INTERNATIONAL PACIFIC HALIBUT COMMISSION

IPHC–2019–SRB014–R

Report of the 14th Session of the IPHC Scientific Review Board (SRB014)

Seattle, Washington, U.S.A., 26-28 June 2019

Commissioners

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INTERNATIONAL PACIFIC HALIBUT COMMISSION

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ACRONYMS

AM	Annual Meeting
CDN	Canada
IPHC	International Pacific Halibut Commission
MSAB	Management Strategy Advisory Board
MSE	Management Strategy Evaluation
NPUE	Number-Per-Unit-Effort
PDO	Pacific Decadal Oscillation
SB	Spawning Biomass
SRB	Scientific Review Board
TCEY	Total Constant Exploitable Yield
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; 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.

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EXECUTIVE SUMMARY

The 14th Session of the International Pacific Halibut Commission (IPHC) Scientific Advisory Board (SRB014) was held in Seattle, WA, U.S.A. from 26-28 June 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 MSAB013, which are provided in full at Appendix IV.

RECOMMENDATIONS

NOTING that the core purpose of the SRB014 is to review progress on the IPHC science program, and to provide guidance for the delivery of products to the SRB015 in September 2019, the SRB RECALLED that formal recommendations to the Commission would not be developed at the present meeting, but rather, these would be developed at the SRB015.

REQUESTS

Methods for spatial setline survey modelling – Program of work for 2019

SRB014–Req.01 (para. 14) The SRB **REQUESTED** analysis of past prediction patterns (a type of cross-validation analysis) to help assess the proposed methods' ability to meet precision targets while maintaining low bias. This should include an examination of spatio-temporal residual patterns for the appropriateness of estimated autocorrelation.

Pacific halibut stock assessment: 2019 - Modelling updates

SRB014–Req.02 (para. 27) The SRB **REQUESTED** the following additional analyses for evaluation in September:

a) The Pacific Decadal Oscillation (PDO) index affects results that correspond with the presence and absence of FISS age data. As a check, perhaps evaluate models with the selectivity for the FISS fixed at the current estimates but then do a run which completely down-weights the FISS age data. This is intended as a check for the PDO coefficient.

b) Evaluate a profile (coarse) over steepness, e.g. 0.65 and 0.85, and check the impact on recruitment estimates and RSB values.

Management Strategy Evaluation: update

SRB014–Req.03 (para. 32) The SRB **REQUESTED** that the new operating model be used to generate simulated input data sets for simulation testing estimation performance of the current assessment ensemble. The SRB looks forward to reviewing these results as part of the full review of the assessment in 2022 or thereafter.

Research integration

SRB014–Req.04 (para. 48) The SRB **REQUESTED** clarification on how the juvenile spatial distribution analyses and simulations will be used/incorporated into operating models. The SRB can only assume that these will be used to develop an age-dependent transition matrix for < 100 cm fish.

SRB014–Req.05 (para. 52) The SRB **REQUESTED** preliminary results for steps (a)-(c) (paragraph 51) for the September 2019 meeting.

1. OPENING OF THE SESSION

1. The 14th Session of the International Pacific Halibut Commission (IPHC) Scientific Review Board (SRB014) was held in Seattle, Washington, U.S.A. from 26 to 28 June 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/14th-session-of-the-iphc-scientific-review-board-srb014.

3. IPHC PROCESS

3.1 SRB annual workflow

4. **NOTING** that the core purpose of the SRB014 is to review progress on the IPHC science program, and to provide guidance for the delivery of products to the SRB015 in September 2019, the SRB **RECALLED** that formal recommendations to the Commission would not be developed at the present meeting, but rather, these would be developed at the SRB015.

3.2 Update on the actions arising from the 13th Session of the SRB (SRB013)

5. The SRB **NOTED** paper IPHC-2019-SRB014-03, 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 (SRB013).

6. The SRB **AGREED** to consider and revise the actions as necessary, and to combine them with any new actions arising from SRB014 into a consolidated list for future reporting.

3.3 Outcomes of the 95th Session of the IPHC Annual Meeting (AM095)

7. The SRB **NOTED** paper IPHC-2019-SRB014-04 which detailed the outcomes of the 95th 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.

3.4 Observer updates

8. The SRB **NOTED** updates from the two 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 reference points; 4) the current intention of the IPHC to move from a coastwise stock assessment to an area-based model; 5) juvenile (pre-reproductive) Pacific halibut population changes; 6) options for distributing the TCEY spatially; and 7) justifications for using biological regions in comparison to IPHC Regulatory areas.

4. INDEPENDENT EXTERNAL PEER REVIEW OF THE IPHC STOCK ASSESSMENT: UPDATE ON THE PROCESS

9. The SRB **RECALLED** that at the 95th 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.*

10. The SRB **NOTED** that:

a) the IPHC Secretariat provided the SRB with draft terms of reference for the peer review on 1 April 2019;

b) comments/endorsement were provided by all SRB members through 5 April 2019;

c) in accordance with AM095-Rec.10, on 5 April 2019 the IPHC Secretariat circulated IPHC Circular 2019-005 which contained the Draft "*Open call for expressions of interest: Independent peer reviewer for the IPHC stock assessment*", for Contracting Party review and endorsement;

d) the Commission endorsed the open call for expressions of interest on 17 April 2019, via IPHC Circular 2019-010;

e) following the expression of interest period, and under a mandate from the lead Commissioners, the IPHC Secretariat recruited Dr Kevin Stokes to undertake the Independent peer review;

f) expected delivery of the independent peer review: 1) draft report 15 August 2019; 2) final report 31 August 2019; 3) electronic presentation at SRB015 (24-26 September 2019).

5. IPHC FISHERY-INDEPENDENT SETLINE SURVEY (FISS)

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

11. The SRB **NOTED** paper IPHC-2019-SRB014-05 Rev_1, which proposed methods for assessing options for a rationalised IPHC fishery-independent setline survey (FISS) following completion of the planned FISS expansions in 2019.

12. The SRB **NOTED** that the proposed precision targets for WPUE and NPUE indices for management units (IPHC Regulatory Areas, biological regions, and the coastwide stock), along with the use of estimates of past changes to stock distribution within management units, provided a balanced approach for determining sampling priorities for future setline survey designs.

13. The SRB **NOTED** the use of space-time modelling with simulated data to project uncertainty for potential future FISS designs.

14. The SRB **REQUESTED** analysis of past prediction patterns (a type of cross-validation analysis) to help assess the proposed methods' ability to meet precision targets while maintaining low bias. This should include an examination of spatio-temporal residual patterns for the appropriateness of estimated autocorrelation.

15. The SRB **AGREED** that for future presentations, all Coefficient of Variation's (CV) should be rounded to whole percentages.

16. The SRB **NOTED** that the "middle ground" for selecting criteria for survey stations (i.e. sub-areas) as it sits between over-reliance on optimisation at one end versus random FISS station selection at the other. The treatment of whale depredation seems appropriate.

17. The SRB **NOTED** that the analysts could examine the covariance over years (for the FISS index data) to evaluate the potential correlation among years. This should help determine whether further steps are needed to include such covariance in the assessment model.

6. PACIFIC HALIBUT STOCK ASSESSMENT: 2019

18. The SRB **NOTED** paper IPHC-2019-SRB014-07, which provided a preliminary analysis in development of the 2019 Pacific halibut stock assessment.

19. The SRB **NOTED** that following the review of the preliminary assessment, requested revisions will be considered and presented for final review in September 2019 (SRB015). Updated data sources, including the results of the 2019 Fishery-Independent Setline Survey (FISS), logbook and biological data from the 2019 commercial fishery, and (potentially) sex-ratio information from the 2018 commercial landings-at-age will be included for the final 2019 analysis.

6.1 Data source development

20. The SRB **NOTED** that the most current summary of data (2018) used for stock assessment and MSE analyses are provided in paper IPHC-2019-AM095-08, titled "*Overview of data sources for the Pacific halibut stock assessment, harvest policy, and related analyses*".

21. The SRB **NOTED** that two new or revised sources of data were included in the preliminary 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).

6.2 Modelling updates

22. The SRB **NOTED** the 2018 stock assessment (IPHC-2019-AM095-09) provides a summary of stock assessment results through the beginning of 2019, serving as a starting point for the preliminary 2019 stock assessment.

23. The SRB **NOTED** that the same approach of using an ensemble of four (4) models to estimate management quantities has been employed since 2015, with only minor changes and updates to data sources as available.

24. The SRB **NOTED** that the preliminary 2019 assessment provided a 'bridging' analysis, showing the incremental changes made for several steps in model development. These steps included:

    a) Updating to the newest software available (stock synthesis version 3.30);

    b) Adding the 2017 sex-ratio data;

    c) Extending the time-series of the two short models to include 1992+, allowing for the use of all available years of the space-time model estimated survey indices (1993+);

d) Replacing the previous survey index of abundance with the series corrected for improved whale depredation criteria;

e) Regularizing and tuning each model to ensure convergence and internal consistency among process error (recruitment, selectivity, and catchability variation), and observation error (input sample sizes).

25. The SRB **NOTED** that overall the changes made in the preliminary assessment, particularly the effects of adding the commercial sex-ratio data and removing the link between fishery and survey selectivity had the result of increasing the estimates of spawning biomass. Extending the time-series and adding the survey index using revised whale depredation criteria had little effect on the results, and the tuning process had mixed results across models.

26. The SRB **NOTED** the sensitivity and retrospective analyses, including comparison of Bayesian results for the coastwide short model and the evaluation of the sources of uncertainty.

27. The SRB **REQUESTED** the following additional analyses for evaluation in September:

a) The Pacific Decadal Oscillation (PDO) index affects results that correspond with the presence and absence of FISS age data. As a check, perhaps evaluate models with the selectivity for the FISS fixed at the current estimates but then do a run which completely down-weights the FISS age data. This is intended as a check for the PDO coefficient.

b) Evaluate a profile (coarse) over steepness, e.g. 0.65 and 0.85, and check the impact on recruitment estimates and RSB values.

28. The SRB **NOTED** the discussion of ensemble methods and the transition to dynamic relative spawning biomass for consistency with the results of the MSE process and to eliminate the use of arbitrary historical constants in the calculations.

29. The SRB **NOTED** the discussion of research priorities, highlighting the ongoing activities of the Biological and Ecosystem Sciences Research Program as well as a large number of data-related and technical avenues for development.

30. The SRB **NOTED** a brief discussion regarding paper IPHC-2019-AM095-INF08, presented at the 95th Session of the IPHC Annual Meeting (AM095) in January 2019, and **AGREED** to consider the need for further discussion at SRB015, inter-sessionally.

7. MANAGEMENT STRATEGY EVALUATION: UPDATE

31. The SRB **NOTED** paper IPHC-2019-SRB014-08 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.

32. The SRB **REQUESTED** that the new operating model be used to generate simulated input data sets for simulation testing estimation performance of the current assessment ensemble. The SRB looks forward to reviewing these results as part of the full review of the assessment in 2022 or thereafter.

7.1 Outcomes of MSAB013

33. The SRB **NOTED** the report of the 13th Session of the IPHC Management Strategy Advisory Board (MSAB013) (IPHC-2019-MSAB013-R).

34. The SRB **NOTED** that following request arising from MSAB013:

Goals, objectives, and performance metrics

MSAB013–Req.02 (para. 38) *The MSAB **REQUESTED** that the Scientific Review Board (SRB) and the IPHC Secretariat consider the draft objectives contained within Table 1 and to provide advice to the MSAB on potential MSY and MEY proxy target reference points for objective 2.1B.*

35. The SRB **NOTED** that:

    a) the primary objectives used to evaluate management procedures related to coastwide scale and the additional primary objectives related to a target biomass;

    b) three methods will be used to investigate BMSY for Pacific halibut;

    c) no coast-wide management procedure without constraints met the stability objective;

    d) three different constraints were ranked in the top 5 management procedures (a slow-up fast-down approach, a maximum change of 15%, and a multi-year limit).

36. The SRB **AGREED** that objective 2.1B is sensible because unlike 2.1A (from Appendix V of MSAB013 report: IPHC-2019-MSAB013-R) does not conflate the objective and the management procedure.

37. The SRB **NOTED** that the choice of SB target in 2.1B (from Appendix V of MSAB013 report: IPHC-2019-MSAB013-R) will have implications for the SPR target in the management procedure. Ultimately, the specific value of the SB target is a management choice, involving a range of trade-offs with other objectives.

7.2 Updates to MSE framework and closed-loop simulations

38. The SRB **ACKNOWLEDGED** and appreciated the important investment in staff and resources allocated to the MSE work.

39. The SRB **NOTED** that:

    a) the distribution framework consisting of a coastwide TCEY distributed to Biological Regions based on stock distribution, relative fishing intensities and other regional allocation adjustments, and then distribution to IPHC Regulatory Areas based other data, observations, or agreement.

    b) the development of a closed-loop simulation framework to evaluate management procedures related to coastwide scale and distribution of the TCEY.

40. The SRB **NOTED** the development of online tools that MSAB can use to explore the implications and trade-offs between Objectives.

7.3 MSAB Program of Work and delivery of timeline for 2019-21

41. The SRB **NOTED** the MSE Program of Work, including the presentation of results for the MSE investigating the full harvest strategy policy that is scheduled to occur at the 97th Annual Meeting in early 2021. The SRB will review the technical details of the framework and operating model in September 2019, see preliminary results in June 2020, and review the full MSE in September 2020.

8. BIOLOGICAL AND ECOSYSTEM SCIENCE PROGRAM RESEARCH UPDATES

8.1 Five-year research plan and management implications: update

42. The SRB **NOTED** paper IPHC-2019-SRB014-09 which provided the SRB with an update on current progress on research projects conducted and planned within the IPHC's five-year research plan (2017-21).

43. The SRB **NOTED** the temporal link of listed detailed outputs from the IPHC's five-year research plan (2017-21) with specific inputs into the Stock Assessment and Management Strategy Evaluation process.

8.2 Progress on ongoing research projects

44. The SRB **NOTED** the progress on ongoing research projects contemplated within the IPHC's five year research plan (2017-2021) involving

a) Discard mortality rates, which have been estimated in the longline fishery and that the relationship between capture or handling conditions and injuries and physiological stress levels sustained are being investigated;

b) Progress on the identification of physiological markers in skeletal muscle of temperature-induced growth manipulations in juvenile Pacific halibut;

c) Initial results on the annual progression of ovarian growth, as assessed by the gonadosomatic index, and of field maturity stages, as assessed macroscopically, in female Pacific halibut during an entire reproductive cycle;

d) Continuing efforts to generate a first complete draft of the Pacific halibut genome.

45. The SRB **NOTED** future research (2020) aimed at improving understanding of population structure by collecting samples from spawning grounds.

8.3 Focus on population genetics and migration studies

8.3.1 Summary of past studies

46. **RECALLING** the request from SRB013 (below), the SRB **NOTED** presentation IPHC-2019-SRB014-09 ppt, titled "Migration and population genetics research at IPHC".

SRB013–Req.03 (para. 41) *Biological research updates:*
The SRB REQUESTED that specific research topics, analysis and results be addressed in depth at subsequent SRB meetings, and that at SRB014, a presentation focused on population genetics and migration as they relate to the stock assessment and MSE work be provided. For example, how does this work identify alternative hypotheses for movement and population structure that can be considered in the MSE process and the stock assessment.

9. RESEARCH INTEGRATION

47. The SRB **NOTED** improved interaction, collaboration, and iteration between biological and modelling research programs, although some of the migration research seems to be bottom-up, driven mainly by data collection and ecological hypotheses rather than by precisely defined questions related to assessment and harvest policy development.

48. The SRB **REQUESTED** clarification on how the juvenile spatial distribution analyses and simulations will be used/incorporated into operating models. The SRB can only assume that these will be used to develop an age-dependent transition matrix for < 100 cm fish.

49. The SRB **NOTED** that empirical data and models (e.g. space-time models for juvenile density in Bering Sea (BS) trawl survey) continue to be generated, but it is not clear (i) how the quality of the models is being assessed and (ii) how the model outputs will link to assessments and operating models. For example, there was no presentation of model fits and diagnostics for the juvenile BS space-time distribution model. This is needed to ensure that model outputs produce relevant information for <100 cm fish in operating models, if that is the ultimate intent.

50. The SRB **URGED** the IPHC Secretariat take a more formal approach to developing research priorities, integrating research programs among biological, assessment, and MSE programs. For example, assessment results showing potential sensitivity to new demographic information (e.g. sex ratio in catch) was noted and subsequently identified as a high research priority. There are other aspects of demography that should also be jointly investigated for sensitivity. For example, size/age-at-maturation and frequency of reproduction could have serious consequences for assessments and MSE if these traits change over age, space, time, etc.

51. The SRB **NOTED** that maturity involves an ideal set of topics where the biological and modelling programs could work iteratively to:

a) develop plausible hypotheses for these traits

b) construct models to incorporate these hypotheses into the assessment model (and also operating models)

c) explore sensitivity of assessment model outputs to alternative hypotheses. At this point, a new iteration could proceed to determine whether new empirical data are needed and subsequently designing research. Also, the programs could jointly determine whether to expand the ensemble to incorporate these models.

52. The SRB **REQUESTED** preliminary results for steps (a)-(c) (paragraph 51) for the September 2019 meeting.

9.1 Research priorities

53. The SRB **REQUESTED** that an integrated set of future research priorities be presented jointly after the conclusion of the stock assessment, MSE, and biological program presentations. Integrated, in this context, means that priorities are co-developed by the program leads of the three groups. For example, a Table of Research Priorities could include the following columns: Rank, Topic, Justification, Lead Responsibility. Such a table will allow the SRB and Secretariat to effectively fill-in details and assess viability of the research.

10. REVIEW OF THE DRAFT AND ADOPTION OF THE REPORT OF THE 14TH SESSION OF THE IPHC SCIENTIFIC REVIEW BOARD (SRB014)

54. The report of the 14th Session of the IPHC Scientific Review Board (IPHC-2019-SRB014-R) was **ADOPTED** on 28 June 2019, including the consolidated set of recommendations and/or requests arising from SRB014, provided at Appendix IV.

APPENDIX I
LIST OF PARTICIPANTS FOR THE 14TH SESSION OF THE IPHC SCIENTIFIC REVIEW BOARD (SRB014)

SRB Members

Dr Sean **Cox**:	spcox@sfu.ca; Associate Professor, School of Resource and Environmental Management, Simon Fraser University, 8888 University Dr., Burnaby, B.C., Canada V5A 1S6
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APPENDIX II
AGENDA FOR THE 14TH SESSION OF THE IPHC SCIENTIFIC REVIEW BOARD (SRB014)

Date: 26-28 June 2019
Location: Seattle, Washington, U.S.A.
Venue: IPHC Board Room, Salmon Bay
Time: 12:00-17:00 (26th), 09:00-17:00 (27th), 09:00-17:00 (28th)
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 13th Session of the SRB (SRB013) (D. Wilson)
- 3.3. Outcomes of the 95th 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: UPDATE ON THE PROCESS

5. IPHC FISHERY-INDEPENDENT SETLINE SURVEY (FISS)
- 5.1. Methods for spatial setline survey modelling – Program of work 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. Outcomes of the MSAB013 (A. Hicks)
- 7.2. Updates to MSE framework and closed-loop simulations (A. Hicks)
- 7.3. MSAB Program of Work and delivery timeline for 2019-21 (A. Hicks)

8. BIOLOGICAL AND ECOSYSTEM SCIENCE RESEARCH UPDATES
- 8.1. Five-year research plan and management implications: Update (J. Planas)
- 8.2. Progress on ongoing research projects (J. Planas)
  - 8.2.1. Discard Mortality Rates
  - 8.2.2. Juvenile growth studies
  - 8.2.3. Reproductive assessment
  - 8.2.4. Genomics
- 8.3. Focus on population genetics and migration studies (J. Planas, T. Loher, L. Sadorus)
  - 8.3.1. Summary of past studies
  - 8.3.2. Proposed future studies

9. RESEARCH INTEGRATION

10. REVIEW OF THE DRAFT AND ADOPTION OF THE REPORT OF THE 14TH SESSION OF THE IPHC SCIENTIFIC REVIEW BOARD (SRB014)

APPENDIX III
LIST OF DOCUMENTS FOR THE 14TH SESSION OF THE IPHC SCIENTIFIC REVIEW BOARD (SRB014)

Document	Title	Availability
IPHC-2019-SRB014-01	DRAFT: Agenda & Schedule for the 14th Session of the Scientific Review Board (SRB014)	✓ 28 Mar 2019 ✓ 21 May 2019
IPHC-2019-SRB014-02	List of Documents for the 14th Session of the Scientific Review Board (SRB014)	✓ 21 May 2019 ✓ 24 May 2019
IPHC-2019-SRB014-03	Update on the actions arising from the 13th Session of the SRB (SRB013) (IPHC Secretariat)	✓ 21 May 2019
IPHC-2019-SRB014-04	Outcomes of the 95th Session of the IPHC Annual Meeting (AM095) (D. Wilson)	✓ 21 May 2019
IPHC-2019-SRB014-05 Rev_1	Methods for spatial survey modelling – program of work for 2019 (R. Webster)	✓ 24 May 2019 ✓ 20 Jun 2019
IPHC-2019-SRB014-06	Withdrawn	
IPHC-2019-SRB014-07	2019 Pacific halibut (*Hippoglossus stenolepis*) stock assessment: Development (I. Stewart, A. Hicks)	✓ 23 May 2019
IPHC-2019-SRB014-08	An update on the IPHC Management Strategy Evaluation (MSE) process for SRB014 (A. Hicks, P. Carpi, S. Berukoff, & I. Stewart)	✓ 23 May 2019
IPHC-2019-SRB014-09	Report on current and future biological research activities (J. Planas, T. Loher, L. Sadorus, C. Dykstra, J. Forsberg)	✓ 24 May 2019
Information papers		
IPHC-2019-SRB014-INF01	Nil	

APPENDIX IV
CONSOLIDATED SET OF RECOMMENDATIONS AND REQUESTS OF THE 14TH SESSION OF THE IPHC SCIENTIFIC REVIEW BOARD (SRB014)

RECOMMENDATIONS

(para. 4) **NOTING** that the core purpose of the SRB014 is to review progress on the IPHC science program, and to provide guidance for the delivery of products to the SRB015 in September 2019, the SRB **RECALLED** that formal recommendations to the Commission would not be developed at the present meeting, but rather, these would be developed at the SRB015.

REQUESTS

Methods for spatial setline survey modelling – Program of work for 2019

SRB014–Req.01 (para. 14) The SRB **REQUESTED** analysis of past prediction patterns (a type of cross-validation analysis) to help assess the proposed methods' ability to meet precision targets while maintaining low bias. This should include an examination of spatio-temporal residual patterns for the appropriateness of estimated autocorrelation.

Pacific halibut stock assessment: 2019 - Modelling updates

SRB014–Req.02 (para. 27) The SRB **REQUESTED** the following additional analyses for evaluation in September:

a) The Pacific Decadal Oscillation (PDO) index affects results that correspond with the presence and absence of FISS age data. As a check, perhaps evaluate models with the selectivity for the FISS fixed at the current estimates but then do a run which completely down-weights the FISS age data. This is intended as a check for the PDO coefficient.

b) Evaluate a profile (coarse) over steepness, e.g. 0.65 and 0.85, and check the impact on recruitment estimates and RSB values.

Management Strategy Evaluation: update

SRB014–Req.03 (para. 32) The SRB **REQUESTED** that the new operating model be used to generate simulated input data sets for simulation testing estimation performance of the current assessment ensemble. The SRB looks forward to reviewing these results as part of the full review of the assessment in 2022 or thereafter.

Research integration

SRB014–Req.04 (para. 48) The SRB **REQUESTED** clarification on how the juvenile spatial distribution analyses and simulations will be used/incorporated into operating models. The SRB can only assume that these will be used to develop an age-dependent transition matrix for < 100 cm fish.

SRB014–Req.05 (para. 52) The SRB **REQUESTED** preliminary results for steps (a)-(c) (paragraph 51) for the September 2019 meeting.

Research priorities

SRB014–Req.06 (para. 53) The SRB **REQUESTED** that an integrated set of future research priorities be presented jointly after the conclusion of the stock assessment, MSE, and biological program presentations. Integrated, in this context, means that priorities are co-developed by the program leads of the three groups. For example, a Table of Research Priorities could include the following columns: Rank, Topic, Justification, Lead Responsibility. Such a table will allow the SRB and Secretariat to effectively fill-in details and assess viability of the research.