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11 July 2017

**IPHC CIRCULAR 2017-012**

Dear Commissioners,

**SUBJECT: REPORT OF THE 10<sup>th</sup> SESSION OF THE IPHC SCIENTIFIC REVIEW BOARD (SRB10)**

In accordance with Rule 15 (Reports and Records) of the IPHC Rules of Procedure (2017), I am pleased to provide you with the final Report of the 10<sup>th</sup> Session of the IPHC Scientific Review Board (SRB10), which was adopted via correspondence on 11 July 2017. Please distribute as you see fit.

The report is also available for download from the IPHC website at the following link:  
<http://www.iphc.info/Pages/SRB-Meetings-10.aspx>

Yours sincerely

David T. Wilson, Ph.D.

Executive Director, IPHC

**Attachments:**

**Attachment I:** Report of the 10<sup>th</sup> Session of the IPHC Scientific Review Board (SRB10)



## **Report of the 10<sup>th</sup> Session of the IPHC Scientific Review Board (SRB10)**

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Seattle, Washington, U.S.A., 14-16 June 2017

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**DISTRIBUTION:**

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**BIBLIOGRAPHIC ENTRY**

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*IPHC-2017-SRB10-R, 17 pp.*

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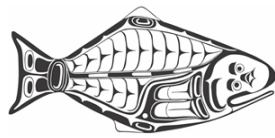
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## ACRONYMS

CDN	Canada
CPUE	Catch-per-unit-effort
CV	Coefficient of Variation
DMR	Discard Mortality Rate
FCEY	Fishery Constant Exploitation Yield
F <sub>SPR</sub>	The Fishing Intensity that results in an equilibrium Spawning Potential Ratio
IPHC	International Pacific Halibut Commission
LRP	Limit Reference Point
MSAB	Management Strategy Advisory Board
MSL	Minimum Size Limit
RSB	Relative Spawning Biomass
SRB	Scientific Review Board
SPR	Spawning Potential Ratio
TCEY	Total Constant Exploitation Yield
TRP	Threshold/Trigger Reference Point
U.S.A.	United States of America
WPUE	Weight-Per-Unit-Effort

## HOW TO INTERPRET TERMINOLOGY CONTAINED IN THIS REPORT

The SRB10 Report has been written using the following terms and associated definitions so as to remove ambiguity surrounding how particular paragraphs should be interpreted.

- Level 1: RECOMMENDED; RECOMMENDATION** (formal); **REQUESTED** (informal): A conclusion for an action to be undertaken, by the Commission, a Contracting Party, a subsidiary (advisory) body of the Commission and/or the IPHC Secretariat. *Note:* Subsidiary (advisory) bodies of the Commission must have their Recommendations and Requests formally provided to the next level in the structure of the Commission for its consideration/endorsement (e.g. from an Advisory Board to the Commission). The intention is that the higher body will consider the action for endorsement under its own mandate, if the subsidiary body does not already have the required mandate. Ideally, this should be task-specific and contain a timeframe for completion.
- Level 2: AGREED:** Any point of discussion from a meeting, which the IPHC body considers to be an agreed course of action covered by its mandate, which has not already been dealt with under Level 1 above; a general point of agreement among delegations/participants of a meeting which does not need to be elevated in the Commission's reporting structure.
- Level 3: NOTED/NOTING; CONSIDERED; URGED; ACKNOWLEDGED:** General terms to be used for consistency. Any point of discussion from a meeting, which the SRB 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 10<sup>TH</sup> SESSION OF THE IPHC SCIENTIFIC REVIEW BOARD (SRB10) ..... 1**

**TABLE OF CONTENTS..... 4**

**EXECUTIVE SUMMARY ..... 5**

**1. OPENING OF THE SESSION ..... 6**

**2. ADOPTION OF THE AGENDA AND ARRANGEMENTS FOR THE SESSION ..... 6**

**3. IPHC PROCESS ..... 6**

    3.1 *Update on the actions arising from the 9<sup>th</sup> Session of the SRB (SRB09)..... 6*

    3.2 *Outcomes of the 93<sup>rd</sup> Session of the IPHC Annual Meeting (AM093) ..... 6*

**4. METHODS FOR SPATIAL SURVEY MODELLING ..... 7**

    4.1 *Recap and proposed changes for 2017 ..... 7*

    4.2 *Evaluation of need for future survey expansions ..... 7*

**5. DISCUSSION OF SPATIAL SURVEY MODELLING ..... 7**

**6. PACIFIC HALIBUT STOCK ASSESSMENT DEVELOPMENT ..... 7**

    6.1 *Data source development ..... 7*

    6.2 *Model code update ..... 8*

    6.3 *TCEY-based management ..... 8*

    6.4 *Stock distribution estimation by region..... 8*

**7. SIZE LIMIT ANALYSIS FOR 2017 ..... 8**

**8. UPDATE ON ABUNDANCE BASED MANAGEMENT OF PACIFIC HALIBUT PROTECTED SPECIES (BYCATCH)  
CATCH LIMITS ..... 9**

**9. MANAGEMENT STRATEGY ADVISORY BOARD (MSAB): UPDATE ..... 9**

    9.1 *MSAB Program of Work and timeline for 2017 ..... 9*

    9.2 *Improved Harvest Policy and recommendations from AM093 ..... 9*

    9.3 *Fishing intensity metrics and design of simulations to investigate them ..... 9*

    9.4 *Presenting MSE results to MSAB members ..... 9*

    9.5 *Addressing stock & catch distribution in the harvest policy and future simulations ..... 9*

**10. DISCUSSION OF MSAB TOPICS AND RECOMMENDATIONS FOR 2017..... 9**

**11. BIOLOGICAL AND ECOSYSTEM SCIENCE PROGRAM RESEARCH UPDATES ..... 10**

    11.1 *Progress on ongoing IPHC-funded research projects ..... 10*

    11.2 *Update on outcome of external funding applications ..... 13*

**12. OTHER BUSINESS..... 13**

    12.1 *Election of the SRB Chair for the next biennium ..... 13*

    12.2 *Election of a Vice-Chair for the next biennium ..... 13*

    12.3 *IPHC meetings calendar (2017-19): SRB..... 13*

**13. THE PROCESS FOR ‘REVIEW OF THE DRAFT AND ADOPTION OF THE REPORT OF THE 10<sup>TH</sup> SESSION OF THE  
IPHC SCIENTIFIC REVIEW BOARD (SRB10) ..... 13**

**APPENDIX I LIST OF PARTICIPANTS FOR THE 10<sup>TH</sup> SESSION OF THE IPHC SCIENTIFIC REVIEW BOARD (SRB10)14**

**APPENDIX II AGENDA FOR THE 10<sup>TH</sup> SESSION OF THE IPHC SCIENTIFIC REVIEW BOARD (SRB10) ..... 15**

**APPENDIX III LIST OF DOCUMENTS FOR THE 10<sup>TH</sup> SESSION OF THE IPHC SCIENTIFIC REVIEW BOARD (SRB10)16**

**APPENDIX IV CONSOLIDATED SET OF RECOMMENDATIONS AND REQUESTS OF THE 10<sup>TH</sup> SESSION OF THE IPHC  
SCIENTIFIC REVIEW BOARD (SRB10) ..... 17**



## EXECUTIVE SUMMARY

The 10<sup>th</sup> Session of the International Pacific Halibut Commission (IPHC) Scientific Review Board (SRB10) was held in Seattle, Washington, U.S.A. from 14 to 16 June 2017. The meeting was opened by the Chairperson, Dr Sean Cox (Canada), who welcomed an ad-hoc SRB member, Dr Kim Scribner (Michigan State University, U.S.A.).

The following are a subset of the complete recommendations/requests arising from the SRB10, which are provided at [Appendix IV](#).

## RECOMMENDATIONS

([para. 2](#)) **NOTING** that the core purpose of the SRB10 is to review progress on the IPHC scientific program, and to provide guidance for the delivery of products to the SRB11 in September 2017, the SRB **AGREED** that formal recommendations to the Commission would not be developed at the present meeting, but rather, these would be developed at the SRB11.

## REQUESTS

### **Pacific halibut stock assessment development - Data source development**

SRB10–Req.01 ([para. 18](#)) The SRB **REQUESTED** that a plot of non-tribal CPUE (y-axis) vs. tribal CPUE (x-axis) be created/presented as a supplement to the current time series plots to improve communication.

### **Size limit analysis for 2017**

SRB10–Req.02 ([para. 28](#)) The SRB **REQUESTED** an evaluation of the potential to try different size limits in different regions given the diversity of impacts on Pacific halibut fishing sectors and areas. MSL changes may need an adaptive management experiment approach that considers the biological, economic, and sociological consequences MSL changes. Indeed, predictions of consequences in each IPHC Regulatory Area should be a pre-requisite to any proposed MSL changes.

### **Progress on ongoing IPHC-funded research projects**

SRB10–Req.03 ([para. 51](#)) The SRB **REQUESTED** that prior to future SRB meetings, the IPHC Secretariat prepare a report that details topics associated with each research area and then limit the topics for presentation to those that they consider to be most crucial.

### **Genetics and genomics**

SRB10–Req.04 ([para. 73](#)) The SRB **REQUESTED** that a future presentation on the overall research initiatives showing how stock assessment, biology, and policy are integrated.



## 1. OPENING OF THE SESSION

1. The 10<sup>th</sup> Session of the International Pacific Halibut Commission (IPHC) Scientific Review Board (SRB10) was held in Seattle, Washington, U.S.A. from 14 to 16 June 2017. The list of participants is provided at [Appendix I](#). The meeting was opened by the Chairperson, Dr Sean Cox (Canada), who welcomed an ad-hoc SRB member, Dr Kim Scribner (Michigan State University, U.S.A.).
2. **NOTING** that the core purpose of the SRB10 is to review progress on the IPHC scientific program, and to provide guidance for the delivery of products to the SRB11 in September 2017, the SRB **AGREED** that formal recommendations to the Commission would not be developed at the present meeting, but rather, these would be developed at the SRB11.

## 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](#).

## 3. IPHC PROCESS

### 3.1 *Update on the actions arising from the 9<sup>th</sup> Session of the SRB (SRB09)*

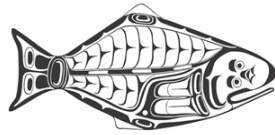
4. The SRB **NOTED** paper IPHC-2017-SRB10-03, which provided an opportunity to consider the progress made during the inter-sessional period since the SRB09 meeting held in September 2016.
5. The SRB **AGREED** to consider and revise as necessary, the actions arising that are either in progress or pending, and for these to be combined with any new actions arising from the SRB10 into a consolidated list for future reporting.
6. The SRB **NOTED** and were pleased to see that four out of the 10 actions from the SRB09 had been completed. The three ‘*In Progress*’ items were presented during the current Session of the SRB, and deemed to be completed. As for ongoing status projects, the following updates were advised:
  - SRB09.04 – Detailed mathematical specifications, flowcharts, and pseudocode as per below related to the survey space-time model and the proposed management procedures. Lacking these limits the contribution that we can make to technical discussion.
  - SRB09.05 – Draft completed and will be finalised for the Commission’s Interim Meeting.
  - SRB09.06 – Carried forward to future SRB meetings where the spatial modelling is re-initiated.

### 3.2 *Outcomes of the 93<sup>rd</sup> Session of the IPHC Annual Meeting (AM093)*

7. The SRB **NOTED** paper IPHC-2017-SRB10-04 which outlined the main outcomes of the 93<sup>rd</sup> Session of the Commission, specifically related to 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.
8. The SRB **NOTED** that at its 93<sup>rd</sup> Session, the Commission adopted revised IPHC Rules of Procedure (2017) by consensus. The document is available for download from the IPHC website: <http://iphc.int/basic-texts-of-the-commission.html> and includes the Terms of Reference for the SRB as follows:

**Appendix VIII, Sect I, para 1.** *The Scientific Review Board’s (SRB) main objective is to provide an independent scientific review of Commission science products and programs, and to support and strengthen the stock assessment process. The SRB shall review modeling and evaluation used by the Management Strategy Advisory Board, and review research proposals from the Research Advisory Board and the IPHC Secretariat. The SRB will prepare reports to the Commission summarising findings, recommendations, and documentation of any divergent views for all of its reviews.*





#### 4. METHODS FOR SPATIAL SURVEY MODELLING

9. The SRB **NOTED** paper IPHC-2017-SRB10-05, which provided preliminary results of an evaluation of the survey expansions in IPHC Regulatory Areas 2A and 4A, and sought guidance from the SRB on potential further spatial survey modelling.

##### *4.1 Recap and proposed changes for 2017*

10. The SRB **NOTED** space-time modelling changes and updates for 2017. See Comments and Suggestions under Section 5 [paragraphs 12-15](#).

##### *4.2 Evaluation of need for future survey expansions*

11. The SRB **NOTED** that the addition of repeated survey expansions (3 years apart) played a smaller role in reducing variability than did a single effort where stations were added for IPHC Regulatory Area 2A.

#### 5. DISCUSSION OF SPATIAL SURVEY MODELLING

##### *SRB Comments and Suggestions*

12. In response to questions regarding the frequency of repeating expansion experiments, the SRB **SUGGESTED** the following types of analyses and information that could inform decisions on when a future set of expansion stations is appropriate:
- Expected revenue from surveys with and without expansion stations to determine impacts on survey cost-recovery;
  - A plot of the number of stations vs. grand relative error to assess the relative value of information gained from additional stations;
  - Assessment of the frequency of zeroes at traditionally fished stations to help interpret zeroes at expansion stations;
  - A precision goal stated as a realistic target CV on the coastwide biomass index to provide a benchmark for cost-benefit analysis;
  - Appropriate scale simulations or suitable alternative forecasting approach (e.g., a quadratic function of CV vs time) to determine when expected CV from lack of survey expansion stations might exceed the target (and considering costs);
13. **NOTING** [paragraph 12](#), the SRB **AGREED** that there is little urgency for the IPHC Secretariat to make repeated survey expansions a high priority in the near term.
14. The SRB **NOTED** the utility in recalculating implied stock distribution for alternative expansion data sets and to evaluate the assessment model sensitivity with the selected expansion data sets included; this will allow the IPHC to assess the effect of survey expansion on stock biomass distribution.
15. The SRB **SUGGESTED** that for presentation purposes stations might be characterized as high density/low variability; high density/high variability; low density/low variability; or low density/high variability. From the perspective of the fishery, understanding what is happening at the high density/high variability stations may be the most important.

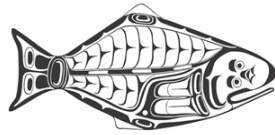
#### 6. PACIFIC HALIBUT STOCK ASSESSMENT DEVELOPMENT

16. The SRB **NOTED** paper IPHC-2017-SRB10-07 which provided an overview of proposed improvements related to the stock assessment data and reporting of results for the 2017-18 annual process.

##### *6.1 Data source development*

17. The SRB **NOTED** the efforts concerning data, which include
- a) Updating historical bycatch data;





- b) Obtaining the age data appropriately attributed from expansion stations;
  - c) Examining fishery CPUE for apportionment rather than survey WPUE in an MSE context as an alternative;
  - d) Reconciling tribal vs nontribal CPUE data; especially since this should improve communication between different fishing sectors within IPHC Regulatory Area 2A; and
  - e) Updating the effective number of skates calculation.
18. The SRB **REQUESTED** that a plot of non-tribal CPUE (y-axis) vs. tribal CPUE (x-axis) be created/presented as a supplement to the current time series plots to improve communication.
19. The SRB **CAUTIONED** that space-time modelling of fishery logbook data may not be worth the effort, mainly because fishery CPUE is used as a communication tool and the modelling output would appear dissociated from the raw fishery CPUE data that industry currently understands. However, the SRB **ACKNOWLEDGED** the work that has been underway and would be interested to see how it may compare and/or supplement stock distribution information.
20. The SRB **SUGGESTED** using the empirical length-weight allometry in the stock assessment models.

#### ***6.2 Model code update***

21. The SRB **AGREED** with the IPHC Secretariat's plans to put off adopting the software update for Stock Synthesis (SS3) until next year. It will likely take time for bugs to be ironed out and the benefits at present are expected to be relatively minor.
22. The SRB **AGREED** with putting the development of the spatial model on hold for this year.

#### ***6.3 TCEY-based management***

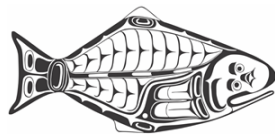
23. The SRB **AGREED** with the steady evolution towards TCEY management and that this has been consistently presented in the IPHC Harvest Decision Table and is an improvement over the FCEY values presented in the past. Importantly, retaining a fishing mortality metric based on Spawning biomass Per Recruit (SPR) can help with assessing potential fishing impacts, particularly as management measures such as the minimum size limit are re-evaluated.

#### ***6.4 Stock distribution estimation by region***

24. The SRB **NOTED** the work on stock distribution by region.

### **7. SIZE LIMIT ANALYSIS FOR 2017**

25. The SRB **NOTED** paper IPHC-2017-SRB10-08 that provided an evaluation of the current 32" (81.3 cm) Minimum Size Limit (MSL) in the directed commercial Pacific halibut fishery, and described likely changes to the Pacific halibut fishery under alternative minimum size limits.
26. The SRB **NOTED** the details of the history and current situation for the Pacific halibut fishery, for example the declining size at age, and some of the economic factors that have played a role.
27. The SRB **NOTED** that recovery rates may be lower for smaller Pacific halibut and that information on the socio-economic data on valuation is needed.
28. The SRB **REQUESTED** an evaluation of the potential to try different size limits in different regions given the diversity of impacts on Pacific halibut fishing sectors and areas. MSL changes may need an adaptive management experiment approach that considers the biological, economic, and sociological consequences MSL changes. Indeed, predictions of consequences in each IPHC Regulatory Area should be a pre-requisite to any proposed MSL changes.



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## 8. UPDATE ON ABUNDANCE BASED MANAGEMENT OF PACIFIC HALIBUT PROTECTED SPECIES (BYCATCH) CATCH LIMITS

29. The SRB **NOTED** paper IPHC-2017-SRB10-INF01 which provided the NPFMC's latest report from its ABM Working Group, entitles '*Abundance-based management for Pacific halibut PSC*' and are delighted to see NPFMC pursue this.
30. The SRB **NOTED** that there are parallels between this work and that being done within the auspices of the MSAB and that the IPHC Secretariat staff and a member of the SRB are part of the inter-agency group organized by the NPFMC. The NPFMC's decision to evaluate several indices is appreciated, and since some are highly correlated the need for multiple indices may be reduced.
31. The SRB **AGREED** that a study of the correlation between potential indices will help elucidate the combination of indices that will provide the most information.

## 9. MANAGEMENT STRATEGY ADVISORY BOARD (MSAB): UPDATE

32. The SRB **NOTED** the Report of the 9<sup>th</sup> Session of the IPHC Management Strategy Advisory Board (MSAB09), held in Seattle, Washington, U.S.A., 9-11 May 2017 (IPHC-2017-MSAB09-R).

### *9.1 MSAB Program of Work and timeline for 2017*

33. The SRB **NOTED** the MSAB Program of Work and time line for 2017.

### *9.2 Improved Harvest Policy and recommendations from AM093*

34. The SRB **NOTED** the harvest policy and recommendations from AM093 and are supportive of moving towards SPR-based decisions and removal of the Blue Line.

### *9.3 Fishing intensity metrics and design of simulations to investigate them*

35. **NOTING** the proposed metrics of fishing intensity and the design of simulations, the SRB **URGED** the IPHC Secretariat to continue to review the classic literature on MSE<sup>1</sup>.

### *9.4 Presenting MSE results to MSAB members*

36. Since objectives are critical for conducting an MSE and open fora may inhibit input from diverse groups, the SRB **URGED** the IPHC Secretariat staff to continue to coordinate informal meetings to review objectives and performance metrics individually instead of in a group-meeting format. This may allow for more frank discussions.

### *9.5 Addressing stock & catch distribution in the harvest policy and future simulations*

37. The SRB **NOTED** paper IPHC-2017-SRB10-09 that provided an overview of the simulations to evaluate the fishing intensity and harvest control rules in the IPHC Harvest Strategy Policy, with the goal of finding management strategies that are robust to bycatch scenarios, recognizing that the IPHC Regulatory Areas are not necessarily the biologically relevant areas.

## 10. DISCUSSION OF MSAB TOPICS AND RECOMMENDATIONS FOR 2017

38. The SRB **CONSIDERED** the simulation framework and assumptions as described, including scenarios and distribution of the TCEY, and of particular note were the negative relationships between Pacific

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<sup>1</sup> These are: de la Mare, W.K. 1998. Tidier fisheries management requires a new MOP (management-oriented paradigm). Reviews in Fish Biology and Fisheries 8:349-356; Smith, A.D.M, et al. 1999. Implementing effective fisheries-management systems – management strategy evaluation and the Australian partnership approach. ICES Journal of Marine Science 56:967-979; Sainsbury, K.J. et al. 2000. Design of operational management strategies for achieving fishery ecosystem objectives. ICES Journal of Marine Science 57:731-741; and Constable, A.H. 2005. A possible framework in which to consider plausible models of the Antarctic marine ecosystem for evaluating krill management procedures. CCAMLR Science 12:99-117



halibut sport fishing and total mortality, and also bycatch and total mortality (Fig. 4 of paper 09). This approach for simulating fisheries that are not under direct TCEY management seems reasonable.

39. The SRB **CONSIDERED** the fishing intensity metrics and associated levels to evaluate, **NOTING** that the IPHC Secretariat suggests only evaluating SPR-based fishing intensity metrics and using other metrics as evaluation tools (i.e. performance metrics) or as components of the control rule (e.g. ERSB).
40. The SRB **NOTED** that the control rules require a variety of decisions that can be explored in a MSE framework. These include threshold (trigger) and limit reference points (LRP), the measure of fishing intensity adjusted by the control rule, shape of the control rule, and whether the multiplier is zero when biomass is below the LRP.
41. The SRB **CONSIDERED** the use of dRSB for stock status in the control rule and its relation to ERSB and SPR. Although dRSB is based on sound principles, we cautioned that the approach is more complicated than a static unfished biomass and may be less transparent for stakeholders as a way to provide management advice.
42. The SRB **AGREED** that presenting scenario-by-scenario results may lead to misinterpretation, since the objective of MSE is to find a robust harvest strategy that does pretty well in all or virtually all of the scenarios.
43. The SRB **AGREED** that MSE can be used to ask a series of interlocking questions such as i) what is the best long-term policy, given the various uncertainties in the environment, Pacific halibut biology, and the Pacific halibut fishery? ii) what would be the short term consequences of applying the best long term policy in the current situation? and ii) how do we move from the current harvest policy to the best long term policy?
44. The SRB **AGREED** that a more informative description of the survey results would involve reporting both total survey catch and O32 catch (biomass by Regulatory Area).
45. The SRB **CONSIDERED** that focussing on four biologically relevant regions, with the possibility of distributing stock to IPHC Regulatory Areas within these biogeographic regions is a potentially useful approach that should be evaluated further.

## 11. BIOLOGICAL AND ECOSYSTEM SCIENCE PROGRAM RESEARCH UPDATES

### 11.1 *Progress on ongoing IPHC-funded research projects*

46. The SRB **NOTED** papers IPHC-2017-SRB10-INF02 and IPHC-2017-SRB10-11 which detailed current progress on research projects conducted by the IPHC Biological and Ecosystem Science Research Program. Because these programs are now more fully developed, this section will be longer than the previous ones in this report.
47. The SRB **APPRECIATED** the opportunity to see the overview of research program objectives and how the IPHC Secretariat envisioned new research initiatives that will help (a) fill in current knowledge gaps, (b) assess the effects of environmental conditions, and (c) reduce uncertainty in assessment models.
48. The SRB **CONSIDERED** that the portfolio of research projects proposed [reproduction, growth, DMR, and post catch survival, migration, e) genetics and genomics] could indeed support and/or direct IPHC activities in existing areas of strength in harvest evaluation and demographic modelling.
49. That said, the SRB **CONSIDERED** that while the overview of general research needs and applications was compelling, the data collected to date and proposed data collections could be better articulated relative to expected impacts to the resiliency of the fisheries and stock assessment needs. In addition, we would have appreciated additional background on methods used to obtain data. For example: Are IPHC Secretariat staff doing research in areas where there is the greatest need? What is/was the input that led to strategic research planning? How will progress and impact of ongoing or planned research be evaluated and at what interval(s)?



50. Although the SRB **APPRECIATED** the opportunity to see and comment on the overall program, we would have been better able to provide an assessment with presentation of fewer projects but greater detail concerning methods and results, and how they tie into assessment activities and management outcomes.
51. The SRB **REQUESTED** that prior to future SRB meetings, the IPHC Secretariat prepare a report that details topics associated with each research area and then limit the topics for presentation to those that they consider to be most crucial.
52. The SRB **NOTED** the desire of the IPHC Secretariat to scale management and assessment activities from reporting units to more biogeographically meaningful areas, and support this. The research program objectives could collectively serve to support and better refine spatial criteria for area delineation and could lead to greater potential to forecast physiological and demographic responses to environmental variables and to harvest.
53. The SRB **NOTED** the importance of emerging molecular techniques and the importance of resolving environmental and genetic bases of local adaptation. Similarly, for the IPHC Secretariat's recognition of the importance of greater understanding of Pacific halibut movement ecology, particularly related to effects of emigration and immigration on stock recruitment as local and regional scales.
54. The SRB **AGREED** that research that defines environmental and genetic components associated with maturation, fecundity, and reproductive periodicity are important.
55. The SRB **CONSIDERED** that preliminary evidence supporting the existence of sex-specific genetic markers linked to sex is compelling and that sexing data from tissue biopsy samples will be particularly important for DMR studies. It is not understood why proposed research focused on documenting evidence of environmental sex determination is needed if there are sex-specific fixed differences that are suggestive of a chromosomal basis for sex.
56. The SRB **NOTED** that environment and genotype are expected to contribute to physiological, phenotypic, and demographic responses over the species' range. Furthermore, information on effects of environmental variation on factors such as growth, size and age of sexual maturity would logically be obtained on individuals collected from multiple locations in order to be able to determine whether associations (e.g. gene expression at specific gene loci for members of the same or different region (or proposed management area) are concordant.
57. The SRB **CONSIDERED** that the IPHC Secretariat staff may have difficulty interpreting data collected on hormone levels endocrine profile patterns, or gene expression profiles (or gene regulatory networks) since these are likely influenced by capture methods.
58. The SRB **NOTED** that collection of data opportunistically via fisheries or in assessment fisheries would have to be developed carefully considering the influence of confounding factors such environmental covariates or handling method.
59. The SRB **NOTED** the use of ultrasound methods but were unsure about their success without a full vetting of sampling methods because of the lack of knowledge on confounding sources of variation. The lack of details concerning methodology precluded appraisal of the likelihood of success.
60. The SRB **NOTED** that development of gonadal-somatic-indices could be particularly useful if they can be tied to age/size, nutritional state and environmental covariates.
61. The SRB **CONSIDERED** that the study of gene expression networks based on gene co-expression patterns can be useful if the identification of suites of genes that are differentially expressed can help clarify meaningful biogeographic regions.
62. The SRB **NOTED** that changes in size at age could have significant implications for recruitment and management. However, similar concerns were raised regarding proposed research as with reproductive research in that the IPHC Secretariat did not articulate how growth markers could be used for field



studies, insufficient detail was provided about methods of sampling, and it was not clear how that work will inter-collate with stock assessment and management.

63. The SRB **NOTED** the preliminary data on temperature dependent growth. However, data collected from a few individuals from a single locale may not generalize to the entire species' range. For example, there could be environmental (e.g. temperature), genetic influences, and gene by environment effects on growth. Use of common garden experiments of greater complexity may be warranted, and the IPHC Secretariat should consider ontogenetic contingency in this work. How this work will inter-collate with stock assessment and management should also be considered.

#### *11.1.1 Discard Mortality Rates (DMR)*

64. In the DMR research area, the SRB **NOTED** that ongoing research has significant management implications. The research appeared well organized.
65. The SRB **SUGGESTED** that additional attention be given to empirical evaluation of the ultrasound methods before it is used widely and that the IPHC Secretariat staff consider evaluation of how long fish were exposed to capture (e.g. time on hook). For example, lethality of capture and release could be much greater for a fish on a hook for days rather than hours.
66. The SRB **NOTED** that the indirect effects of capture and release should focus on both direct (mortality) and indirect effects such as capture/release effects on growth and reproduction and probabilities of movements/seasonal migration. However, elucidation of indirect effects would necessitate considerable investment in telemetry so that a cost-benefit analysis is required.

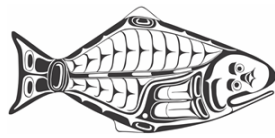
#### *11.1.2 Migration*

67. In the planned research area of migration, the SRB **NOTED** that the focal area should be explicitly tied to all other areas. As per previous comments in other research areas, we received insufficient information on methodology and application/integration with other topics of research.
68. The SRB **AGREED** that collection and analyses of otoliths is valuable and encourage the IPHC Secretariat to consider laser ablation methods whereby different sections of the otolith could be interrogated to discern ontogenetic shifts in elemental signature. This could provide valuable information on regions occupied and diets at different life stages/ages.
69. The SRB **SUGGESTED** that otolith work will most profitably move forward to coincident work on diet and forage availability and in collection of baseline on environmental elemental signatures in different regions.

#### *11.1.3 Genetics and genomics*

70. In the planned research activities area of genetics and genomics, the SRB **NOTED** a pressing need for expertise in areas of population genetics and genomics particularly associated with methodology for demographic-genetic modelling and in areas associated with interpretation of gene expression/co-expression and gene regulator networks.
71. **NOTING** that it was not clear how existing sampling designs or collaborations could provide the necessary information or samples to allow more informed use of population genomic data, the SRB **SUGGESTED**:
- (a) There is a need for integration of 'seascape' features such as bathymetry, depth, and currents on gene flow to better model spatial dynamics of stock structure and movements.
  - (b) There is high likelihood for the existence of 'sources' and 'sink' areas in terms of net recruitment and emigration. There are numerous means of identification of these areas using genetics data.





- (c) There is strong evidence that genomic data as collected using RADseq and similar methods can identify thousands of loci. "Outlier loci" can be identified that would provide far greater resolution of stock structure than existing data.
- (d) Recent research has shown that genetics data can be combined with age data to estimate relative stock recruitment<sup>2</sup> and the IPHC Secretariat should consider using these methods.
- (e) Coalescence methods could be profitably used to define demographic and migratory patterns from spatially explicit genetics data.
72. As above, the SRB **NOTED** that further explanations were needed to show how genomic data collected to identify patterns of gene expression that are tied to growth and reproduction.
73. The SRB **REQUESTED** that a future presentation on the overall research initiatives showing how stock assessment, biology, and policy are integrated.

### *11.2 Update on outcome of external funding applications*

74. The SRB **NOTED** the outcomes on the external funding applications.

## **12. OTHER BUSINESS**

### *12.1 Election of the SRB Chair for the next biennium*

75. The SRB **NOTED** that the term of the current Chairperson, Dr Sean Cox is due to expire at the closing of the current Session, and in accordance with the IPHC Rules of Procedure (2017) (Rule 14, paragraph 7(e)), the SRB is required to elect a new Chairperson for the next biennium.
76. The SRB **CALLED** for nominations for the position of Chairperson of the IPHC SRB for the next biennium. Dr. Sean Cox was nominated, seconded and elected for the next biennium.

### *12.2 Election of a Vice-Chair for the next biennium*

77. The SRB **NOTED** that the terms of the current Vice-Chairpersons, Drs. Jim Ianelli and Marc Mangel are due to expire at the closing of the current Session, and in accordance with the IPHC Rules of Procedure (2017) (Rule 14, paragraph 7(e)), the SRB may elect a new Vice-Chairperson for the next biennium.
78. The SRB **AGREED** that given the nature of the Board, there was no need for a Vice-Chairperson for the next biennium.

### *12.3 IPHC meetings calendar (2017-19): SRB*

79. The SRB **NOTED** the annual IPHC meetings calendar (2017-19) adopted by the Commission at its 93<sup>rd</sup> Session in 2017.

## **13. THE PROCESS FOR ‘REVIEW OF THE DRAFT AND ADOPTION OF THE REPORT OF THE 10<sup>TH</sup> SESSION OF THE IPHC SCIENTIFIC REVIEW BOARD (SRB10)’**

80. The report of the 10<sup>th</sup> Session of the IPHC Scientific Review Board (IPHC-2017-SRB10–R) was **ADOPTED** via correspondence on 11 July 2017, including the consolidated set of recommendations and/or requests arising from SRB10, provided at [Appendix IV](#).

<sup>2</sup> Bravington, M. et al. 2016. Close-kin mark-recapture. *Statistical Science* 31:259-274

**APPENDIX I**  
**LIST OF PARTICIPANTS FOR THE 10<sup>TH</sup> SESSION OF THE**  
**IPHC SCIENTIFIC REVIEW BOARD (SRB10)**

**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 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

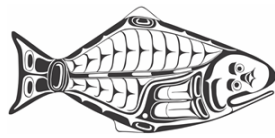
**Observers**

Canada	United States of America
Allen <b>Kronlund</b> : <a href="mailto:Allen.Kronlund@dfo-mpo.gc.ca">Allen.Kronlund@dfo-mpo.gc.ca</a>	Carey <b>McGilliard</b> : <a href="mailto:carey.mcgilliard@noaa.gov">carey.mcgilliard@noaa.gov</a>
Robyn <b>Forest</b> : <a href="mailto:Robyn.Forrest@dfo-mpo.gc.ca">Robyn.Forrest@dfo-mpo.gc.ca</a>	

**IPHC Secretariat**

Name	Position and email
Dr David <b>Wilson</b>	Executive Director, <a href="mailto:david@iphc.int">david@iphc.int</a>
Mr Stephen <b>Keith</b>	Assistant Director, <a href="mailto:steve@iphc.int">steve@iphc.int</a>
Dr Allan <b>Hicks</b>	Quantitative Scientist, <a href="mailto:allan@iphc.int">allan@iphc.int</a>
Dr Ian <b>Stewart</b>	Quantitative Scientist, <a href="mailto:ian@iphc.int">ian@iphc.int</a>
Dr Ray <b>Webster</b>	Quantitative Scientist, <a href="mailto:ray@iphc.int">ray@iphc.int</a>





**APPENDIX II**  
**AGENDA FOR THE 10<sup>TH</sup> SESSION OF THE**  
**IPHC SCIENTIFIC REVIEW BOARD (SRB10)**

**Date:** 14–16 June 2017

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

**Venue:** IPHC Office, Salmon Bay

**Time:** 09:00-17:00, 09:00-12:00 (the 16<sup>th</sup>)

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

**Vice-Chairpersons:** Drs. Marc Mangel and Jim Ianelli

- 1. OPENING OF THE SESSION**
- 2. ADOPTION OF THE AGENDA AND ARRANGEMENTS FOR THE SESSION**
- 3. IPHC PROCESS**
  - 3.1 Update on the actions arising from the 9<sup>th</sup> Session of the SRB (SRB09) (S. Cox)
  - 3.2 Outcomes of the 93<sup>rd</sup> Session of the IPHC Annual Meeting (AM093) (D. Wilson)
- 4. METHODS FOR SPATIAL SURVEY MODELLING (R. Webster)**
  - 4.1 Recap and proposed changes for 2017
  - 4.2 Evaluation of need for future survey expansions
- 5. DISCUSSION OF SPATIAL SURVEY MODELLING (Chairperson)**
- 6. PACIFIC HALIBUT STOCK ASSESSMENT DEVELOPMENT (I. Stewart)**
  - 6.1 Data source development
  - 6.2 Model code update
  - 6.3 TCEY-based management
  - 6.4 Stock distribution estimation by region
- 7. SIZE LIMIT ANALYSIS FOR 2017 (I. Stewart)**
- 8. UPDATE ON ABUNDANCE BASED MANAGEMENT OF PACIFIC HALIBUT PROTECTED SPECIES (Bycatch) CATCH LIMITS (A. Hicks)**
- 9. MANAGEMENT STRATEGY ADVISORY BOARD (MSAB): UPDATE (A. Hicks)**
  - 9.1 MSAB work plan and timeline for 2017
  - 9.2 Improved Harvest Policy and recommendations from AM093
  - 9.3 Fishing intensity metrics and design of simulations to investigate them
  - 9.4 Presenting MSE results to MSAB members
  - 9.5 Addressing stock & catch distribution in the harvest policy and future simulations
- 10. DISCUSSION OF MSAB TOPICS AND RECOMMENDATIONS FOR 2017 (S. Cox)**
- 11. BIOLOGICAL AND ECOSYSTEM SCIENCE PROGRAM RESEARCH UPDATES (J. Planas)**
  - 11.1 Progress on ongoing IPHC-funded research projects
  - 11.2 Update on outcome of external funding applications
- 12. OTHER BUSINESS (S. Cox)**
- 13. THE PROCESS FOR ‘REVIEW OF THE DRAFT AND ADOPTION OF THE REPORT OF THE 10<sup>th</sup> SESSION OF THE IPHC SCIENTIFIC REVIEW BOARD (SRB10)’**



**APPENDIX III**  
**LIST OF DOCUMENTS FOR THE 10<sup>TH</sup> SESSION OF THE**  
**IPHC SCIENTIFIC REVIEW BOARD (SRB10)**

Document	Title	Availability
IPHC-2017-SRB10-01	DRAFT: Agenda & Schedule for the 10 <sup>th</sup> Session of the Scientific Review Board (SRB10)	✓ 22 March 2017 ✓ 19 May 2017
IPHC-2017-SRB10-02	DRAFT: List of Documents for the 10 <sup>th</sup> Session of the Scientific Review Board (SRB10)	✓ 19 May 2017 ✓ 1 June 2017
IPHC-2017-SRB10-03	Update on the actions arising from the 9 <sup>th</sup> Session of the SRB (SRB09) (IPHC Secretariat)	✓ 22 May 2017
IPHC-2017-SRB10-04	Outcomes of the 93 <sup>rd</sup> Session of the IPHC Annual Meeting (AM093) (IPHC Secretariat)	✓ 19 May 2017
IPHC-2017-SRB10-05	Evaluating the need for future survey expansions in Areas 2A and 4A and proposed changes to the space-time modelling in 2017 (R. Webster)	✓ 1 June 2017
IPHC-2017-SRB10-06	Withdrawn	Withdrawn
IPHC-2017-SRB10-07	Pacific halibut stock assessment development for 2017 (I. Stewart)	✓ 25 May 2017
IPHC-2017-SRB10-08	Evaluation of the IPHC's 32" minimum size limit (I. Stewart & A. Hicks)	✓ 19 May 2017
IPHC-2017-SRB10-09	Defining the simulations to evaluate fishing intensity (A. Hicks)	✓ 22 May 2017
IPHC-2017-SRB10-10	A discussion on estimating stock distribution and distributing catch for Pacific halibut fisheries (A. Hicks, I. Stewart & R. Webster)	✓ 1 June 2017
IPHC-2017-SRB10-11	Progress report on biological research activities at IPHC (J. Planas)	✓ 19 May 2017
<b><i>Information papers</i></b>		
IPHC-2017-SRB10-INF01	Abundance based management for Pacific halibut PSC (NPFMC June 2017-C5)	✓ 25 May 2017
IPHC-2017-SRB10-INF02	5-yr Biological and Ecosystem Science Program Research Plan	✓ 19 May 2017



**APPENDIX IV**

**CONSOLIDATED SET OF RECOMMENDATIONS AND REQUESTS OF THE 10<sup>TH</sup> SESSION OF THE  
IPHC SCIENTIFIC REVIEW BOARD (SRB10)**

***RECOMMENDATIONS***

([para. 2](#)) **NOTING** that the core purpose of the SRB10 is to review progress on the IPHC scientific program, and to provide guidance for the delivery of products to the SRB11 in September 2017, the SRB **AGREED** that formal recommendations to the Commission would not be developed at the present meeting, but rather, these would be developed at the SRB11.

***REQUESTS***

**Pacific halibut stock assessment development - Data source development**

SRB10–Req.01 ([para. 18](#)) The SRB **REQUESTED** that a plot of non-tribal CPUE (y-axis) vs. tribal CPUE (x-axis) be created/presented as a supplement to the current time series plots to improve communication.

**Size limit analysis for 2017**

SRB10–Req.02 ([para. 28](#)) The SRB **REQUESTED** an evaluation of the potential to try different size limits in different regions given the diversity of impacts on Pacific halibut fishing sectors and areas. MSL changes may need an adaptive management experiment approach that considers the biological, economic, and sociological consequences MSL changes. Indeed, predictions of consequences in each IPHC Regulatory Area should be a pre-requisite to any proposed MSL changes.

**Progress on ongoing IPHC-funded research projects**

SRB10–Req.03 ([para. 51](#)) The SRB **REQUESTED** that prior to future SRB meetings, the IPHC Secretariat prepare a report that details topics associated with each research area and then limit the topics for presentation to those that they consider to be most crucial.

**Genetics and genomics**

SRB10–Req.04 ([para. 73](#)) The SRB **REQUESTED** that a future presentation on the overall research initiatives showing how stock assessment, biology, and policy are integrated.