Report of the 27th Session of the IPHC Scientific Review Board (SRB027)

Meeting held in Seattle, WA, USA, 16-18 September 2025

Commissioners

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Executive Director
David T. Wilson, Ph.D.

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INTERNATIONAL PACIFIC HALIBUT COMMISSION

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ACRONYMS

AI	Artificial Intelligence	IRMP	Integrated Research and Monitoring Plan
AM	Annual Meeting	MSAB	Management Strategy Advisory Board
FISS	Fishery-Independent Setline Survey	MSE	Management Strategy Evaluation
IPHC	International Pacific Halibut Commission	SRB	Scientific Review Board
		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**; **ACCEPTED** (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 27th Session of the International Pacific Halibut Commission (IPHC) Scientific Review Board (SRB027) was held in Seattle, WA, USA from 16 to 18 September 2025. The Chairperson, Dr Sean Cox (Canada), and the Executive Director, Dr David Wilson, opened the meeting.

The following are a subset of the complete recommendations/requests for action from the SRB027, which are provided in full at Appendix IV.

RECOMMENDATIONS

Research - Biology and ecology

SRB027–Rec.01 (para. 14) The SRB **RECOMMENDED** that evaluation of epigenetic aging be expanded from random selection of cross-validation samples to include testing out-of-sample interannual predictive performance. That is, how well can an epigenetic aging method trained on data from one set of years predict age of individuals sampled in other years?

Pacific halibut stock assessment

SRB027–Rec.02 (para. 16) The SRB **RECOMMENDED** that the analysis of projection performance be expanded to include plotting receiver operating characteristic (ROC) curves and evaluating the area under the curve (AUC) to understand the predictive performance of probabilistic advice from the stock assessment projections. This approach is commonly used as a threshold-independent metric of performance in applications such as species distribution modelling.

Management strategy evaluation

SRB027–Rec.03 (para. 18) The SRB **RECOMMENDED** that the definition of "overfishing" be tied to the Fmsy proxy rather than a probability of becoming overfished or depleted. This is a standard definition of overfishing and distinguishes it from the state of being overfished/depleted.

SRB027–Rec.04 (para. 19) The SRB **NOTED** the definition of "overfishing" in the draft Harvest Strategy Policy and **RECOMMENDED** adopting the revised definition developed at SRB027 to align with the recommendation in paragraph 18.

a) **Overfishing**: When the annual fishing intensity is higher than the level required to sustain maximum sustainable yield (MSY). The MSY fishing intensity is currently FSPR=35% based on current understanding of Pacific halibut population dynamics and fishery characteristics. The MSY fishing intensity may be revised as new information becomes available.

SRB027–Rec.05 (para. 20) The SRB **NOTED** the paragraphs describing "overfished" and "depleted" in the draft Harvest Strategy Policy and **RECOMMENDED** adopting the revised paragraphs developed at SRB027 which clarify these descriptions while retaining the intended meaning.

a) Overfished is a relative limit reference point defining an unacceptably low ratio of spawning biomass to dynamic unfished spawning biomass that results from fishing alone rather than the combined effects of fishing and the environment. The dynamic unfished spawning biomass is that which would have occurred without any fishing given natural variability (e.g. recruitment deviations, changes in size-at-age, etc). Therefore, an overfished state may be fully mitigated by management actions.

b) Depleted is an absolute limit reference point defined by a spawning biomass below which the potential for recovery is uncertain. Natural variability affects stock size resulting in fluctuations of the spawning biomass, which along with fishing may result in a 'depleted' stock where reductions in fishing mortality may not lead to recovery without a change in the environmental conditions affecting the stock. Therefore, a depleted state may be only partially mitigated by management actions.

c) Because overfished and depleted represent 'limit' reference points, the Commission may choose additional precautionary actions whenever needed, including when at, or approaching, either of these states.

SRB027–Rec.06 (para. 21) The SRB **RECOMMENDED** defining an "exceptional circumstance" if the stock is determined to be "depleted" as this state is unlikely to occur under the circumstances in which the HSP is implemented and may be indicative of a need for model revision.

SRB027–Rec.07 (para. 22) The SRB **RECOMMENDED** considering some fishery performance indicators that represent metrics directly observable by stakeholders, e.g. fishery CPUE.

SRB027–Rec.08 (para. 23) The SRB **RECOMMENDED** increasing simulation sample sizes to achieve a smooth curve so that a "depleted" threshold can be identified as the lowest spawning stock biomass that results in near 100% probability of recovery.

SRB027–Rec.09 (para. 24) The SRB **RECOMMENDED** considering the development of an assessment model within the MSE framework. This would have multiple benefits including:

a) facilitating analysis of the economic consequences of reduced FISS sampling and the associated increased potential for bias in assessment-relevant metrics such as WPUE, the maturity schedule, size-at-age, and age composition.

b) Understanding the impacts of uncertainty in natural mortality on management performance.

Updates to space-time modelling

SRB027–Rec.10 (para. 31) The SRB **RECOMMENDED** continuing the development of the spatial models of maturity and expanding this very promising modelling approach in the following ways:

a) Adding a temporal component to the model;

b) Extending this approach to coast-wide modelling of WPUE and NPUE.

The full recording of the SRB027 is available at the following link, under Meeting Outcomes: IPHC-2025-SRB027-Audio recordings

1. OPENING OF THE SESSION

1. The 27th Session of the International Pacific Halibut Commission (IPHC) Scientific Review Board (SRB027) was held in Seattle, WA, USA, from 16 to 18 September 2025, and was open to online observer participation. The list of participants is provided at Appendix I. The Chairperson, Dr Sean Cox (Canada), and the Executive Director, Dr David Wilson, opened the meeting.

2. The SRB **RECALLED** its mandate, as detailed in Appendix VIII, Sect. I, para. 1-3 of the IPHC Rules of Procedure (2024):

    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. *Data collection;*
        b. *Historical data sets;*
        c. *Stock assessment;*
        d. *Management Strategy Evaluation;*
        e. *Migration;*
        f. *Reproduction;*
        g. *Growth;*
        h. *Discard survival;*
        i. *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 in accordance with the IPHC Rules of Procedure (2024), all documents and presentations for the meeting were published on the IPHC website 30 days and 10 days prior to the Session, respectively: https://www.iphc.int/meetings/27th-session-of-the-iphc-scientific-review-board-srb027/

3. IPHC PROCESS

3.1 SRB annual workflow

4. The SRB **RECALLED** that the core purpose of the SRB027 is to review progress on the IPHC research and monitoring activities, including specific products, and to provide guidance for the delivery of products to the Commission at its Interim Meeting (IM101) in December 2025, and Annual Meeting (AM102) in January 2026.

3.2 Update on the actions arising from the 26th Session of the SRB (SRB026)

5. The SRB **NOTED** paper IPHC-2025-SRB027-03 that provided the SRB with an opportunity to consider the progress made during the intersessional period on the recommendations/requests arising from the SRB026.

6. The SRB **AGREED** to consider and revise the actions as necessary, and to combine them with any new actions arising from SRB027 into a consolidated list for future reporting.

3.3 Outcomes of the 101st Session of the IPHC Annual Meeting (AM101)

7. The SRB **NOTED** paper IPHC-2025-SRB027-04 that detailed the outcomes of the 101st Session of the IPHC Annual Meeting (AM101), 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** the following questions from the Canadian science advisor:
   a) Harvest Strategy Policy: are there examples of how "depleted" has been used elsewhere? How might this concept be implemented for Pacific halibut?
   b) Fecundity Study: What are the fecundity sample collection plans for 2026 within the current fecundity project and how will this project be continued in the future?
   c) FISS design: Are there ways to improve articulation of objectives for the survey in order to match survey precision and accuracy to the management needs?
9. The SRB **NOTED** that these questions (para. 8) were discussed during the relevant presentations at SRB027.
10. The SRB **NOTED** the following updates from the USA science advisor: *Nil*.

4. INTERNATIONAL PACIFIC HALIBUT COMMISSION INTEGRATED RESEARCH AND MONITORING PLAN

11. The SRB **NOTED** paper IPHC-2025-SRB027-05, that provided the SRB with the draft IPHC Integrated Research and Monitoring Plan (IRMP).
12. The SRB **REQUESTED** that, in a future iteration of the Plan, the following elements be considered:
   a) **Tactical workplan**: Develop a 3-5 year tactical workplan with defined milestones.
   b) **Prioritizing research**: according to needs for stock assessment, MSE, and other potential applications. This may require a new process for determining priority such as sensitivity analyses on the stock assessment or MSE.
   c) **Rang-wide research**: including collaboration with western Pacific Ocean countries fishing for Pacific halibut (Ref. PRIPHC02-Rec.03).
   d) **Cost-benefit analysis**: innovation and emerging scientific methods could use a procedure for determining the cost-benefit of proposed or ongoing projects. For example, AI-assisted ageing and epigenetic ageing presumably have different operational costs as supplemental ageing methods (although non-lethal epigenetic ageing has other potential applications)
   e) **Addition of decision-points**: to determine whether internally funded projects continue or stop. Many of the items in the IRMP are potentially open-ended but should not be continued indefinitely if the question is answered sufficiently to remove it from the high priority list. For example, questions about stock structure could certainly be continued, but they have been sufficiently addressed that the possibility of stock structure is no longer a high priority risk
   f) **Observer coverage**: Evaluation of observer coverage and/or other methods of catch and discard reporting across the entire fishery (Ref. PRIPHC02-Rec.09)
   g) **Dashboards**: The IRMP emphasizes outreach via websites, meetings, publications, and plain language summaries. Outputs could be made more actionable for decision-makers and other stakeholders through graphical dashboard summaries of key stock and harvest indicators, perhaps by IPHC Regulatory Area.

h) **Communication**: supplemental documentation is needed of completed projects, progress against independent review recommendations, etc., and how these may or may not affect organization and prioritization of ongoing projects. For example, the IRMP Supplement could include a brief summary of the stock structure conclusions and what that means for ongoing stock structure related projects.

i) **Measures of Success**: although the plan lists broad performance categories, there is a need for project-level indicators. Some performance measures, such as relevance and impact, may require surveys of science information users to elicit performance data.

j) **Capacity building**: Is there a formal capacity building plan to ensure the long-term viability of the IRMP?

4.1 Research

4.1.1 Biology and ecology

13. The SRB **NOTED** paper IPHC-2025-SRB027-06 that provided a description of progress towards research activities described in the IPHC's 5-Year Program of Integrated Research and Monitoring (2022-2026).

14. The SRB **RECOMMENDED** that evaluation of epigenetic aging be expanded from random selection of cross-validation samples to include testing out-of-sample interannual predictive performance. That is, how well can an epigenetic aging method trained on data from one set of years predict age of individuals sampled in other years?

4.1.2 Pacific halibut stock assessment

15. The SRB **NOTED** paper IPHC-2025-SRB027-07, that provided a response to recommendations and requests made during SRB026 (IPHC-2025-SRB026-R) and to provide an update on the 2026 stock assessment development.

16. The SRB **RECOMMENDED** that the analysis of projection performance be expanded to include plotting receiver operating characteristic (ROC) curves and evaluating the area under the curve (AUC) to understand the predictive performance of probabilistic advice from the stock assessment projections. This approach is commonly used as a threshold-independent metric of performance in applications such as species distribution modelling.

4.1.3 Management strategy evaluation

17. The SRB **NOTED** paper IPHC-2025-SRB027-08 that provided an update on Management Strategy Evaluation (MSE) progress including the harvest strategy policy (IPHC-2025-SRB027-INF01) and congratulated the MSAB, Secretariat, and Commission on their progress toward adopting a Harvest Strategy Policy.

18. The SRB **RECOMMENDED** that the definition of "overfishing" be tied to the Fmsy proxy rather than a probability of becoming overfished or depleted. This is a standard definition of overfishing and distinguishes it from the state of being overfished/depleted.

19. The SRB **NOTED** the definition of "overfishing" in the draft Harvest Strategy Policy and **RECOMMENDED** adopting the revised definition developed at SRB027 to align with the recommendation in paragraph 18.

a) **Overfishing**: When the annual fishing intensity is higher than the level required to sustain maximum sustainable yield (MSY). The MSY fishing intensity is currently FSPR=35% based on current understanding of Pacific halibut population dynamics and fishery characteristics. The MSY fishing intensity may be revised as new information becomes available.

20. The SRB **NOTED** the paragraphs describing "overfished" and "depleted" in the draft Harvest Strategy Policy and **RECOMMENDED** adopting the revised paragraphs developed at SRB027 which clarify these descriptions while retaining the intended meaning.

    a) Overfished is a relative limit reference point defining an unacceptably low ratio of spawning biomass to dynamic unfished spawning biomass that results from fishing alone rather than the combined effects of fishing and the environment. The dynamic unfished spawning biomass is that which would have occurred without any fishing given natural variability (e.g. recruitment deviations, changes in size-at-age, etc). Therefore, an overfished state may be fully mitigated by management actions.

    b) Depleted is an absolute limit reference point defined by a spawning biomass below which the potential for recovery is uncertain. Natural variability affects stock size resulting in fluctuations of the spawning biomass, which along with fishing may result in a 'depleted' stock where reductions in fishing mortality may not lead to recovery without a change in the environmental conditions affecting the stock. Therefore, a depleted state may be only partially mitigated by management actions.

    c) Because overfished and depleted represent 'limit' reference points, the Commission may choose additional precautionary actions whenever needed, including when at, or approaching, either of these states.

21. The SRB **RECOMMENDED** defining an "exceptional circumstance" if the stock is determined to be "depleted" as this state is unlikely to occur under the circumstances in which the HSP is implemented and may be indicative of a need for model revision.

22. The SRB **RECOMMENDED** considering some fishery performance indicators that represent metrics directly observable by stakeholders, e.g. fishery CPUE.

23. The SRB **RECOMMENDED** increasing simulation sample sizes to achieve a smooth curve so that a "depleted" threshold can be identified as the lowest spawning stock biomass that results in near 100% probability of recovery.

24. The SRB **RECOMMENDED** considering the development of an assessment model within the MSE framework. This would have multiple benefits including:

    a) facilitating analysis of the economic consequences of reduced FISS sampling and the associated increased potential for bias in assessment-relevant metrics such as WPUE, the maturity schedule, size-at-age, and age composition.

    b) Understanding the impacts of uncertainty in natural mortality on management performance.

4.2 Monitoring

4.2.1 Fishery-dependent data

25. Nil.

4.2.2 Fishery-independent data

4.2.2.1 2026 FISS design evaluation

26. The SRB **NOTED** paper IPHC-2025-SRB027-09 that proposed designs for the IPHC's Fishery-Independent Setline Survey (FISS) for the 2026-28 period.

27. The SRB **NOTED** that the cost of moving from the "reduced loss" to "base block" FISS designs may be offset by the increased TCEY that better survey information allows.

28. The SRB **RECALLED** the "value of information" analysis presented in IPHC-2024-SRB025-06 that demonstrated the economic value of improved FISS designs in terms of the resulting increase in TCEY when more precise and unbiased FISS data are available: "To put this degree of bias in SPR in context, in recent year's decision tables if the Commission wanted to increase the SPR by 1% (at or near the status quo harvest level) a reduction of 1.0- 1.5 million pounds of TCEY would have been required. Given an average price of $6 USD per pound in the commercial fishery, this equates to approximately $7.5 million USD that would need to be temporarily forgone to ensure that the management decision was precautionary for a bias of up to 15% in the FISS index".

29. The SRB **NOTED** that other fishery management organizations utilize a set-aside percentage of the fishing quota (TCEY) to fund research and monitoring programs. This approach may help the Commission mitigate the impacts of low prices on information quality of the FISS.

4.2.2.2 Updates to space-time modelling

30. The SRB **NOTED** that the sophisticated spatial logistic regression model with random effects presented in IPHC-2025-SRB027-09 solves many of the analytical challenges associated with the maturity data.

31. The SRB **RECOMMENDED** continuing the development of the spatial models of maturity and expanding this very promising modelling approach in the following ways:

    a) Adding a temporal component to the model;

    b) Extending this approach to coast-wide modelling of WPUE and NPUE.

32. The SRB **NOTED** that these methods mentioned in paragraphs 30 and 31 will require additional development and looks forward to reviewing progress at future SRB meetings up to and including SRB032 in 2028 where the next full stock assessment will be presented for review.

5. MANAGEMENT SUPPORTING INFORMATION

33. Nil

6. OTHER BUSINESS

34. The SRB **AGREED** to the following meeting dates in 2026:

    a) SRB028: 19-21 May 2026

    b) SRB029: 22-24 September 2026

35. The SRB **THANKED** Dr Sean Cox for his excellent chairmanship since the SRB was formed. Dr Cox has contributed greatly to the IPHC scientific peer review process and has led the SRB to where it is today.

7. REVIEW OF THE DRAFT AND ADOPTION OF THE REPORT OF THE 27TH SESSION OF THE IPHC SCIENTIFIC REVIEW BOARD (SRB027)

36. The Report of the 27th Session of the IPHC Scientific Review Board (IPHC-2025-SRB027-R) was **ADOPTED** on 18 September 2025, including the consolidated set of recommendations and/or requests arising from SRB027, provided at Appendix IV.

APPENDIX I
LIST OF PARTICIPANTS FOR THE 27TH SESSION OF THE IPHC SCIENTIFIC REVIEW BOARD (SRB027)

SRB Members

Dr Sean **Cox**:	spcox@sfu.ca; 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 27TH SESSION OF THE IPHC SCIENTIFIC REVIEW BOARD (SRB027)

Date: 16-18 September 2025
Location: Seattle, WA, USA & Electronic
Venue: IPHC HQ (for SRB and Science advisors only) & Adobe Connect (observers)
Time: 09:00-17:00 (16-17th), 09:00-12:00 (18th) PDT
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 26th Session of the SRB (SRB026) (D. Wilson)
3.3. Outcomes of the 101st Session of the IPHC Annual Meeting (AM101) (D. Wilson)
3.4. Observer updates (e.g. Science Advisors)

4. INTERNATIONAL PACIFIC HALIBUT COMMISSION 5-YEAR PROGRAM OF INTEGRATED RESEARCH AND MONITORING (2027-2031)

4.1. RESEARCH

4.1.1. Biology and ecology
4.1.2. Pacific halibut stock assessment
4.1.3. Management strategy evaluation

4.2. MONITORING

4.2.1. Fishery-dependent data
4.2.2. Fishery-independent data
- IPHC Fishery-Independent Setline Survey (FISS)
  - 2026 FISS design evaluation (R. Webster)
  - Updates to space-time modelling (R. Webster)

4.2.3. Age composition data (both fishery-dependent and fishery-independent)

5. OTHER BUSINESS

6. REVIEW OF THE DRAFT AND ADOPTION OF THE REPORT OF THE 27th SESSION OF THE IPHC SCIENTIFIC REVIEW BOARD (SRB027)

APPENDIX III
LIST OF DOCUMENTS FOR THE 27TH SESSION OF THE IPHC SCIENTIFIC REVIEW BOARD (SRB027)

Document	Title	Availability
IPHC-2025-SRB027-01	Agenda & Schedule for the 27th Session of the Scientific Review Board (SRB027)	✓ 12 Jun 2025
IPHC-2025-SRB027-02	List of Documents for the 27th Session of the Scientific Review Board (SRB027)	✓ 12 Jun 2025 ✓ 9 Sept 2025
IPHC-2025-SRB027-03	Update on the actions arising from the 26th Session of the SRB (SRB026) (IPHC Secretariat)	✓ 17 Aug 2025
IPHC-2025-SRB027-04	Outcomes of the 101st Session of the IPHC Annual Meeting (AM101) (D. Wilson)	✓ 12 Jun 2025
IPHC-2025-SRB027-05	Draft: International Pacific Halibut Commission 5-Year program of integrated research and monitoring (2027-31) (D. Wilson, J. Planas, I. Stewart, A. Hicks, R. Webster, & B. Hutniczak)	✓ 17 Aug 2025
IPHC-2025-SRB027-06	Report on current and future biological and ecosystem science research activities (J. Planas, C. Dykstra, A. Jasonowicz, & C. Jones)	✓ 17 Aug 2025
IPHC-2025-SRB027-07	Development of the 2025 Pacific halibut (*Hippoglossus stenolepis*) stock assessment (I. Stewart, A. Hicks, & R. Webster)	✓ 5 Aug 2025
IPHC-2025-SRB027-08	An update of the IPHC Secretariat MSE and development of a Harvest Strategy Policy (A. Hicks & I. Stewart)	✓ 17 Aug 2025
IPHC-2025-SRB027-09	2026-28 FISS design evaluation and modelling updates (R. Webster, I. Stewart, K. Ualesi, T. Jack, & D. Wilson)	✓ 17 Aug 2025
Information papers		
IPHC-2025-SRB027-INF01	Draft IPHC Harvest Strategy Policy (A. Hicks, D. Wilson, I. Stewart)	✓ 09 Sept 2025

APPENDIX IV
CONSOLIDATED SET OF RECOMMENDATIONS AND REQUESTS OF THE 27TH SESSION OF THE IPHC SCIENTIFIC REVIEW BOARD (SRB027)

RECOMMENDATIONS

Research - Biology and ecology

SRB027–Rec.01 (para. 14) The SRB **RECOMMENDED** that evaluation of epigenetic aging be expanded from random selection of cross-validation samples to include testing out-of-sample interannual predictive performance. That is, how well can an epigenetic aging method trained on data from one set of years predict age of individuals sampled in other years?

Pacific halibut stock assessment

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a) **Overfishing**: When the annual fishing intensity is higher than the level required to sustain maximum sustainable yield (MSY). The MSY fishing intensity is currently FSPR=35% based on current understanding of Pacific halibut population dynamics and fishery characteristics. The MSY fishing intensity may be revised as new information becomes available.

SRB027–Rec.05 (para. 20) The SRB **NOTED** the paragraphs describing "overfished" and "depleted" in the draft Harvest Strategy Policy and **RECOMMENDED** adopting the revised paragraphs developed at SRB027 which clarify these descriptions while retaining the intended meaning.

a) Overfished is a relative limit reference point defining an unacceptably low ratio of spawning biomass to dynamic unfished spawning biomass that results from fishing alone rather than the combined effects of fishing and the environment. The dynamic unfished spawning biomass is that which would have occurred without any fishing given natural variability (e.g. recruitment deviations, changes in size-at-age, etc). Therefore, an overfished state may be fully mitigated by management actions.

b) Depleted is an absolute limit reference point defined by a spawning biomass below which the potential for recovery is uncertain. Natural variability affects stock size resulting in fluctuations of the spawning biomass, which along with fishing may result in a 'depleted' stock where reductions in fishing mortality may not lead to recovery without a change in

the environmental conditions affecting the stock. Therefore, a depleted state may be only partially mitigated by management actions.

c) Because overfished and depleted represent 'limit' reference points, the Commission may choose additional precautionary actions whenever needed, including when at, or approaching, either of these states.

SRB027–Rec.06 (para. 21) The SRB **RECOMMENDED** defining an "exceptional circumstance" if the stock is determined to be "depleted" as this state is unlikely to occur under the circumstances in which the HSP is implemented and may be indicative of a need for model revision.

SRB027–Rec.07 (para. 22) The SRB **RECOMMENDED** considering some fishery performance indicators that represent metrics directly observable by stakeholders, e.g. fishery CPUE.

SRB027–Rec.08 (para. 23) The SRB **RECOMMENDED** increasing simulation sample sizes to achieve a smooth curve so that a "depleted" threshold can be identified as the lowest spawning stock biomass that results in near 100% probability of recovery.

SRB027–Rec.09 (para. 24) The SRB **RECOMMENDED** considering the development of an assessment model within the MSE framework. This would have multiple benefits including:

a) facilitating analysis of the economic consequences of reduced FISS sampling and the associated increased potential for bias in assessment-relevant metrics such as WPUE, the maturity schedule, size-at-age, and age composition.

b) Understanding the impacts of uncertainty in natural mortality on management performance.

Updates to space-time modelling

SRB027–Rec.10 (para. 31) The SRB **RECOMMENDED** continuing the development of the spatial models of maturity and expanding this very promising modelling approach in the following ways:

a) Adding a temporal component to the model;

b) Extending this approach to coast-wide modelling of WPUE and NPUE.

REQUESTS

International Pacific Halibut Commission Integrated Research and Monitoring Plan

SRB027–Req.01 (para. 12) The SRB **REQUESTED** that, in a future iteration of the Plan, the following elements be considered:

a) **Tactical workplan**: Develop a 3-5 year tactical workplan with defined milestones.

b) **Prioritizing research**: according to needs for stock assessment, MSE, and other potential applications. This may require a new process for determining priority such as sensitivity analyses on the stock assessment or MSE.

c) **Rang-wide research**: including collaboration with western Pacific Ocean countries fishing for Pacific halibut (Ref. PRIPHC02-Rec.03).

d) **Cost-benefit analysis**: innovation and emerging scientific methods could use a procedure for determining the cost-benefit of proposed or ongoing projects. For example, AI-assisted

ageing and epigenetic ageing presumably have different operational costs as supplemental ageing methods (although non-lethal epigenetic ageing has other potential applications)

e) **Addition of decision-points**: to determine whether internally funded projects continue or stop. Many of the items in the IRMP are potentially open-ended but should not be continued indefinitely if the question is answered sufficiently to remove it from the high priority list. For example, questions about stock structure could certainly be continued, but they have been sufficiently addressed that the possibility of stock structure is no longer a high priority risk

f) **Observer coverage**: Evaluation of observer coverage and/or other methods of catch and discard reporting across the entire fishery (Ref. PRIPHC02-Rec.09)

g) **Dashboards**: The IRMP emphasizes outreach via websites, meetings, publications, and plain language summaries. Outputs could be made more actionable for decision-makers and other stakeholders through graphical dashboard summaries of key stock and harvest indicators, perhaps by IPHC Regulatory Area.

h) **Communication**: supplemental documentation is needed of completed projects, progress against independent review recommendations, etc., and how these may or may not affect organization and prioritization of ongoing projects. For example, the IRMP Supplement could include a brief summary of the stock structure conclusions and what that means for ongoing stock structure related projects.

i) **Measures of Success**: although the plan lists broad performance categories, there is a need for project-level indicators. Some performance measures, such as relevance and impact, may require surveys of science information users to elicit performance data.

j) **Capacity building**: Is there a formal capacity building plan to ensure the long-term viability of the IRMP?