC-2019-SRB015-10 Rev_1	Technical details of the IPHC MSE framework (A. Hicks, P. Carpi, S. Berukoff)	✓ 25 Aug 2019 ✓ 10 Sep 2019
IPHC-2019-SRB015-11 Rev_1	An evaluation of dynamic reference points for Pacific halibut, <i>Hippoglossus stenolepis</i> (A. Hicks, P. Carpi, I. Stewart)	✓ 21 Aug 2019 ✓ 10 Sep 2019
IPHC-2019-SRB015-12	Analysis of the effects of historical discard mortality in non-directed fisheries ('bycatch') (I. Stewart, A. Hicks, P. Carpi)	✓ 20 Aug 2019
IPHC-2019-SRB015-13	Stock Assessment: Independent peer review of the Pacific halibut stock assessment (D. Wilson for K. Stokes)	✓ 16 Aug 2019
<b>Information papers</b>		
IPHC-2019-SRB015- INF01	Ad-hoc Working Group ideas to Refine Goals, Objectives, and Performance Metrics for the IPHC Management Strategy Evaluation (MSE) (A. Hicks, P. Carpi, MSAB Ad-Hoc Working Group)	✓ 24 Aug 2019



---

APPENDIX IV

CONSOLIDATED SET OF RECOMMENDATIONS AND REQUESTS OF THE 15<sup>TH</sup> SESSION OF THE  
IPHC SCIENTIFIC REVIEW BOARD (SRB015)

**RECOMMENDATIONS**

***Discard mortality in non-directed fisheries***

SRB015-Rec.01 ([para. 10](#)) The SRB **RECOMMENDED** that the analysis of the effects of historical discard mortality in non-directed fisheries ('bycatch'), be interpreted with caution, as there are multiple methods for evaluating how bycatch in non-directed fisheries impact stock productivity and biomass over time. The estimated rates of bycatch impact on directed fishery changed over time in part due to the variability in recruitment and/or sublegal abundance relative to the vulnerable stock. The choice of the appropriate method will depend on how the results feed into management advice.

SRB015-Rec.02 ([para. 11](#)) The SRB **RECOMMENDED** that, if a bycatch management strategy is a priority for the Commission, then the MSE process would be a more appropriate venue for evaluating methods of bycatch accounting for reasons outlined at SRB012:

*"NOTING the request for "replay" analyses, the SRB AGREED that "what if" questions about past behaviour are not appropriate for stock assessment models because those analyses do not adequately reflect the information available at the time or information feedbacks to future decision over time. An MSE analysis, on the other hand is specifically designed to answer "what if" questions under particular future scenarios while properly accounting for stock assessment errors in response to changing information."* (IPHC-2018-SRB012-R, para. 23)

***Independent external peer review of the IPHC stock assessment***

SRB015-Rec.03 ([para. 19](#)) The SRB **RECOMMENDED** that as was the case in the 2019 external peer review, any future external review would also benefit from an in-person review component. The biannual peer review that the SRB undertakes should continue as a complimentary element, thereby providing ongoing verification for the Commission.

***Pacific halibut stock assessment: 2019***

SRB015-Rec.04 ([para. 34](#)) **NOTING** the discussion of recommendations arising from the external peer review of the IPHC stock assessment (Section 4), the SRB **RECOMMENDED** that the IPHC Secretariat:

- a) Update data weighting for the 2019 assessment;
- b) For SRB016:
  - i. evaluate the types of weightings (e.g., Dirichlet-multinomial) for compositional data;
  - ii. advise on the impact of data re-weighting as new information arises. This could be more sensitive as new sex-composition data are included;
  - iii. keep apprised of new software developments (e.g. CAPAM meeting in NZ) and report on potential future directions (e.g. if alternatives provide improved Bayesian integration or adaptations for simulation testing etc.).

***Management Strategy Evaluation: Goals, Objectives and Performance Metrics***

SRB015-Rec.05 ([para. 41](#)) The SRB **RECOMMENDED** that if the original objective to have annual mortality limits related to local abundances was of broad interest to the Commission, then



candidate management procedures be developed and tested in which regional mortality limits are set annually in proportion to modelled survey abundance trends by IPHC Regulatory Area (noting that splitting regions into Regulatory Areas would require assumptions about within-region abundance proportions).

***Management Strategy Evaluation: Dynamic reference points***

SRB015–Rec.06 ([para. 45](#)) The SRB **RECOMMENDED** that the MSAB define objectives independently of the management procedures used to achieve them and, instead, focus on the outcomes/consequences they wish to avoid (e.g. low catch, fishery closures, large drops in TCEY, public perceptions of poor stock status).

***Management Strategy Evaluation: Updates to MSE framework and closed-loop simulations***

SRB015–Rec.07 ([para. 51](#)) The SRB **RECOMMENDED** that the Commission develop a standard criterion for achieving a limited set of (or one over-arching) objectives. This would ensure that any candidate management procedure achieves common goals with differences in trade-offs between risks and benefits. Doing so will improve the efficiency of the iterative approach that is required for MSE.

***REQUESTS***

***IPHC Fishery-independent setline survey (FISS)***

SRB015–Req.01 ([para. 25](#)) The SRB **REQUESTED** that the IPHC Secretariat further develop the approach in collaboration with the SRB to specifically address the issue of potential bias in the indices caused by areas that are unsampled in some years. A draft manuscript was made available, which provided details on aspects of this research, and the SRB looks forward to reviewing this prior to the SRB016, in 2020.

***Pacific halibut stock assessment: 2019***

SRB015–Req.02 ([para. 33](#)) The SRB **REQUESTED** that for SRB016 (2020), the IPHC Secretariat:

- a) provide a more detailed evaluation and profile of steepness values. Specifically, this should show the different data and model components that inform the steepness parameter, and also the interaction with sigmaR. This should also help inform the SRR relationship to be used in the operating model for MSE work;
- b) consider examining the relative impact of different fleets (sources of mortality) on historical SSB (e.g. set fleet x  $F = 0$ , replay, then fleet x and y, etc.).

SRB015–Req.03 ([para. 36](#)) The SRB **REQUESTED** that values related to stock status from the assessment be distinguished from MSE presentations (e.g. probabilities of avoiding a threshold based on operating model simulations).

***Updates to MSE framework and closed-loop simulations***

SRB015–Req.04 ([para. 50](#)) The SRB **REQUESTED** that the initial performance of the above proposals for candidate management procedures be evaluated and presented at the SRB016 in 2020. At that time the appropriateness of different performance measures and objectives could be more carefully evaluated.