INTERNATIONAL PACIFIC HALIBUT COMMISSION

IPHC–2022–IM098–00
Last Update:28 November 2022

98th Session of the IPHC Interim Meeting (IM098) – *Compendium of meeting documents*

30 November - 1 December 2022, Seattle, WA, USA

Commissioners

Canada	United States of America
Paul Ryall	Jon Kurland
Neil Davis	Robert Alverson
Peter DeGreef	Richard Yamada

Executive Director

David T. Wilson, Ph.D.

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INTERNATIONAL PACIFIC HALIBUT COMMISSION

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DRAFT: AGENDA & SCHEDULE FOR THE 98th SESSION OF THE IPHC INTERIM MEETING (IM098)

Date: 30 November – 1 December 2022
Location: Electronic
Venue: Adobe Connect
Time: 09:00-17:00 (PST) daily
Chairperson: Mr Paul Ryall (Canada)
Vice-Chairperson: Vacant (USA)

Notes:

- *All sessions are open to Observers and the general public*
- *All sessions will be webcast. Webcast sessions will also take audience comments and questions as directed by the Chairperson of the Commission.*

AGENDA FOR THE 98th SESSION OF THE IPHC INTERIM MEETING (IM098)

1. OPENING OF THE SESSION (Chairperson)

2. ADOPTION OF THE AGENDA AND ARRANGEMENTS FOR THE SESSION (Chairperson & Executive Director)
- 2.1 Election of Vice-Chairperson of the Commission (Chairperson)

3. IPHC PROCESS (D. Wilson)
- 3.1 Update on actions arising from the 98th Session of the IPHC Annual Meeting (AM098), 2022 Special Sessions, and intersessional decisions (D. Wilson)
- 3.2 Report of the IPHC Secretariat (2022): Draft (D. Wilson & B. Hutniczak)
- 3.3 2nd IPHC Performance Review (PRIPHC02): Implementation of recommendations (D. Wilson)
- 3.4 International Pacific Halibut Commission 5-year program of Integrated Research and Monitoring (2022-26) (D. Wilson, J. Planas, I. Stewart, A. Hicks, R. Webster, B. Hutniczak, & J. Jannot)
- 3.5 Report of the 23rd Session of the IPHC Research Advisory Board (RAB023) (D. Wilson, J. Planas)
- 3.6 Reports of the IPHC Scientific Review Board (SRB Chairperson)

4. FISHERY MONITORING
- 4.1 Fishery-dependent data overview (2022) (J. Jannot)
- 4.2 Fishery-independent data overview (2022)
  - 4.2.1 IPHC Fishery-Independent Setline Survey (FISS) design and implementation in 2022 (K. Ualesi)

5. STOCK STATUS OF PACIFIC HALIBUT (2022) AND HARVEST DECISION TABLE 2023

5.1 Space-time modelling of survey data (R. Webster)
5.2 2023-25 FISS design evaluation (R. Webster)
5.3 Data overview and preliminary stock assessment (2022), and draft harvest decision table (2023) (I. Stewart, A. Hicks, R. Webster, D. Wilson, & B. Hutniczak)

6. BIOLOGICAL AND ECOSYSTEM SCIENCES – PROJECT UPDATES

6.1 Report on Current and Future Biological and Ecosystem Science Research Activities (J. Planas)

7. MANAGEMENT STRATEGY EVALUATION

7.1 IPHC Management Strategy Evaluation: update (A. Hicks)

8. IPHC FISHERY REGULATIONS: PROPOSALS FOR THE 2022-23 PROCESS

8.1 IPHC Secretariat fishery regulation proposals (B. Hutniczak)
8.2 Contracting Party fishery regulation proposals (Contracting Parties)
8.3 Stakeholder fishery regulation proposals (Stakeholders)
8.4 Stakeholder statements (B. Hutniczak)

9. FINANCE AND ADMINISTRATION

9.1 IPHC Rules of Procedure: amendments for 2023 (D. Wilson)
9.2 FY2022 Independent auditing process (D. Wilson, A. Keikkala)
9.3 FY2023 Budget update (D. Wilson, A. Keikkala)

10. OTHER BUSINESS

10.1 Preparation for the 99th Session of the IPHC Annual Meeting (AM099) and associated subsidiary bodies (D. Wilson)

11. REVIEW OF THE DRAFT AND ADOPTION OF THE REPORT OF THE 98th SESSION OF THE IPHC INTERIM MEETING (IM098) (Chairperson & Executive Director)

SCHEDULE FOR THE 98th SESSION OF THE IPHC INTERIM MEETING (IM098)

Wednesday, 30 November 2022		
Time	**Agenda item**	**Lead**
09:00-09:10	1. Opening of the Session	Chairperson
09:10-09:20	2. Adoption of the agenda and arrangements for the Session	Chairperson
09:20-10:25	3. IPHC Process 3.1 Update on actions arising from the 98th Session of the IPHC Annual Meeting (AM098), and 2022 Special Sessions, and intersessional decisions 3.2 Report of the IPHC Secretariat (2022): Draft 3.3 2nd IPHC Performance Review (PRIPHC02): Implementation of recommendations 3.4 International Pacific Halibut Commission 5-year program of Integrated Research and Monitoring (2022-26) 3.5 Report of the 23rd Session of the IPHC Research Advisory Board (RAB023) 3.6 Reports of the IPHC Scientific Review Board (SRB Chairperson)	D. Wilson SRB Chairperson
10:15-10:30	4. Fishery Monitoring 4.1 Fishery-dependent data overview (2022)	J. Jannot
10:30-10:45	Break	
10:45-11:15	4.2 Fishery-independent data overview (2022) 4.2.1 IPHC Fishery-Independent Setline Survey (FISS) design and implementation in 2022	K. Ualesi
11:15-12:30	5. Stock status of Pacific halibut (2022) and harvest decision table (2023) 5.1 Space-time modelling of survey data 5.2 2023-25 FISS design evaluation *Public comment and questions (Agenda Items 3-5.2)*	R. Webster R. Webster
12:30-13:30	Lunch	
13:30-14:45	5.3 Data overview and preliminary stock assessment (2022), and draft harvest decision table (2023)	I. Stewart
14:45-15:30	6. Biological and ecosystem sciences – project updates *Public comment and questions (Agenda Items 5.3-6)*	J. Planas
15:30-15:45	Break	
15:45-17:00	7. Management strategy evaluation 7.1 IPHC Management Strategy Evaluation: update *Public comment and questions (Agenda Item 7)*	A. Hicks

Thursday, 1 December 2022		
09:00-10:00	8. IPHC Fishery Regulations: Proposals for the 2022-23 process 8.1 IPHC Secretariat fishery regulation proposals 8.2 Contracting Party fishery regulation proposals) 8.3 Stakeholder fishery regulation proposals 8.4 Stakeholder statements *Public comment and questions (Agenda Item 8)*	B. Hutniczak Contracting Parties Stakeholders B. Hutniczak
10:30-10:45	Break	
10:45-12:15	9. Finance and Administration 9.1 IPHC Rules of Procedure: Amendments for 2023 9.2 FY2022 Independent auditing process 9.3 FY2023 Budget update	D. Wilson D. Wilson & A. Keikkala
12:15-12:30	10. Other business 10.1 Preparation for the 99th Session of the IPHC Annual Meeting (AM099) and associated subsidiary bodies	D. Wilson
12:30-13:30	Lunch	
13:30-14:30	Report drafting Session	IPHC Secretariat
14:30-14:45	Break	
14:45-17:00	11. Review of the draft and adoption of the Report of the 98th Session of the IPHC Interim Meeting (IM098)	Chairperson & Executive Director

LIST OF DOCUMENTS FOR THE 98th SESSION OF THE IPHC INTERIM MEETING (IM098)

Last updated: 28 November 2022

Document	Title	Availability
IPHC-2022-IM098-01	Agenda & Schedule for the 98th Session of the IPHC Interim Meeting (IM098)	✓ 16 Aug 2022 ✓ 21 Sept 2022 ✓ 25 Oct 2022
IPHC-2022-IM098-02	List of Documents for the 98th Session of the IPHC Interim Meeting (IM098)	✓ 21 Sept 2022 ✓ 28 Oct 2022 ✓ 28 Nov 2022
IPHC-2022-IM098-03	Update on actions arising from the 98th Session of the IPHC Annual Meeting (AM098), 2022 Special Sessions, and intersessional decisions (D. Wilson)	✓ 24 Oct 2022
IPHC-2022-IM098-04	Report of the IPHC Secretariat (2022): Draft (D. Wilson & B. Hutniczak)	✓ 25 Oct 2022
IPHC-2022-IM098-05	Implementation of the Recommendations from the 2nd IPHC Performance Review (PRIPHC02) (D. Wilson)	✓ 24 Oct 2022
IPHC-2022-IM098-06	International Pacific Halibut Commission 5-Year program of integrated research and monitoring (2022-26) (D. Wilson, J. Planas, I. Stewart, A. Hicks, B. Hutniczak, R. Webster, & J. Jannot)	✓ 24 Oct 2022
IPHC-2022-IM098-07 Rev_1	Fisheries data overview (2022): Preliminary statistics (J. Jannot, H. Tran, T. Kong, K. Magrane & K. Sawyer van Vleck)	✓ 25 Oct 2022 ✓ 9 Nov 2022
IPHC-2022-IM098-08	IPHC Fishery-independent setline survey (FISS) design and implementation in 2022 (K. Ualesi, C. Jones, R. Rillera & T. Jack)	✓ 26 Oct 2022
IPHC-2022-IM098-09 Rev_1	Space-time modelling of survey data (R.A. Webster)	✓ 26 Oct 2022 ✓ 9 Nov 2022
IPHC-2022-IM098-10	2023-25 FISS Design evaluation (R. Webster & D. Wilson)	✓ 26 Oct 2022
IPHC-2022-IM098-11 Rev_1	Summary of the data, stock assessment, and harvest decision table for Pacific halibut (*Hippoglossus stenolepis*) at the end of 2022 (I. Stewart, A. Hicks, R. Webster, & D. Wilson)	✓ 21 Oct 2022 ✓ 23 Nov 2022
IPHC-2022-IM098-12	Report on Current and Future Biological and Ecosystem Science Research Activities (J. Planas)	✓ 24 Oct 2022

IPHC-2022-IM098-13 Rev_1	IPHC Management Strategy Evaluation and Harvest Strategy Policy: FOR DECISION (A. Hicks, I. Stewart & D. Wilson)	✓ 27 Oct 2022 ✓ 18 Nov 2022
IPHC-2022-IM098-14	IPHC Fishery Regulations: Proposals for the 2022-23 process (B. Hutniczak)	✓ 28 Oct 2022
IPHC-2022-IM098-15	IPHC Rules of Procedure – Draft amendments (D. Wilson & A. Hicks)	✓ 25 Oct 2022
IPHC-2022-IM098-16	FY2022 Independent auditing process (D. Wilson & A. Keikkala)	✓ 25 Oct 2022
IPHC-2022-IM098-17	FY2023 Budget - update (D. Wilson & A. Keikkala)	✓ 25 Oct 2022
IPHC Fishery Regulation proposals for 2023		
IPHC Secretariat Fishery Regulation proposals for 2023		
IPHC-2022-IM098-PropA1	Mortality and Fishery Limits (Sect. 5) (IPHC Secretariat)	✓ 25 Oct 2022
IPHC-2022-IM098-PropA2	Commercial Fishing Periods (Sect. 9) (IPHC Secretariat)	✓ 25 Oct 2022
IPHC-2022-IM098-PropA3	Fishing Period Limits (Sect 14) & Licensing Vessels for IPHC Regulatory Area 2A (Sect. 15) – Accommodation of the transition of management in the IPHC Regulatory Area 2A	✓ 26 Oct 2022
IPHC-2022-IM098-PropA4	IPHC Fishery Regulations: minor amendments (IPHC Secretariat)	✓ 25 Oct 2022
Contracting Party Fishery Regulation proposals for 2023		
IPHC-2022-IM098-PropB1	Recreational (sport) fishing for Pacific halibut—IPHC Regulatory Areas 2c, 3a, 3b, 4a, 4b, 4c, 4d, 4e (Sect. 29) - *Charter Management Measures in IPHC Regulatory Areas 2C and 3A* (USA: NOAA-Fisheries)	Deferred to AM098
IPHC-2022-IM098-PropB2	*Recreational (Sport) Fishing for Pacific Halibut—IPHC Regulatory Area 2B – Daily bag limit in IPHC Regulatory Area 2B (Sect. 28) (Canada: DFO)*	✓ 28 Oct 2022
IPHC-2022-IM098-PropB3	Recreational (sport) fishing for Pacific halibut—IPHC Regulatory Areas 2c, 3a, 3b, 4a, 4b, 4c, 4d, 4e (Sect. 29) – *Onboard consumption* (USA: NOAA-Fisheries)	✓ 25 Oct 2022
Other Stakeholder Fishery Regulation proposals for 2023		
IPHC-2022-IM098-PropC1 Rev_1	Recreational (Sport) Fishing for Pacific Halibut—IPHC Regulatory Areas 2C, 3A, 3B, 4A, 4B, 4C,	✓ 30 Aug 2022 ✓ 6 Oct 2022

	4D, 4E (Sect. 29) - Processing Pacific halibut for eating and preservation (J. Fields)	
IPHC-2022-IM098-PropC2	Mortality and Fishery Limits (Sect. 5) - TCEY floor in IPHC Regulatory Area 2A	✓ 28 Oct 2022
Reports from IPHC subsidiary bodies		
IPHC-2022-SRB020-R	Report of the 20th Session of the IPHC Scientific Review Board (SRB020)	✓ 16 Jun 2022
IPHC-2022-SRB021-R	Report of the 21st Session of the IPHC Scientific Review Board (SRB021)	✓ 22 Sept 2022
IPHC-2022-MSAB017-R	Report of the 17th Session of the IPHC Management Strategy Advisory Board (MSAB017)	✓ 20 Oct 2022
IPHC-2022-RAB023-R	Report of the 23rd Session of the IPHC Research Advisory Board (RAB023)	Expected: 29 Nov 2022
IPHC-2022-FAC098-R	Report of the 98th Session of the IPHC Finance and Administration Committee (FAC098)	✓ 25 Jan 2022
IPHC-2022-PAB027-R	Report of the 27th Session of the IPHC Processor Advisory Board (PAB027)	✓ 27 Jan 2022
IPHC-2022-CB092-R	Report of the 92nd Session of the IPHC Conference Board (CB092)	✓ 27 Jan 2022
Information papers		
IPHC-2022-IM098-INF01	Stakeholder Statements on IPHC Fishery Regulation proposals (B. Hutniczak)	Due: 29 Nov 2022
IPHC-2022-IM098-INF02	The IPHC mortality projection tool for 2023 mortality limits (I. Stewart)	✓ 19 Oct 2022
IPHC-2022-IM098-INF03	Transition of management in the IPHC Regulatory Area 2A: outreach material (IPHC Secretariat)	✓ 28 Oct 2022

Update on actions arising from the 98th Session of the IPHC Annual Meeting (AM098), 2022 Special Sessions, and intersessional decisions

PREPARED BY: IPHC SECRETARIAT (D. WILSON; 24 OCTOBER 2022)

PURPOSE

To provide the Commission with an opportunity to consider the progress made during the inter-sessional period in relation to the direct requests for action by the Commission.

BACKGROUND

At the 98th Session of the IPHC Annual Meeting (AM098), Contracting Parties agreed on a series of actions to be taken by Commissioners, subsidiary bodies, and the IPHC Secretariat on a range of issues as detailed in Appendix A.

In addition, the Commission made a number of decisions during a Special Session in 2022 (SS012), and an intersessional decision, as detailed in Appendix B.

DISCUSSION

Noting that best practice governance requires the prompt delivery of core tasks assigned to the IPHC Secretariat by the Commission, at each session of the Commission and its subsidiary bodies, any recommendations for action are carefully constructed so that each contains the following elements:

1) a specific action to be undertaken (deliverable);
2) clear responsibility for the action to be undertaken (i.e. a specific Contracting Party, the IPHC Secretariat staff, a subsidiary body of the Commission, or the Commission itself);
3) a desired time frame for delivery of the action (i.e. by the next session of a subsidiary body, or other date).

This involves numbering and tracking all action items from the Commission, as well as including clear progress updates and document reference numbers.

RECOMMENDATION/S

That the Commission:

1) **NOTE** paper IPHC-2022-IM098-03, which provided the Commission with an opportunity to consider the progress made during the inter-sessional period, in relation to the direct requests for action by the Commission.

APPENDICES

Appendix A: Update on actions arising from the 98th Session of the IPHC Annual Meeting (AM098: January 2022)

Appendix B: 2022 Special Session decisions, and other intersessional decisions

APPENDIX A

Update on actions arising from the 98th Session of the IPHC Annual Meeting (AM098: January 2022)

98th Session of the IPHC Annual Meeting (AM098)		
Action No.	**Description**	**Update**
	RECOMMENDATIONS	
AM098–Rec.01 (para. 69)	***Management Strategy Evaluation*** The Commission **RECOMMENDED** that an MSE agenda item be added to the upcoming special session to discuss and provide direction on elements of the MSE workplan, including distribution procedures to incorporate in the management procedures being simulated in 2022 and evaluated at the 99th Session of the IPHC Annual Meeting (AM099).	**Lead**: IPHC Secretariat **Status/Plan**: Completed Agenda: IPHC-2022-SS012-01 Meeting page: https://www.iphc.int/venues/details/12th-special-session-of-the-iphc-ss012 Report: IPHC-2022-SS012-R
AM098–Rec.02 (para. 116)	***12th Special Session of the Commission (SS012)*** The Commission **RECOMMENDED** that the 12th Special Session of the Commission be held electronically in late February or early March 2022 and include the following agenda items: 1) FY2023 budget review and adoption; 2) Management Strategy Evaluation; 3) IPHC Fishery Regulations: Daily bag limit in IPHC Regulatory Area 2B (Sect. 28) (IPHC-2022-AM098-PropB4).	**Lead**: IPHC Secretariat & Commission **Status/Plan**: Completed Invitation: IPHC-2022-CR003 Agenda: IPHC-2022-SS012-01 Meeting page: https://www.iphc.int/venues/details/12th-special-session-of-the-iphc-ss012 Report: IPHC-2022-SS012-R
AM098–Rec.03 (para. 121)	***Length-Weight*** The Commission **RECOMMENDED** the adoption of the updated length-weight relationship as detailed in paper IPHC-2022-AM098-INF07, and its dissemination to the appropriate domestic management agencies.	**Lead**: IPHC Secretariat **Status/Plan**: Completed Published online 23 January 2022. In addition, the IPHC Pacific Halibut calculator was updated and is available for stakeholder use: https://www.iphc.int/management/science-and-research/pacific-halibut-length-weight-relationships Disseminated to appropriate domestic agencies via Secretariat@iphc.int on 23 January 2022.

<table>
<tr><th colspan="3">98th Session of the IPHC Annual Meeting (AM098)</th></tr>
<tr><th>Action No.</th><th>Description</th><th>Update</th></tr>
<tr><td colspan="3">REQUESTS</td></tr>
<tr><td>AM098–Req.01 (para. 9)</td><td>2nd IPHC Performance Review (PRIPHC02): Implementation of recommendations

The Commission REQUESTED that a ‘scorecard’ be added to the covering paper of the PRIPHC02 update paper, for future meeting documents. Mindful that a timeline to address the set of recommendations is by the end of 2024, the intention would be to better facilitate a discussion of progress and feasibility of the current set of recommendations.</td><td>Lead: IPHC Secretariat (D. Wilson)

Status/Plan: Completed

See paper IPHC-2022-IM098-05
<table>
<tr><th>PRIPHC02 Recommendation</th><th>Status</th></tr>
<tr><td>Completed and/or annually ongoing</td><td>17</td></tr>
<tr><td>In Progress</td><td>5</td></tr>
<tr><td>Pending</td><td>2</td></tr>
<tr><td>On-Hold</td><td>2</td></tr>
<tr><td>Total</td><td>26</td></tr>
</table></td></tr>
<tr><td>AM098–Req.02 (para. 61)</td><td>Management Strategy Evaluation

The Commission RECALLED SS011-Rec.01 and REQUESTED that the current size limit (32 inches), a 26 inch size limit, and no size limit be investigated. to understand the long-term effects of a change in the size limit.</td><td>Lead: IPHC Secretariat (A. Hicks)

Status/Plan: Completed

Results investigating these three size limits have been presented to the SRB (SRB021) the MSAB (MSAB017) and are detailed in paper IPHC-2022-IM098-13.</td></tr>
<tr><td>AM098–Req.03 (para. 63)</td><td>The Commission REQUESTED that the IPHC Secretariat work with the SRB and others as necessary to identify potential costs and benefits of not conducting an annual stock assessment. This will include a prioritized list of work items that could be accomplished in its place.</td><td>Lead: IPHC Secretariat (A. Hicks)

Status/Plan: Completed

The Secretariat has discussed this with the SRB and MSAB, and outcomes are described in paper IPHC-2022-IM098-13.</td></tr>
<tr><td>AM098–Req.04 (para. 64)</td><td>The Commission REQUESTED that multi-year management procedures include the following concepts:

a) The stock assessment occurs biennially (and possibly triennial if time in 2022 allows) and no changes would occur to the FISS (i.e. remains annual);

b) The TCEY within IPHC Regulatory Areas for non-assessment years:

i. remains the same as defined in the previous assessment year, or

ii. changes within IPHC Regulatory Areas using simple empirical rules, to be developed by the IPHC Secretariat, that incorporate FISS data.</td><td>Lead: IPHC Secretariat (A. Hicks)

Status/Plan: Completed

Biennial and triennial management procedures have been investigated using constant TCEYs for non-assessment years as well as two empirical options for adjusting the TCEY in non-assessment years. Results are presented in paper IPHC-2022-IM098-13.</td></tr>
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98th Session of the IPHC Annual Meeting (AM098)		
Action No.	**Description**	**Update**
AM098–Req.05 (para. 66)	The Commission **NOTED** that a distribution procedure is necessary to evaluate the size limit and multi-year assessment management procedures, and **REQUESTED** that a range of distribution procedures be used to highlight potential differences in the performance of size limits and multi-year assessments.	**Lead**: IPHC Secretariat (A. Hicks) **Status/Plan**: Completed Five distribution procedures defining a potential future range of possibilities were defined by the Commission at SS012 (SS012-Rec.01, para. 10) and implemented in the MSE framework.
AM098–Req.06 (para. 68)	The Commission **REQUESTED** that work continue on methods to evaluate MSE outcomes, including providing new alternative methods to quickly evaluate large sets of management procedures, which may involve ranking them in various ways.	**Lead**: IPHC Secretariat (A. Hicks) **Status/Plan**: Completed & Ongoing The Secretariat worked with the SRB and MSAB to improve methods to evaluate MSE outcomes. Various methods are presented in paper IPHC-2022-IM098-13.
AM098–Req.07 (para. 73)	***Pacific halibut fishery economics – Project Report*** The Commission **AGREED** that it wished to see the Commission improve its knowledge of key inputs into the Pacific halibut stock assessment and Management Strategy Evaluation (MSE) processes, thereby providing the best possible advice for management decision making processes. Accordingly the Commission **REQUESTED** that no additional economic analyses be undertaken and that the Commission instead dedicate its efforts and funds to core areas of responsibility.	**Lead**: IPHC Secretariat (B. Hutniczak) **Status/Plan**: Completed
AM098–Req.08 (para. 105)	***IPHC Rules of Procedure (2022)*** The Commission **ADOPTED** the IPHC Rules of Procedure (2022), as provided in IPHC-2022-FAC098-09, and **REQUESTED** that the IPHC Secretariat finalise and publish them accordingly with the following amendments: 1) amend para. 1.a of the RAB ToR's to read as follows: "I.1.a *Suggest research topics to be considered for incorporation in the IPHC integrated research and monitoring activities, as well as to comment upon operational and implementation considerations of those research and monitoring activities.*" 2) retain para. 14 of the PAB TOR's: "*14. Conduct of meetings: Parliamentary procedure will be used in the conduct of the PAB*"	**Lead**: IPHC Secretariat (D. Wilson) **Status/Plan**: Completed Published on 8 February 2022 via IPHC Circular (IPHC-2022-CR-001) Direct link to 2022 ROP: IPHC-2022-ROP22

98th Session of the IPHC Annual Meeting (AM098)		
Action No.	**Description**	**Update**
AM098–Req.09 (para. 126)	***Review of the draft and adoption of the report of the 98th Session of the IPHC Annual Meeting (AM098)*** The Commission **REQUESTED** that the IPHC Secretariat finalise and publish the IPHC *Pacific Halibut Fishery Regulations (2022)* as soon as possible, **NOTING** that only minor editorial and formatting changes are permitted beyond the decisions made by the Commission at the AM098.	**Lead**: IPHC Secretariat **Status/Plan**: Completed Published on 2 February 2022. **Note**: Revised on 3 March 2022 following the 12th Special Session of the IPHC (IPHC-2022-SS012-R) Direct link to 2022 Fishery Regulations: IPHC-2022-FISHR22

APPENDIX B

2022 Special Sessions of the Commission

Action No.	Description	Update
12th Special Session of the IPHC (SS012) (25 February 2022)		
SS012-Rec.01 (para. 10)	***Management Strategy Evaluation*** The Commission **RECOMMENDED** the following five distribution procedures to be used in the management strategy evaluation of size limits and multi-year assessments, noting that these distribution procedures are for analytical purposes only and are not endorsed by both parties, thus would be reviewed in the future if the Commission wishes to evaluate them for implementation. a) Baseline based on recent year O32 FISS results, relative harvest rates of 1.0 for IPHC Regulatory Areas 2-3A, relative harvest rates of 0.75 for IPHC Regulatory Areas 3B-4, and no application of the current interim agreements for 2A and 2B; b) Baseline based on recent year O32 FISS results, relative harvest rates of 1.0 for IPHC Regulatory Areas 2-3A, relative harvest rates of 0.75 for IPHC Regulatory Areas 3B-4, and current interim agreements for 2A and 2B; c) Baseline based on recent year O32 FISS results with 1.65 Mlbs to 2A and 20% of the coastwide TCEY to 2B; d) Baseline based on recent year O32 FISS results, relative harvest rates of 1.0 for IPHC Regulatory Areas 2-3, 4A, and 4CDE, a relative harvest rate of 0.75 for IPHC Regulatory Area 4B, and no agreements for 2A and 2B; e) Baseline based on recent year O32 FISS results, relative harvest rates of 1.0 for IPHC Regulatory Areas 2-3, 4A, and 4CDE, a relative harvest rate of 0.75 for IPHC Regulatory Area 4B, and current interim agreements for IPHC Regulatory Areas 2A and 2B.	**Lead**: IPHC Secretariat (A. Hicks) **Status/Plan**: Completed These five distribution procedures have been implemented in the MSE framework for generating results in 2022 for final presentation at AM099 in January 2023.
REQUESTS		
SS012-Req.01 (para. 04)	***Budget Estimates: FY2023 (for approval)*** The Commission **REQUESTED** that a detailed breakdown of current Payroll Benefit Liabilities, proposed as current versus long-term liabilities, be presented for discussion at the Commission's September Work Meeting, by the IPHC Secretariat. Additional elements surrounding the Commission's movement towards being GAAP compliant (Generally Accepted Accounting Principles) should also be presented (note that OCBOA - Other Comprehensive Basis of Accounting was historically employed by the IPHC).	**Lead**: IPHC Secretariat (D. Wilson, Sommerville & Associates) **Status/Plan**: Completed See paper IPHC-2022-WM2022-13

Action No.	Description	Update
SS012-Req.02 (para. 05)	The Commission **REQUESTED** that in accordance with the IPHC's inter-sessional decision-making process (Rule 11, paragraphs 4-10 of the IPHC Rules of Procedure (2022)), a further hybrid option between Options 2 and 3 from IPHC-2022-SS012-03 Rev_1, be provided to the Commission for consideration and potential adoption that incorporates the following elements: a) Contracting Party base contributions to remain at FY2021/FY2022 levels: • **Canada**: US$900,407 • **USA**: US$4,157,760 b) Budget reductions from the total operating expenses provided in Option 2 totaling approximately US$75,000 (these should focus on reductions to Meetings and Conferences (electronic meetings for the Interim Meeting, MSAB in October 2022, and one electronic SRB meeting in 2023), Travel (COVID-19 savings or other as identified), Salaries and wages (as relates to a position that may become vacant in FY2023, and non-essential services where not fully cost recovered on a case-by-case basis); and c) An inter-fund transfer from 50-Reserve to 10-General, totaling the remaining budget shortfall of approximately US$76,745. This component involves the utilization of the non-committed funds 'carryover' in the Reserve fund which stands at US$1,476,626 (as of 1 October 2021).	**Lead**: IPHC Secretariat (D. Wilson) **Status/Plan**: Completed Budget paper for decision provided via IPHC Circular on 7 March 2022: IPHC-2022-CR-006. The Commission subsequently reviewed and adopted the FY2023 budget on 16 March 2022 via IPHC Circular IPHC-2022-CR-007, the '*date of notification*'.
Intersessional Decisions (ID)		
IPHC-2022-ID001:	The Commission: a) **NOTED** paper IPHC-2022-ID001 which provided revised budget estimates for FY2023 (1 October 2022 to 30 September 2023) for approval, noting the outcomes of the 12th Special Session of the Commission (SS012). b) **ADOPTED** the FY2023 budget (1 October 2022 to 30 September 2023), as detailed in Appendix I [*of IPHC-2022-ID001*], including the Contracting Party contributions to the General Fund as follows: • Canada: Contribution to the General Fund: **US$900,407** • U.S.A.: Contribution to the General Fund: **US$4,157,760** c) **NOTED** the extra-budgetary (IFCP Fund deficit and Headquarters lease/maintenance) contributions from each Contracting Party for FY2023 as follows: • Canada: ○ 50% Contribution to the IFCP Fund deficit (former staff pension plan): **US$127,848** • U.S.A.: ○ 50% Contribution to the IFCP Fund deficit (former staff pension plan): **US$127,848**	**Lead**: Commission & IPHC Secretariat (D. Wilson) **Status/Plan**: Completed Adopted on 16 March 2022 via IPHC Circular IPHC-2022-CR-007, the '*date of notification*'.

Action No.	Description	Update
	○ Contribution to the headquarters building lease and maintenance costs: **US$489,250** d) **AGREED** that it would like at least one in-person/hybrid MSAB meeting in 2023. This could occur in mid-2023 or in the standard October time slot (October 2023). In doing so, the MSAB membership may need to be reviewed and travel expenses for non-government members capped.	

Report of the IPHC Secretariat (2022): Draft

PREPARED BY: IPHC SECRETARIAT (D. WILSON & B. HUTNICZAK, 25 OCTOBER 2022)

CONTENTS

1 PURPOSE

To provide the Commission with a draft update on the activities of the IPHC Secretariat in 2022, not already contained within other papers before the Commission.

2 IPHC SECRETARIAT 2022

The IPHC is a public international organization so designated via Presidential Executive Order 11059 and established by a Convention between Canada and the United States of America. The IPHC Convention was signed on 2 March 1923, ratified on 21 July 1924, and came into effect on **21 October 1924** upon exchange.

The basic texts of the Commission are available on the IPHC website: https://www.iphc.int/the-commission, and prescribe the mission of the organization as:

*"….. **to develop the stocks of [Pacific] halibut in the Convention waters to those levels which will permit the optimum yield from the fishery and to maintain the stocks at those levels**. ….." IPHC Convention*, Article I, sub-article I, para. 2).

The IPHC Secretariat, formed in support the Commission's activities, is based in Seattle, WA, U.S.A. (Fig. 1) and consists of 34 fulltime positions (FTEs) and 35-45 temporary/seasonal positions to staff our ports and research vessels (Appendix I). As our shared vision, ***the IPHC Secretariat aims to deliver positive economic, environmental, and social outcomes for the Pacific halibut resource for Canada and the U.S.A. through the application of rigorous science, innovation, and the implementation of international best practice*.**

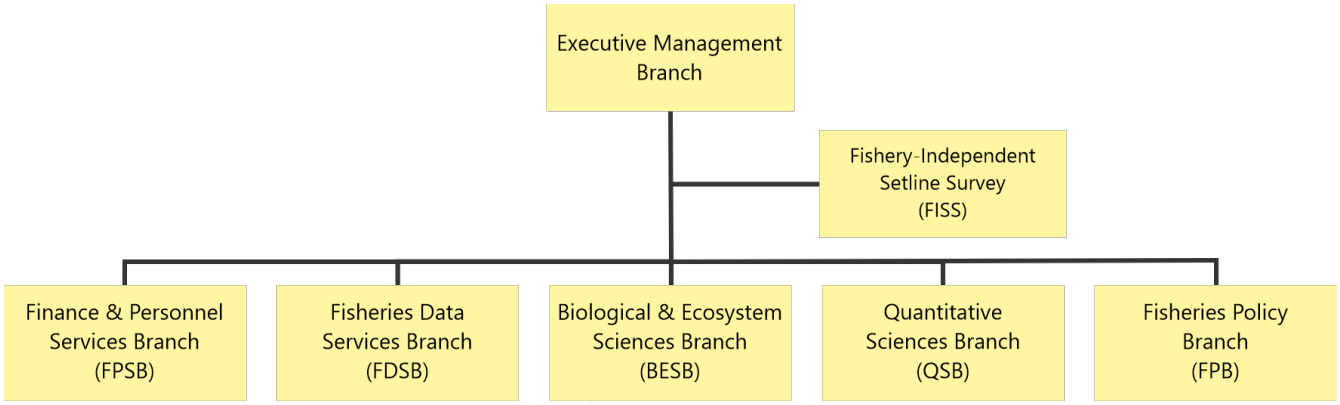


Figure 1. IPHC Secretariat organisation chart (2022).

3 IPHC INTERNSHIP PROGRAM: 2022

The IPHC funds full-time internships each summer. In 2022 the IPHC hosted two undergraduate interns, Ms Vasilisa (Vasi) **Tyurina**, a Biology major at Pacific Lutheran University (Tacoma, WA), and Ms Kaitlyn **Murray**, an Environmental Science major at Sweet Briar College (Amherst, VA).

Vasi and Kaitlyn have participated in two research activities of the Biological and Ecosystem Sciences Branch. First, Vasi and Kaitlyn have contributed to the generation of sex ratio

information from the 2021 commercial samples by participating in all components of this important monitoring effort: from extracting DNA from fin clips to conducting the genotyping assays. Secondly, Vasi and Kaitlyn have participated in the reproductive assessment project by processing blood samples and testing methods for measuring the blood levels of reproductive hormones as reproductive indicators in female Pacific halibut at different stages in their reproductive development. The internship period runs from 31 May through 15 August 2022.

4 IPHC MERIT SCHOLARSHIP FOR 2022-25

The IPHC funds several Merit Scholarships to support university, technical college, and other post-secondary education for students from Canada and the United States of America who are connected to the Pacific halibut fishery. Generally, a single new scholarship valued at US$4,000 per year is awarded every two years. The scholarships are renewable annually for the normal four-year period of undergraduate education, subject to maintenance of satisfactory academic performance.

Since the scholarships inception in 2002, the IPHC has awarded over US$150,000 in scholarship funds to 18 recipients.

In 2022, the IPHC Merit Scholarship Selection Panel reviewed applications and selected an outstanding candidate from a very strong application pool, based on academic qualifications, career goals, and relationship to the Pacific halibut industry.

The Selection Panel consists of the following five (5) panelists:

- Robert Alverson (USA Commissioner)
- Peter DeGreef (Canadian Commissioner)
- Patrick DePoe
- Angel Drobnica
- Christa Rusel

The Selection Panel unanimously awarded Lucy Hankins (Seward, AK, USA) 2022 IPHC Merit Scholarship. The current recipients and their expected years of receipt are provided below.

Name	2022	2023	2024	2025
Hahlen Behnken-Barkhau (Sitka, AK, USA)	$4,000	$4,000	-	-
Lucy Hankins (Seward, AK, USA)	-	$4,000	$4,000	$4,000

5 MEETINGS OF THE COMMISSION AND SUBSIDIARY BODIES DURING 2022

Meeting	No.	Date	Location	Secretariat material
Finance and Administration Committee (FAC)	98th	24 Jan	Electronic	9 working papers
Annual Meeting (AM)	**98th**	**24-28 Jan**	Electronic	15 working papers, 3 regulatory proposals
Conference Board (CB)	92nd	25-26 Jan	Electronic	Commission papers
Processor Advisory Board (PAB)	27th	25-26 Jan	Electronic	Commission papers

Special Session (SS)	12th	25 Feb	Electronic	4 working papers
Scientific Review Board (SRB)	20th	14-16 June	Seattle, USA & Electronic	10 working papers
Work Meeting (WM)	2022	14-15 Sept	Bellingham, USA & Electronic	14 working papers
Scientific Review Board (SRB)	21st	20-22 Sept	Seattle, USA & Electronic	7 working papers
Management Strategy Advisory Board (MSAB)	17th	18-20 Oct	Electronic	7 working papers
Research Advisory Board (RAB)	23rd	28 Nov	Seattle, USA & Electronic	10 working papers
Interim Meeting (IM)	**98th**	**30 Nov – 1 Dec**	Electronic	14 working papers

6 IPHC PACIFIC HALIBUT FISHERY REGULATIONS ADOPTED IN 2022

In 2022, the Commission adopted **seven (7)** fishery regulations/amendments (IPHC-2022-AM098-R) in accordance with Article III of the Convention, as follows:

6.1 IPHC Secretariat fishery regulation proposals

IPHC Fishery Regulations: Morality and Fishery Limits (Sect. 5)

(para. 75) The Commission **NOTED** and **ADOPTED** fishery regulation proposal IPHC-2022-AM098-PropA1 Rev_1, which provides the mortality and fishery limits framework for population at AM098 (Appendix VI).

(para. 76) The Commission **ADOPTED** the distributed mortality limits for each Contracting Party, by IPHC Regulatory Area, (Table 5) and sector, as provided in Appendix VI. [**Canada**: In favour=3, Against=0][**USA**: In favour=3, Against=0]

Table 5. Adopted TCEY mortality limits for 2022

Contracting Party IPHC Regulatory Area	Mortality limit (TCEY) (mlbs)	Mortality limit (TCEY) (metric tonnes)
Canada Total: 2B	**7.56**	**3,429**
USA: 2A	1.65	748
USA: 2C	5.91	2,681
USA: 3A	14.55	6,600
USA: 3B	3.90	1,769
USA: 4A	2.10	953
USA: 4B	1.45	658
USA: 4CDE	4.10	1,860
United States of America Total	**33.66**	**15,268**
Total (IPHC Convention Area)	**41.22**	**18,697**

IPHC Fishery Regulations: Commercial fishing periods (Sect. 9)

(para. 79) The Commission **ADOPTED** fishing periods for 2022 as provided below, thereby superseding the relevant portions of Section 9 of the IPHC Pacific halibut fishery regulations (Appendix VII) by specifying that commercial fishing for Pacific halibut in all IPHC Regulatory

Areas may begin no earlier than 1200 (noon) local lime on **6 March** and must cease at 1200 (noon) local time on **7 December**, 2022.

IPHC Fishery Regulations: minor amendments

(para. 80) The Commission **NOTED** and **ADOPTED** fishery regulation proposal IPHC-2022-AM098-PropA3, which proposed minor amendments to the existing IPHC Fishery Regulations, improving their clarity and consistency (Appendix VIII).

6.2 *Contracting Party fishery regulation proposals*

IPHC Fishery Regulations: Recreational (sport) fishing for Pacific halibut—IPHC Regulatory areas 2c, 3a, 3b, 4a, 4b, 4c, 4d, 4e (sect. 29) - Recordkeeping for charter Pacific halibut annual limits

(para. 81) The Commission **NOTED** and **ADOPTED** fishery regulation proposal IPHC-2022-AM098-PropB1 Rev_1, which proposed establishing recordkeeping requirements needed to enforce Pacific halibut annual limits for recreational (sport) fishing for Pacific halibut in IPHC Regulatory Areas 2C and 3A (Appendix IX).

IPHC Fishery Regulations: Charter management measures in IPHC Regulatory Areas 2C and 3A (Sect. 29)

(para. 82) The Commission **NOTED** and **ADOPTED** fishery regulation proposal IPHC-2022-AM098-PropB2, which proposed IPHC Regulation changes for charter recreational Pacific halibut fisheries in IPHC Regulatory Areas 2C and 3A (Appendix X), in order to achieve the charter Pacific halibut allocation under the North Pacific Fisheries Management Council's (NPFMC) Pacific halibut Catch Sharing Plan:

a) IPHC Regulatory Area 2C – one-fish bag limit with size limit of less than or equal to 40 inches or greater than or equal to 80 inches;

b) IPHC Regulatory Area 3A – two-fish bag limit with one fish of any size and a second fish less than or equal to 28 inches, Wednesdays and two Tuesdays (26 July and 2 August) closed to retention of Pacific halibut, one trip per vessel and one trip per permit per day. See IPHC-2022-AM098-PropB2 for additional detail.

IPHC Fishery Regulations: Fishing gear (Sect. 18) – Trap gear use in IPHC Regulatory Area 2b

(para. 83) The Commission **NOTED** and **ADOPTED** fishery regulation proposal IPHC-2022-AM098-PropB3, which proposed IPHC Regulation changes to allow trap gear use on directed commercial trips in IPHC Regulatory Area 2B (Appendix XI). The Commission also expressed interest in sharing experience between Contracting Parties on the effectiveness of the use of traps/pots in preventing whale depredation.

IPHC Fishery Regulations: Recreational (sport) fishing for Pacific halibut – IPHC Regulatory Area 2B (Sect. 28) – daily bag limit

(SS012-R, para. 14) The Commission **ADOPTED** a modified version of the fishery regulation proposal [IPHC-2022-SS012-PropB4], which proposed allowing a maximum daily bag limit of up

to three (3) fish per person in IPHC Regulatory Area 2B within a limited time frame, from 1 April 2021 to 31 March 2023 (Appendix IV).

7 IPHC FISHERY REGULATIONS DEFERRED IN 2022

In 2022, the Commission deferred one (1) fishery regulation proposal as follows:

7.1 *Other Stakeholder fishery regulation proposals*

IPHC Fishery Regulations: Recreational (sport) fishing for Pacific halibut—IPHC Regulatory Areas 2C, 3A, 3B, 4A, 4B, 4C, 4D, 4E (Sect. 29) - Processing Pacific halibut for eating and/or preservation

(para. 85) The Commission **NOTED** and **DEFERRED** fishery regulation proposal IPHC-2022-AM098-PropC1, which proposed an exception that allows recreational fishermen on pleasure craft in Alaska Regulatory Area to process Pacific halibut for eating and/or preservation, subject to measures to facilitate enforcement of the applicable daily bag limits.

8 INTERACTIONS WITH CONTRACTING PARTIES

8.1 Contracting Party reports

In 2022, the IPHC Secretariat has engaged agency representatives from both Contracting Parties regarding more comprehensive and timely reporting of all forms of Pacific halibut removals and directed commercial fishery revenue data. The IPHC Secretariat is working to identify and address data gaps in reporting.

8.2 Canada

Fisheries and Oceans Canada (DFO)

Multiyear permit for the IPHC survey in Gwaii Haanas National Marine Conservation Area

In May 2022, the Archipelago Management Board (AMB) approved the application the DFO put forward to permit multi-year approvals for the IPHC Fishery-Independent Setline Survey (FISS) in Gwaii Haanas National Marine Conservation Area (NMCA). What this means is that the IPHC has approval to fish the FISS stations within Gwaii Haanas for the 2022, 2023 and 2024 FISS without having to annually apply for these permissions when they apply for their Canadian scientific licences.

Areas of conservation concern

The IPHC Secretariat continues to work with the DFO representatives to address gaps in coverage for the IPHC FISS in the IPHC Regulatory Area 2B. Currently, the FISS license excludes Marine Protected Areas as described by Hecate Strait and Queen Charlotte Sound Glass Sponge Reefs Marine Protected Areas Regulations, and Rockfish Conservation Areas (RCAs).

Northern Shelf Bioregion

The action plan for the development of a network of marine protected areas (MPAs) in the Northern Shelf Bioregion is a collaborative partnership between the Government of Canada, the

Province of British Columbia and 17 First Nations. While detailed management plans for individual MPAs within the network remain in the planning phase, the Secretariat follows the process in relation to network's overlap with FISS (see Fig. 2). Proposed extension of the network covers 29 FISS stations.

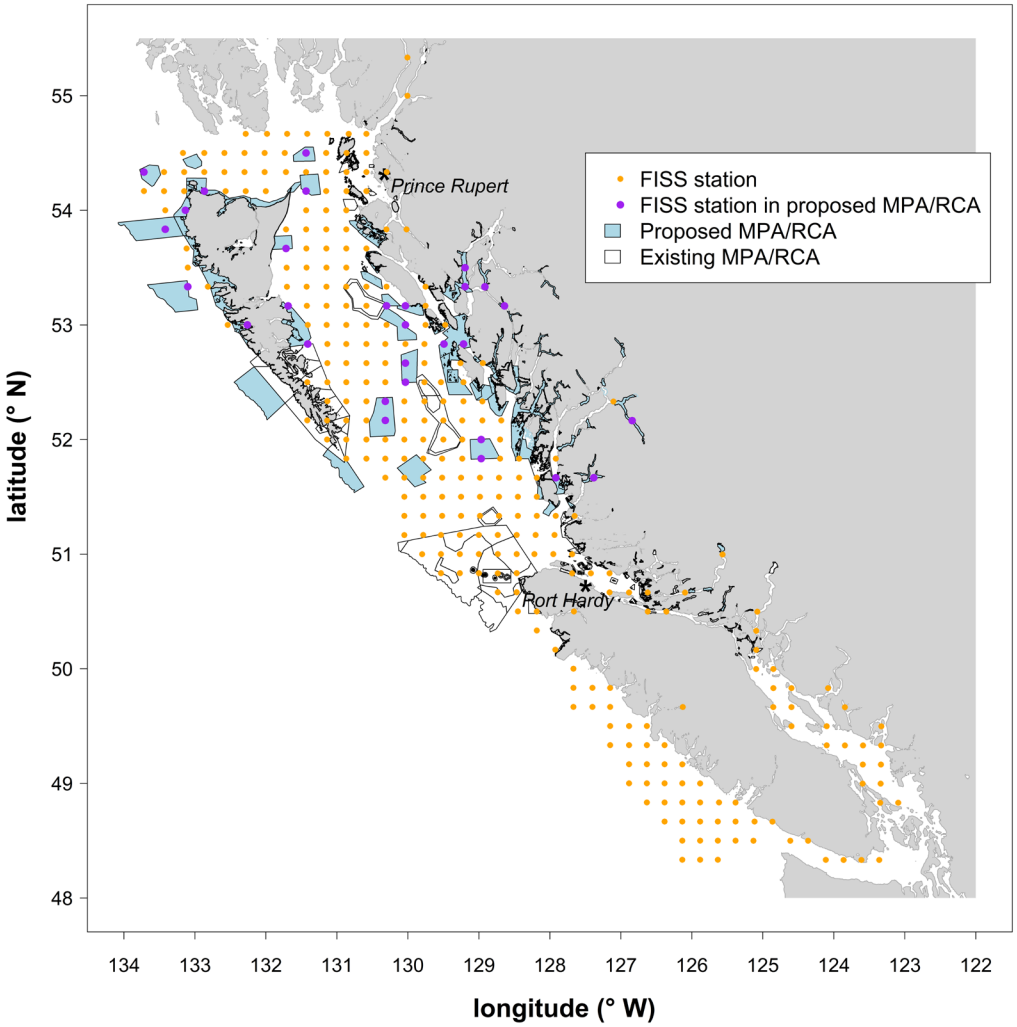


Figure 2: Overlap between locations of FISS stations and proposed area of the Northern Shelf Bioregion.

Halibut Advisory Board (HAB)

The Executive Director (Dr. Wilson) participates as a HAB member, with the Fisheries Policy Branch Manager (Dr. Hutniczak) as the IPHC alternate. This relationship is expected to continue into the future given the HAB's contributions to the Canadian decision-making process.

8.3 *United States of America*

North Pacific Fishery Management Council (NPFMC)

At the meeting in February 2022, the IPHC presented to the Council the outcomes of the 98th Session of the IPHC Annual Meeting (AM098).

At the same meeting, the Council adopted the purpose and need statement and set of alternatives for analysis of Pacific halibut catch sharing plan allocations between the charter sector and the commercial sector (D1 CM 2). This item is not yet scheduled by the Council.

At the meeting in April 2022, the Council took final action on establishing a fee collection program for charter vessel operators to fund the Recreational Quota Entity (RQE) (C2 CM). Accordingly, NMFS will develop regulations to establish the fee requirement for a Charter Halibut Stamp.

At the same meeting, the Council also adopted the following changes to individual fishing quota (IFQ) program regulations (IFQ Omnibus Action) (C1 CM):

- Clarify that "slinky pots" are a legal gear for the IFQ fishery and CDQ [Community Development Quota] fisheries, and revise regulations to allow the use of biodegradable twine in the door latch or pot tunnel.
- Remove buoy configuration, radar reflector, and flagpole requirements in regulation but retain "LP" marking requirement.
- Authorize jig gear as a legal gear type for the harvest of sablefish IFQ and CDQ.
- Revise the pot gear configuration requirements to remove the nine-inch maximum width of tunnel opening so it does not apply when a vessel begins a trip with unfished halibut IFQ onboard.
- Change the Pot Limit for Western Yakutat to 200 pots per vessel.
- Modify the gear retrieval requirement to 7 days for the CG area [Central Gulf] and 5 days in SEO [Southeast Outside]
- Remove Adak CQE [Community Quota Entity] residency requirement for a period of five years.

At the meeting in June 2022, the Council adopted the purpose and need statement and alternatives for analysis of adjusting the vessel cap for Area 4 halibut to recognize conditions leading to fewer vessels participating in the Area 4 fisheries, and to increase utilization of quota in the region (D2 CM). The Council requested NMFS to evaluate options for extending the temporary rule to waive vessel use caps in Area 4 while the Council considers permanent changes to this provision.

Nomination process for the Alaĝum Kanuux̂ as a National Marine Sanctuary

At the meeting in June 2022, the Council received an update on marine sanctuary nomination for area around the Pribilof Islands proposed by the Aleut Community of St. Paul Island Tribal Government. At this time, the Council requested additional details on the proposal (see letter from July 7, 2022) to evaluate the management implications for the region. The IPHC will monitor the progress of the designation for potential implications for FISS survey.

PACIFIC Fishery Management Council (PFMC)

IPHC Regulatory Area 2A Catch Sharing Plans and in-season management

The IPHC Secretariat collaborated with NOAA Fisheries and State agencies to conduct in-season management of the various fisheries identified in the IPHC Regulatory Area 2A Catch

Sharing Plan. Date and possession restrictions were adjusted in season among the various fisheries to meet identified fishery needs while attaining and remaining within the applicable catch limits. Estimates of removals for 2021 will be presented during Agenda Item 5.

IPHC Regulatory Area 2A fishery management handover to the USA

The Council took final action in November 2020, and adopted the following:

- The Council will consider the directed fishery framework during the Catch Sharing Plan process in September and November; include any guidance for vessel limits and in-season changes for NMFS implementation.
- NMFS will issue permits for all Area 2A halibut fisheries: commercial-directed, incidental salmon troll, incidental sablefish, and recreational charter halibut fisheries.
- NMFS will determine the appropriate application deadlines for all commercial halibut applications, set to accommodate Council meetings and NMFS processing time.
- Proof of permit will be required to be onboard the fishing vessel and made readily available upon request, regardless of the type of permit (e.g., paper or electronic). NMFS will provide access to permits in a printable format or send paper copies directly to the participant.

As for the status of implementation:

- In July 2022, NMFS shared with the IPHC a draft of a proposed rule; the Secretariat reviewed the document and provided NMFS with comments
- The proposed rule (87 FR 44318) went out for public comment on 26 July 2022; the comment period was open until 25 August 2022
- NMFS is currently in the process of preparing the final rule with the input from the public
- NMFS is in process of collecting information necessary to issue permits by early 2023
- Management alternatives will be considered through the Council process in September and November 2023
- NMFS will manage the non-tribal directed commercial fishery beginning in 2023

More details on the transition of management in the IPHC Regulatory Area 2A can be found in the IPHC information paper IPHC-2022-IM098-INF01 intended for outreach.

Bureau of Ocean Energy Management (BOEM) offshore wind planning activities

The PFMC Marine Planning Committee (MPC), at its June 2022 meeting, considered recent BOEM offshore wind planning activities. In April 2022, BOEM formally announced a Request for Information and Nominations for offshore wind (OSW) energy development off the Oregon Coast for the Coos Bay and the Brookings Call Areas. IPHC reviewed the proposed area in relation to its overlap with FISS (see Fig. 3). Six stations are within the Coos Bay call area and two within the Brookings call area. Other stations are close to the area edges and gear from those stations may also be set within the areas given the length of the gear and that it is not always set exactly on the station's coordinates.

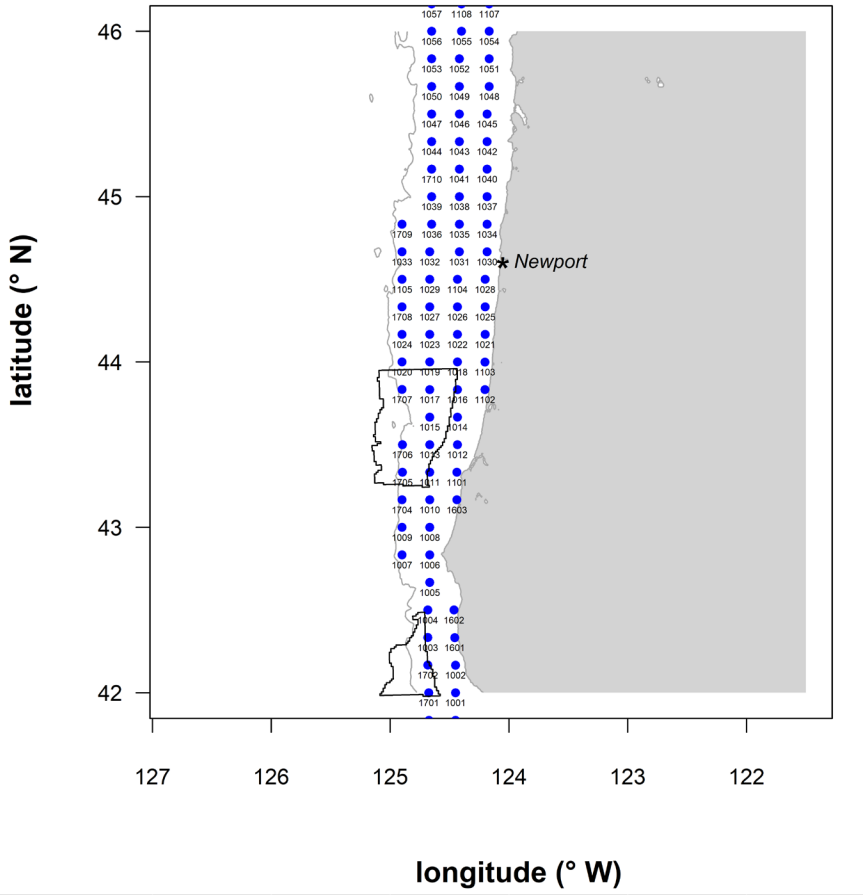


Figure 3. Overlap between locations of FISS stations and proposed area for offshore wind energy development off the Oregon Coast.

9 IPHC COMMUNICATIONS AND OUTREACH

9.1 IPHC Website

The IPHC Secretariat continues to develop new ways to display data and statistics for our stakeholders and other interested parties, focusing particularly on the addition of timely and useful visual displays such as those listed below. In 2022, we developed and published all of our historical water column profiler data which has been collated annually since 2009, as part of our FISS activities.

1) **Directed commercial fisheries:**
   https://www.iphc.int/datatest/commercial-fisheries
2) **Fishery-independent setline survey (FISS):**
   https://www.iphc.int/data/datatest/fishery-independent-setline-survey-fiss
3) **Non-Directed Commercial Discard Mortality Fisheries:**
   https://www.iphc.int/data/datatest/non-directed-commercial-discard-mortality-fisheries
4) **Geospatial Data:**
   https://www.iphc.int/datatest/data/geospatial-data
5) **Recreational Fisheries:**
   https://www.iphc.int/data/datatest/pacific-halibut-recreational-fisheries-data
6) **Time Series Data Sets:**
   https://www.iphc.int/data/time-series-datasets

7) **Subsistence Fisheries:**
   https://www.iphc.int/datatest/subsistence-fisheries
8) **Water Column Profiler Data:**
   https://www.iphc.int/datatest/data/water-column-profiler-data

Water Column Profiler Data

Download static environmental data collected during the IPHC FISS.

View Water Column Profiler Data ›

9.2 Annual Report

The 2021 Annual Report (1 January to 31 December 2021) was published on 31 March 2022 and is available for download from the IPHC website at the following link: https://www.iphc.int/uploads/pdf/ar/iphc-2022-ar2021-r.pdf

9.3 IPHC Circulars and Media Releases

2022 IPHC Circulars continue to serve as the formal inter-sessional communication mechanism for the Commission. Circulars are used to announce meetings of the Commission and its subsidiary bodies, as well as inter-sessional decisions made by the Commission. The following are those published in 2022, and a full list may be accessed via the following weblink: https://www.iphc.int/library/documents/category/circulars

Circular	Title/Subject	Date published
IPHC-2022-CR-001	IPHC Rules of Procedure (2022)	8 Feb 2022
IPHC-2022-CR-002	Reports of the 98th Session of the IPHC Finance and Administration Committee (FAC098); 92nd Session of the IPHC Conference Board (CB092); 27th Session of the IPHC Processor Advisory Board (PAB027)	8 Feb 2022
IPHC-2022-CR-003	Invitation to the 12th Special Session of the IPHC (SS012)	8 Feb 2022
IPHC-2022-CR-004	Report of the 98th Session of the IPHC Annual Meeting (AM098	18 Feb 2022
IPHC-2022-CR-005	Report of the 12th Special Session of the IPHC (SS012)	7 Mar 2022
IPHC-2022-CR-006	For Decision - Budget Estimates FY2023 (for approval)	7 Mar 2022
IPHC-2022-CR-007	Intersessional Decision - Budget Estimates: FY2023	16 Mar 2022
IPHC-2022-CR-008	Announcement of the 20th Session of the IPHC Scientific Review Board (SRB020)	17 Mar 2022
IPHC-2022-CR-009	Publication of IPHC Annual Report 2021 (IPHC-2022-AR2021-R)	31 Mar 2022
IPHC-2022-CR-010	Invitation to the 2022 Session of the IPHC Work Meeting (WM2022)	16 Jun 2022
IPHC-2022-CR-011	Report of the 20th Session of the IPHC Scientific Review Board (SRB020)	17 Jun 2022
IPHC-2022-CR-012	Announcement of the 21st Session of the IPHC Scientific Review Board (SRB021)	22 Jun 2022
IPHC-2022-CR-013	Announcement of the 17th Session of the IPHC Management Strategy Advisory Board (MSAB017)	8 Jul 2022
IPHC-2022-CR-014	Invitation to an informal Commissioner meeting (15 July 2022)	8 Jul 2022

IPHC-2022-CR-015	Invitation to the 23rd Session of the IPHC Research Advisory Board (RAB023)	19 Aug 2022
IPHC-2022-CR-016	Invitation to the 98th Session of the IPHC Interim Meeting (IM098)	19 Aug 2022
IPHC-2022-CR-017	Report of the 21st Session of the IPHC Scientific Review Board (SRB021)	22 Sept 2022
IPHC-2022-CR-018	For Decision - MSAB Membership (for approval)	7 Oct 2022
IPHC-2022-CR-019	Intersessional Decision (2022-ID002) - MSAB Membership	8 Oct 2022
IPHC-2022-CR-020	Report of the 17th Session of the IPHC Management Strategy Advisory Board (MSAB017)	21 Oct 2022
IPHC-2022-CR-021	Invitation to the 99th Session of the IPHC Finance and Administration Committee (FAC099), and the 99th Session of the IPHC Annual Meeting (AM099)	24 Oct 2022
IPHC-2022-CR-022	Invitation to the 93rd Session of the IPHC Conference Board (CB098) and the 28th Session of the IPHC Processor Advisory Board (PAB028)	24 Oct 2022

2022 IPHC Media Releases are the primary informal communication with all stakeholders. https://www.iphc.int/library/documents/category/media-releases

Circular	Title/Subject	Date published
IPHC-2022-MR-001	IPHC Regulatory Area 2A Licence Applications Open for Submission (2022)	31 Jan 2022
IPHC-2022-MR-002	Completion of the 98th Session of the IPHC Annual Meeting (AM098)	31 Jan 2022
IPHC-2022-MR-003	Report of the 98th Session of the IPHC Annual Meeting (AM098)	22 Feb 2022
IPHC-2022-MR-004	Fishery-Independent Setline Survey (2022 FISS) Request for Tender Extended	28 Feb 2022
IPHC-2022-MR-005	Solicitation for the 2022 IPHC Merit Scholarship	16 Mar 2022
IPHC-2022-MR-006	Notification of Potential Pacific Halibut Sales in 2022, Seeking Buyers Interested in Fish Sales from the IPHC Fishery-Independent Setline Survey (FISS)	23 Mar 2022
IPHC-2022-MR-007	Notification of IPHC Fishery-Independent Setline Survey (FISS) 2022 Contract Awards	5 May 2022
IPHC-2022-MR-008	Non-Tribal Directed Commercial Fishery in IPHC Regulatory Area 2A: Fishing Period Limits for First (28 to 30 June 2022) Fishing Period	16 May 2022
IPHC-2022-MR-009	Fishery-Independent Setline Survey (2022 FISS) Request for Tender - 27 June 2022	27 Jun 2022
IPHC-2022-MR-010	Non-Tribal Directed Commercial Fishery in IPHC Regulatory Area 2A: Fishing Period Limits for Second (12 to 14 July 2022) Fishing Period	7 Jul 2022
IPHC-2022-MR-011	Non-Treaty Directed Commercial Fishery in IPHC Regulatory Area 2A: Fishing Period Limits for Third (26 to 28 July 2022) Fishing Period	21 Jul 2022
IPHC-2022-MR-012	Non-Treaty Directed Commercial Fishery in IPHC Regulatory Area 2A: CLOSED	2 Aug 2022
IPHC-2022-MR-013	Recreational Fishery Closure in IPHC Regulatory Area 2A: California	5 Aug 2022

IPHC-2022-MR-014	IPHC Merit Scholarship 2022 – Recipient	11 Aug 2022
IPHC-2022-MR-015	Attention Salmon Processors -Chum Salmon Needed for the 2023 IPHC Fishery-Independent Setline Survey (FISS)	23 Aug 2022
IPHC-2022-MR-016	Announcement of the 99th Session of the IPHC Annual Meeting (AM099), and associated subsidiary bodies	24 Oct 2022

All interested persons are encouraged to request that their email addresses be added to IPHC distribution lists at the following link: https://www.iphc.int/form/media-and-news.

9.4 IPHC External engagement

There is a considerable amount of effort put into public outreach, attending conferences and meetings that enhance knowledge, contributing expertise to the broader scientific community through participation on boards and committees, and seeking further education and training. In 2022, much of this engagement continued to take place electronically due to the COVID-19 pandemic, but there were several meetings attended in-person.

Committees and external organisation appointments

North America:

1) *Technical Subcommittee (TSC) of the Canada-United States Groundfish Committee* - Dr. Josep Planas, Dr. Basia Hutniczak.

Canada:

1) *Halibut Advisory Board* (Canada) - Dr. David Wilson (Dr. Basia Hutniczak – Alternate)
2) *Framework Review for Atlantic Halibut on the Scotian Shelf and Southern Grand Banks in NAFO Divisions 3NOPs4VWX5Zc: Part 2 - Review of Modelling Approaches (DFO) – Dr. Allan Hicks*
3) Centre for Science Advice Pacific (CSAP) Regional Peer Review (RPR) of a Revised Operating Model for Sablefish in British Columbia in 2022 – *Dr. Allan Hicks*

United States of America:

1) *Bering Sea/Aleutian Islands Plan Team* - Dr. Allan Hicks
2) *Bering Sea Fishery Ecosystem Plan Team* - Dr. Ian Stewart
3) *North Pacific Fishery Management Council (NPFMC) Abundance-based Management Working Group* – Dr. Allan Hicks
4) *NPFMC Scientific and Statistical Committee* - Dr. Ian Stewart
5) *NPFMC Trawl Electronic Monitoring Committee* – Dr. Jason Jannot
6) *North Pacific Research Board Science Panel* - Dr. Josep Planas
7) *Fisheries Monitoring Science Committee (NOAA-Alaska)* – Dr. Ray Webster
8) *Interagency electronic reporting system for commercial fishery landings in Alaska (eLandings) Steering Committee – Dr. Jason Jannot*
9) *NOAA Marine Recreational Information Program (MRIP) Alaska Regional Implementation Team – Drs. Jason Jannot and Ian Stewart*

Conferences and symposia (chronological order)

1) 20th Biennial Conference of the International Institute of Fisheries Economics and Trade (Dr. Basia Hutniczak)
2) SCS7 – 7th National Scientific Coordination Subcommittee Meeting, U.S. Regional Fishery Management Councils (Dr. Ian Stewart)

Academic affiliations 2022

Affiliate Faculty:

1) Dr. Allan Hicks - University of Washington School of Aquatic and Fishery Sciences, Seattle, WA, USA
2) Dr. Ian Stewart - University of Washington School of Aquatic and Fishery Sciences, Seattle, WA, USA
3) Dr. Josep Planas - Alaska Pacific University, Anchorage, AK, USA

Graduate student committee member:

1) Dr. Allan Hicks - University of Massachusetts School for Marine Science & Technology, Dartmouth, MA, USA
2) Dr. Allan Hicks - University of Washington School of Aquatic & Fishery Sciences, Seattle, WA, USA
3) Dr. Ian Stewart - University of Washington School of Aquatic & Fishery Sciences, Seattle, WA, USA
4) Dr. Josep Planas - Alaska Pacific University, Anchorage, AK, USA

10 IPHC PUBLICATIONS IN 2022

10.1 Published peer-reviewed journal papers

Adams GD, Holsman KK, Barbeaux SJ, Dorn MW, Ianelli JN, Spies I, **Stewart IJ**, and Punt AE. 2022. An ensemble approach to understand predation mortality for groundfish in the Gulf of Alaska. *Fisheries Research* 251: 106303, https://doi.org/10.1016/j.fishres.2022.106303.

Loher T, McCarthy O, Sadorus LL, Erickson L, Simeon A, Drinan DP, Hauser L, **Planas JV**, and **Stewart IJ.** 2022. A Test of Deriving Sex-Composition Data for the Directed Pacific Halibut Fishery via At-Sea Marking. *Marine and Coastal Fisheries* 14(4), https://doi.org/10.1002/mcf2.10218.

Hutniczak B. 2022. Assessing cross-regional flows of economic benefits: A case study of Pacific halibut commercial fishing in Alaska, *Fisheries Research* 255: 106449, https://doi.org/10.1016/j.fishres.2022.106449.

Hutniczak B. 2022 Efficient updating of regional supply and use tables with the national-level statistics, *Journal of Economic Structures* 11: 16, https://doi.org/10.1186/s40008-022-00274-8.

Good TP, **Jannot JE**, Somers KA, Ward EJ. 2022 Using Bayesian time series models to estimate bycatch of an endangered albatross. *Fisheries Research* 256: 106492, https://doi.org/10.1016/j.fishres.2022.106492.

Jasonowicz A, A. Simeon, M. Zahm, C. Cabau, C. Klopp, C. Roques, C. Iampietro, J. Lluch, C. Donnadieu, H. Parrinello, D. P. Drinan, L. Hauser, Y. Guiguen, **J. V. Planas**. 2022. Generation of a chromosome-level genome assembly for Pacific halibut (Hippoglossus stenolepis) and characterization of its sex-determining genomic region. *Molecular Ecology Resources* 22(7): 2685-2700, https://doi.org/10.1111/1755-0998.13641.

Fish T, Wolf N, Smeltz TS, Harris BP, and **Planas JV**. 2022. Reproductive Biology of Female Pacific Halibut (*Hippoglossus stenolepis*) in the Gulf of Alaska. *Frontiers in Marine Science* 9:801759, https://doi.org/10.3389/fmars.2022.80175.

Loher T, **Dykstra CL**, **Hicks A**, **Stewart IJ**, Wolf N, Harris BP, and **Planas J.V**. 2022. Estimation of postrelease longline mortality in Pacific halibut using acceleration-logging tags. *North*

American Journal of Fisheries Management. 42: 37-49, http://dx.doi.org/10.1002/nafm.10711.

10.2 In press peer-reviewed journal papers

10.3 Submitted peer-review journal papers – In review

11 RECOMMENDATION

That the Commission:

1) **NOTE** paper IPHC-2022-IM098-04 which provides the Commission with an update on activities of the IPHC Secretariat in 2022 not detailed in other papers before the Commission.

12 APPENDICES

Appendix I: IPHC Secretariat positions – current

Appendix I
IPHC Secretariat positions – current

(https://www.iphc.int/locations/map)

Branch	Sub-Section	Position	Current Employee
Executive	-	Executive Director	Dr Wilson, David
Executive	-	Assistant Director	Keikkala, Andrea
-	Fishery-Independent Setline Survey	Setline Survey Coordinator	Ualesi, Kayla
-	Fishery-Independent Setline Survey	Setline Survey Specialist	Rillera, Rachel
-	Fishery-Independent Setline Survey	Setline Survey Specialist	Jack, Tyler
-	Fishery-Independent Setline Survey	Setline Survey Specialist	Coll, Kevin
-	Fishery-Independent Setline Survey	Setline Survey Specialist (Field)	Multiple Employees (25-35)
Quantitative Sciences	-	Quantitative Scientist (Stock Assessment)	Dr Stewart, Ian
Quantitative Sciences	-	Quantitative Scientist (Management Strategy Evaluation)	Dr Hicks, Allan
Quantitative Sciences	-	Quantitative Scientist (Biometrician)	Dr Webster, Raymond
Fisheries Policy	-	Branch Manager (FP)	Dr Hutniczak, Barbara
Finance and Personnel Services	Personnel Services	Administrative Specialist (Snr)	Chapman, Kelly
Finance and Personnel Services	Personnel Services	Administrative Specialist/Communications	Coluccio, Tara
Finance and Personnel Services	Personnel Services	Administrative Specialist	Wietecha, Ola
Finance and Personnel Services	Personnel Services	Administrative Specialist	Burkhalter, Lorissa
Finance and Personnel Services	Personnel Services	Administrative Specialist Accounting	Kuklok, Rebecca
Finance and Personnel Services	Communications Services	Communications Coordinator & Research Biologist	Sadorus, Lauri

Finance and Personnel Services	Communications Services	Communications Specialist	Henry, Edward
Finance and Personnel Services	Technology Services	Systems Administrator	Tynes, Robert
Finance and Personnel Services	Technology Services	Information Technology Specialist (Application Developer)	Taheri, Afshin
Finance and Personnel Services	Technology Services	Information Technology Specialist (Application Developer)	Outsourced
Biological and Ecosystem Sciences	-	Branch Manager (BES)	Dr Planas, Josep
Biological and Ecosystem Sciences	-	Research Scientist - Life History Modeler I (Epigenetics)	Vacant
Biological and Ecosystem Sciences	-	Research Biologist (Mortality and Survivorship)	Dykstra, Claude
Biological and Ecosystem Sciences	-	Research Biologist Genetics	Jasonowicz, Andrew
Biological and Ecosystem Sciences	-	Research Biologist (Life History)	Jones, Colin
Biological and Ecosystem Sciences	-	Biological Science Laboratory Technician	Simchick, Crystal
Fisheries Data Services	-	Branch Manager (FDS)	Dr Jannot, Jason
Fisheries Data Services	Port Operations Services	Port Operations Coordinator	Thom, Monica
Fisheries Data Services	Port Operations Services	Fisheries Data Specialist (Field)	Multiple Employees (8-10)
Fisheries Data Services	Fisheries Data Services	Fisheries Data Coordinator	Tran, Huyen
Fisheries Data Services	Fisheries Data Services	Fisheries Data Specialist (HQ-GIS)	Kong, Thomas
Fisheries Data Services	Fisheries Data Services	Fisheries Data Specialist (HQ)	Sawyer Van Vleck, Kim
Fisheries Data Services	Fisheries Data Services	Fisheries Data Specialist (HQ)	Magrane, Kelsey
Fisheries Data Services	Otolith Aging Services	Otolith Laboratory Technician (Snr)	Forsberg, Joan
Fisheries Data Services	Otolith Aging Services	Otolith Laboratory Technician	Johnston, Chris
Fisheries Data Services	Otolith Aging Services	Otolith Laboratory Technician	Tobin, Robert

Implementation of the Recommendations from the 2nd IPHC Performance Review (PRIPHC02)

PREPARED BY: IPHC SECRETARIAT (D. WILSON; 24 OCTOBER 2022)

To provide the Commission with an update on the implementation of the recommendations arising from the 2nd Performance Review of the IPHC (PRIPHC02).

BACKGROUND

The Report of the 2nd Performance Review of the IPHC (PRIPHC02), IPHC-2019-PRIPHC02-R (adopted on 11 October 2019) is available for download from the IPHC website: https://www.iphc.int/library/documents/post/iphc-2019-priphc02-r-report-of-the-2nd-performance-review-of-the-international-pacific-halibut-commission-priphc02

At the 96th Session of the IPHC Annual Meeting (AM096), the Commission:

> *(para. 137) "The Commission **NOTED** that the PRIPHC02 was carried out over the course of 2019 via three face-to-face meetings: one in Seattle, USA (4-6 June 2019), one in New York City, USA (25 August 2019) and one in Ottawa, Canada (7-11 October 2019). The Panel held several additional tele-conferences, both among themselves, and with stakeholders. The meeting was also supported by Independent Legal and Science Experts who each dedicated additional working days to providing technical reviews and reports on specific components of the review criteria relevant to their areas of expertise."*
>
> *(para 138) "The Commission **NOTED** para. 22 of the report which stated:*
>
> > *(para. 22) "The PRIPHC02 **CONGRATULATED** the Commission and Secretariat for the positive strides in response to the first performance review. Through the course of the consultations, document review and interviews, the panel saw consistent and significant improvements in transparency, availability and modernisation of documentation and background information, and heard resounding praise for this increased transparency and the movement away from previously "closed-door" and perceived "secretive" processes and decision-making."*
>
> *(para. 139) "The Commission **REQUESTED** that paper IPHC-2020-AM096-14 be reviewed intersessionally by each Contracting Party, with the intention of providing edits/additions, for endorsement. The IPHC Secretariat will facilitate this request by proposing intersessional meeting dates."*

During the 6th Special Session of the IPHC (SS06) held on 3 March 2020, the Commission:

> (para. 6) "*The Commission **ENDORSED** the recommendations, priorities, responsibilities, timelines and updates provided at Appendix B, and **AGREED** that these would be reported on at each IPHC meeting.*" (IPHC-2020-SS06-R)

DISCUSSION

The following is a summary of the status of each of the detailed updated provided in Appendix A.

PRIPHC02 Recommendation	Status
Completed and/or annually ongoing	17
In Progress	5
Pending (from Contracting Parties)	2
On-Hold (decision = no action to be taken)	2
Total	**26**

RECOMMENDATION

That the Commission **NOTE** paper IPHC-2022-IM098-05 that provides the Commission with an update on the implementation of the recommendations arising from the 2nd Performance Review of the IPHC (PRIPHC02).

APPENDICES

Appendix A: Table of recommendations arising from the PRIPHC02, including 1) priorities, 2) responsibilities, 3) timeline, and 4) any new updates on status.

Appendix A
RECOMMENDATIONS OF THE 2ND PERFORMANCE REVIEW OF THE INTERNATIONAL PACIFIC HALIBUT COMMISSION (PRIPHC02)

REF#	RECOMMENDATION	PRIORITY	RESPONSIBILITY	TIMELINE	UPDATE/STATUS
PRIPHC02 –Rec.01 (para. 32)	***Legal analysis of the IPHC Convention*** The PRIPHC02 **RECOMMENDED** that consideration be given to updating the Convention at the next opportunity, to become consistent with newer international legal instruments, and specifically consider including the following elements: a) – z)	N/A	N/A	N/A	**On-Hold:** At this time, the Contracting Parties have indicated that they do not wish to commence the process of updating the IPHC Convention. Thus, this Recommendation is on-hold until a decision is made to reopen it.
PRIPHC02 –Rec.02 (para. 33)	The PRIPHC02 **RECOMMENDED** to update the Convention, while in the interim period seek alternate mechanisms to implement international best practices and* legal principles. Commission directive: The Commission **RECOMMENDED** the exploration and implementation of alternate mechanisms to implement international best practices, such as revisions to the IPHC Rules of Procedure, IPHC Financial Regulations and IPHC Fishery Regulations.	N/A High	N/A Commission	N/A 2020-24	**N/A** **Completed** (2020, 2021, 2022): The IPHC Rules of Procedure (ROP) and the IPHC Financial Regulations (FR) will be periodically updated (at least once every 2 years) and where possible, should accommodate applicable improvements as recommended in the legal review of the IPHC Convention.
PRIPHC02 –Rec.03 (para. 44)	***Science: Status of living marine resources*** The PRIPHC02 **RECOMMENDED** that opportunities to engage with western Pacific halibut science and management agencies be sought, to strengthen science links and data exchange. Specifically, consider options to investigate pan-Pacific stock structure and migration of Pacific halibut.	High	IPHC Secretariat	2020-24	**Ongoing**: There are three non-Contracting Parties who exploit Pacific halibut: Russia, Rep. of Korea and Japan. Most recently we have engaged Russian scientists working on Pacific halibut through PICES (https://meetings.pices.int/). We will continue to explore this avenue via PICES, noting that COVID-19 has hindered/delayed interactions to a certain degree.

REF#	RECOMMENDATION	PRIORITY	RESPONSIBILITY	TIMELINE	UPDATE/STATUS
PRIPHC02 –Rec.04 (para. 45)	The PRIPHC02 **RECOMMENDED** that: a) further efforts be made to lead and collaborate on research to assess the ecosystem impacts of Pacific halibut fisheries on incidentally caught species (retained and/or discarded); b) where feasible, this research be incorporated within the IPHC's 5-Year Research Plan (https://www.iphc.int/uploads/pdf/besrp/2019/iphc-2019-besrp-5yp.pdf); c) findings from the IPHC Secretariat research and that of the Contracting Parties be readily accessible via the IPHC website.	Medium	IPHC Secretariat	2020-24	**Completed & Ongoing**: The IPHC's work in this area has been limited to date. However, some efforts to incorporate ecosystem considerations into the MSE work has commenced.
PRIPHC02 –Rec.05 (para. 63)	***Science: Quality and provision of scientific advice*** The PRIPHC02 **RECOMMENDED** that simplified materials be developed for RAB and especially MSAB use, including training/induction materials.	High	IPHC Secretariat	2020-24	**Completed & Ongoing**: The IPHC Secretariat continues to seek ways to ensure broad stakeholder understanding of our work. For the MSAB and associated MSE work, an interactive web-based tool has been developed to provide a user friendly means to explore and understand the utility of MSE and the simulation results arising. See paper **IPHC-2022-AM098-12** for the latest iteration. MSE Explorer tool: https://www.iphc.int/management/science-and-research/management-strategy-evaluation
PRIPHC02 –Rec.06 (para. 64)	The PRIPHC02 **RECOMMENDED** that consideration be given to amending the Rules of Procedure to include appropriate fixed terms of service to ensure SRB peer review remains independent and fresh; a fixed term of three years seems appropriate, with no more than one renewal.	Medium	Commission; IPHC Secretariat	2020	**Completed**: The IPHC Secretariat provided the Commission with revised Rules of Procedure for consideration at AM096, which included a two-term limit. This was adopted by the Commission and is now in force. See **IPHC Rules of Procedure (2020).**

REF#	RECOMMENDATION	PRIORITY	RESPONSIBILITY	TIMELINE	UPDATE/STATUS
PRIPHC02 –Rec.07 (para. 65)	The PRIPHC02 **RECOMMENDED** that the peer review process be strengthened through expanded subject specific independent reviews including data quality and standards, the FISS, MSE, and biological/ecological research; as well as conversion of "grey literature" to primary literature publications. The latter considered important to ongoing information outreach efforts given the cutting-edge nature of the Commission's scientific work.	High	Commission; IPHC Secretariat	2020-24	**Completed & Ongoing**: The Commission approved peer review of the IPHC stock assessment which was **concluded** in 2019, the IPHC MSE which was concluded on 25 September 2020. See **IPHC-2020-CR-022**. The Commission has indicated its strong support topic-based peer review moving forward.
PRIPHC02 –Rec.08 (para. 66)	The PRIPHC02 **RECOMMENDED** that the IPHC Secretariat develop options for simple graphical summaries (i.e. phase plot equivalents) of fishing intensity and spawning stock biomass for provision to the Commission.	High	IPHC Secretariat	2020	**Completed**: The IPHC Secretariat now includes both time-series' and phase plots of management-related quantities See paper **IPHC-2022-AM098-10** (Fig. 11) for the latest iteration.
PRIPHC02 –Rec.09 (para. 73)	***Conservation and Management: Data collection and sharing*** The PRIPHC02 **RECOMMENDED** that observer coverage be adjusted to be commensurate with the level of fishing intensity in each IPHC Regulatory Area. Commission directive: The Commission **RECOMMENDED** that the IPHC Secretariat, in consultation with the Commission, develop minimum data collection standards for Pacific halibut by scientific observer programs. The intention would be for the Commission to review and approve the minimum standards, and recommend them for implementation by domestic agencies.	N/A High	N/A Contracting Parties	N/A 2020-24	**N/A** **On-Hold**. The Contracting Parties have indicated that at this time, they do not wish to develop minimum data standards for data collection. Thus, this Recommendation is on-hold until a decision is made to reopen it.
PRIPHC02 –Rec.10 (para. 82)	***Conservation and Management: Consistency between scientific advice and fishery Regulations adopted*** The PRIPHC02 **RECOMMENDED** that the development of MSE to underpin multi-year (strategic) decision-making be continued, and as multi-year decision making is implemented, current Secretariat capacity usage for annual stock assessments should be refocused on research to investigate MSE operating model development (including consideration of biological and fishery uncertainties) for future MSE iterations and regularised multi-year stock assessments.	High	IPHC Secretariat; Commission	2021-24	**Completed**: MSE products, including the evaluation of multi-year (biennial and triennial) management procedures, were delivered to the MSAB017, and are to be presented at AM099 in January 2023. Evaluating multi-year stock assessments was a priority task in the MSE program of work for 2021-2023.

REF#	RECOMMENDATION	PRIORITY	RESPONSIBILITY	TIMELINE	UPDATE/STATUS
PRIPHC02 –Rec.11 (para. 83)	The PRIPHC02 **RECOMMENDED** that ongoing work on the MSE process be prioritised to ensure there is a management framework/procedure with minimal room for ambiguous interpretation, and robust pre-agreed mortality limit setting frameworks.	High	IPHC Secretariat; Commission	2020-21	**In progress**: See paper IPHC-2022-IM098-13 for the latest update, and https://www.iphc.int/uploads/pdf/msab/tech/iphc-2021-mse-02.pdf for the most recent MSE program of work activities. ***Next steps***: The Commission to formally adopt a harvest strategy.
PRIPHC02 –Rec.12 (para. 88)	***Fishing allocations and opportunities*** The PRIPHC02 **STRONGLY URGED** the Commission to conclude its MSE process and **RECOMMENDED** it meet its 2021 deadline to adopt a harvest strategy.	High	Commission; IPHC Secretariat	2020-21	**In progress**: The IPHC Secretariat provided options for Commission decision at the 98th Session of the IPHC Annual Meeting (AM098). The Commission requested further work at that time. See paper IPHC-2022-IM098-13 for the latest update. ***Next steps***: The Commission to formally adopt a harvest strategy.
PRIPHC02 –Rec.13 (para. 96)	***Compliance and enforcement: Port State measures*** The PRIPHC02 **RECOMMENDED** that Contracting Party enforcement agencies adopt common standards for assessment of implementation of the principles of port State measures.	Medium	Contracting Parties	2020-24	**Pending**: To be incorporated into the Contracting Party National Reports at each Annual Meeting. Next National Report will be provided by each Contracting Party for the AM099.
PRIPHC02 –Rec.14 (para. 105)	***Compliance and enforcement: Monitoring, control and surveillance (MCS)*** The PRIPHC02 **RECOMMENDED** enhancement of coordination of MCS activities to result in a common, integrated enforcement report for each Contracting Party to facilitate assessment of compliance efforts, trends and input into management decisions.	Medium	Contracting Parties	2021-24	**Pending**: To be incorporated into the Contracting Party National Reports at each Annual Meeting. Next National Report will be provided by each Contracting Party for the AM099.

REF#	RECOMMENDATION	PRIORITY	RESPONSIBILITY	TIMELINE	UPDATE/STATUS
PRIPHC02 –Rec.15 (para. 106)	The PRIPHC02 **RECOMMENDED** that the Commission re-assess the 'derby-style' fisheries management concept in operation in IPHC Regulatory Area 2A in terms of available resources, impact on validity of monitoring results, and safety of fishers, and amend the management processes, if and as necessary.	High	IPHC Secretariat; NOAA-Fisheries	2020	**In progress**: The IPHC Secretariat is coordinating with relevant Contracting Party domestic agencies regarding shifting management of all Pacific halibut fisheries in IPHC Regulatory Area 2A from the IPHC to the relevant domestic agencies. At IM095, the Commission requested: IM095 (para. 89) *The Commission **WELCOMED** the PFMC's commitment to transition management of Pacific halibut fisheries in IPHC Regulatory Area 2A from the IPHC to domestic agencies and **REQUESTED** that the IPHC Secretariat continue to support this process in the short-term, with the aim of transitioning management of the fishery to the domestic agencies at the earliest opportunity.* See paper **IPHC-2022-AM098-14** for the latest iteration. Handover is expected late 2022/early 2023 and the PFMC and NOAA-Fisheries have confirmed this is on-track.
PRIPHC02 –Rec.16 (para. 108)	***Compliance and enforcement: Follow-up on infringements*** The PRIPHC02 **RECOMMENDED** that the IPHC request information regarding Contracting Party follow-up of infringements, to assist in determining the overall efficacy of MCS and enforcement activities. This would support best practices with respect to transparency.	High	IPHC Secretariat; Commission; Contracting Parties	2020	**Ongoing**: The IPHC Secretariat has requested this information be provided by domestic agencies via the Contracting Party National Reports to the Commission.
PRIPHC02 –Rec.17 (para. 109)	The PRIPHC02 **RECOMMENDED** that the Commission improve the process of Contracting Party reporting to the Commission by aggregating individual agency reports into a consolidated, standardised, Contracting Party report to the Commission.	Medium	IPHC Secretariat; Contracting Parties	2020	**Completed**: The IPHC Secretariat made this request in 2020. Consolidated Contracting Party National Reports are now the standard.
PRIPHC02 –Rec.18 (para. 124)	***Governance: Decision-making*** The PRIPHC02 **RECOMMENDED** that the IPHC Rules of Procedure be modified to include a clear category and recognition for observer organisations, which would be in addition to the general public.	Low	IPHC Secretariat	2020-21	**Completed**: IPHC Rules of Procedure (2020) published on 7 February 2020.

REF#	RECOMMENDATION	PRIORITY	RESPONSIBILITY	TIMELINE	UPDATE/STATUS
PRIPHC02 –Rec.19 (para. 128)	***Governance: Dispute settlement*** The PRIPHC02 **RECOMMENDED** updating the rules of procedure to reflect intersessional decision-making approaches.	Medium	IPHC Secretariat	2020-21	**Completed**: IPHC Rules of Procedure (2020) published on 7 February 2020. Further amendments were made in 2021.
PRIPHC02 –Rec.20 (para. 137)	***Governance: Transparency*** The PRIPHC02 **RECOMMENDED** that the significant level of transparency achieved across Commission business continue to be improved.	High	Commission; IPHC Secretariat;	2020-24	**Completed & Ongoing**: Monitor progress through the annual IPHC meeting cycle and improve as identified. In June of 2022, the SRB made the following noting and recommendation of relevance: SRB020–Rec.05 (para. 36) The SRB **NOTED** the exceptional level of transparency and commitment to the principles of open science represented by the Secretariat's data and code-sharing practices and, therefore, **RECOMMENDED** that the Secretariat consider producing peer-reviewed data report publications, which would (a) enhance outreach to potential external data users and (b) allow for tracking external use of IPHC data and resources.
PRIPHC02 –Rec.21 (para. 146)	***International cooperation: Relationship to non-Contracting Parties*** The PRIPHC02 **RECOMMENDED** that the Commission prioritise scientific work to confirm the full range of the Pacific halibut stock.	High	IPHC Secretariat;	2020-24	**In progress**: There are three non-Contracting Parties who exploit Pacific halibut: Russia, Rep. of Korea and Japan. Most recently we have engaged Russian scientists working on Pacific halibut through PICES (https://meetings.pices.int/).
PRIPHC02 –Rec.22 (para. 147)	The PRIPHC02 **RECOMMENDED** that if the full range of the Pacific halibut stock extends outside the Convention Area, the Contracting Parties invite collaboration with all parties involved in the harvest of this stock, to ensure science and management includes accurate data regarding all removals from the stock.	Low/ Medium	IPHC Secretariat	2020-24	**In progress**: The IPHC Secretariat is engaging with other countries harvesting Pacific halibut via PICES as a first step. Known harvesters are Russia, Rep. of Korea and Japan with the latter two harvesting very minor levels at the extremity of Pacific halibut distribution in the western Pacific.

REF#	RECOMMENDATION	PRIORITY	RESPONSIBILITY	TIMELINE	UPDATE/STATUS
PRIPHC02 –Rec.23 (para. 156)	***Efficiency and transparency of financial and administrative management: Availability of resources for IPHC activities*** The PRIPHC02 **RECOMMENDED** the continued establishment of a Business Continuity Plan (BCP), which will serve to strengthen the long-term viability of IPHC Secretariat functioning and accountability, in line with best practices of an organisation of its size and breadth. Prioritising a financial and administrative BCP, with the ultimate goal of establishing a comprehensive BCP for the IPHC Secretariat as a whole.	High	IPHC Secretariat; FAC	2020	**Completed**: The IPHC Secretariat has developed and implemented a BCP. Periodic review will ensure BC is maintained.
PRIPHC02 –Rec.24 (para. 162)	***Efficiency and transparency of financial and administrative management: Efficiency and cost-effectiveness*** The PRIPHC02 **RECOMMENDED** the FAC produce a report detailing the actual FAC meeting and that the presentation of the report be incorporated into the Annual Meeting agenda and report, along with the final decisions of the Commission.	High	FAC; IPHC Secretariat	2020-24	**Completed**: The first report of the IPHC Finance and Administration Committee (FAC) was adopted on 4 February 2020, and presented to the Commission at its 96th Session for consideration.
PRIPHC02 –Rec.25 (para. 165)	***Efficiency and transparency of financial and administrative management: Advisory structure*** The PRIPHC02 **RECOMMENDED** that when revisiting PRIPHC01 Recommendation 3.1 on unifying subsidiary bodies, treat the CB and PAB as non-science process and maintain separated RAB and MSAB at least until the 2021 adoption and implementation of a new management strategy.	N/A	Commission	N/A	**Completed & Ongoing**: The Commission agreed to keep the two subsidiary bodies separate moving forward.
PRIPHC02 –Rec.26 (para. 166)	The PRIPHC02 **RECOMMENDED** that continued support for high quality stakeholder engagement through the science-focused subsidiary bodies (RAB and MSAB) or any future subsidiary bodies be maintained.	High	Commission; IPHC Secretariat	2020-24	**Completed & Ongoing**: The Commission agreed to keep the two subsidiary bodies separate moving forward, and for them to be enhanced wherever feasible.

INTERNATIONAL PACIFIC HALIBUT COMMISSION 5-YEAR PROGRAM OF INTEGRATED RESEARCH AND MONITORING (2022-26)

PREPARED BY: IPHC SECRETARIAT (D. WILSON, J. PLANAS, I. STEWART, A. HICKS, B. HUTNICZAK, R. WEBSTER, & J. JANNOT; 24 OCTOBER 2022)

PURPOSE

To provide the Commission with an annual opportunity to comment and amend the IPHC's 5-year Program of Integrated Research and Monitoring (2022-26) (the Plan).

BACKGROUND

Recalling that:

a) the IPHC Secretariat conducts activities to address key issues identified by the Commission, its subsidiary bodies, the broader stakeholder community, and the IPHC Secretariat;

b) the process of identifying, developing, and implementing the IPHC's science-based activities involves several steps that are circular and iterative in nature, but result in clear project activities and associated deliverables;

c) the process includes developing and proposing projects based on direct input from the Commission, the experience of the IPHC Secretariat given its broad understanding of the resource and its associated fisheries, and concurrent consideration by relevant IPHC subsidiary bodies, and where deemed necessary, including by the Commission, additional external peer review;

d) the IPHC Secretariat commenced implementation of the new Plan in 2022 and will keep the Plan under review on an ongoing basis.

Also recalling that an overarching goal of the IPHC 5-year Program of Integrated Research and Monitoring (2022-26) is to promote integration and synergies among the various research and monitoring activities of the IPHC Secretariat in order to improve knowledge of key inputs into the Pacific halibut stock assessment, and Management Strategy Evaluation (MSE) processes, thereby providing the best possible advice for management decision making processes.

The 1st iteration of the Plan was formally presented to the Commission at IM097 in November 2021 (IPHC-2021-IM097-12) for general awareness of the documents ongoing development. At the 98th Session of the IPHC Annual Meeting (AM098) in January 2022, the Commission requested a number of amendments which were subsequently incorporated.

The Plan had already been through two cycles of review and improvement with the Scientific Review Board (SRB).

In 2022, the plan went through two further cycles of review and improvement with the SRB, with amendments being suggested and incorporated accordingly, and which resulted in the version now provided at Appendix A.

The current version was presented to the Commission at it's annual Work Meeting in September 2022, and will now move to an annual comment and amendment process at each years Interim and then Annual Meetings.

DISCUSSION

The Commission should note that:

a) the intention is to ensure that the new integrated plan is kept as a '*living plan*', and is reviewed and updated annually based on the resources available to undertake the work of the Commission (e.g. internal and external fiscal resources, collaborations, internal expertise);

b) the plan focuses on core responsibilities of the Commission; and any redirection provided by the Commission;

c) each year the SRB may choose to recommend modifications to the current Plan, and that any modifications subsequently made would be documented both in the Plan itself, and through reporting back to the SRB and then the Commission.

RECOMMENDATION

That the Commission:

1) **NOTE** paper IPHC-2022-IM098-06 which provides the IPHC 5-year program of Integrated Research and Monitoring (2022-26).

APPENDICES

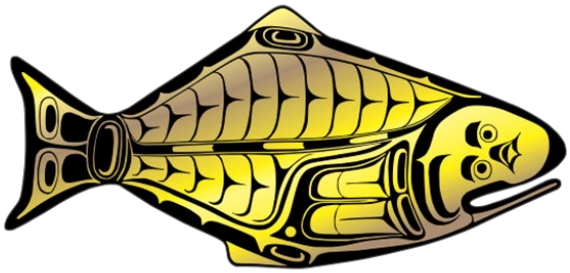
Appendix A: IPHC 5-Year Program of Integrated Research and Monitoring (2022-26) (D. Wilson, J. Planas, I. Stewart, A. Hicks, B. Hutniczak, R. Webster, & J. Jannot)

INTERNATIONAL PACIFIC HALIBUT COMMISSION

5-YEAR PROGRAM OF INTEGRATED RESEARCH AND MONITORING

(2022 - 2026)

INTERNATIONAL PACIFIC



HALIBUT COMMISSION

Commissioners

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

Executive Director

David T. Wilson, Ph.D.

BIBLIOGRAPHIC ENTRY

IPHC 2022. International Pacific Halibut Commission 5-Year program of integrated research and monitoring (2022-26). Seattle, WA, U.S.A. *IPHC–2022-5YPIRM, 52 pp.*

INTERNATIONAL PACIFIC HALIBUT COMMISSION

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ACRONYMS

AM	Annual Meeting
CB	Conference Board
DMR	Discard Mortality Rate
FAC	Finance and Administration Committee
FISS	Fishery-Independent Setline Survey
FSC	First Nations Food, Social, and Ceremonial [fishery]
IM	Interim Meeting
IPHC	International Pacific Halibut Commission
MSAB	Management Strategy Advisory Board
MSE	Management Strategy Evaluation
OM	Operating Model
PAB	Processor Advisory Board
PDO	Pacific Decadal Oscillation
PHMEIA	Pacific halibut multiregional economic impact assessment [model]
QAQC	Quality assurance/quality control
RAB	Research Advisory Board
SHARC	Subsistence Halibut Registration Certificates
SRB	Scientific Review Board
TCEY	Total Constant Exploitation Yield
U.S.A.	United States of America
WM	Work Meeting

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

TABLE OF CONTENTS

EXECUTIVE SUMMARY

An overarching goal of the *IPHC 5-Year Program of Integrated Research and Monitoring (2022-26)* is to promote integration and synergies among the various research and support activities of the IPHC Secretariat in order to improve our knowledge of key inputs into the Pacific halibut stock assessment and Management Strategy Evaluation (MSE) processes, and to provide the best possible advice for management decision-making processes.

Along with the implementation of the short- and medium-term activities contemplated in this *IPHC 5-Year Program of Integrated Research and Monitoring (2022-26)*, and in pursuit of the overarching objective, the IPHC Secretariat will also aim to:

1) undertake cutting-edge research programs in fisheries research in support of Pacific halibut fisheries management;
2) undertake groundbreaking methodological research;
3) undertake applied research;
4) establish new collaborative agreements and interactions with research agencies and academic institutions;
5) promote the international involvement of the IPHC by continued and new participation in international scientific organizations and by leading international science and research collaborations;
6) effectively communicate IPHC research outcomes;
7) incorporate talented students and early researchers in research activities contemplated.

The research and monitoring activities conducted by the IPHC Secretariat are directed towards fulfilling the following four (4) objectives within areas of data collection, biological and ecological research, stock assessment, and Management Strategy Evaluation (MSE). In addition, the IPHC responds to Commission requests for additional inputs to management and policy development which are classified under management support.

The Secretariat's success in implementing the *IPHC 5-Year Program of Integrated Research and Monitoring (2022-26)* will be measured according to the following four criteria relevant to the stock assessment, the MSE and for all inputs to IPHC management:

1) Timeliness – was the research conducted, analyzed, published, and provided to the Commission at the appropriate points to be included in annual management decisions?
2) Accessibility – was the research published and presented in such a way that it was available to other scientists, stakeholders, and decision-makers?
3) Relevance – did the research improve the perceived accuracy of the stock assessment, MSE, or decisions made by the Commission?
4) Impact – did the research allow for more precision or a better estimate of the uncertainty associated with information for use in management?
5) Reliability – has research resulted in more consistent information provided to the Commission for decision-making.

1. Introduction

The International Pacific Halibut Commission (IPHC) is a public international organization so designated via Presidential Executive Order 11059 and established by a Convention between Canada and the United States of America. The IPHC Convention was signed on 2 March 1923, ratified on 21 July 1924, and came into effect on 21 October 1924 upon exchange. The Convention has been revised several times since, to extend the Commission's authority and meet new conditions in the fishery. The most recent change occurred in 1979 and involved an amendment to the 1953 Halibut Convention. The 1979 amendment, termed a "protocol", was precipitated in 1976 by Canada and the United States of America extending their jurisdiction over fisheries resources to 200 miles. The 1979 Protocol along with the U.S. legislation that gave effect to the Protocol (Northern Pacific Halibut Act of 1982) has affected the way the fisheries are conducted, and redefined the role of IPHC in the management of the fishery. Canada does not require specific enabling legislation to implement the protocol.

The basic texts of the Commission are available on the IPHC website: https://www.iphc.int/the-commission, and prescribe the mission of the organization as:

*"..... **to develop the stocks of [Pacific] halibut in the Convention waters to those levels which will permit the optimum yield from the fishery and to maintain the stocks at those levels**. ....." IPHC Convention*, Article I, sub-article I, para. 2). The IPHC Convention Area is detailed in Fig. 1.

The IPHC Secretariat, formed in support the Commission's activities, is based in Seattle, WA, U.S.A. As its shared vision, ***the IPHC Secretariat aims to deliver positive economic, environmental, and social outcomes for the Pacific halibut resource for Canada and the U.S.A. through the application of rigorous science, innovation, and the implementation of international best practice.***

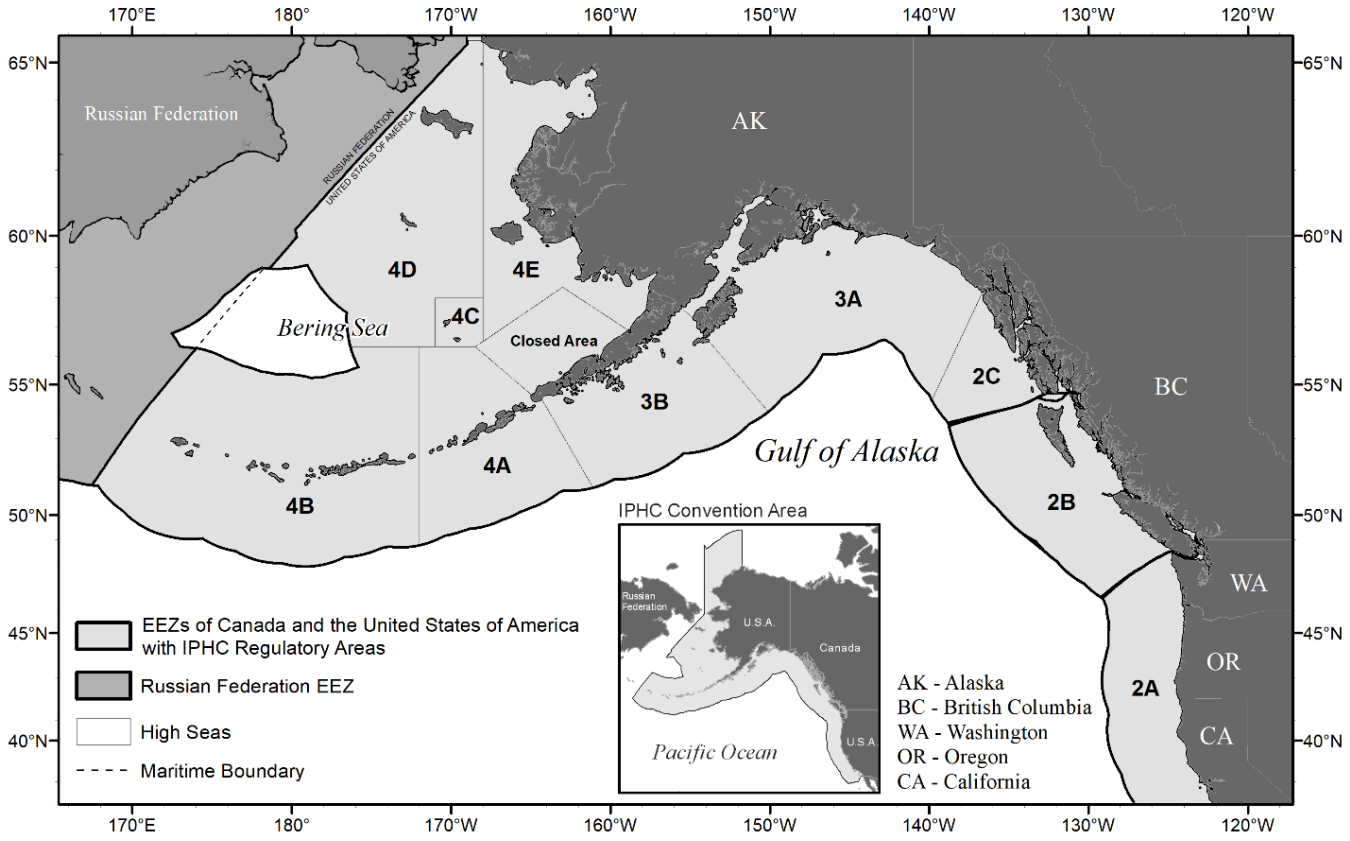

Figure 1. Map of the IPHC Convention Area (map insert) and IPHC Regulatory Areas.

2. Objectives

The IPHC has a long-standing history (since 1923) of collecting data, undertaking research, and stock assessment, devoted to describing and understanding the Pacific halibut (*Hippoglossus stenolepis*) stock and the fisheries that interact with it.

The IPHC Secretariat conducts activities to address key issues identified by the Commission, its subsidiary bodies, the broader stakeholder community, and of course, the IPHC Secretariat itself. The process of identifying, developing, and implementing our science-based activities involves several steps that are circular in nature, but result in clear research activities and associated deliverables. The process includes developing and proposing projects based on direct input from the Commission, the experience of the IPHC Secretariat given our broad understanding of the resource and its associated fisheries, and concurrent consideration by relevant IPHC subsidiary bodies, and where deemed necessary, additional external peer review.

Over the last five years (2017-2021), the research conducted by the IPHC Secretariat has been guided by a 5-Year Biological and Ecosystem Science Research Plan (IPHC–2019–BESRP-5YP) that aimed at improving knowledge on the biology of Pacific halibut in order to improve the accuracy of the stock assessment and in the management strategy evaluation (MSE) process. The IPHC-2019-BESRP-5YP contemplated research activities in five focal areas, namely Migration and Distribution, Reproduction, Growth and Physiological Condition, Discard Mortality Rates and Survival, and Genetics and Genomics. Research activities were highly integrated with the needs of stock assessment and MSE by their careful alignment with biological uncertainties and parameters, and the resulting prioritization (Appendix I). The outcomes of the IPHC-2019-BESRP-5YP have provided key inputs into stock assessment and the MSE process and, importantly, have provided foundational information for the successful pursuit of continuing and novel objectives within the new 5-Year Program of Integrated Research and Monitoring (2022-2026) (5YPIRM) (Appendix I).

The 2nd Performance Review of the IPHC (IPHC-2019-PRIPHC02-R), carried out over the course of 2019, also provided a range of recommendations to the Commission on ways in which it could continue to improve on the quality of scientific advice being provided to the Commission. There were nine (9) specific recommendations as provided below:

Science: Status of living marine resources

PRIPHC02–Rec.03 (para. 44) The PRIPHC02 ***RECOMMENDED*** *that opportunities to engage with western Pacific halibut science and management agencies be sought, to strengthen science links and data exchange. Specifically, consider options to investigate pan-Pacific stock structure and migration of Pacific halibut.*

PRIPHC02–Rec.04 (para. 45) The PRIPHC02 ***RECOMMENDED*** *that:*

a) further efforts be made to lead and collaborate on research to assess the ecosystem impacts of Pacific halibut fisheries on incidentally caught species (retained and/or discarded);
b) where feasible, this research be incorporated within the IPHC's 5-Year Research Plan (https://www.iphc.int/uploads/pdf/besrp/2019/iphc-2019-besrp-5yp.pdf);
c) findings from the IPHC Secretariat research and that of the Contracting Parties be readily accessible via the IPHC website.

Science: Quality and provision of scientific advice

PRIPHC02–Rec.05 (para. 63) The PRIPHC02 ***RECOMMENDED*** *that simplified materials be developed for RAB and especially MSAB use, including training/induction materials.*

PRIPHC02–Rec.06 (para. 64) The PRIPHC02 ***RECOMMENDED*** *that consideration be given to amending the Rules of Procedure to include appropriate fixed terms of service to ensure SRB peer review remains independent and fresh; a fixed term of three years seems appropriate, with no more than one renewal.*

PRIPHC02–Rec.07 (para. 65) The PRIPHC02 ***RECOMMENDED*** *that the peer review process be strengthened through expanded subject specific independent reviews including data quality and standards, the FISS, MSE, and biological/ecological research; as well as conversion of "grey literature" to primary literature publications. The latter considered important to ongoing information outreach efforts given the cutting-edge nature of the Commission's scientific work.*

PRIPHC02–Rec.08 (para. 66) The PRIPHC02 ***RECOMMENDED*** *that the IPHC Secretariat develop options for simple graphical summaries (i.e. phase plot equivalents) of fishing intensity and spawning stock biomass for provision to the Commission.*

Conservation and Management: Data collection and sharing

PRIPHC02–Rec.09 (para. 73) The PRIPHC02 ***RECOMMENDED*** *that observer coverage be adjusted to be commensurate with the level of fishing intensity in each IPHC Regulatory Area.*

Conservation and Management: Consistency between scientific advice and fishery Regulations adopted

PRIPHC02–Rec.10 (para. 82) The PRIPHC02 ***RECOMMENDED*** *that the development of MSE to underpin multi-year (strategic) decision-making be continued, and as multi-year decision making is implemented, current Secretariat capacity usage for annual stock assessments should be refocused on research to investigate MSE operating model development (including consideration of biological and fishery uncertainties) for future MSE iterations and regularised multi-year stock assessments.*

PRIPHC02–Rec.11 (para. 83) The PRIPHC02 ***RECOMMENDED*** *that ongoing work on the MSE process be prioritised to ensure there is a management framework/procedure with minimal room for ambiguous interpretation, and robust pre-agreed mortality limit setting frameworks.*

The work outlined in this document builds on the previous a 5-Year Biological and Ecosystem Science Research Plan (IPHC–2019–BESRP-5YP), closing completed projects, extending efforts where needed, and adding new avenues in response to new information. Appendix I provides a detailed summary of the previous plan and the status of the work specifically undertaken. Key highlights relevant to the stock assessment and MSE include:

- Completion of the genetic assay for determining sex from tissue samples, processing of commercial fishery samples collected during 2017-2020, inclusion of this information in the 2019 and subsequent stock assessments, and transfer of this effort from research to ongoing monitoring.
- Incremental progress toward population-level sampling and analysis of maturity and fecundity.
- Continued development of the understanding of physiological and environmental mechanisms determining growth for future field application.
- Published estimates of discard mortality rates for use in data processing and management accounting.
- Collection of genetic samples and genome sequencing to provide a basis for ongoing evaluation of stock structure at population-level and finer scales.

All previously described research areas continue to represent critical areas of uncertainty in the stock assessment and thus are closely linked to management performance. The previous 5-year plan was successful in either

providing direct new information to the stock assessment or building the foundation for the collection/analysis of such information in this updated plan. As noted below, some new priorities have emerged, and others have evolved based on the work completed to date. The incorporation of research objectives in the 5YPIRM that address climate change as a factor influencing Pacific halibut biology and ecology as well as fishery performance and dynamics constitutes a timely and relevant contribution towards advancing IPHC-led research to the forefront of fisheries science.

An **overarching goal** of the *IPHC 5-Year Program of integrated research and monitoring (2022-26)* is therefore to promote integration and synergies among the various research and support activities of the IPHC Secretariat in order to improve our knowledge of key inputs into the Pacific halibut stock assessment and MSE processes, in order to provide the best possible advice for management decision-making processes.

Along with the implementation of the short- and medium-term activities contemplated in this *IPHC 5-Year Program of Integrated Research and monitoring (2022-26)*, and in pursuit of the overarching objective, the IPHC Secretariat will also aim to:

1) undertake cutting-edge research programs in fisheries research in support of fisheries management of Pacific halibut;
2) undertake groundbreaking methodological research;
3) undertake applied research;
4) establish new collaborative agreements and interactions with research agencies and academic institutions;
5) promote the international involvement of the IPHC by continued and new participation in international scientific organizations and by leading international science and research collaborations.
6) effectively communicate IPHC research outcomes
7) incorporate talented students and early researchers in research activities contemplated.

The research and monitoring activities conducted by the IPHC Secretariat are directed towards fulfilling the following four (4) **objectives** within areas of data collection, biological and ecological research, stock assessment, and MSE. In addition, the IPHC responds to Commission requests for additional inputs to management and policy development which are classified under management support. The overall aim is to provide a program of integrated research and monitoring (Fig 2):

Research

1) **Stock assessment**: apply the resulting knowledge to improve the accuracy and reliability of the current stock assessment and the characterization of uncertainty in the resultant stock management advice provided to the Commission;
2) **Management Strategy Evaluation (MSE)**: to develop an accurate, reliable, and informative MSE process to appropriately characterize uncertainty and provide for the robust evaluation of the consequences of alternative management options, known as harvest strategies, using defined conservation and fishery objectives;
3) **Biology and Ecology**: identify and assess critical knowledge gaps in the biology and ecology of Pacific halibut within its known range, including the influence of environmental conditions on population and fishery dynamics;

Monitoring

4) **Monitoring**: collect representative fishery dependent and fishery-independent data on the distribution, abundance, biology, and demographics of Pacific halibut through ongoing monitoring activities;

Integrated management support

5) **Additional inputs**: respond to Commission requests for any additional information supporting management and policy development.

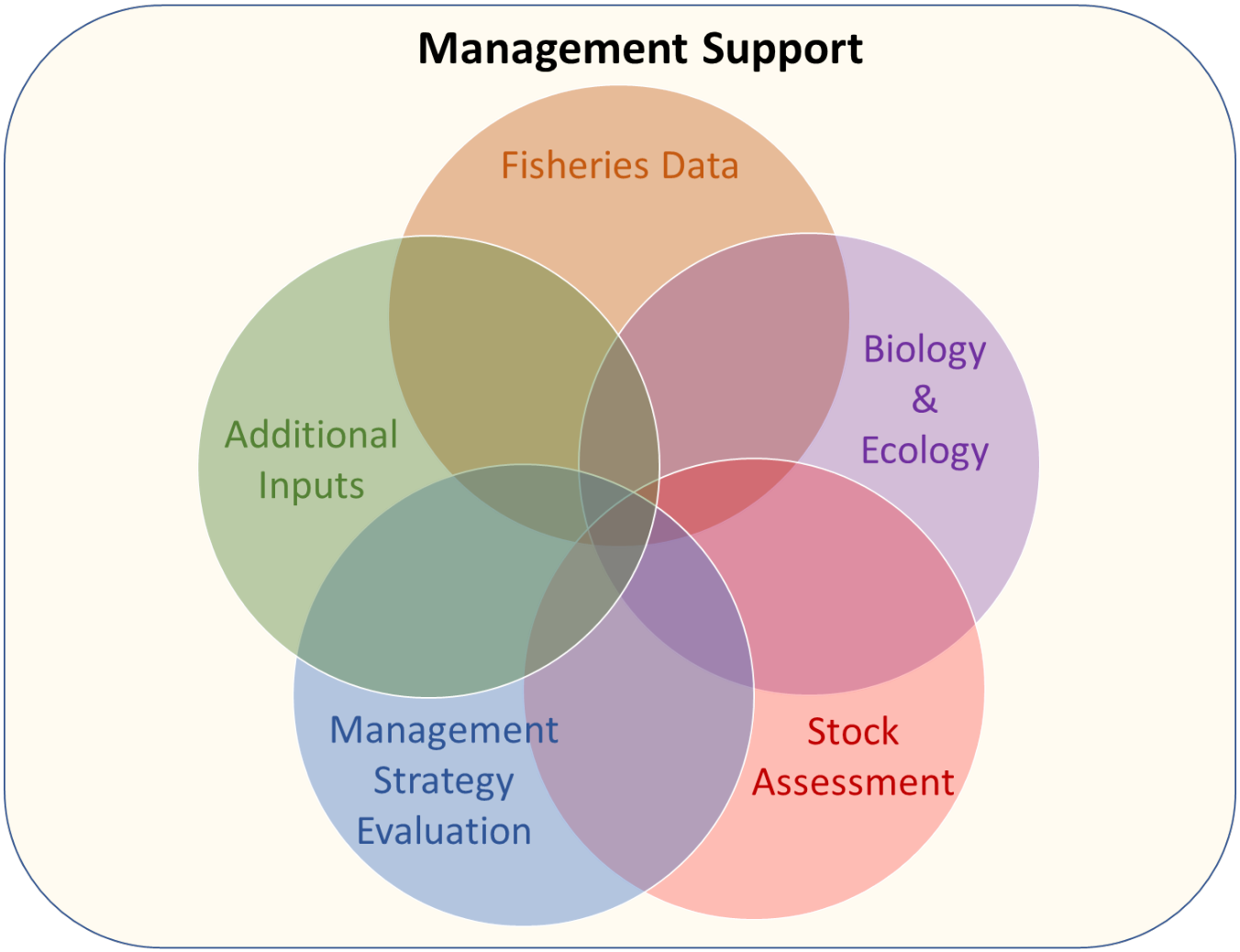

Figure 2. Core areas of the IPHC's program of integrated research and monitoring providing management support.

3. Strategy

The IPHC Secretariat has five (5) enduring strategic goals in executing our mission, including our overarching goal and associated science and research objectives, as articulated in our Strategic Plan (IPHC Strategic Plan (2019-23)): 1) To operate in accordance with international best practice; 2) Be a world leader in scientific excellence and science-based decision making; 3) To foster collaboration (within Contracting Parties and internationally) to enhance our science and management advice; 4) Create a vibrant IPHC culture; and 5) Set the

standard for fisheries commissions globally.

Although priorities and tasking will change over time in response to events and developments, the Strategic Plan provides a framework to standardise our approach when revising or setting new priorities and tasking. The Strategic goals as they apply to the science and research activities of the IPHC Secretariat, will be operationalised through a multi-year tactical activity matrix at the organisational and management unit (Branch) level (Fig. 3). The tactical activity matrix is described in the sections below and has been developed based on the core needs of the Commission, in developing and implementing robust, scientifically-based management decisions on an annual, and multi-year level. Relevant IPHC subsidiary bodies will be involved in project development and ongoing review.

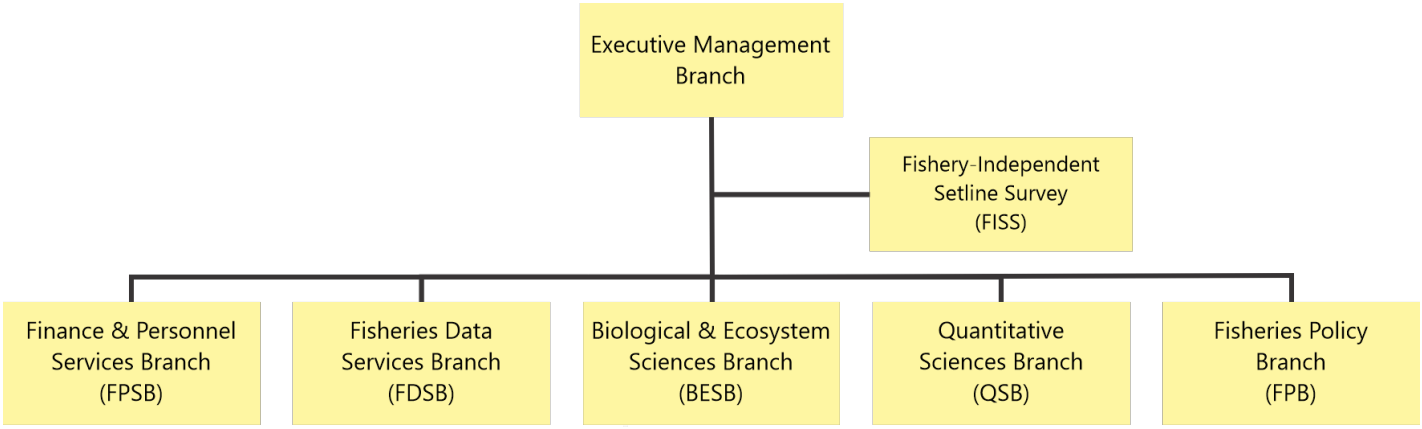

Figure 3. IPHC Secretariat organisation chart (2022).

4. Measures of Success

The Secretariat's success in implementing the *IPHC 5-Year Program of Integrated Research and Monitoring (2022-26)* will be measured according to the following four criteria relevant to the stock assessment, the MSE and for all inputs to IPHC management:

1) Timeliness – was the research conducted, analyzed, published, and provided to the Commission at the appropriate points to be included in annual management decisions?
2) Accessibility – was the research published and presented in such a way that it was available to other scientists, stakeholders, and decision-makers?
3) Relevance - did the research improve the perceived accuracy of the stock assessment, MSE or decisions made by the commission?
4) Impact – did the research allow for more precision or a better estimate of the uncertainty associated with information for use in management?
5) Reliability - has research resulted in more consistent information provided to the Commission for decision-making.

4.1 Delivery of specified products

Each project line item will contain specific deliverables that constitute useful inputs into the stock assessment and the management strategy evaluation process, as well as support their implementation in the decision-making process at the level of the Commission.

4.2 Communication

The IPHC Secretariat will disseminate information about the activities contemplated in the IPHC 5-Year Program of Integrated Research and Monitoring (2022-2026) and the resulting products to Contracting Parties, stakeholders, the scientific community, and the general public through a variety of channels:

1) IPHC website (www.iphc.int);
2) Formal documentation provided for IPHC meetings (Interim and Annual Meetings, Subsidiary Body meetings, etc.);
3) Presentations at national and international scientific conferences;
4) Published reports and peer-reviewed publications (section 4.4);
5) Outreach events;
6) Social media outlets (e.g. Facebook, Twitter, LinkedIn, etc.);
7) Informal presentations and interactions with partners, stakeholders, and decision-makers at varied times and venues when needed.

4.3 External research funding

The Secretariat has set a funding goal of at least 20% of the funds for this program to be sourced from external funding bodies on an annual basis. Continuing the successful funding-recruitment strategy adopted during the previous 5-yr research plan (IPHC–2019–BESRP-5YP) (Appendix I), the Secretariat will identify and select external funding opportunities that are timely and that aim at addressing key research objectives (as outlined in Appendix II) that have important implications for stock assessment and the MSE process. The IPHC Secretariat has the necessary expertise to propose novel and important research questions to funding agencies and to recruit external collaborators from research agencies and universities as deemed necessary. The IPHC Secretariat will continue to capitalize on the strong analytical contributions of quantitative scientists to the development of biological research questions within the framework of research projects funded by external as well as internal funding sources.

4.4 Peer-reviewed journal publication

Publication of research outcomes in peer-reviewed journals will be clearly documented and monitored as a measure of success. This may include single publications at the completion of a particular project, or a series of publications throughout the project as well as at its completion. Each sub-project shall be published in a timely manner and shall be submitted no later than 12 months after the end of the research. In the sections that follow, the expected publications from each research stream and cross-stream are defined.

5. Core focal areas – Background

The goals of the main activities of the *5-Year program of integrated research and monitoring (2022-26)* are integrated across the organisation, involving 1) monitoring (fisheries-dependent and –independent data collection), and 2) research (biological, ecological), modelling (FISS and stock assessment), and MSE, as outlined in the following sub-sections. These components are closely linked to one another, and all feed into management decision-making (Fig. 4). Additionally, management-supporting information constitute a range of additional decision-making drivers within and beyond IPHC's current research and monitoring programs. The current program builds on the outcomes and experiences of the Commission arising from the implementation of the 2017-21 5-Year Biological and Ecosystem Science Research Plan (IPHC–2019–BESRP-5YP), and which is summarized in Appendix I.

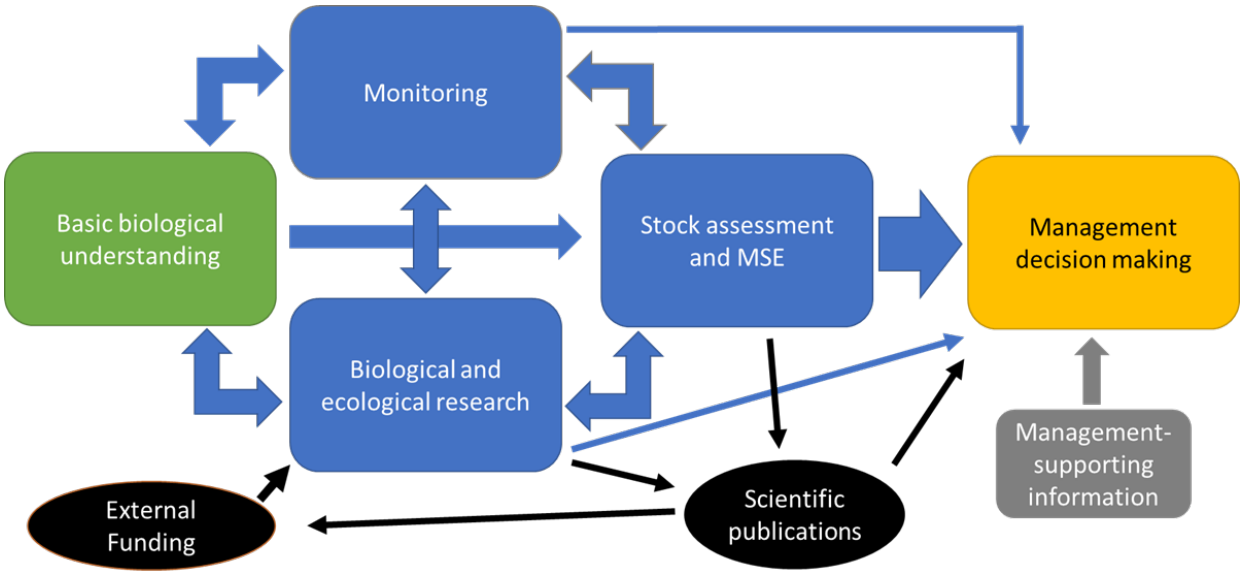

Figure 4. Flow of information from basic biological understanding of the Pacific halibut resource, through IPHC research components (monitoring, biological and ecological research, stock assessment, and MSE) to management decision-making. Management-supporting information (grey) constitute a range of additional decision-making drivers within and beyond IPHC's current research and monitoring programs. Arrows indicate the strength (size of the arrow) and direction of information exchange. Also identified (in black) are the external links from funding and scientific publications which supplement the IPHC's internal process.

5.1 Research

5.1.1 Stock Assessment

Focal Area Objective	To improve accuracy and reliability of the current stock assessment and the characterization of uncertainty in the resultant stock management advice provided to the Commission.
IPHC Website portal	https://www.iphc.int/management/science-and-research/stock-assessment

The IPHC conducts an annual stock assessment, using data from the fishery-independent setline survey (FISS), the commercial Pacific halibut and other fisheries, as well biological information from its research program. The assessment includes the Pacific halibut resource in the IPHC Convention Area, covering the Exclusive Economic Zones of Canada and the United States of America. Data sources are updated each year to reflect the most recent scientific information available for use in management decision-making.

The 2021 stock assessment relied on an ensemble of four population dynamics models to estimate the probability distributions describing the current stock size, trend, and demographics. The ensemble is designed to capture both uncertainty related to the data and stock dynamics (due to estimation) as well as uncertainty related to our understanding of the way in which the Pacific halibut stock functions and is best approximated by a statistical model (structural uncertainty).

Stock assessment results are used as inputs for harvest strategy calculations, including mortality projection tables

for the upcoming year that reflect the IPHC's harvest strategy policy and other considerations, as well as the harvest decision table which provides a direct tool for the management process. The harvest decision table uses the probability distributions from short-term (three year) assessment projections to evaluate the trade-offs between alternative levels of potential yield (catch) and the associated risks to the stock and fishery.

The stock assessment research priorities have been subdivided into four categories:

1) Assessment data collection and processing;
2) technical development;
3) biological inputs; and
4) fishery yield.

It is important to note that ongoing monitoring, including the annual FISS and directed commercial landings sampling programs is not considered research and is therefore not included in this research priority list despite the critical importance of these collections. These are described in the sections below.

5.1.2 Management Strategy Evaluation (MSE)

Focal Area Objective	To develop an accurate, reliable, and informative MSE process to appropriately characterize uncertainty and provide for the robust evaluation of the consequences of alternative management options, known as harvest strategies, using defined conservation and fishery objectives.
IPHC Website portal	https://www.iphc.int/management/science-and-research/management-strategy-evaluation

Management Strategy Evaluation (MSE) is a process to evaluate the consequences of alternative management options, known as harvest strategies. MSE uses a simulation tool to determine how alternative harvest strategies perform given a set of pre-defined fishery and conservation objectives, taking into account the uncertainties in the system and how likely candidate harvest strategies are to achieve the chosen management objectives.

MSE is a simulation technique based on modelling each part of a management cycle. The MSE uses an operating model to simulate the entire population and all fisheries, factoring in management decisions, the monitoring program, the estimation model, and potential ecosystem effects using a closed-loop simulation.

Undertaking an MSE has the advantage of being able to reveal the trade-offs among a range of possible management decisions. Specifically, to provide the information on which to base a rational decision, given harvest strategies, preferences, and attitudes to risk. The MSE is an essential part of the process of developing, evaluating and agreeing to a harvest strategy.

The MSE process involves:

- Defining fishery and conservation objectives with the involvement of stakeholders and managers;
- Identifying harvest strategies (a.k.a. management procedures) to evaluate;
- Simulating a Pacific halibut population using those harvest strategies;
- Evaluating and presenting the results in a way that examines trade-offs between objectives;
- Applying a chosen harvest strategy for the management of Pacific halibut;
- Repeating this process in the future in case of changes in objectives, assumptions, or expectations.

There are many tasks that would continue to improve the MSE framework and the presentation of future results to the Commission. The tasks can be divided into five general categories, which are common to MSE in general:

1. **Objectives**: The goals and objectives that are used in the evaluation.
2. **Management Procedures (MPs)**: Specific, well-defined management procedures that can be coded in the MSE framework to produce simulated Total Constant Exploitation Yields (TCEY) for each IPHC Regulatory Area.
3. **Framework**: The specifications and computer code for the closed-loop simulations including the operating model and how it interacts with the MP.
4. **Evaluation**: The performance metrics and presentation of results. This includes how the performance metrics are evaluated (e.g. tables, figures, and rankings), presented to the Commission and its subsidiary bodies, and disseminated for outreach.
5. **Application**: Specifications of how an MP may be applied in practice and re-evaluated in the future, including responses to exceptional circumstances.

All these categories provide inputs and outputs of the MSE process, but the Framework category benefits most from the integration of biological and ecosystem research because the operating model, the simulation of the monitoring program, the estimation model, and potential ecosystem effects are determined from this knowledge.

Outcomes of the MSE process will not only inform the Commission on trade-offs between harvest strategies and assist in choosing an optimal strategy for management of the Pacific halibut resource but will inform the prioritization of research activities related to fisheries monitoring, biological and ecological research, stock assessment, and fishery socioeconomics.

5.1.3 Biology and Ecology

Focal Area Objective	To identify and assess critical knowledge gaps in the biology and ecology of Pacific halibut within its known range, including the influence of environmental conditions on population and fishery dynamics.
IPHC Website portal	https://www.iphc.int/management/science-and-research/biological-and-ecosystem-science-research-program-bandesrp

Since its inception, the IPHC has had a long history of research activities devoted to describe and understand the biology of the Pacific halibut. At present, the main objectives of the Biological and Ecosystem Science Research Program at IPHC are to: 1) identify and assess critical knowledge gaps in the biology of the Pacific halibut; 2) understand the influence of environmental conditions in the biology of the Pacific halibut and its fishery; and 3) apply the resulting knowledge to reduce uncertainty in current stock assessment models.

The primary biological research activities at the IPHC that follow Commission objectives and that are selected for their important management implications are identified and described in the proposed 5-Year Research Plan for the period 2022-2026. An overarching goal of the 5-Year Research Plan is to promote integration and synergies among the various research activities led by the IPHC to improve our knowledge of key biological inputs that feed into the stock assessment and MSE process. The goals of the main research activities of the 5-Year Research Plan are therefore aligned and integrated with the IPHC stock assessment and MSE processes. The IPHC Secretariat conducts research activities to address key biological issues based on the IPHC Secretariat's own input as well as input from the IPHC Commissioners, stakeholders and particularly from specific subsidiary bodies to the IPHC, including the Scientific Review Board (SRB) and the Research Advisory Board (RAB).

The biological research activities contemplated in the 5-Year Research Plan and their specific aims are detailed in Section 6. Overall, the biological research activities at the IPHC aim to provide information on 1) factors that influence the biomass of the Pacific halibut population (e.g. distribution and movement of fish among IPHC Regulatory Areas, growth patterns and environmental influences on growth in larval, juvenile and adult fish, drivers of changes in size-at-age); 2) the spawning (female) population (e.g. reproductive maturity, skipped spawning, reproductive migrations); and 3) resulting changes in population dynamics. Furthermore, the research activities of IPHC also aim to provide information on the survival of regulatory-discarded Pacific halibut in the directed fisheries with the objective to refine current estimates of discard mortality rates and develop best handling practices, and reduce whale depredation and Pacific halibut bycatch through gear modifications and through a better understanding of behavioral and physiological responses of Pacific halibut to fishing gear.

5.2 Monitoring

Focal Area Objective	To collect fishery-dependent and fishery-independent data on the distribution, abundance, and demographics of Pacific halibut, as well as other key biological data, through ongoing monitoring activities.
IPHC Website portal	***Fishery-dependent data:*** • https://www.iphc.int/datatest/commercial-fisheries • https://www.iphc.int/data/datatest/non-directed-commercial-discard-mortality-fisheries • https://www.iphc.int/data/datatest/pacific-halibut-recreational-fisheries-data • https://www.iphc.int/datatest/subsistence-fisheries • https://www.iphc.int/data/time-series-datasets ***Fishery-independent data:*** • https://www.iphc.int/management/science-and-research/fishery-independent-setline-survey-fiss • https://www.iphc.int/data/datatest/fishery-independent-setline-survey-fiss • https://www.iphc.int/datatest/data/water-column-profiler-data

5.2.1 Fishery-dependent data

The IPHC estimates all Pacific halibut removals taken in the IPHC Convention Area and uses this information in its yearly stock assessment and other analyses. The data are compiled by the IPHC Secretariat and include data from Federal and State agencies of each Contracting Party. Specific activities in this area are described below.

5.2.1.1 Directed commercial fisheries data

The IPHC Secretariat collects logbooks, otoliths, tissue samples, and associated sex-length-weight data from directed commercial landings coastwide (Fig. 5). A sampling rate is determined for each port by IPHC Regulatory Area. The applicable rate is calculated from the current year's mortality limits and estimated percentages of weight of fish landed, and estimated percentages of weight sampled in that port to allow for collection of the target number of biological samples by IPHC Regulatory Area. An example of the data collected and the methods used are provided in the annually updated directed commercial sampling manual (e.g. IPHC Directed Commercial Landings Sampling Manual 2022). Directed commercial fishery landings are recorded by the Federal and State agencies of each Contracting Party and summarized each year by the IPHC. Discard mortality for the directed

commercial fishery is currently estimated using a combination of research survey (U.S.A.) and observer data (Canada).

5.2.1.2 Non-directed commercial discard mortality data

The IPHC accounts for non-directed commercial discard mortality by IPHC Regulatory Area and sector. Non-directed commercial discard mortality estimates are provided by State and Federal agencies of each Contracting Party and compiled annually for use in the stock assessment and other analyses. https://www.iphc.int/data/datatest/non-directed-commercial-discard-mortality-fisheries.

Non-directed commercial discard mortality of Pacific halibut is estimated because not all fisheries have 100% monitoring and not all Pacific halibut that are discarded are assumed to die. The IPHC relies upon information supplied by observer programs run by Contracting Party agencies for non-directed commercial discard mortality estimates in most fisheries. Non-IPHC research survey information or other sources are used to generate estimates of non-directed commercial discard mortality in the few cases where fishery observations are unavailable. Non-directed fisheries off Canada British Columbia are monitored and discard mortality information is provided to IPHC by DFO. NOAA Fisheries operates observer programs off the USA West Coast and Alaska, which monitor the major groundfish fisheries. Data collected by those programs are used to estimate non-directed commercial discard mortality.

5.2.1.3 Subsistence fisheries data

Subsistence fisheries are non-commercial, customary, and traditional use of Pacific halibut for direct personal, family, or community consumption or sharing as food, or customary trade. The primary subsistence fisheries are the treaty Indian Ceremonial and Subsistence fishery in IPHC Regulatory Area 2A off northwest Washington State (USA), the First Nations Food, Social, and Ceremonial (FSC) fishery in British Columbia (Canada), and the subsistence fishery by rural residents and federally recognized native tribes in Alaska (USA) documented via Subsistence Halibut Registration Certificates (SHARC). Subsistence fishery removals of Pacific halibut, including estimated subsistence discard mortality, are provided by State and Federal agencies of each Contracting Party, estimated, and compiled annually for use in the stock assessment and other analysis. https://www.iphc.int/datatest/subsistence-fisheries.

5.2.1.4 Recreational fisheries data

Recreational removals of Pacific halibut, including estimated recreational discard mortality, are provided by National/State agencies of each Contracting Party, estimated, and compiled annually for use in the stock assessment and other analysis. https://www.iphc.int/data/datatest/pacific-halibut-recreational-fisheries-data.

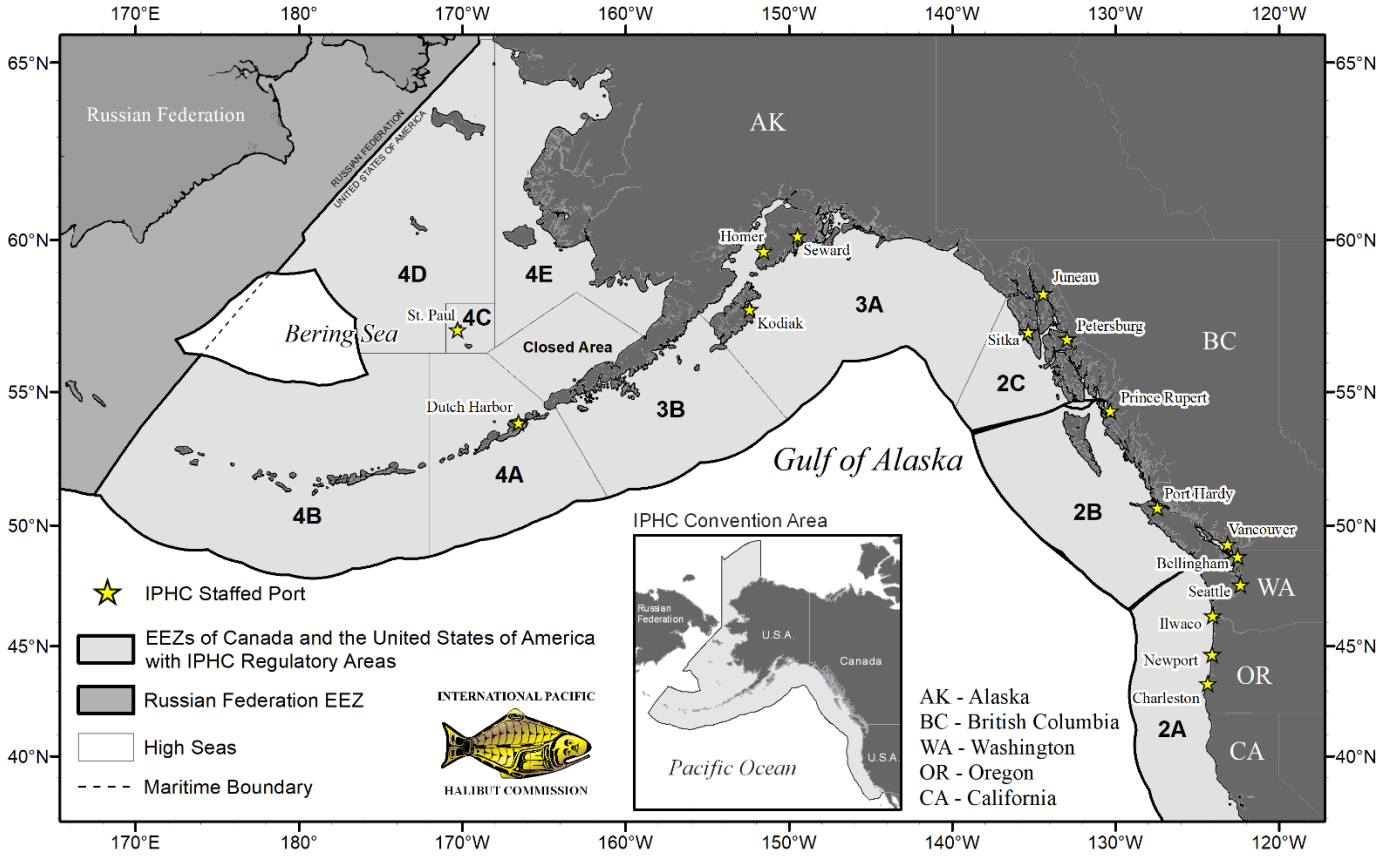

Figure 5. Ports where the IPHC has sampled directed commercial landings throughout the fishing period in recent years (note: ports sampled may change from year-to-year for operational reasons).

5.2.2 Fishery-independent data.

Data collection and monitoring activities aimed at providing a standardised time-series of biological and ecological data that is independent of the fishing fleet.

5.2.2.1 Fishery-independent setline survey (FISS)

The IPHC Fishery-Independent Setline Survey (FISS) provides catch-rate information and biological data on Pacific halibut that are independent of the fishery. These data, collected using standardized methods, bait, and gear, are used to estimate the primary index of population abundance used in the stock assessment. The FISS is restricted to the summer months but encompasses the commercial fishing grounds in the Pacific halibut fishery, and almost all known Pacific halibut habitat in Convention waters outside the Bering Sea. The standard FISS grid totals 1,890 stations (Fig. 6). Biological data collected on the FISS (e.g. the length, weight, age, and sex of Pacific halibut) are used to monitor changes in biomass, growth, and mortality. In addition, records of non-target species caught during FISS operations provide insight into bait competition, and serve as an index of abundance over time, making them valuable to the potential management and avoidance of non-target species. Environmental data are also collected including water column temperature, salinity, dissolved oxygen, pH, and chlorophyll concentration to help identify the conditions in which the fish were caught, and these data can serve as co-variates in space-time modeling used in the stock assessment. An example of the data collected and the methods used are provided in the annually updated FISS sampling manual (e.g. IPHC FISS Sampling Manual 2022).

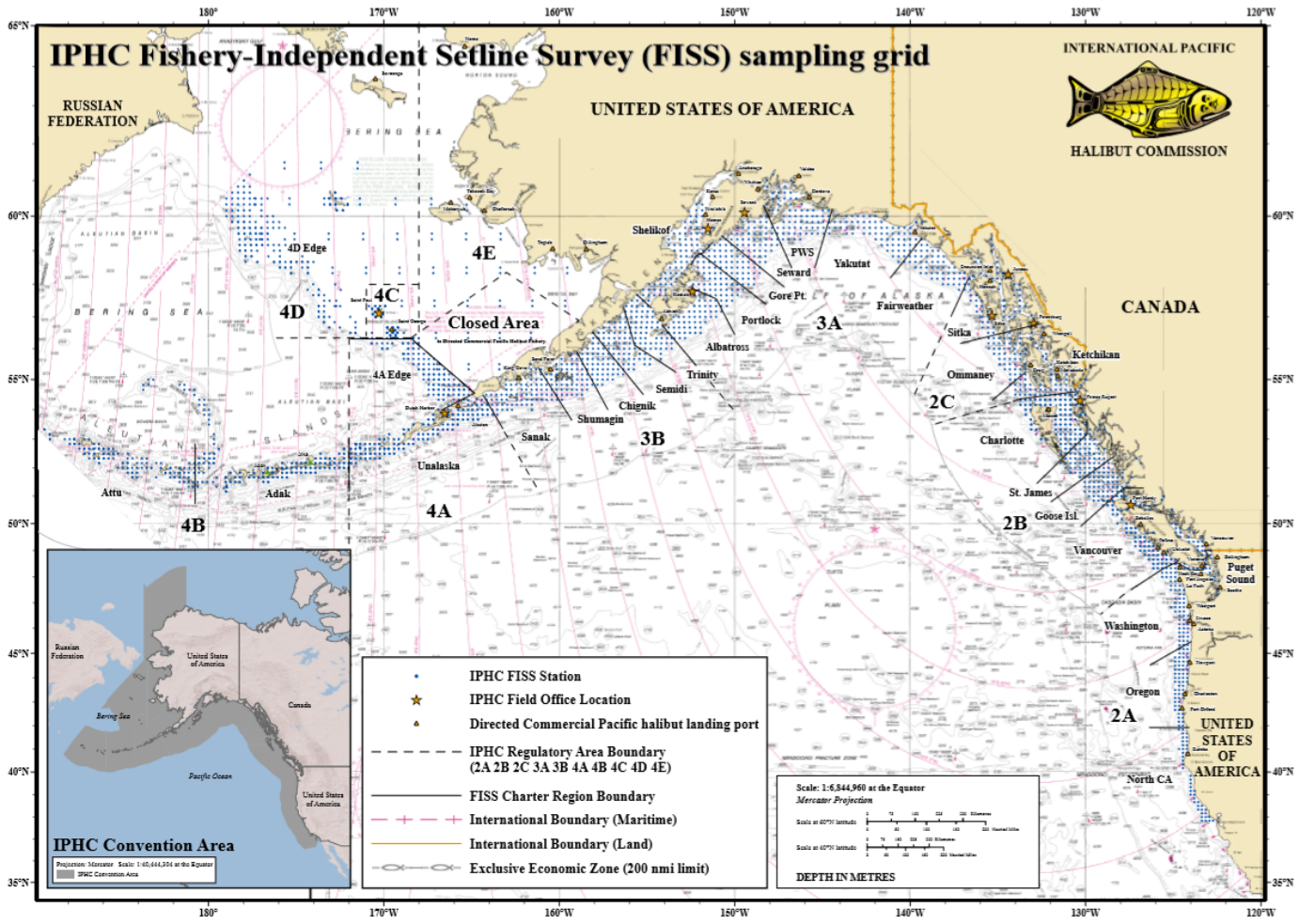

Figure 6. IPHC Fishery-Independent Setline Survey (FISS) with full sampling grid shown.

Quality control and sampling rate estimations: Following a program of planned FISS expansions from 2014-19, a process of rationialisation of the FISS was undertaken. The goal was to ensure that, given constraints on resources available for implementing the FISS, station selection was such that density indices would be estimated with high precision and low potential for bias. An annual design review process has been developed during which potential FISS designs for the subsequent three years are evaluated according to precision and bias criteria. The resulting proposed designs and their evaluation are presented for review at the June Scientific Review Board (SRB) meetings and potentially modified following SRB input before presentation to the Commissioners at the Work Meeting and Interim Meeting. Annual biological sampling rates for each IPHC Regulatory Area are calculated based on the previous year's catch rates and an annual target of 2000 sampled fish (with 100 additional archive samples).

5.2.2.2 Fishery-independent Trawl Survey (FITS)

The IPHC has participated routinely in the NOAA Fisheries trawl surveys operating in the Bering Sea (Fig. 7, annually since 1998), Aleutian Islands (intermittently since 1997) and Gulf of Alaska (since 1996). The information collected from Pacific halibut caught on these surveys, together with data from the IPHC Fishery-Independent Setline Survey (FISS) and commercial Pacific halibut data, are used directly in estimating indices of abundance and in the stock assessment and to monitor population trends, growth/size, and to supplement understanding of recruitment, distribution, and age composition of young Pacific halibut.

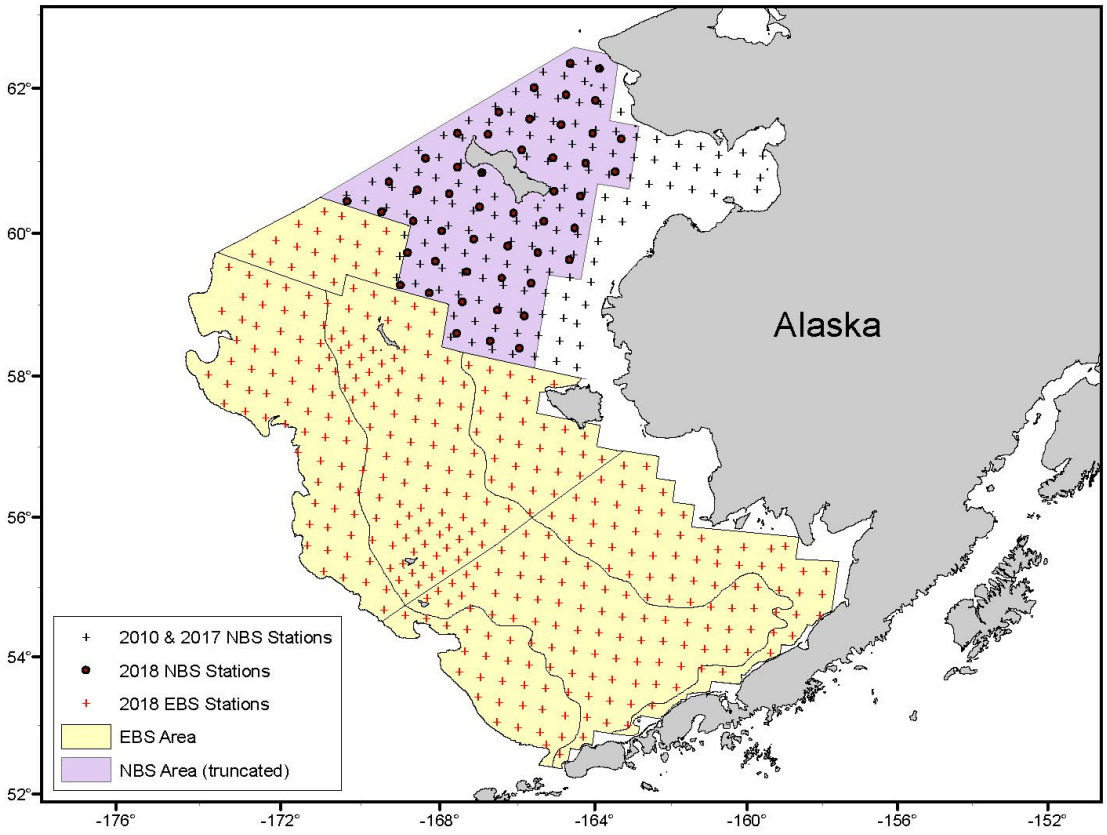

Figure 7. Sampling station design for the 2018 NOAA Bering Sea bottom trawl survey. Black dots are stations sampled in the 2018 "rapid-response" Northern Bering Sea trawl survey and black plus signs are stations sampled in standardized Northern Bering Sea trawl survey.

5.3 Management-supporting information

Successful fisheries management requires rigorous application of the scientific method of problem solving in the development of strategic alternatives and their evaluation on the basis of objectives that integrate ecosystem and human dynamics across space and time into management decision-making (Lane and Stephenson, 1995). This points to the importance of understanding a broad range of factors to deliver on the Commission's objective to develop the stocks of Pacific halibut to the levels that permit the optimum yield from the fishery over time. Management-supporting information beyond IPHC's current research and monitoring programs relate to, among others, socioeconomic considerations, community development, political constraints, and operational limitations.

Responding to the Commission's "*desire for more comprehensive economic information to support the overall management of the Pacific halibut resource in fulfillment of its mandate*" (economic study terms of reference adopted at FAC095 and endorsed at AM095 in 2019), between 2019 and 2021 the IPHC conducted a socioeconomic study. The study's core product, Pacific halibut multiregional economic impact assessment (PHMEIA) model, describes economic interdependencies between sectors and regions to bring a better understanding of the role and importance of the Pacific halibut resource to regional economies of Canada and the United States of America (see project report). The model details the within-region production structure of the Pacific halibut sectors (fishing, processing, charter) and cross-regional flows of economic benefits. The model also accounts for economic activity generated through sectors that supply fishing vessels, processing plants, and charter businesses with inputs to production, by embedding Pacific halibut sectors into the model of the entire economy of Canada and the USA. The PHMEIA model fosters stakeholders' better understanding of a broad

scope of regional impacts of the Pacific halibut resource. The results highlight that the harvest stage accounts for only a fraction of economic activity that would be forgone if the resource was not available to fishers in the Pacific Northwest. Moreover, the study informs on the vulnerability of communities to changes in the state of the Pacific halibut stock throughout its range, highlighting regions particularly dependent on economic activities that rely on Pacific halibut. Leveraging multiple sources of socioeconomic data, the project provides complementary input for designing policies with desired effects depending on regulators' priorities which may involve balancing multiple conflicting objectives. A good understanding of the localized effects is pivotal to policymakers who are often concerned about community impacts, particularly in terms of impact on employment opportunities and households' welfare.

The economic impact assessment is supplemented by an analysis of the formation of the price paid for Pacific halibut products by final consumers (end-users) that is intended to provide a better picture of Pacific halibut contribution to the gross domestic product (GDP) along the entire value chain, from the hook-to-plate. This supplemental material is available in IPHC's Pacific halibut market analysis.

6. Core focal areas – Planned and opportunistic activities (2022-2026)

Research at IPHC can be classified as "use-inspired basic research" (Stokes 1997) which combines knowledge building with the application of existing and emerging knowledge to provide for the management of Pacific halibut. The four core focal areas: stock assessment, management strategy evaluation, management supporting information, and biology & ecology, all interact with each other as well as with fisheries monitoring activities in the IPHC program of integrated research and monitoring. Progress and knowledge building in one focal area influences and informs application in other core focal areas, also providing insight into future research priorities. The circular feedback loop is similar to the scientific method of observing a problem, creating a hypothesis, testing that hypothesis through research and analysis, drawing conclusions, and refining the hypothesis.

The IPHC Secretariat has been working with IPHC advisory bodies, such as the Scientific Review Board (SRB), and the Commission to conduct scientific research in a way that utilizes the scientific method. Problems are often identified by an advisory body or Commission and hypotheses are developed by the IPHC Secretariat. Research is reviewed by the SRB and refined hypotheses are presented to advisory bodies and the Commission. This process occurs via an annual schedule of meetings, as shown in Fig. 8. In May, an MSE informational session may be held if there is significant progress in the MSE such that it would be useful to prepare stakeholders for the Management Strategy Advisory Board (MSAB) meeting in October. Recommendations related to the MSE, and development of a harvest strategy directed to the Commission are a result of the MSAB meeting. The SRB holds two meetings each year: one in June where requests are typically directed to IPHC Secretariat, and one in September where recommendations are made to the Commission. The June SRB meeting has a focus on research; the September meeting represents a final check of science products to be presented to the Commission for use in management. The Research Advisory Board (RAB) meets in November to discuss ongoing research, provide guidance and recommend new research projects. The Work Meeting (WM) is held in September and is a working session with IPHC Secretariat and the Commission to prepare for the Interim Meeting (IM) held in November and the Annual Meeting (AM) held in January. Outcomes from the AM include mortality limits (coastwide and by IPHC Regulatory Area), directed fishery season dates, domestic regulations, and requests and recommendations for the IPHC Secretariat. In conjunction with the AM are meetings of the Finance and Administration Committee (FAC), the Conference Board (CB), and the Processor Advisory Board (PAB). The Commission may also hold Special Sessions (SS) throughout the year to take up and make decisions on specific topics.

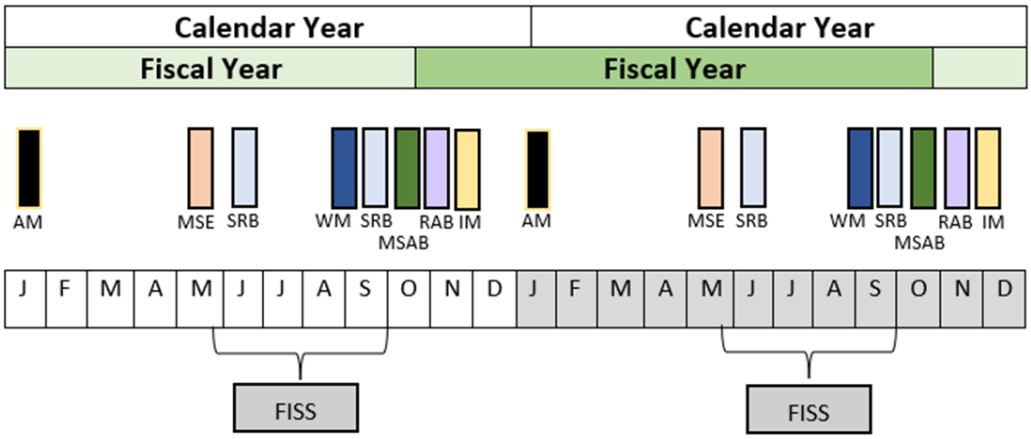

Figure 8. The typical IPHC annual meeting schedule with the calendar year and fiscal year shown. The meetings, shown in the middle row are: Annual Meeting where the Commission makes many final decisions for that year (AM), an MSE informational session (MSE), Scientific Review Board meetings (SRB), the Commission Work Meeting (WM), the Management Strategy Advisory Board meeting (MSAB), the Research Advisory Board Meeting (RAB), and the Interim Meeting (IM). The annual FISS schedule is also shown.

In addition to the annual meeting process at IPHC, individual core focal areas of research may identify and prioritize research for other core focal areas. For example, stock assessment research often identifies gaps in the knowledge of Pacific halibut biology and ecology, which then identifies priority research for the Biology and Ecology core area. Vice versa, basic biological and ecological research can identify concepts that could be better understood and result in improved implementation in any of the core areas. Furthermore, Management Strategy Evaluation can often be used to identify priority research topics for any core areas by simulation testing to identify research that may have the largest benefit to improving the management of Pacific halibut.

The top priorities of research for various categories in each of the core focal areas are provided below. The top priorities are a subset of the potential research topics in each core focal area. More exhaustive and up-to-date lists of research topics, that may extend beyond a five-year timeframe, can be found in recent meeting documents related to each core focal area.

6.1 Research

6.1.1 Stock Assessment

Within the four assessment research categories, the following topics have been identified as top priorities in order to focus attention on their importance for the stock assessment and management of Pacific halibut. A brief narrative is provided here to highlight the specific use of products from these studies in the stock assessment.

6.1.1.1 Stock Assessment data collection and processing

6.1.1.1.1 Commercial fishery sex-ratio-at-age via genetics

Commercial fishery sex-ratio information has been found to be closely correlated with the absolute scale of the population estimates in the stock assessment and has been identified as the greatest source of uncertainty since 2013. With only four years (2017-20) of commercial sex-ratio-at-age information available for the 2021 stock assessment, the annual genetic assay of fin clips sampled from the landings remains critically important. When the time series grows longer, it may be advantageous to determine the ideal frequency at which these assays need to be conducted. Development of approaches to use archived otoliths, scales or other samples to derive historical estimates (if possible) could provide valuable information on earlier time-periods (with differing fishery and

biological properties), and therefore potentially reconcile some of the considerable historical uncertainty in the present stock assessment. This assessment priority directly informs *6.1.3.2 Reproduction* as described below.

6.1.1.1.2 Whale depredation accounting and tools for avoidance

Whale depredation currently represents a source of unobserved and unaccounted-for mortality in the assessment and management of Pacific halibut. A logbook program has been phased in over the last several years, in order to record whale interactions observed by commercial harvesters. Estimation of depredation mortality, from logbook records and supplemented with more detailed data and analysis from the FISS represents a first step in accounting for this source of mortality; however, such estimates will likely come with considerable uncertainty. Reduction of depredation mortality through improved fishery avoidance and/or catch protection would be a preferable extension and/or solution to basic estimation. As such, research to provide the fishery with tools to reduce depredation is considered a closely-related high priority. This assessment priority directly informs *6.1.3.4 Mortality and Survival Assessment* as described below.

6.1.1.2 Stock Assessment technical development

6.1.1.2.1 Maintaining coordination with the MSE

The stock assessment and MSE operating models have been developed in close coordination, in order to identify plausible hypotheses regarding the processes governing Pacific halibut population dynamics. Important aspects of Pacific halibut dynamics include recruitment (possibly related to extrinsic environmental factors in addition to spawning biomass), size-at-age, movement/migration and spatial patterns in fishery catchability and selectivity. Many approaches developed as part of the tactical stock assessment have been explored in the MSE operating model, and conversely, the MSE operating model has highlighted areas of data uncertainty or alternative hypotheses for exploration in the assessment (e.g. movement rates). Although these two modelling efforts target differing objectives (tactical vs. strategic) continued coordination is essential to ensure that the stock assessment and the MSE represent the Pacific halibut similarly and provide consistent and useful advice for tactical and strategic decision-making.

6.1.1.2.2 Data weighting

The stock assessment currently relies on iterative "Francis" weighting of the age compositional data using a multinomial likelihood formulation (Francis 2011) based on the number of samples available in each year. Exploration of a stronger basis for input sample sizes through analysis of sampling design, estimation of sample weighting and alternative likelihoods may all provide for a more stable approach and a better description of the associated uncertainty.

6.1.1.2.3 Environmental covariates to recruitment

The two long time-series models included in the stock assessment ensemble allow for the Pacific Decadal Oscillation (PDO; Mantua et al. 1997) to be a binary covariate indicating periods of higher or lower average recruitment. This relationship has been observed to be consistent since its development over 20 years ago (Clark et al 1999) and is re-estimated in each year's stock assessment models. With additional years of data, evaluation of the strength of this relationship, as compared to other metrics of the PDO (e.g., annual deviations, running averages) or other indicators of NE Pacific Ocean productivity should be undertaken in order to provide the best estimates and projections of Pacific halibut recruitment and to provide for alternative hypotheses for use in the MSE. This assessment priority partially informs *6.1.3.2 Reproduction* as described below.

6.1.1.2.4 'Leading' parameter estimation

Stock assessments are generally very sensitive to the estimates of leading parameters (stock-recruitment

parameters, natural mortality, sex-specific dynamics, etc.). For Pacific halibut some of these are fully integrated into the estimation uncertainty (average unexploited recruitment), or partially integrated (e.g. estimation of natural mortality in two of the four models). As time-series of critically informative data sources like the FISS and the sex-ratio of the commercial landings grow longer it may be possible to integrate additional leading parameters directly in the assessment models and/or include them as nested models within the ensemble.

6.1.1.3 Stock Assessment biological inputs

6.1.1.3.1 Maturity, skip-spawning, and fecundity

Management of Pacific halibut is currently based on reference points that rely on relative female spawning biomass. Therefore, any changes to the understanding of reproductive output – either across age/size (maturity), over time (skip spawning) or as a function of body mass (fecundity) are crucially important. Each of these components directly affects the annual reproductive output estimated in the assessment. Ideally, the IPHC would have a program in place to monitor each of these three reproductive processes over time and use that information in the estimation of the stock-recruitment relationship, and the annual reproductive output relative to reference points. This would reduce the potential for biased time-series estimates created by non-stationarity in these traits (illustrated via sensitivity analyses in several of the recent assessments). However, at present we have only historical time-aggregated estimates of maturity and fecundity schedules. Therefore, the current research priority is to first update our estimates for each of these traits to reflect current environmental and biological conditions. After current stock-wide estimates have been achieved, a program for extending this information to a time-series via transition from research to monitoring can be developed. This assessment priority directly informs *6.1.3.2 Reproduction* as described below.

6.1.1.3.2 Stock structure of IPHC Regulatory Area 4B relative to the rest of the convention area

The current stock assessment and management of Pacific halibut assume that IPHC Regulatory Area 4B is functionally connected with the rest of the stock, i.e., that recruitment from other areas can support harvest in Area 4B and that biomass in Area 4B can produce recruits that may contribute to other Areas. Tagging (Webster et al. 2013) and genetic (Drinan et al. 2016) analyses have indicated the potential for Area 4B to be demographically isolated. An alternative to current assessment and management structure would be to treat Area 4B separately from the rest of the coast. This would not likely have a large effect on the coastwide stock assessment as Area 4B represents only approximately 5% of the surveyed stock (Stewart and Webster 2022). However, it would imply that the specific mortality limits for Area 4B could be very important to local dynamics and should be separated from stock-wide trends. Therefore, information on the stock structure for Area 4B has been identified as a top priority. This assessment priority directly informs *6.1.3.1 Migration and Population Dynamics* as described below.

6.1.1.3.3 Meta-population dynamics (connectivity) of larvae, juveniles, and adults

The stock assessment and current management procedure treat spawning output, juvenile Pacific halibut abundance, and fish contributing to the fishery yield as equivalent across all parts of the Convention Area. Information on the connectivity of these life-history stages could be used for a variety of improvements to the assessment and current management procedure, including: investigating recruitment covariates, structuring spatial assessment models, identifying minimum or target spawning biomass levels in each Biological Region, refining the stock-recruitment relationship to better reflect source-sink dynamics and many others. Spatial dynamics have been highlighted as a major source of uncertainty in the Pacific halibut assessment for decades and will continue to be of high priority until they are better understood. This assessment priority directly informs *6.1.3.1 Migration and Population Dynamics* as described below.

6.1.1.4 Stock Assessment fishery yield

6.1.1.4.1 Biological interactions with fishing gear

In 2020, 16% of the total fishing mortality of Pacific halibut was discarded (Stewart et al. 2021). Discard mortality rates can vary from less than 5% to 100% depending on the fishery, treatment of the catch and other factors (Leaman and Stewart 2017). A better understanding of the biological underpinnings for discard mortality could lead to increased precision in these estimates, avoiding potential bias in the stock assessment. Further, improved biological understanding of discard mortality mechanisms could allow for reductions in this source of fishing mortality, and thereby increased yield available to the fisheries. This assessment priority directly informs *6.1.3.4 Mortality and Survival Assessment* as described below.

6.1.1.4.2 Guidelines for reducing discard mortality

Much is already known about methods to reduce discard mortality, in non-directed fisheries as well as the directed commercial and recreational sectors. Promotion and adoption of best handling practices could reduce discard mortality, lead to greater retained yield, and reduce the potential uncertainty associated with large quantities of estimated mortality due to discarding. This assessment priority directly informs *6.1.3.4 Mortality and Survival Assessment* as described below.

Outside of the four general assessment categories, the IPHC has recently considered adding close-kin genetics (e.g., Bravington et al. 2016) to its ongoing research program (see section 6.1.3.1). Close-kin mark-recapture can potentially provide estimates of the absolute scale of the spawning output from the Pacific halibut population. This type of information can be fit directly into the stock assessment, and if estimated with a reasonable amount of precision, even a single data point could substantially reduce the uncertainty in the scale of total population estimates. Further, close-kin genetics may provide independent estimates of total mortality (and therefore natural mortality conditioned on catch-at-age), relative fecundity-at-age, and the spatial dynamics of spawning and recruitment. All of these quantities could substantially improve the structure of the current assessment and reduce uncertainty. Data collection of genetic samples from 100% of the sampled commercial landings has been in place since 2017 (as part of the sex-ratio monitoring) and from the FISS since 2021. The genetic analysis required to produce data allowing the estimation of reproductive output and other population parameters from close-kin mark-recapture modelling is both complex and expensive, and it could take several years for this project to get fully underway. This five-year plan should consider a pilot evaluation, such that a broader study could be undertaken in the future, providing the likely results would meet the Commission's objectives and prove possible given financial constraints. Research related to close-kin genetics would be pursued under *6.1.3.1 Migration and Population Dynamics* as described below.

6.1.2 Management Strategy Evaluation

MSE priorities have been subdivided into three categories: 1) biological parameterisation, 2) fishery parameterization, and 3) technical development. Research provides specifications for the MSE simulations, such as inputs to the Operating Model (OM), but another important outcome of the research is to define the range of plausibility to include in the MSE simulations as a measure of uncertainty. The following topics have been identified as top priorities.

6.1.2.1 MSE Biological and population parameterization

6.1.2.1.1 Distribution of life stages and stock connectivity

Research topics in this category will mainly inform parameterization of movement in the OM, but will also provide further understanding of Pacific halibut movement, connectivity, and the temporal variability. This

knowledge may also be used to refine specific MSE objectives to reflect reality and plausible outcomes. Research under Section 6.1.3.1 will inform this MSE priority.

This research includes examining larval and juvenile distribution which is a main source of uncertainty in the OM that is currently not fully incorporated. Outcomes will assist with conditioning the OM, verify patterns simulated from the OM, and provide information to develop reasonable sensitivity scenarios to test the robustness of MPs.

Also included in this number one priority is stock structure research, especially regarding IPHC Regulatory Area 4B. The dynamics of this IPHC Regulatory Area are not fully understood and it is useful to continue research on the connectivity of IPHC Regulatory Area 4B with other IPHC Regulatory Areas.

Finally, genomic analysis of population size is also included in this ranked category because that would help inform development of the OM as well as the biological sustainability objective related to maintaining a minimum spawning biomass in each IPHC Regulatory Area. An understanding of the spatial distribution of population size will help to inform this objective as well as the OM conditioning process.

6.1.2.1.2 Spatial spawning patterns and connectivity between spawning populations

An important parameter that can influence simulation outcomes is the distribution of recruitment across Biological Regions. Continued research in this area will improve the OM and provide justification for parameterising temporal variability. Research includes assigning individuals to spawning areas and establishing temporal and spatial spawning patterns. Outcomes may also provide information on recruitment strength and the relationship with environmental factors. For example, recent work by Sadorus et al (2020) used a biophysical and spatio-temporal models to examine connectivity across the Bering Sea and Gulf of Alaska. Furthermore, close-kin mark-recapture (Bravington et al. 2016) may provide insights into spatial relationships between juveniles and adults as well as abundance in specific regions. Research under Sections 6.1.3.1 and 6.1.3.2 will inform this MSE priority.

6.1.2.1.3 Understanding growth variation

Changes in the average weight-at-age of Pacific halibut is one of the major drivers of changes in biomass over time. The OM currently simulates temporal changes in weight-at-age via a random autocorrelated process which is unrelated to population size or environmental factors. Ongoing research in drivers related to growth in Pacific halibut will help to improve the simulation of weight-at-age. Research under Section 6.1.3.3 will inform this MSE priority.

6.1.2.1.4 MSE fishery parameterization

The specifications of fisheries and their parameterizations involved consultation with Pacific halibut stakeholders but some aspects of those parameterizations benefit from targeted research. One specific example is knowledge of discarding and discard mortality rates in directed and non-directed fisheries. Discard mortality can be a significant source of fishing mortality in some IPHC Regulatory Areas and appropriately modelling that mortality will provide a more robust evaluation of MPs. Research under Sections 6.1.3.4 and 6.1.3.5 will inform this MSE priority.

6.1.2.2 MSE technical development

Technical improvements to the MSE framework will allow for rapid development of alternative operating models and efficient simulation of management strategies for future evaluation. Coordination with the technical development of the stock assessment (Section 6.1.1.2.1) is necessary to ensure consistent assumptions and hypotheses for tactical (i.e. stock assessment) and strategic (i.e. MSE) models. Investigations done in the stock

assessment will inform the stock assessment, which will then be informed by investigations using the closed-loop simulation framework. Multi-year assessments may allow for additional opportunity to coordinate between stock assessment and MSE.

6.1.2.2.1 Alternative migration scenarios

Including alternative migration hypotheses in the MSE simulations will assist in identifying management procedures that are robust to this uncertainty. This exploration will draw on general research on the movement and migration of Pacific halibut, observations from FISS and fisheries data, and outcomes of the stock assessment. Identification of reasonable hypotheses for the movement of Pacific halibut is essential to the robust investigation of management procedures. Research under Section 6.1.3.1 will inform this MSE priority.

6.1.2.2.2 Realistic simulations of estimation error

Closed loop simulation uses feedback from the management procedure to update the population in the projections. The management procedure consists of data collection, an estimation model, and harvest rules; currently IPHC uses a stock assessment as the estimation model. Future development of an efficient simulation process to mimic the stock assessment will more realistically represent the current management process. This involves using multiple estimation models to represent the ensemble and appropriately adding data and updating those models in the simulated projections. Improvements to the current MSE framework include adding additional estimation models to better represent the ensemble stock assessment, ensuring that the simulated estimation accurately represent the stock assessment now and, in the future, and speeding up the simulation process.

6.1.2.2.3 Incorporate additional sources of implementation uncertainty

Implementation uncertainty consists of three subcategories: 1) decision-making uncertainty, 2) realized uncertainty, and 3) perceived uncertainty. Decision-making uncertainty is the difference between mortality limits determined from the management procedure and those adopted by the Commission. This uncertainty is currently not implemented in the MSE framework but has been requested by the SRB and the independent peer review of the MSE. Realized uncertainty is the difference between the mortality limit set by the Commission and the actual mortality realized by the various fisheries. This type of uncertainty is currently partially implemented in the MSE framework. Finally, perceived uncertainty is the difference between the realized mortality and the estimated mortality limits from the various fisheries, which would be used in the estimation model. This third type of implementation uncertainty has not been implemented in the MSE framework. Implementing decision-making uncertainty is a priority for the MSE and will assist in understanding the performance of management procedures when they may not be followed exactly.

6.1.2.3 MSE Program of Work for 2021–2023

Following the 11th Special Session of the IPHC, an MSE program of work for 2021–2023 was developed. Seven tasks were identified that pertained to further developments of the MSE framework, evaluation of alternative MPs, and improvements in evaluation and presentation of results. Table 1 lists these tasks and provides a brief description. Additional details can be found in the program of work available on the MSE webpage.

Table 1. Tasks recommended by the Commission at SS011 (IPHC-2021-SS011-R para 7) for inclusion in the IPHC Secretariat MSE Program of Work for 2021–23.

ID	Category	Task	Deliverable
F.1	Framework	Develop migration scenarios	Develop OMs with alternative migration scenarios
F.2	Framework	Implementation variability	Incorporate additional sources of implementation variability in the framework
F.3	Framework	Develop more realistic simulations of estimation error	Improve the estimation model to more adequately mimic the ensemble stock assessment
F.5	Framework	Develop alternative OMs	Code alternative OMs in addition to the one already under evaluation.
M.1	MPs	Size limits	Identification, evaluation of size limits
M.3	MPs	Multi-year assessments	Evaluation of multi-year assessments
E.3	Evaluation	Presentation of results	Develop methods and outputs that are useful for presenting outcomes to stakeholders and Commissioners

6.1.2.4 Potential Future MSE projects

Management Strategy Evaluation is an iterative process where new management procedures may be evaluated, current management procedures may be re-evaluated under different assumptions, and the understanding of the population, environment, and fisheries may be updated with new information stemming from the stock assessment and biological/ecological research. The current Program of Work (Table 1) focuses on two elements of Management Procedures, but in the future other elements may be of interest, such as distribution procedures. The research being done now will inform the development of the MSE in the future to ensure a robust evaluation of any management procedure.

6.1.3 Biology and Ecology

Capitalizing on the outcomes of the previous 5-year plan (IPHC–2019–BESRP-5YP) (Appendix I), the IPHC Secretariat has identified five research areas that will provide key inputs for stock assessment and the MSE process. In addition to linking genetics and genomics with migration and distribution studies in the newly coined area of Migration and Population Dynamics, the IPHC Secretariat has incorporated a novel research area on Fishing Technology. A series of key objectives for each the five research areas have been identified.

6.1.3.1 Migration and Population Dynamics

Genetic and genomic studies aimed at improving current knowledge of Pacific halibut migration and population dynamics throughout all life stages in order to achieve a complete understanding of stock structure and distribution across the entire distribution range of Pacific halibut in the North Pacific Ocean and the biotic and abiotic factors that influence it (specifically excluding satellite tagging). Specific objectives in this area include:

- Improve current knowledge of the genetic structure of the Pacific halibut population through the use of state-of-the-art low-coverage whole genome resequencing approaches. Establishment of genetic signatures of spawning sites.
- Improve our understanding of the mechanisms and magnitude of larval connectivity in the North Pacific

Ocean. Identification of environmental and biological predictors of larval abundance and recruitment.

- Improve our understanding of spawning site contributions to nursery/settlement areas in relation to year-class, recruit survival and strength, and environmental conditions in the North Pacific Ocean. Measure of genetic diversity of Pacific halibut juveniles from the eastern Bering Sea and the Gulf of Alaska.
- Improve our understanding of the relationship between nursery/settlement origin and adult distribution and abundance over temporal and spatial scales. Genomic assignment of individuals to source populations and assessment of distribution changes.
- Integrate analyses of Pacific halibut connectivity and distribution changes by incorporating genomic approaches.
- Improve estimates of population size, migration rates among geographical regions, and demographic parameters (e.g. fecundity-at-age, survival rate), through the application of close-kin mark-recapture-based approaches.
- Improve our understanding of the influences of oceanographic and environmental variation on connectivity, population structure and adaptation at a genomic level using seascape genomics approaches.
- Exploration and development of alternative methods for aging Pacific halibut based on genetic analyses of DNA methylation patterns in tissues (fin clips).
- Exploration of methods for individual identification based on computer-assisted tail image matching systems as an alternative for traditional mark and recapture tagging.

6.1.3.2 Reproduction

Studies aimed primarily at addressing two critical issues for stock assessment analysis based on estimates of female spawning biomass: 1) the sex ratio of the commercial catch and 2) maturity estimations. Specific objectives in this area include:

- Continued improvement of genetic methods for accurate sex identification of commercial landings from fin clips and otoliths in order to incorporate recent and historical sex-at-age information into the stock assessment process.
- Improve our understanding of the temporal progression of reproductive development and gamete production during an entire annual reproductive cycle in female and male Pacific halibut.
- Update current maturity-at-age estimates.
- Provide estimates of fecundity-at-age and fecundity-at-size.
- Investigate the possible presence of skip spawning in Pacific halibut females.
- Improve accuracy in current staging criteria of maturity status used in the field.
- Investigate possible environmental effects on the ontogenetic establishment of the phenotypic sex and their influence on sex ratios in the adult Pacific halibut population.
- Improve our understanding of potential temporal and spatial changes in maturity schedules and spawning patterns in female Pacific halibut and possible environmental influences.
- Improve our understanding of the genetic basis of variation in age and/or size-at-maturity, fecundity, and spawning timing, by conducting genome-wide association studies.

6.1.3.3 Growth

Studies aimed at describing the role of factors responsible for the observed changes in size-at-age and at evaluating growth and physiological condition in Pacific halibut. Specific objectives in this area include:

- Evaluate possible variation in somatic growth patterns in Pacific halibut as informed by physiological growth markers, physiological condition, energy content and dietary influences.
- Investigate the effects of environmental and ecological conditions that may influence somatic growth in Pacific halibut. Evaluate the relationship between somatic growth and temperature and trophic histories in Pacific halibut through the integrated use of physiological growth markers.
- Improve our understanding of the genetic basis of variation in somatic growth and size-at-age by conducting genome-wide association studies.

6.1.3.4 Mortality and Survival Assessment

Studies aimed at providing updated estimates of discard mortality rates (DMRs) for Pacific halibut in the guided recreational fisheries and at evaluating methods for reducing mortality of Pacific halibut. Specific objectives in this area include:

- Provide information on the types of fishing gear and fish handling practices used in the Pacific halibut recreational (charter) fishery as well as on the number and size composition of discarded Pacific halibut in this fishery.
- Establish best handling practices for reducing discard mortality of Pacific halibut in recreational fisheries.
- Investigate new methods for improved estimation of depredation mortality from marine mammals.

6.1.3.5 Fishing Technology

Studies aimed at developing methods that involve modifications of fishing gear with the purpose of reducing Pacific halibut depredation and bycatch. Specific objectives in this area include:

- Investigate new methods for whale avoidance and/or deterrence for the reduction of Pacific halibut depredation by whales (e.g. catch protection methods).
- Investigate physiological and behavioral responses of Pacific halibut to fishing gear in order to reduce bycatch.

6.2 Monitoring

The Commission's extensive monitoring programs include both direct data collection and coordination with domestic agencies to produce both fishery-dependent and fishery-independent information on the stock and fishery trends, and other information. These critical sources include estimates of fishing mortality from all fisheries encountering Pacific halibut, biological sampling from these fisheries as well as catch-rates and biological sampling from longline and trawl surveys. Monitoring data provide the basis for stock assessment and MSE analysis, many biological research studies, and some inputs directly to the decision-making process (Figure 4). While not the primary focus of this 5-year plan, a basic summary of the components led by the IPHC and those that are provided by domestic agencies is provided below.

6.2.1 Fishery-dependent data

Data collection and monitoring activities aimed at providing standardised time-series of mortality, fishery, and biological data from both direct target fisheries as well as fisheries that incidentally catch Pacific halibut. Directed commercial fisheries data are managed by IPHC. Non-directed commercial discard mortality data, subsistence

fisheries data, and recreational fisheries data are managed by Contracting Party domestic agencies.

6.2.1.1 Directed commercial fisheries data

6.2.1.2 Annually review the spatial distribution of sampling effort among ports, data collection methods, sampling rates, and quality assurance/quality control (QAQC) processes, including in-season review of port sampling activities

Ensure current data collection efforts meet current and future needs of stock assessment, MSE and management. Collaborate and coordinate with other Secretariat functions to develop methods and procedures for incorporating promising research results into long-term monitoring program. The IPHC relies on domestic and Tribal agency programs to report annual mortality from incidental catches in non-directed commercial fisheries, catches from subsistence fisheries, and catches from recreational fisheries. Non-directed commercial discard mortality data

Annually collaborate with observer programs and other partners to ensure robust data collection and sampling, QAQC processes, and reporting of incidental catch and mortality, as well as biological sampling.

6.2.1.3 Subsistence fisheries data

Annually collaborate with Tribal, State and Federal agencies of each Contracting Party to ensure high quality data collection, sampling, and reporting in the subsistence fisheries in Canada and the United States of America.

6.2.1.4 Recreational fisheries data

Annually collaborate with National/State agencies of each Contracting Party to ensure and validate high quality data and reporting of recreational fishery mortality estimates and biological data.

6.2.2 Fishery-independent data

Data collection and monitoring activities aimed at providing a standardised time-series of biological and ecological data that is independent of the fishing fleet.

6.2.2.1 Fishery-independent setline survey (FISS)

An annual review process for the FISS station design has been developed (Fig. 9) and is expected to continue in coming years. This process involves scientific review of proposed FISS designs by the Scientific Review Board and includes input from stakeholders prior to review and approval of designs by the Commissioners.

Direct weighing of Pacific halibut has been integrated into the annual FISS sampling since 2019 and will continue into the future to ensure accurate estimation of WPUE and other weight-derived quantities. Sample rates for genetic monitoring will need to be determined for future sampling. Sampling rates of otoliths for aging, archive otoliths and tagged fish will continue to be reviewed annually to ensure the data needs of the IPHC stock assessment and research program are met. Annual FISS sampler training and data QAQC (including at point of data collection and during post-sampling review) will ensure high quality data from the FISS program. Procedures are reviewed annually.

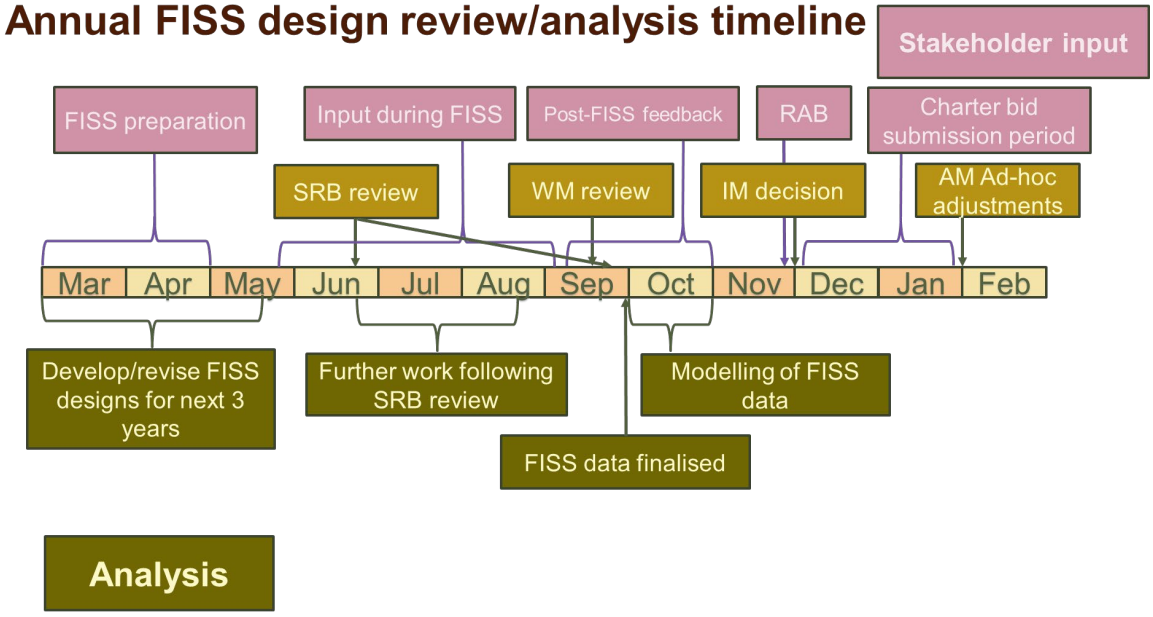

Figure 9. Timeline of annual FISS design review process.

6.2.2.2 Fishery-independent Trawl Survey (FITS)

The IPHC will continue to collaborate with NMFS on sampling procedures for Pacific halibut on the placement of an IPHC sampler onboard a survey vessel for the collection of biological data.

6.3 Potential of integrating human dynamics into management decision-making

Understanding the complexity of human dimension of the fisheries sectors is becoming increasingly important in the context of globalization. Local products compete on the market with a large variety of imported seafood. High exposure to international markets makes seafood accessibility fragile to perturbations, as shown by the COVID-19 pandemic (OECD 2020). Seafood production is also highly dependent on the production and price of imports. The IPHC's socioeconomic study showed that Pacific halibut contribution to households' income dropped by a quarter throughout the pandemic. While signs of strong recovery were present in 2021 (Fry 2021), the study called attention to Pacific halibut sectors' exposure to external factors beyond stock condition and the need for expanding the scope of management-supporting information the IPHC provides.

It is also unclear how small remote communities can capitalize on the high prices that the final customers are paying for premium seafood products. In 2021, fresh Alaskan Pacific halibut fillets routinely sold for USD 24-28 a pound, and often more, in downtown Seattle (e.g. USD 38 at Pike Place Market). Pacific halibut dishes at the restaurants typically sell for USD 37-43 for a dish including a 6oz fish portion. The IPHC's socioeconomic study detailed the geography of impacts of the Pacific halibut fisheries, providing a coherent picture of the exposure of fisheries-dependent households by location to changes in resource availability, but paying closer attention to quantifying leakage of economic benefits from communities strongly involved in fisheries, highlighted that the local earnings often do not align with how much fishing occurs within the community. This suggests the need for research focused on how to operationalize social equity in the context of the globalized market dynamics and the pursuit of stock sustainability.

In addition, fisheries are at the forefront of exposure to the accelerating impacts of climate change. For example, a rapid increase in water temperature off the coast of Alaska in 2014-16, termed *the blob*, affected fisheries (Cheung and Frölicher 2020) and may have a long-term impact on Pacific halibut distribution. The consequences

may include shifts in the distribution of benefits, but possibly go further, affecting the stability of agreements over allocation of a shared resource. Research on decision quality under fast-progressing climate-induced changes to stock distribution may be warranted.

Conflicting objectives among stakeholders regarding the use of limited resource in the context of globalization, calls for social equity and climate change are a major challenge of decision-making in fisheries management. Integrating approaches aimed at understanding the human dynamics and external factors with stock assessment and MSE can assist fisheries in bridging the gap between the current and the optimal performance without compromising the stock biological sustainability. For example, socioeconomic performance metrics presented alongside already developed biological/ecological performance metrics would supplement IPHC's portfolio of tools for assessing policy-oriented issues (as requested by the Commission, IPHC-2021-AM097-R, AM097-Req.02) and support decision-making. Moreover, continuing investment in understanding the human dimension of Pacific halibut fishing can also inform on other drivers such as human behavior or human organization that affect the dynamics of fisheries, and thus contribute to improved accuracy of the stock assessment and the MSE (Lynch et al.2018). As such, it can contribute to research integration at the IPHC and provide a complementary resource for the development of harvest control rules.

Lastly, Pacific halibut value is also in its contribution to the diet through subsistence fisheries and importance to the traditional users of the resource. To native people, traditional fisheries constitute a vital aspect of local identity and a major factor in cohesion. One can also consider the Pacific halibut's existence value as an iconic fish of the Pacific Northwest. Recognizing and adopting such an all-encompassing definition of the Pacific halibut resource contribution, the IPHC echoes a broader call to include the human dimension into the research on the impact of management decisions, as well as changes in environmental or stock conditions.

7. Amendment

The intention is to ensure the plan is kept as a '*living plan'*, that is reviewed and updated annually based on the resources available to undertake the work of the Commission (e.g. internal and external fiscal resources, collaborations, internal expertise). The IPHC Secretariat is committed to ensuring an exceptional level of transparency and commitment to the principles of open science.

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APPENDICES

Appendix I: Outcomes of the IPHC 5-Year Biological and Ecosystem Science Research Plan (2017-21)

Appendix II: Proposed schedule of outputs

Appendix III: Proposed schedule with funding and staffing indicators

APPENDIX I

Outcomes of the IPHC 5-Year Biological and Ecosystem Science Research Plan (2017-21) (IPHC–2019–BESRP-5YP)

A. Outcomes by Research Area:

1. Migration and Distribution.

1.1. Larval and juvenile connectivity and early life history studies. Planned research outcomes: improved understanding of larval and juvenile distribution.

Main results:

- Larval connectivity between the Gulf of Alaska and the Bering Sea occurs through large island passes across the Aleutian Island chain.
- The degree of larval connectivity between the Gulf of Alaska and the Bering Sea is influenced by spawning location.
- Spawning locations in the western Gulf of Alaska significantly contribute Pacific halibut larvae to the Bering Sea.
- Pacific halibut juveniles counter-migrate from inshore settlement areas in the eastern Bering Sea into the Gulf of Alaska through Unimak Pass.
- Elemental signatures of otoliths from juvenile Pacific halibut vary geographically at a scale equivalent to IPHC regulatory areas.

Publications:

Sadorus, L.; Goldstein, E.; Webster, R.; Stockhausen, W.; Planas, J.V.; Duffy-Anderson, J. Multiple life-stage connectivity of Pacific halibut (*Hippoglossus stenolepis*) across the Bering Sea and Gulf of Alaska. *Fisheries Oceanography*. 2021. 30:174-193. doi: https://doi.org/10.1111/fog.12512.

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Links to 5-Year Research Plan (2022-2026):

- Evaluate the level of genetic diversity among juvenile Pacific halibut in the Gulf of Alaska and the Bering sea due to admixture.
- Assignment of individual juvenile Pacific halibut to source populations.

Integration with Stock Assessment and MSE: The relevance of research outcomes from activities in this research area for stock assessment is in the improvement of estimates of productivity. Research outcomes will be used to generate potential recruitment covariates and to inform minimum spawning biomass targets by Biological Region and represent one of the top three biological inputs into stock assessment. The relevance of these research outcomes for MSE is in the improvement of the parametrization of the Operating Model and represent the top ranked biological input into the MSE.

2. Reproduction.

2.1 Sex ratio of commercial landings. Planned research outcomes: sex ratio information.

Main results:

- Establishment of TaqMan-based genetic assays for genotyping Pacific halibut in the IPHC Biological Laboratory.
- Sex ratio information for the 2017-2020 commercial landings.
- Transfer of genotyping efforts for sex identification to IPHC monitoring program.

Links to 5-Year Research Plan (2022-2026):

- Monitoring effort.

2.2 Histological maturity assessment. Planned research outcomes: updated maturity schedule.

Main results:

- Oocyte developmental stages have been characterized and fully described in female Pacific halibut for the first time.
- Oocyte developmental stages have been used for the classification of female developmental stages and to be able to characterize female Pacific halibut as group synchronous with determinate fecundity.
- Female developmental stages have been used for the classification of female reproductive phases and to be able to characterize female Pacific halibut as following an annual reproductive cycle with spawning in January and February.
- Female developmental stages and reproductive phases of females collected in the central Gulf of Alaska have been used to identify the month of August as the time of the transition between the Vtg2 and Vtg3 developmental stages marking the beginning of the spawning capable reproductive phase.
- Future gonad collections for revising maturity schedules and estimating fecundity can be conducted in August during the FISS.

Publications:

Fish, T., Wolf, N., Harris, B.P., Planas, J.V. A comprehensive description of oocyte developmental stages in Pacific halibut, *Hippoglossus stenolepis*. *Journal of Fish Biology* 2020. 97: 1880-1885. doi: 10.1111/jfb.14551.

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Links to 5-Year Research Plan (2022-2026):

- Revision of maturity schedule by gonad collection during the FISS, as informed by previous studies on reproductive development.

- Estimation of fecundity by age and size, as informed by previous studies demonstrating determinate fecundity.

Integration with Stock Assessment and MSE: Research activities in this Research Area aim at providing information on key biological processes related to reproduction in Pacific halibut (maturity and fecundity) and to provide sex ratio information of Pacific halibut commercial landings. The relevance of research outcomes from these activities for stock assessment is in the scaling of Pacific halibut biomass and in the estimation of reference points and fishing intensity. These research outputs will result in a revision of current maturity schedules and will be included as inputs into the stock assessment and represent the most important biological inputs for stock assessment. The relevance of these research outcomes for MSE is in the improvement of the simulation of spawning biomass in the Operating Model.

3. Growth.

3.1 Identification of physiological growth markers and their application for growth pattern evaluation. Planned research outcomes: informative physiological growth markers.

Main results:

- Transcriptomic profiling by RNAseq of white skeletal muscle from juvenile Pacific halibut subjected to growth suppression and to growth stimulation resulted in the identification of a number of genes that change their expression levels in response to growth manipulations.
- Proteomic profiling by LC-MS/MS of white skeletal muscle from juvenile Pacific halibut subjected to growth suppression and to growth stimulation resulted in the identification of a number of proteins that change their abundance in response to growth manipulations.
- Genes and proteins that changed their expression levels in accordance to changes in the growth rate in juvenile Pacific halibut were selected as putative growth markers for future studies on growth pattern evaluation.

Publications:

Planas et al. 2022. In Preparation.

Links to 5-Year Research Plan (2022-2026):

- Application of identified growth markers in studies aiming at investigating environmental influences on growth patterns and at investigating dietary influences on growth patterns and physiological condition.

3.2 Environmental influences on growth patterns. Planned research outcomes: information on growth responses to temperature variation.

Main results:

- Laboratory experiments under controlled temperature conditions have shown that temperature affects the growth rate of juvenile Pacific halibut through changes in the expression of genes that regulate growth processes.

Publications:

Planas et al. 2022. In Preparation.

Links to 5-Year Research Plan (2022-2026):

- Identification of temperature-specific responses in skeletal muscle through comparison between transcriptomic responses to temperature-induced growth changes and to density- and stress-induced growth changes.
- Application of growth markers for additional studies investigating the link between environmental variability and growth patterns and the effects of diet (prey quality and abundance) on growth and physiological condition.

Integration with Stock Assessment and MSE: Research activities conducted in this Research Area aim at providing information on somatic growth processes driving size-at-age in Pacific halibut. The relevance of research outcomes from these activities for stock assessment resides, first, in their ability to inform yield-per-recruit and other spatial evaluations for productivity that support mortality limit-setting, and second, in that they may provide covariates for projecting short-term size-at-age and may help delineate between fishery and environmental effects, thereby informing appropriate management responses. The relevance of these research outcomes for MSE is in the improvement of the simulation of variability and to allow for scenarios investigating climate change.

4. Mortality and Survival Assessment.

4.1 Discard mortality rate estimation in the longline Pacific halibut fishery. Planned research outcomes: experimentally-derived DMR.

Main results:

- Different hook release methods used in the longline fishery result in specific injury profiles and viability classification.
- Plasma lactate levels are high in Pacific halibut with the lowest viability classification.
- Mortality of discarded fish with the highest viability classification is estimated to be between 4.2 and 8.4%.

Publications:

Kroska, A.C., Wolf, N., Planas, J.V., Baker, M.R., Smeltz, T.S., Harris, B.P. Controlled experiments to explore the use of a multi-tissue approach to characterizing stress in wild-caught Pacific halibut (*Hippoglossus stenolepis*). *Conservation Physiology* 2021. 9(1):coab001; doi:10.1093/conphys/coab001.

Loher, T., Dykstra, C.L., Hicks, A., Stewart, I.J., Wolf, N., Harris, B.P., Planas, J.V. Estimation of postrelease longline mortality in Pacific halibut using acceleration-logging tags. *North American Journal of Fisheries Management*. 2022. 42: 37-49. DOI: https://doi.org/10.1002/nafm.10711.

Links to 5-Year Research Plan (2022-2026):

- Integration of information on capture and handling conditions, injury and viability assessment and physiological condition will lead to establishing a set of best handling practices in the longline fishery.

4.2 Discard mortality rate estimation in the guided recreational Pacific halibut fishery. Planned research outcomes: experimentally-derived DMR.

Main results:

- Field experiments testing two different types of gear types (i.e. 12/0 and 16/0 circle hooks) resulted in the capture, sampling and tagging of 243 Pacific halibut in IPHC Regulatory Area 2C (Sitka, AK) and 118 in IPHC Regulatory Area 3A (Seward, AK).
- The distributions of fish lengths by regulatory area and by hook size were similar.

Links to 5-Year Research Plan (2022-2026):

- Estimation of discard mortality rate in the guided recreational fishery.
- Integration of information on capture and handling conditions, injury and viability assessment and physiological condition linked to survival.
- Establishment of a set of best handling practices in the guided recreational fishery.

Integration with Stock Assessment and MSE: The relevance of research outcomes from these activities for stock assessment resides in their ability to improve trends in unobserved mortality in order to improve estimates of stock productivity and represent the most important inputs in fishery yield for stock assessment. The relevance of these research outcomes for MSE is in fishery parametrization

5. Genetics and genomics.

5.1 Generation of genomic resources for Pacific halibut. Planned research outcomes: sequenced genome and reference transcriptome.

Main results:

- A first draft of the chromosome-level assembly of the Pacific halibut genome has been generated.
- The Pacific halibut genome has a size of 602 Mb and contains 24 chromosome-size scaffolds covering 99.8% of the complete assembly with a N50 scaffold length of 27 Mb at a coverage of 91x.
- The Pacific halibut genome has been annotated by NCBI and is available as NCBI Hippoglossus stenolepis Annotation Release 101 (https://www.ncbi.nlm.nih.gov/assembly/GCA_022539355.2/).
- Transcriptome (i.e. RNA) sequencing has been conducted in twelve tissues in Pacific halibut and the raw sequence data have been deposited in NCBI's Sequence Read Archive (SRA) under the bioproject number PRJNA634339 (https://www.ncbi.nlm.nih.gov/bioproject/PRJNA634339) and with SRA accession numbers SAMN14989915 - SAMN14989926.

Publications:

Jasonowicz, A.C., Simeon, A., Zahm, M., Cabau, C., Klopp, C., Roques, C., Iampietro, C., Lluch, J., Donnadieu, C., Parrinello, H., Drinan, D.P., Hauser, L., Guiguen, Y., Planas, J.V. Generation of a chromosome-level genome assembly for Pacific halibut (*Hippoglossus stenolepis*) and characterization of its sex-determining genomic region. *Molecular Ecology Resources. 2022. In Press*. doi: https://doi.org/10.1111/1755-0998.13641.

Jasonowicz et al. 2022. In Preparation.

Links to 5-Year Research Plan (2022-2026):

- Genome-wide analysis of stock structure and composition.

5.2 Determine the genetic structure of the Pacific halibut population in the Convention Area. Planned research outcomes: genetic population structure.

Main results:

- The collection of winter genetic samples in the Aleutian Islands completed the winter sample collection needed to conduct studies on the genetic population structure of Pacific halibut in the Convention Area.
- Initial results of low coverage whole genome resequencing of winter samples indicate that an average of 26.5 million raw sequencing reads per obtained per sample that provided average individual genomic coverages for quality filtered alignments of 3.2x.

Links to 5-Year Research Plan (2022-2026):

- Fine-scale delineation of population structure, with particular emphasis on IPHC Regulatory 4B structure.

Integration with Stock Assessment and MSE: The relevance of research outcomes from these activities for stock assessment resides in the introduction of possible changes in the structure of future stock assessments, as separate assessments may be constructed if functionally isolated components of the population are found (e.g. IPHC Regulatory Area 4B), and in the improvement of productivity estimates, as this information may be used to define management targets for minimum spawning biomass by Biological Region. These research outcomes provide the second and third top ranked biological inputs into stock assessment. Furthermore, the relevance of these research outcomes for MSE is in biological parametization and validation of movement estimates and of recruitment distribution.

B. List of ranked biological uncertainties and parameters for stock assessment (SA) and their links to research areas and activities contemplated in the IPHC 5-Year Biological and Ecosystem Science Research Plan (2017-21)

SA Rank	Research outcomes	Relevance for stock assessment	Specific analysis input	Research Area	Research activities
1. Biological input	Updated maturity schedule	Scale biomass and reference point estimates	Will be included in the stock assessment, replacing the current schedule last updated in 2006	Reproduction	Histological maturity assessment
	Incidence of skip spawning		Will be used to adjust the asymptote of the maturity schedule, if/when a time-series is available this will be used as a direct input to the stock assessment		Examination of potential skip spawning
	Fecundity-at-age and -size information		Will be used to move from spawning biomass to egg-output as the metric of reproductive capability in the stock assessment and management reference points		Fecundity assessment
	Revised field maturity classification		Revised time-series of historical (and future) maturity for input to the stock assessment		Examination of accuracy of current field macroscopic maturity classification
2. Biological input	Stock structure of IPHC Regulatory Area 4B relative to the rest of the Convention Area	Altered structure of future stock assessments	If 4B is found to be functionally isolated, a separate assessment may be constructed for that IPHC Regulatory Area	Genetics and Genomics	Population structure
3. Biological input	Assignment of individuals to source populations and assessment of distribution changes	Improve estimates of productivity	Will be used to define management targets for minimum spawning biomass by Biological Region		Distribution
	Improved understanding of larval and juvenile distribution		Will be used to generate potential recruitment covariates and to inform minimum spawning biomass targets by Biological Region	Migration	Larval and juvenile connectivity studies
1. Assessment data collection and processing	Sex ratio-at-age	Scale biomass and fishing intensity	Annual sex-ratio at age for the commercial fishery fit by the stock assessment	Reproduction	Sex ratio of current commercial landings
	Historical sex ratio-at-age		Annual sex-ratio at age for the commercial fishery fit by the stock assessment		Historical sex ratios based on archived otolith DNA analyses
2. Assessment data collection and processing	New tools for fishery avoidance/deterence; improved estimation of depredation mortality	Improve mortality accounting	May reduce depredation mortality, thereby increasing available yield for directed fisheries. May also be included as another explicit source of mortality in the stock assessment and mortality limit setting process depending on the estimated magnitude	Mortality and survival assessment	Whale depredation accounting and tools for avoidance
1. Fishery yield	Physiological and behavioral responses to fishing gear	Reduce incidental mortality	May increase yield available to directed fisheries	Mortality and survival assessment	Biological interactions with fishing gear
2. Fishery yield	Guidelines for reducing discard mortality	Improve estimates of unobserved mortality	May reduce discard mortality, thereby increasing available yield for directed fisheries	Mortality and survival assessment	Best handling practices: recreational fishery

C. List of ranked biological uncertainties and parameters for management strategy evaluation (MSE) and their links to research areas and activities contemplated in the IPHC 5-Year Biological and Ecosystem Science Research Plan (2017-21)

MSE Rank	Research outcomes	Relevance for MSE	Research Area	Research activities
1. Biological parameterization and validation of movement estimates	Improved understanding of larval and juvenile distribution	Improve parametization of the Operating Model	Migration	Larval and juvenile connectivity studies
	Stock structure of IPHC Regulatory Area 4B relative to the rest of the Convention Area		Genetics and Genomics	Population structure
2. Biological parameterization and validation of recruitment variability and distribution	Assignment of individuals to source populations and assessment of distribution changes	Improve simulation of recruitment variability and parametization of recruitment distribution in the Operating Model		Distribution
	Establishment of temporal and spatial maturity and spawning patterns	Improve simulation of recruitment variability and parametization of recruitment distribution in the Operating Model	Reproduction	Recruitment strength and variability
3. Biological parameterization and validation for growth projections	Identification and application of markers for growth pattern evaluation	Improve simulation of variability and allow for scenarios investigating climate change	Growth	Evaluation of somatic growth variation as a driver for changes in size-at-age
	Environmental influences on growth patterns			
	Dietary influences on growth patterns and physiological condition			
1. Fishery parameterization	Experimentally-derived DMRs	Improve estimates of stock productivity	Mortality and survival assessment	Discard mortality rate estimate: recreational fishery

D. External funding received during the IPHC 5-Year Biological and Ecosystem Science Research Plan (2017-21):

Project #	Grant agency	Project name	PI	Partners	IPHC Budget ($US)	Management implications	Grant period
1	**Saltonstall-Kennedy NOAA**	Improving discard mortality rate estimates in the Pacific halibut by integrating handling practices, physiological condition and post-release survival (NOAA Award No. NA17NMF4270240)	IPHC	Alaska Pacific University	$286,121	Bycatch estimates	September 2017 – August 2020
2	**North Pacific Research Board**	Somatic growth processes in the Pacific halibut (*Hippoglossus stenolepis*) and their response to temperature, density and stress manipulation effects (NPRB Award No. 1704)	IPHC	AFSC-NOAA-Newport, OR	$131,891	Changes in biomass/size-at-age	September 2017 – February 2020
3	**Bycatch Reduction Engineering Program - NOAA**	Adapting Towed Array Hydrophones to Support Information Sharing Networks to Reduce Interactions Between Sperm Whales and Longline Gear in Alaska	Alaska Longline Fishing Association	IPHC, University of Alaska Southeast, AFSC-NOAA	-	Whale Depredation	September 2018 – August 2019
4	**Bycatch Reduction Engineering Program - NOAA**	Use of LEDs to reduce Pacific halibut catches before trawl entrainment	Pacific States Marine Fisheries Commission	IPHC, NMFS	-	Bycatch reduction	September 2018 – August 2019
5	**National Fish & Wildlife Foundation**	Improving the characterization of discard mortality of Pacific halibut in the recreational fisheries (NFWF Award No. 61484)	IPHC	Alaska Pacific University, U of A Fairbanks, charter industry	$98,902	Bycatch estimates	April 2019 – November 2021
6	**North Pacific Research Board**	Pacific halibut discard mortality rates (NPRB Award No. 2009)	IPHC	Alaska Pacific University,	$210,502	Bycatch estimates	January 2021 –March 2022
7	**Bycatch Reduction Engineering Program - NOAA**	Gear-based approaches to catch protection as a means for minimizing whale depredation in longline fisheries (NA21NMF4720534)	IPHC	Deep Sea Fishermen's Union, Alaska Fisheries Science Center-NOAA, industry representatives	$99,700	Mortality estimations due to whale depredation	November 2021 – October 2022
8	**North Pacific Research Board**	Pacific halibut population genomics (NPRB Award No. 2110)	IPHC	Alaska Fisheries Science Center-NOAA	$193,685	Stock structure	December 2021- January 2024
				Total awarded ($)	**$1,020,801**		

E. Publications in the peer-reviewed literature resulting from the IPHC 5-Year Biological and Ecosystem Science Research Plan (2017-21):

2020:

Fish, T., Wolf, N., Harris, B.P., Planas, J.V. A comprehensive description of oocyte developmental stages in Pacific halibut, *Hippoglossus stenolepis*. *Journal of Fish Biology*. 2020. 97: 1880-1885. https://doi: 10.1111/jfb.14551.

2021:

Carpi, P., Loher, T., Sadorus, L., Forsberg, J., Webster, R., Planas, J.V., Jasonowicz, A., Stewart, I. J., Hicks, A. C. Ontogenetic and spawning migration of Pacific halibut: a review. *Rev Fish Biol Fisheries*. 2021. https://doi.org/10.1007/s11160-021-09672-w.

Kroska, A.C., Wolf, N., Planas, J.V., Baker, M.R., Smeltz, T.S., Harris, B.P. Controlled experiments to explore the use of a multi-tissue approach to characterizing stress in wild-caught Pacific halibut (*Hippoglossus stenolepis*). *Conservation Physiology* 2021. 9(1):coab001. https://doi:10.1093/conphys/coab001.

Loher, T., Bath, G. E., Wischniowsky, S. The potential utility of otolith microchemistry as an indicator of nursery origins in Pacific halibut (*Hippoglossus stenolepis*) in the eastern Pacific: the importance of scale and geographic trending. *Fisheries Research*. 2021. 243: 106072. https://doi.org/10.1016/j.fishres.2021.106072.

Lomeli, M.J.M., Wakefield, W.W., Herrmann, B., Dykstra, C.L., Simeon, A., Rudy, D.M., Planas, J.V. Use of Artificial Illumination to Reduce Pacific Halibut Bycatch in a U.S. West Coast Groundfish Bottom Trawl. *Fisheries Research*. 2021. 233: 105737. doi: 10.1016/j.fishres.2020.105737.

Sadorus, L., Goldstein, E., Webster, R., Stockhausen, W., Planas, J.V., Duffy-Anderson, J. Multiple life-stage connectivity of Pacific halibut (*Hippoglossus stenolepis*) across the Bering Sea and Gulf of Alaska. *Fisheries Oceanography*. 2021. 30:174-193. doi: https://doi.org/10.1111/fog.12512.

2022:

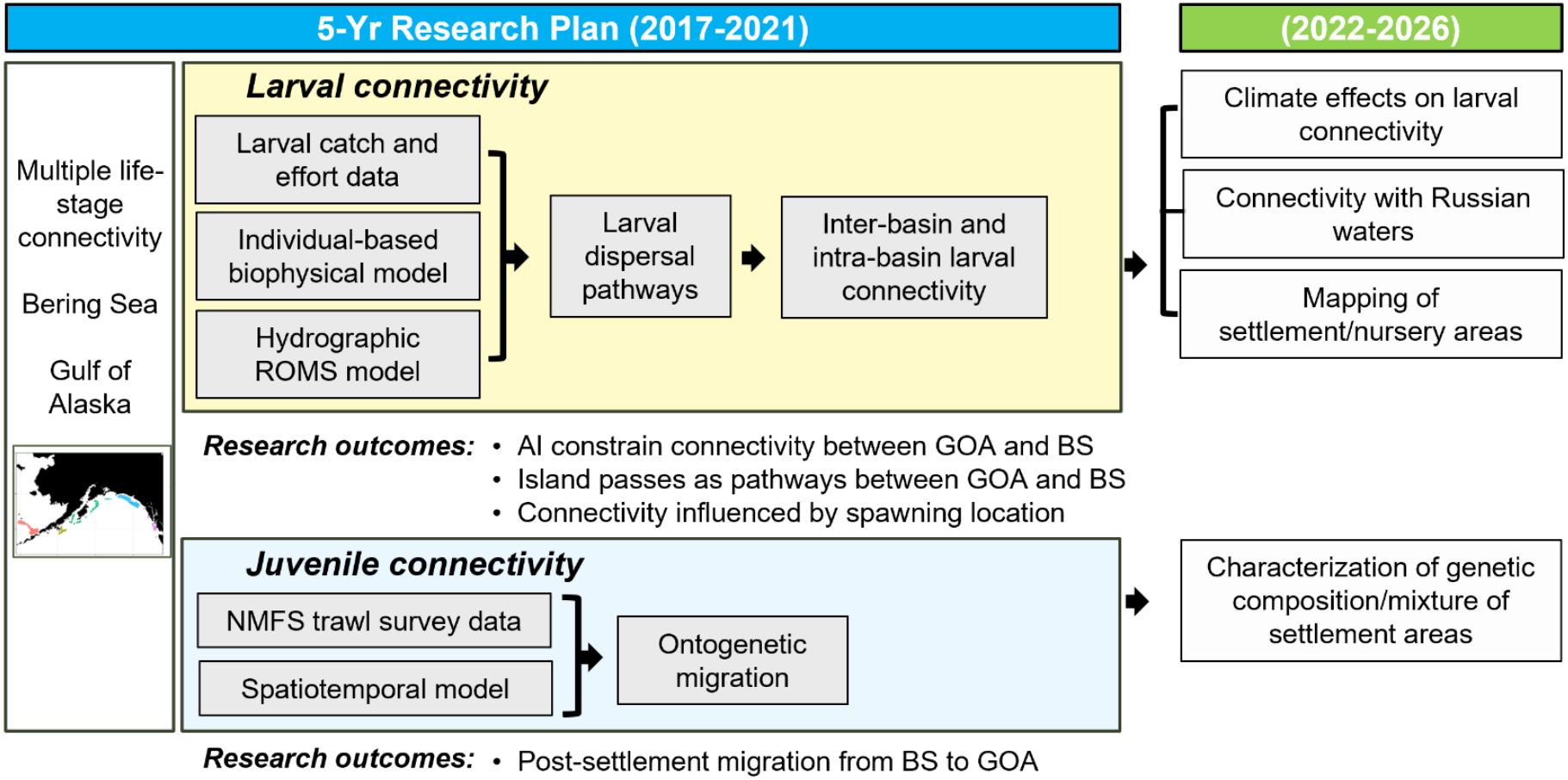
Fish, T., Wolf, N., Smeltz, T. S., Harris, B. P., and Planas, J. V. Reproductive Biology of Female Pacific Halibut (*Hippoglossus stenolepis*) in the Gulf of Alaska. *Frontiers in Marine Science* 2022. 9:801759. doi: 10.3389/fmars.2022.801759.

Jasonowicz, A.C., Simeon, A., Zahm, M., Cabau, C., Klopp, C., Roques, C., Iampietro, C., Lluch, J., Donnadieu, C., Parrinello, H., Drinan, D.P., Hauser, L., Guiguen, Y., Planas, J.V. Generation of a chromosome-level genome assembly for Pacific halibut (*Hippoglossus stenolepis*) and characterization of its sex-determining genomic region. *Molecular Ecology Resources.* 2022. In Press. doi: https://doi.org/10.1111/1755-0998.13641.

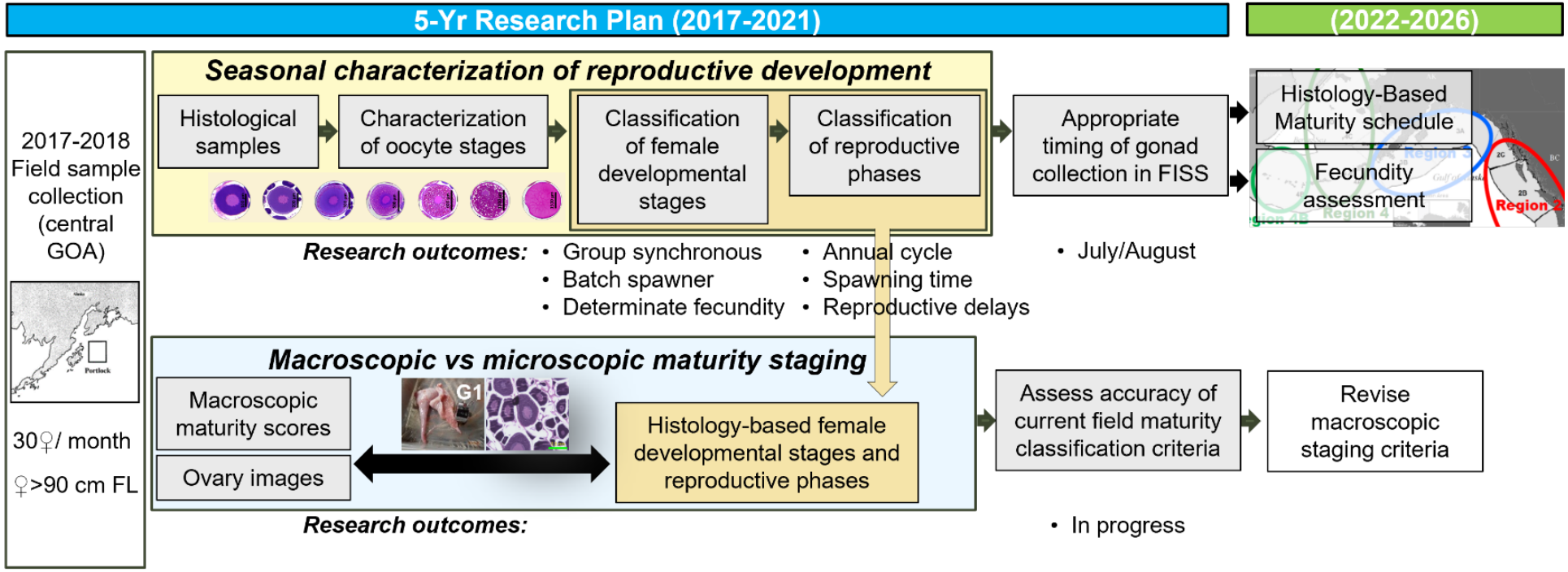
Loher, T., Dykstra, C.L., Hicks, A., Stewart, I.J., Wolf, N., Harris, B.P., Planas, J.V. Estimation of postrelease longline mortality in Pacific halibut using acceleration-logging tags. *North American Journal of Fisheries Management*. 2022. 42: 37-49. DOI: http://dx.doi.org/10.1002/nafm.10711.

F. Flow chart of progress resulting from the IPHC 5-Year Biological and Ecosystem Science Research Plan (2017-21) by research area leading to the IPHC 5-Year Program of Integrated Research and Monitoring (2022-2026)

1. Migration and Distribution

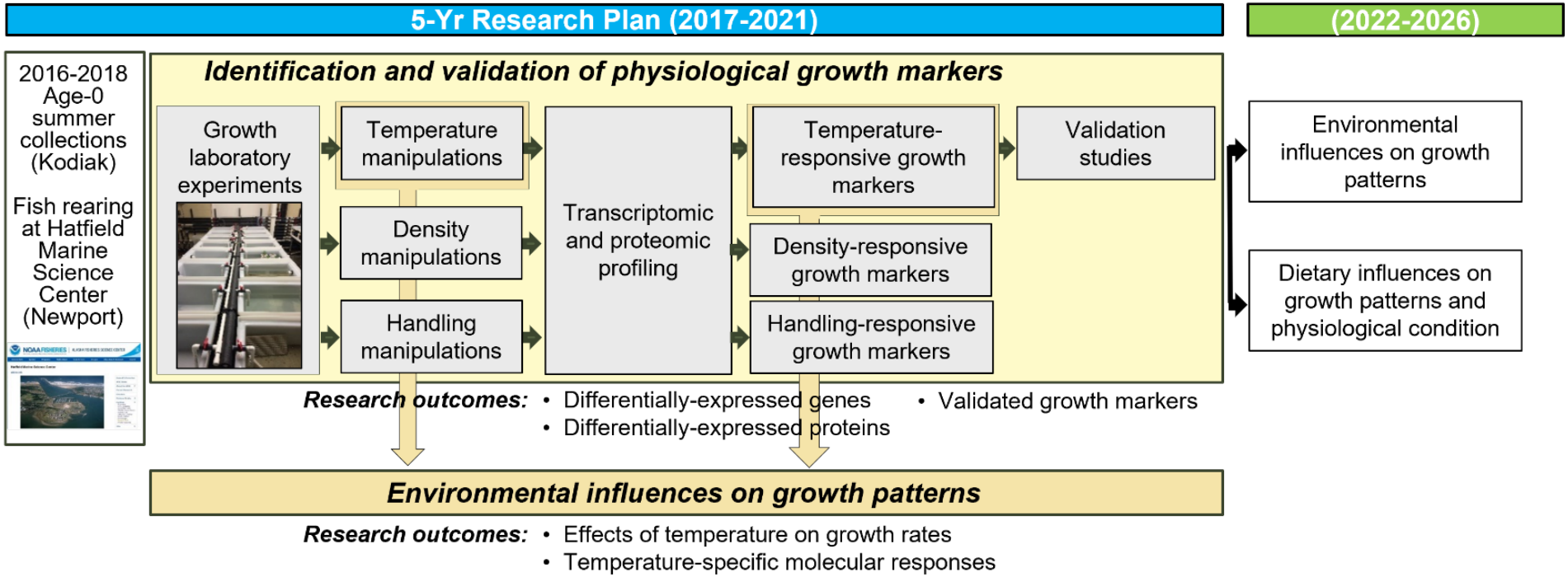


2. Reproduction



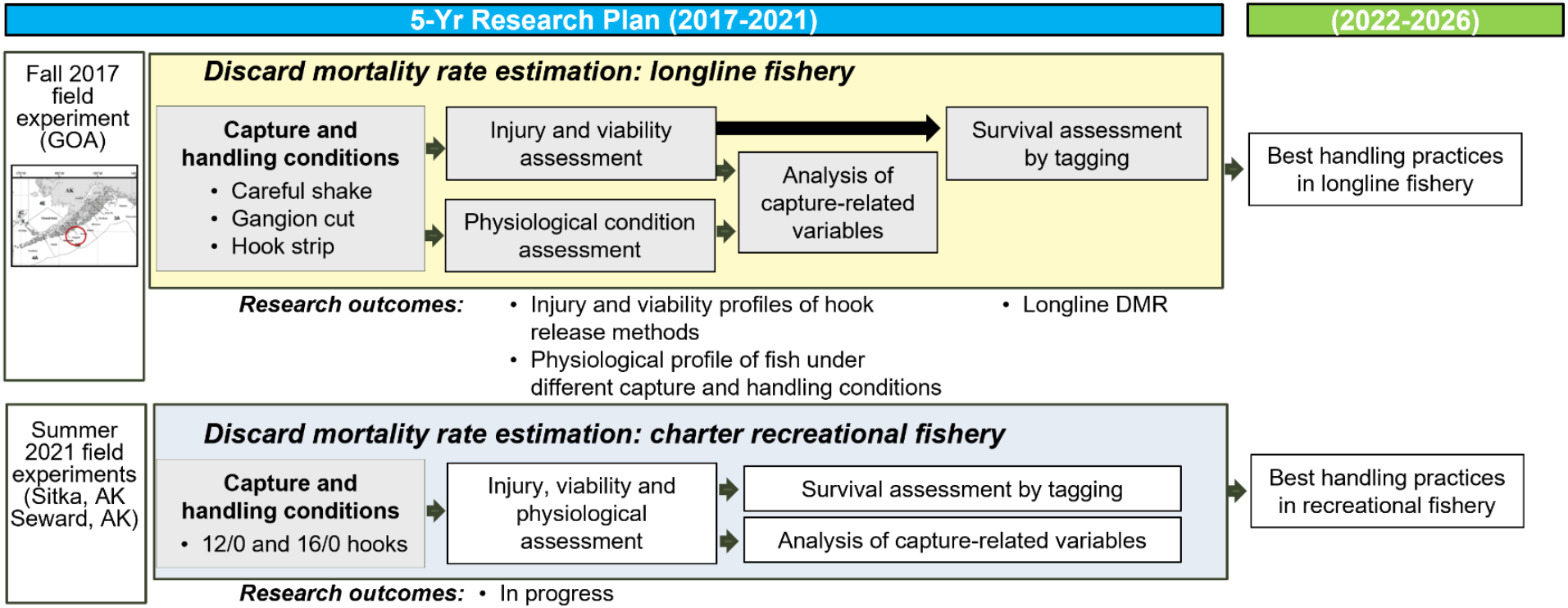
Staff involved: Teresa Fish, MSc APU (2018-2020), Crystal Simchick, Ian Stewart, Allan Hicks, Josep Planas
Funding: IPHC (2018-2020)
Publications (2): Fish et al. (2020) *J. Fish Biol*. **97**: 1880–1885 ; Fish et al. (2022) Front. Mar. Sci. 9:801759

3. Growth



Staff involved: Andy Jasonowicz, Crystal Simchick, Josep Planas
Funding: NPRB Grant#1704 (Sept. 2017-Feb. 2020)
Publications: Planas et al. (in preparation)

4. Mortality and Survival Assessment



Staff involved: Claude Dykstra, Allan Hicks, Ian Stewart, Josep Planas
Funding (3): Saltonstall-Kennedy NOAA (Sept. 2017-Aug. 2020); NFWF (Apr. 2019-Nov. 2021); NPRB#2009 (Jan. 2021-Mar. 2022)
Publications (2): Kroska et al. (2021) *Conserv. Physiol.*; Loher et al. (2022) *North Amer. J. Fish. Manag. 42: 37-49*

5. Genetics and Genomics

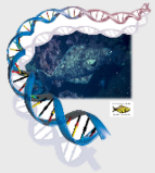
5-Yr Research Plan (2017-2021)

Collection of genetic samples of spawning aggregations spanning the Gulf of Alaska, Bering Sea and Aleutian Islands

(1999-2020)

Development and application of genomic approaches

Chromosome-level genome assembly



Development of methods based on low-coverage whole genome resequencing

Establishment of a bioinformatic pipeline in the cloud (Microsoft Azure)

Population structure analyses

(2022-2026)

Establishment of a baseline of genetic diversity

Delineation of fine-scale stock structure

Research outcomes:

- Sequenced genome (size=602 Mbp)
- Full annotation (NCBI) (27,944 genes)
- 24 chromosome-length scaffolds
- SNP detection and genotyping

Staff involved: Andy Jasonowicz, Josep Planas
Funding: IPHC, NPRB#2110
Publications: Jasonowicz et al. (2022) *Mol. Ecol. Resour. (In Review)*

APPENDIX II

Proposed schedule of outputs

	2022		2023		2024		2025		2026	
Biology and Ecology										
Migration and population dynamics										
Reproduction										
Growth										
Mortality and survival assessment										
Fishing technology										
Stock Assessment										
Management Strategy Evaluation										
Monitoring										

APPENDIX III

Proposed schedule of funding and staffing indicators: Biology and Ecology

Research areas	Research activities	Required FTEs/Year	IPHC FTEs/Year	2022	2023	2024	2025	2026	IPHC Funds	Grant Funds
Migration and Population Dynamics	Larval and juvenile connectivity and early life history studies	0.45	0.45		RB1	RB2			Yes	NPRB #2100
	Population structure	0.4	0.8		RB1				No	NPRB #2110
	Adult migration and distribution	0.4							No	NPRB #2110
	Close-kin mark-recapture studies	1	0						No	Planned
	Seascape genomics	1	0						No	Planned
	Genome-wide association analyses	1	0						No	Planned
	Genomic-based aging methods	1	1		RS 1				Yes	No
Reproduction	Maturity-at-age estimations	0.75	0						Yes	No
	Fecundity assessment	0.5	0.25			RB4	RS 2		Yes	No
	Examination of accuracy of current field macroscopic maturity classification	0.25							Yes	No
	Sex ratio of current commercial landings	0.5	0.75	LT					Yes	No
	Recruitment strength and variability	0.5	0				RS 2		Yes	Planned
Growth	Environmental influences on growth patterns	0.5	0.5		MSc student				No	Planned
	Dietary influences on growth patterns and physiological condition	0.5	0.2		RB3				No	Planned
Mortality and survival assessment	Discard mortality rate estimate: recreational fishery	0.5	1						No	NPRB #2009
	Best handling practices: recreational fishery	0.5		RB 3					No	NPRB #2009
	Whale depredation accounting and tools for avoidance	0.5							No	BREP
	Biological interactions with fishing gear	0.5							No	BREP

IPHC staff (Planned):

RS1: Research Scientist 1(PhD; Life History Modeler I). Full time temporary position (100% research;
RS2: Research Scientist 1(PhD; Life History Modeler II). Full time temporary position (100% research;
RB1: Research Biologist 1 (Geneticist; MSc). Full time temporary position (until April 2022; 1 FTE). 55% of salary covered by Grant NPRB#2110.
RB2: Research Biologist 2 (Early Life History; MSc). Full time permanent position (40% research; 0.4 FTE)
RB3: Research Biologist 3 (DMR; MSc). Full time permanent position (100% research; 1 FTE)
RB4: Research Biologist 4 (Maturity and Fecundity; MSc). Full time permanent position (100% research; 1 FTE)
LT: Laboratory Technician (MSc). Full time temporary position (100% research; 1 FTE)

Fisheries Data Overview (2022): Preliminary statistics

PREPARED BY: IPHC SECRETARIAT (J. Jannot, H. TRAN, T. KONG, K. Magrane, & K. S. Van Vleck; 25 Oct & 9 Nov 2022)

PURPOSE

To provide an overview of the key fisheries data regarding Pacific halibut removals from fisheries catching Pacific halibut during 2022, including the status of landings compared to fishery limits implemented by the Contracting Parties to the Commission. Data provided in this paper is the best available up to and including data on 07 November 2022.

BACKGROUND

The International Pacific Halibut Commission (IPHC) estimates all Pacific halibut (*Hippoglossus stenolepis*) removals taken in the IPHC Convention Area and uses this information in its yearly stock assessment (see IPHC-2022-AM098-10) and other analyses. The data are compiled by the IPHC Secretariat and include data from Federal and State agencies of each Contracting Party. All 2022 data are in net weight (head-off, dressed, ice and slime deducted) and are considered preliminary at this time.

This paper includes Pacific halibut removals for:

- Directed commercial fisheries, including landings and discard mortality
- Recreational fisheries, including landings and discard mortality
- Subsistence fisheries
- Non-directed commercial discard mortality (e.g. trawl, pot, longline)
- IPHC Fishery-Independent Setline Survey (FISS) and other IPHC research

Figure 1 shows the distribution of Pacific halibut removals (mortality) by these fishery sources in 2022. Table 1 and Table 2 provide estimates of total removals by IPHC Regulatory Area (Figure 2).

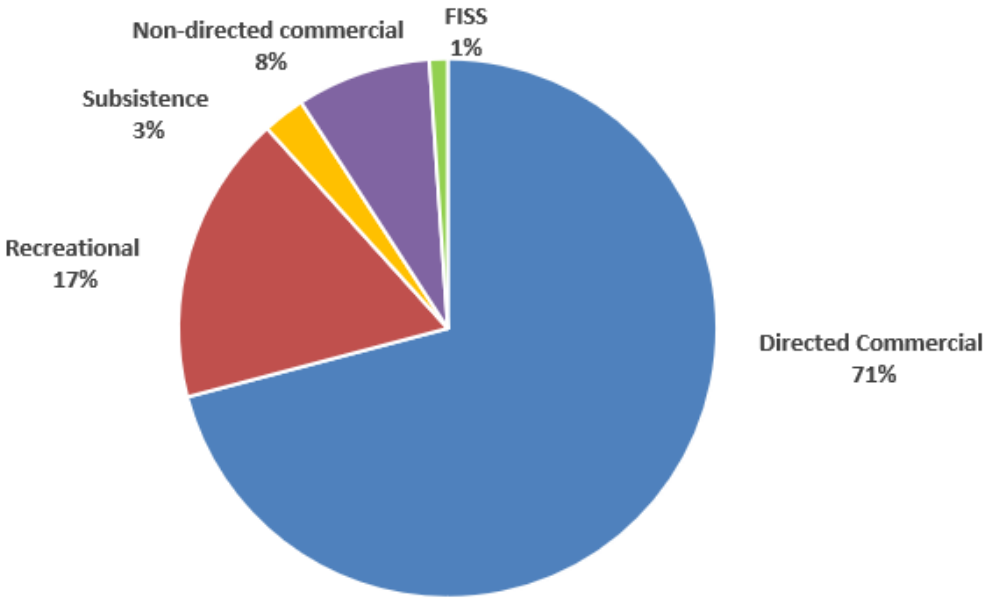


Figure 1. Distribution of Pacific halibut mortality by source in 2022.

Table 1. 2022 Mortality limits (TCEYs) and projection estimates (TCEYs and U26) by Contracting Party.

Contracting Party	Mortality limits (net weight)		Mortality (net weight)		Percent
	Tonnes (t)	Pounds (lb)	Tonnes (t)	Pounds (lb)	%
Canada	**3,429**	**7,560,000**	**3,444**	**7,591,713**	**100**
United States of America	**15,268**	**33,660,000**	**13,721**	**30,249,899**	**90**
IPHC Regulatory Area 2A	748	1,650,000	685	1,510,115	92
IPHC Regulatory Area 2C	2,681	5,910,000	2,819	6,215,271	105
IPHC Regulatory Area 3A	6,600	14,550,000	5,903	13,013,821	89
IPHC Regulatory Area 3B	1,769	3,900,000	1,608	3,544,369	91
IPHC Regulatory Area 4A	953	2,100,000	830	1,830,214	87
IPHC Regulatory Area 4B	658	1,450,000	324	714,300	49
IPHC Regulatory Area 4CDE and Closed Area	1,860	4,100,000	1,552	3,421,810	83
Subtotal (TCEY)	**18,697**	**41,220,000**	**17,164**	**37,839,612**	**92**
Non-directed commercial discard mortality (U26)	558	1,230,000	648	1,429,000	116
Total	**19,255**	**42,450,000**	**17,812**	**39,268,612**	**93**

Table 2. 2022 estimates of fishery removals and mortality (net weight), including fishery limits and mortality projections of Pacific halibut by IPHC Regulatory Area.

IPHC Regulatory Area	Fishery limit/mortality projection		Mortality (net weight)		Percent
	Tonnes (t)	Pounds (lb)	Tonnes (t)	Pounds (lb)	%
Canada – Area 2B (British Columbia)	3,429.16	7,560,000	3,443.54	7,591,713	100
Directed commercial fishery landings	2,585.48	5,700,000	2,531.81	5,581,679	98
Directed commercial discard mortality	95.25	210,000	89.54	197,398	94
Recreational fishery	458.13	1,010,000	444.52	980,000	97
Recreational discard mortality[1]	13.61	30,000	13.80	30,426	101
Recreational fishery (XRQ)	--	--	6.80	15,000	--
Subsistence[1]	185.97	410,000	183.70	405,000	99
Non-directed commercial discard mortality (O26)[1]	95.25	210,000	124.28	274,000	130
IPHC fishery-independent setline survey and research[2]	--	--	49.08	108,210	--
Non-directed commercial discard mortality (U26)	13.61	30,000	17.69	39,000	130
USA – 2A (California, Oregon, and Washington)	748.43	1,650,000	684.98	1,510,115	92
Non-treaty directed commercial	114.64	252,730	109.48	241,365	96
Non-treaty incidental to salmon troll fishery	20.23	44,599	12.37	27,281	61
Non-treaty incidental to sablefish fishery	22.68	50,000	27.67	61,000	122
Treaty Indian directed commercial	225.89	498,000	225.51	497,173	100
Directed commercial discard mortality	31.75	70,000	32.27	71,135	102
Recreational – Washington	133.71	294,786	112.97	249,063	84
Recreational – Oregon	130.47	287,645	82.39	181,644	63
Recreational – California	17.57	38,740	18.13	39,967	103
Recreational discard mortality	--	--	1.70	3,739	--
Treaty Indian ceremonial and subsistence	10.66	23,500	10.66	23,500	100
Non-directed commercial discard mortality (O26)[1]	40.82	90,000	46.27	102,000	113
IPHC fishery-independent setline survey and research[2]	--	--	5.56	12,248	--
Non-directed commercial discard mortality (U26)	--	--	1.81	4,000	--

continued….

Table 2 continued. 2022 estimates of fishery removals and mortality (net weight), including fishery limits and mortality projections of Pacific halibut by IPHC Regulatory Area.

IPHC Regulatory Area	Fishery limit/mortality projection		Mortality (net weight)		Percent
	Tonnes (t)	Pounds (lb)	Tonnes (t)	Pounds (lb)	%
USA – Area 2C (southeastern Alaska)	2,680.73	5,910,000	2,819.20	6,215,271	105
Directed commercial fishery landings	1,592.11	3,510,000	1,587.57	3,500,000	100
Directed commercial discard mortality	63.50	140,000	65.14	143,602	103
Metlakatla (Annette Island Reserve)	--	--	14.12	31,127	--
Guided recreational fishery	371.95	820,000	366.05	807,000	98
Guided recreational discard mortality[3]	--	--	16.58	36,557	--
Guided recreational fishery (GAF)[1]	--	--	45.39	100,067	--
Unguided recreational fishery[1]	494.42	1,090,000	510.29	1,125,000	103
Unguided recreational discard mortality[3]	--	--	6.80	15,000	--
Subsistence[1]	131.54	290,000	131.60	290,137	100
Non-directed commercial discard mortality (O26)[1]	31.75	70,000	19.50	43,000	n/a
IPHC fishery-independent setline survey and research[2]	--	--	56.15	123,781	--
Non-directed commercial discard mortality (U26)	--	--	0	0	--
USA – Area 3A (central Gulf of Alaska)	6,599.77	14,550,000	5,902.97	13,013,821	89
Directed commercial fishery landings	4,331.81	9,550,000	4,109.20	9,059,235	95
Directed commercial discard mortality	185.97	410,000	183.25	404,007	99
Guided recreational fishery	957.08	2,110,000	798.32	1,760,000	83
Guided recreational discard mortality[3]	--	--	6.19	13,641	--
Guided recreational fishery (GAF)	--	--	2.94	6,487	--
Unguided recreational fishery[1]	716.68	1,580,000	536.15	1,182,000	75
Unguided recreational discard mortality[3]	--	--	8.88	19,573	--
Subsistence[1]	81.65	180,000	80.28	176,993	98
Non-directed commercial discard mortality (O26)[1]	326.59	720,000	126.10	278,000	39
IPHC fishery-independent setline survey and research[2]	--	--	51.66	113,885	--
Non-directed commercial discard mortality (U26)	131.54	290,000	83.46	184,000	63
USA – Area 3B (western Gulf of Alaska)	1,769.01	3,900,000	1,607.70	3,544,369	91
Directed commercial fishery landings	1,519.53	3,350,000	1,416.69	3,123,263	93
Directed commercial discard mortality[1]	86.18	190,000	81.70	180,116	95
Recreational fishery[1]	4.54	10,000	2.93	6,460	65
Recreational discard mortality	--	--	--	--	--
Subsistence[1]	4.54	10,000	6.29	13,861	139
Non-directed commercial discard mortality (O26)[1]	158.76	350,000	85.73	189,000	54
IPHC fishery-independent setline survey and research[2]	--	--	14.36	31,669	--
Non-directed commercial discard mortality (U26)	31.75	70,000	39.01	86,000	123
USA – Area 4A (eastern Aleutians)	952.54	2,100,000	830.17	1,830,214	87
Directed commercial fishery landings	798.32	1,760,000	671.77	1,481,006	84
Directed commercial discard mortality[1]	31.75	70,000	24.89	54,868	77
Recreational fishery[1]	4.54	10,000	4.91	10,829	108
Recreational discard mortality	--	--	--	--	--
Subsistence[1]	4.54	10,000	5.50	12,118	121
Non-directed commercial discard mortality (O26)[1]	108.86	240,000	119.29	263,000	110
IPHC fishery-independent setline survey and research[2]	--	--	3.81	8,393	--
Non-directed commercial discard mortality (U26)	36.29	80,000	48.08	106,000	133

continued….

IPHC Regulatory Area	Fishery limit/mortality projection		Mortality (net weight)		Percent
	Tonnes (t)	Pounds (lb)	Tonnes (t)	Pounds (lb)	%
USA – Area 4B (central/western Aleutians)	657.71	1,450,000	324.00	714,300	49
Directed commercial fishery landings	580.60	1,280,000	268.55	592,046	46
Directed commercial discard mortality[1]	22.68	50,000	13.77	30,352	61
Recreational fishery[1]	--	--	--	--	--
Recreational discard mortality	--	--	--	--	--
Subsistence[1]	0	0	0.45	987	--
Non-directed commercial discard mortality (O26)[1]	54.43	120,000	39.01	86,000	72
IPHC fishery-independent setline survey and research[2]	--	--	2.23	4,915	--
Non-directed commercial discard mortality (U26)	4.54	10,000	2.27	5,000	50
USA – Area 4CDE and Closed (Bering Sea)	1,859.73	4,100,000	1,552.11	3,421,810	83
Directed commercial fishery landings	934.40	2,060,000	683.67	1,507,240	73
Directed commercial discard mortality[1]	18.14	40,000	20.85	45,964	115
Recreational fishery[1]	--	--	--	--	--
Recreational discard mortality	--	--	--	--	--
Subsistence[1]	18.14	40,000	16.63	36,661	92
Non-directed commercial discard mortality (O26)[1]	889.04	1,960,000	825.99	1,821,000	93
IPHC fishery-independent setline survey and research[2]	--	--	4.96	10,945	--
Non-directed commercial discard mortality (U26)	353.80	780,000	455.41	1,004,000	129
Totals	18,697.07	41,220,000	17,163.76	37,839,612	92
Directed commercial fishery landings	13,263.04	29,240,000	12,169.82	26,829,856	92
Recreational fishery	3,288.54	7,250,000	2,985.75	6,582,453	91
Subsistence[1]	439.98	970,000	435.11	959,257	99
Non-directed commercial discard mortality (O26)[1]	1,705.51	3,760,000	1,385.27	3,054,000	81
IPHC fishery-independent setline survey and research[2]	--	--	187.81	414,046	--
Non-directed commercial discard mortality (U26)	557.92	1,230,000	648.18	1,429,000	116

[1] 'Fishery projection' is value from 2021 estimates which were used in setting the TCEY for each IPHC Regulatory Area.

[2] Includes U32 Pacific halibut landed during FISS

[3] Limit included in limit listed above.

XRQ = Experimental Quota and GAF = Guided Angler Fish (XRQ and GAF leased from commercial quota).

Non-directed commercial discard mortality incidentally caught Pacific halibut by fisheries targeting other species and that cannot legally be retained, e.g. by the trawl fleet. Refers only to those Pacific halibut that subsequently die due to capture.

IPHC Fishery-Independent Setline Survey (FISS) and IPHC Research includes Pacific halibut landings and removals by the IPHC Fishery-Independent Setline Survey (FISS) and other IPHC research.

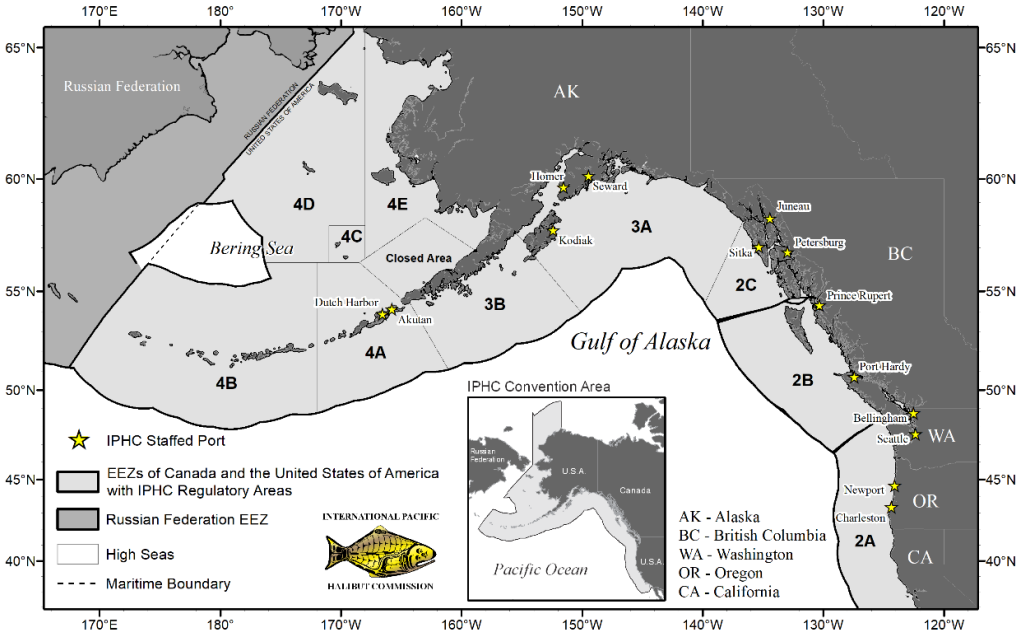


Figure 2. Map of the IPHC Convention Area (insert) and IPHC Regulatory Areas.

DEFINITIONS

Directed commercial fisheries include commercial landings and discard mortality. Directed commercial discard mortality include estimates of sub-legal Pacific halibut (under 81.3 cm [32 inches], a.k.a. U32), fish that die on lost or abandoned fishing gear, and fish discarded for regulatory compliance reasons.

Recreational fisheries include recreational landings including landings from commercial leasing and discard mortality.

Subsistence fisheries are non-commercial, customary, and traditional use of Pacific halibut for direct personal, family, or community consumption or sharing as food, or customary trade. Subsistence fisheries include:

Ceremonial and subsistence (C&S) removals in the IPHC Regulatory Area 2A treaty Indian fishery

i) Sanctioned First Nations Food, Social, and Ceremonial (FSC) fishery conducted in British Columbia;
ii) Federal subsistence fishery in Alaska, USA that uses Alaska Subsistence Halibut Registration Certificate (SHARC); and
iii) U32 Pacific halibut retained in IPHC Regulatory Areas 4D and 4E by the CDQ fishery for personal use.

DIRECTED COMMERCIAL FISHERIES

The IPHC's directed commercial fisheries span from northern California through to northern and western Alaska in USA and Canadian waters of the northeastern Pacific Ocean. The IPHC sets annual limits for the retention of Pacific halibut in each IPHC Regulatory Area. Participants in these commercial fisheries use longline and pot gear to catch Pacific halibut for sale. The directed commercial Pacific halibut fisheries in IPHC Regulatory Area 2A consisted of the directed commercial fishery with fishing period limits, the incidental Pacific halibut catch during the salmon troll and limited-entry sablefish (*Anoplopoma fimbria*) fisheries, and the treaty Indian fisheries. Farther north, the directed commercial fisheries consisted of the Individual Vessel Quota (IVQ) fishery in IPHC Regulatory Area 2B in British Columbia, Canada; the Metlakatla fishery in IPHC Regulatory Area 2C; the Individual Fishing Quota (IFQ) system in Alaska, USA; and the Community Development Quota (CDQ) fisheries in IPHC

Regulatory Areas 4B and 4CDE. All 2022 landing and discard mortality data presented in this document are preliminary.

Directed Commercial Fishing Periods

The Canadian IVQ fishery in IPHC Regulatory Area 2B and the USA IFQ and CDQ fisheries in IPHC Regulatory Areas 2C, 3A, 3B, 4A, 4B, 4C, 4D, and 4E commenced at 12 noon local time on 6 March and closed at 12 noon local time on 7 December (Table 3). The IPHC Regulatory Area 2A directed commercial fisheries, including the treaty Indian commercial fisheries, occurred during the same calendar period (6 March to 7 December 2022). For IPHC Regulatory Area 2A, the potential of 58-hour fishing periods every two weeks beginning on the fourth Tuesday in June for the non-treaty directed commercial fishery were adopted. Fishing periods began on the Tuesday at 0800 and ended on the Thursday at 1800 local time (58-hours), were further restricted by fishing period limits, and closed for the remainder of the year after the third opening on 28 July, when the IPHC Regulatory Area 2A directed commercial non-treaty fishery allocation was estimated to have been reached.

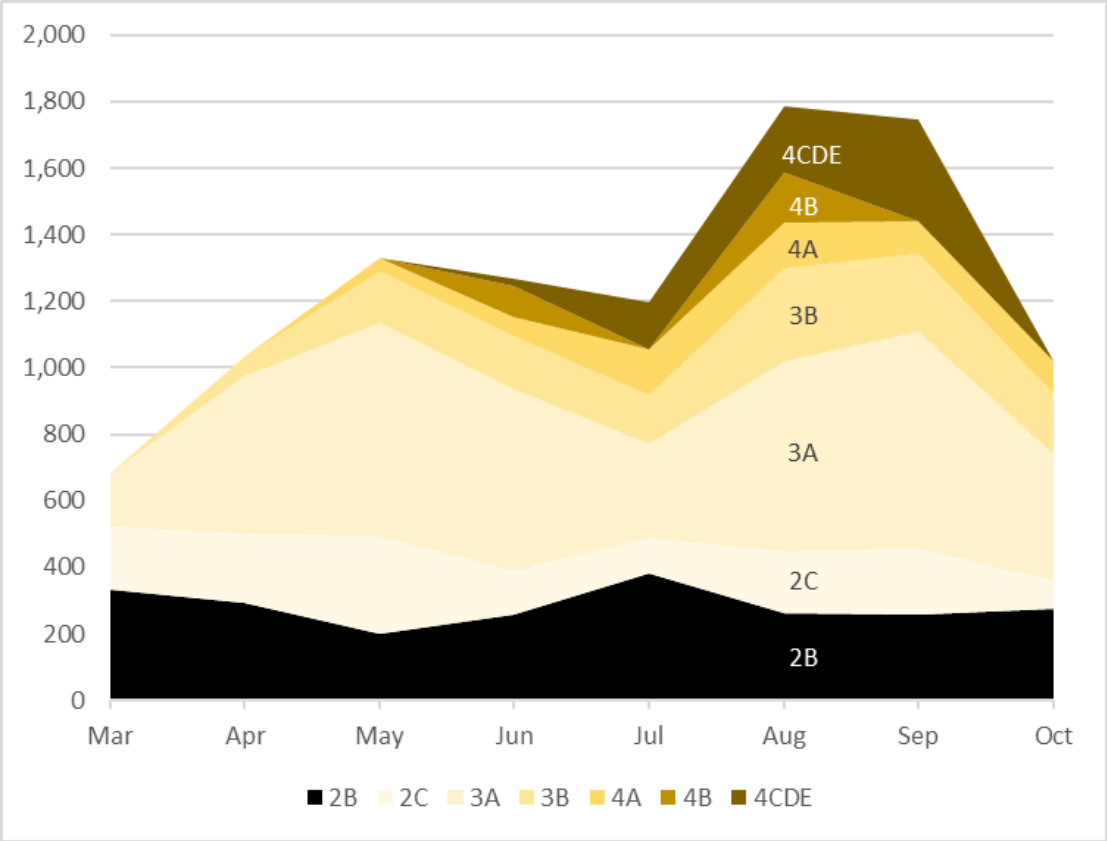
Table 3. Fishing periods for directed commercial Pacific halibut fisheries by IPHC Regulatory Area, 2018-2022. d = days; h = hours

IPHC Regulatory Area	Year				
	2022	2021	2020	2019	2018
Canada: 2B	6 Mar–7 Dec (276 d)	6 Mar–7 Dec (276 d)	14 Mar-7 Dec (268 d)	15 Mar-14 Nov (244 d)	24 Mar–7 Nov (228 d)
USA: 2A Treaty Indian	6 Mar-31 May (55 h) (Unrestricted) 6 Mar-31 May (122 h) (Restricted) 3 Jun-30 Sept (48 h and 72 h) (Restricted)	6 Mar-16 May (55 h) (Unrestricted) 6 Mar-16 May (102 h) (Restricted) 16 May-20 Jun (24 h)	14 Mar-30 Sep (55 h) (Unrestricted) 14 Mar-30 Sep (222 h) (Restricted) 5 Oct -18 Oct (13 d)	15 Mar-15 May (55 h) (Unrestricted) 15 Mar-15 May (84 h) 20 May-15 Jun (72 h) (Restricted) 11 Jun-24 Jul (35 d)	24 Mar – 28 Apr (36 h) 24 Mar – 28 Apr (37 h) 4 May – 23 May (30 h)
USA: 2A Commercial Directed	28-30 Jun 12-14 Jul 26-28 Jul (58 h each)	22-24 Jun 6-8 Jul 20-22 Jul (58 h each)	22-24 Jun 6-8 Jul 20-22 Jul 3-5 Aug 17-19 Aug (58 h each)	26 Jun 10 Jul 24 Jul (10 h each)	27 Jun 11 Jul 25 Jul (10 h each)
USA: 2A Commercial Incidental	Salmon 1 Apr – 31 Oct (213 d) Sablefish 1 Apr – 31 Oct (213 d)	Salmon 1 Apr – 7 Dec (250 d) Sablefish 1 Apr – 7 Dec (250 d)	Salmon 15 Apr–30 Sep (WA – 168 d) 15 Apr–31 Oct (OR - 199 d) 1 Aug–30 Sep (CA - 60 d) Sablefish 1 Apr – 15 Nov (228 d)	Salmon 20 Apr - 30 Sep (WA, CA - 163 d) 20 Apr - 31 Oct (OR - 194 d) Sablefish 1 Apr- 31 Oct (213 d)	Salmon 24 Mar – 8 Aug (137 d) Sablefish 24 Mar – 7 Nov (228 d)
USA: Alaska (2C, 3A, 3B, 4A, 4B, 4CDE)	6 Mar–7 Dec (276 d)	6 Mar–7 Dec (276 d)	14 Mar-15 Nov (246 d)	15 Mar-14 Nov (244 d)	24 Mar–7 Nov (228 d)

Directed Commercial Landings

Directed commercial fishery limits and landings by IPHC Regulatory Area for the 2022 fishing season are shown in Table 2. The directed commercial fishery limit, as referred to here, is the IPHC commercial fishery limit set by the Contracting Parties following the IPHC Annual Meeting and is equivalent to the Fishery Constant Exploitation Yield (FCEY). The fishery limits with adjustments from the underage and overage programs from the previous year's quota share programs are not shown. The Use of Fish allocation in IPHC Regulatory Area 2B are also not presented. Historical landings and fishery limits are available on the IPHC website (https://www.iphc.int/data).

The 2022 directed commercial fishery landings were spread over ten months (March – December) of the year in Canada and the USA (Figure 2). On a month-to-month comparison, July took the lead as the busiest month for total poundage (17%) landed from IPHC Regulatory Area 2B. On a month-to-month comparison, August was the busiest month for total poundage (19%) from Alaska, USA. A year-to-date visualization is also available on the IPHC website: https://www.iphc.int/data/year- to-date-directed-commercial-landing-patterns-ak-and-bc



Regulatory Area 2B landings from DFO Fishery Operations System (FOS).
Regulatory Areas 2C, 3, and 4 landings from NOAA Fisheries Restricted Access Management (RAM) Program.
Regulatory Area 3B: March combined with and shown above in April for confidentiality reasons
Regulatory Area 4A: April combined with and shown above in May for confidentiality reasons.
Regulatory Area 4B: April/May combined with and shown above in June; Jul/Sep/Oct combined with and shown above in August for confidentiality reasons
Regulatory Areas 4CDE: October combined with and shown above in September for confidentiality reasons.

Figure 3. 2022 directed commercial landings (tonnes, net weight, preliminary) of Pacific halibut for IQ fisheries by IPHC Regulatory Area and month.

Canada – IPHC Regulatory Area 2B (British Columbia)

Under the IVQ fishery in British Columbia, Canada, the number of active Pacific halibut licences (L licences), and First Nations communal commercial licences (FL licences) was 144 in 2022. In addition,

Pacific halibut can be landed as incidental catch in other licensed groundfish fisheries. Pacific halibut was landed from a total of 200 active licences in 2022, with 56 of these licences from other fisheries. The 2022 directed commercial landings represented 2,532 tonnes (5,582,000 pounds) of Pacific halibut (Table 2).

Directed commercial trips from IPHC Regulatory Area 2B were delivered into 13 different ports in 2022. The ports of Port Hardy (including Coal Harbour and Port McNeill) and Prince Rupert/Port Edward were the major landing locations, receiving 92% of the commercial landings. Port Hardy received 43% while Prince Rupert received 49% of the directed commercial landings. All IVQ landings were landed in IPHC Regulatory Area 2B. Only Canadian vessels landed frozen, head-off Pacific halibut in 2022: 51 landings 38 tonnes (83,332 net pounds) reported frozen- at-sea head-off product from 23 vessels.

According to logbook data, less than 0.05% by weight of Pacific halibut were caught with pot gear and landed within the directed commercial fishery in IPHC Regulatory Area 2B.

USA – IPHC Regulatory Area 2A (Washington, Oregon, California)

The 2022 IPHC Regulatory Area 2A fisheries and respective fishery limits are listed in Table 2. The total IPHC Regulatory Area 2A directed commercial landings of 375 tonnes (826,819 pounds) are 2% below the fishery limit. The total non-treaty directed commercial landings of 109 tonnes (241,365 pounds) were 4% under the fishery limit of 115 tonnes (252,730 pounds) after three 58 hour openers. The fishing period limits by vessel size class for each opening in 2022 are listed in Table 4.

The salmon troll fishery season began on 1 April with an allowable incidental landing ratio of one Pacific halibut per two Chinook (*Oncorhynchus tshawytscha*), plus an “extra” Pacific halibut per landing, and a vessel trip limit of 35 fish. On 1 July, the fishery was extended at the same ratio and landing limit. Total landings of 12 tonnes (27,281 pounds) were 39% under the fishery limit 20 tonnes (44,599 pounds).

Incidental Pacific halibut retention during the limited-entry sablefish (*Anoplopoma fimbria*) fishery was open from 1 April to 31 October. Beginning 1 April, the allowable landing ratio was 0.10 tonnes (225 pounds) (net weight) of Pacific halibut to 0.45 tonnes (1,000 pounds) of sablefish, and up to two additional Pacific halibut in excess of the ratio limit. Beginning 9 May, the allowable landing ratio was reduced to 0.07 tonnes (150 pounds) of Pacific halibut to 0.45 tonnes (1,000 pounds) of sablefish, and up to two additional Pacific halibut in excess of the ratio limit. The total landings of 28 tonnes (61,000 pounds) were 22% over the fishery limit (23 tonnes (50,000 pounds)).

In IPHC Regulatory Area 2A, north of Point Chehalis (46°53.30´ N. latitude), the treaty Indian tribes manage the directed commercial landings for three fisheries under a Memorandum of Understanding among the 13 tribes. These consist of an unrestricted fishery, a restricted fishery with trip limits, and a late season fishery. These fisheries are subject to in-season management. There was one unrestricted, open access fishery, not to exceed 55 hours from 6 March to 31 May and one restricted fishery not to exceed 122 hours including a vessel per day limit of 0.23 tonnes (500 pounds) from 6 March to 31 May. A final fishery with two options one to not exceed 48 hours in duration 1 tonne (2,200 pounds) limit and option two 72 hours with 0.7 tonne (1500 pounds) was open from 3 June to 30 September. Estimated total landings of 226 tonnes (497,173 pounds) were at the fishery limit (226 tonnes (498,000 pounds)).

Table 4. The fishing periods and limits (tonnes, dressed, head-on with ice/slime) by vessel class used in the 2022 directed commercial fishery in IPHC Regulatory Area 2A.

Vessel Class		Fishing Period (dates) & Limits (t)		
Letter	**Feet**	**28-30 June**	**12-14 July**	**26-28 July**
A, B and C	1-35	1.03	1.03	1.00
D and E	36-45	1.55	1.55	1.51
F and G	46-55	2.06	2.06	2.01
H	56+	2.32	2.32	2.26

USA – IPHC Regulatory Areas 2C, 3, and 4 (Alaska)

In Alaska, USA, the National Oceanic and Atmospheric Administration Fisheries (NOAA Fisheries) Restricted Access Management (RAM) Program allocated Pacific halibut quota share (QS) to recipients by IPHC Regulatory Area. Quota share transfers were permitted with restrictions on the amount of QS a person could hold and the amount that could be fished per vessel. In 2022, RAM reported that 2,241 persons/entities held QS.

The total 2022 landings from the IFQ/CDQ Pacific halibut fishery for the waters off Alaska, USA were 8,738 tonnes (19,263,000 pounds), 10% under the directed commercial fishery limit (Table 2). By IPHC Regulatory Area, the directed commercial landings were at the fishery limit in Area 2C, under by 5% in Area 3A, 7% under in Area 3B, 16% under in Area 4A, 54% under in Area 4B, and 27% under in 4CDE/Closed (IFQ). (Table 2).

Kodiak received approximately 14% of the directed commercial landings of Alaskan catch making it the port that received the greatest number of pounds in 2022. Homer received the second and Seward the third largest landing volume at 14% and 11% of the Alaskan commercial landings, respectively. In Southeast Alaska, the two largest landing volumes were received in Sitka and Petersburg, and their combined landings represented 14% of the directed commercial Alaskan landings. The Alaskan QS catch that was landed in Bellingham, WA, USA was less than 3%.

In Alaska, 24 tonnes (53,000 pounds) of Pacific halibut were caught with pot gear and landed within the directed commercial fishery representing 0.3% of the total Alaska landings.

The Metlakatla Indian Community (within IPHC Regulatory Area 2C) was authorized by the United States government to conduct a commercial Pacific halibut fishery within the Annette Islands Reserve. There were 11 two-day openings between 6 May and 02 October for total landings of 14 tonnes (31,127 pounds). The fishery closed on 4 October.

Directed Commercial Discard Mortality

Incidental mortality of Pacific halibut in the directed commercial Pacific halibut fishery is the mortality of all Pacific halibut that do not become part of the landed catch. The three main sources of discard mortality estimate include: 1) fish that are captured and discarded because they are below the legal-size limit of 81.3 cm (32 inches); 2) fish that are estimated to die on lost or abandoned fishing gear; and 3) fish that are discarded for regulatory reasons (e.g., the vessels trip limit has been exceeded). The methods that are applied to produce each of these estimates differ due to the amount and quality of information available. Information on lost gear and regulatory discards is collected through logbook interviews and fishing logs received by mail. The ratio of U32 to O32 Pacific halibut (>81.3 cm or 32 inches in length) is determined from the IPHC FISS in most areas and by direct observation in the IPHC Regulatory Area 2B fishery. Different mortality rates are applied to each category: released Pacific halibut have a 16% mortality rate and Pacific halibut mortality from lost gear is 100%.

Pacific halibut discard mortality estimates from the commercial Pacific halibut fishery are summarized by IPHC Regulatory Area in Table 2.

RECREATIONAL FISHERIES

The 2022 recreational removals of Pacific halibut, including discard mortality, was estimated at 2,986 tonnes (6,582,453 pounds). Changes in harvests varied across areas, in some cases, in response to changes in size restrictions. Recreational fishery limits and landings are detailed by IPHC Regulatory Area in Table 2. Historical recreational removals are also available at the IPHC website: https://www.iphc.int/data/datatest/pacific-halibut-recreational-fisheries-data

Recreational Landings

Canada – IPHC Regulatory Area 2B (British Columbia)

IPHC Regulatory Area 2B operated under a 133 cm (52.4 inch) maximum size limit and one Pacific halibut had to be between 90 – 133 cm (35.4 - 52.4 inches) or both under 90 cm (35.4 inch) when attaining the two fish possession limit, with an annual limit of ten per licence holder. On 20 August, the possession limit was increased to three fish if all were under 90 cm (35.4 inch), still with an annual limit of ten per licence holder. The IPHC Regulatory Area 2B recreational harvest was 3% under the recreational fishery limit at 445 tonnes (980,000).

USA – IPHC Regulatory Area 2A (Washington, Oregon, California)

The 2022 IPHC Regulatory Area 2A recreational allocation was 282 tonnes (621,171 pounds) net weight and based on the Pacific Fishery Management Council's Catch Sharing Plan formula, which divides the overall fishery limit among all sectors. The recreational allocation was further subdivided to seven subareas, after 23 tonnes (50,000 pounds) were allocated to the incidental Pacific halibut catch in the commercial sablefish fishery in Washington. This subdivision resulted in 134 tonnes (249,786 pounds) being allocated to Washington subareas and 130 tonnes (287,645 pounds) to Oregon subareas. In addition, California received an allocation of 18 tonnes (38,740 pounds). The IPHC Regulatory Area 2A recreational harvest totaled 213 tonnes (WA + OR + CA; 470,674 pounds), 24% under the recreational fishery limit. Recreational fishery harvest seasons by subareas varied and were managed in season with fisheries opening on 1 April.

IPHC Regulatory Areas 2C, 3, and 4 (USA: Alaska)

A reverse slot limit allowing for the retention of Pacific halibut, if ≤ 101.6 cm (40 inches) or ≥ 203.2 cm (80 inches) in total length, was in place for the charter fishery in IPHC Regulatory Area 2C. In IPHC Regulatory Area 3A, charter anglers were allowed to retain two fish per day, but only one could exceed 71.1 cm (28 inches) in length, with a recording requirement. A possession limit equaled to 2 daily bag limits with no annual limit. One trip per calendar day per charter permit was allowed, with no charter retention of Pacific halibut on Wednesdays.

The Contracting Party agencies in Alaska (USA) have a program that allow recreational harvesters to land fish that is leased from commercial fishery quota shareholders for the current season.

Recreational Discard Mortality

Pacific halibut discarded for any reason suffer some degree of discard mortality, and impacts more of the stock with the increasing use of size restrictions, such as reverse slot limits. Current year estimates from Contracting Parties' agencies of recreational discard mortality have been received from both Contracting Parties and are provided in Table 2.

SUBSISTENCE FISHERIES

Pacific halibut is taken throughout its range as subsistence harvest by several fisheries. Subsistence fisheries are non-commercial, customary, and traditional use of Pacific halibut for direct personal, family, or community consumption or sharing as food, or customary trade. The primary subsistence fisheries are the treaty Indian Ceremonial and Subsistence fishery in IPHC Regulatory Area 2A off northwest Washington State (USA), the First Nations Food, Social, and Ceremonial (FSC) fishery in British Columbia (Canada), and the subsistence fishery by rural residents and federally recognized native tribes in Alaska (USA) documented via Subsistence Halibut Registration Certificates (SHARC).

The coastwide subsistence estimate for 2022 was 435 tonnes (959,257 pounds) (Table 2). Historical subsistence removals are also available at the IPHC website: https://www.iphc.int/datatest/subsistence-fisheries

Estimated subsistence harvests by area

In the commercial Pacific halibut fisheries coastwide, the state and federal regulations require that take-home Pacific halibut caught during commercial fishing be recorded as part of the commercial fishery on the landing records (i.e., State fish tickets or Canadian validation records). This is consistent across areas, including the quota share fisheries in Canada and USA, and as part of fishing period limits and Pacific halibut ratios in the incidental fisheries in IPHC Regulatory Area 2A. Therefore, personal use fish or take-home fish within the commercial fisheries are accounted for as commercial catch and are not included here.

IPHC Regulatory Area 2A (USA: Washington, Oregon, California)

The Pacific Fishery Management Council's Catch Sharing Plan allocates the Pacific halibut fishery limit to commercial, recreational, and treaty Indian users in IPHC Regulatory Area 2A. The treaty tribal fishery limit is further sub-divided into commercial and ceremonial and subsistence (C&S) fisheries. It is estimated that 11 tonnes (23,500 pounds) were retained as C&S. A revised estimate of the 2022 removals will be provided at the end of the year.

IPHC Regulatory Area 2B (Canada: British Columbia)

The source of Pacific halibut subsistence harvest in British Columbia is the First Nations FSC fishery. The IPHC receives some logbook and landing data for this harvest from the DFO, but those data have not been adequate for the IPHC to make an independent estimate of the FSC fishery harvest. DFO estimated the First Nations FSC harvest to be 136 tonnes (300,000 pounds) annually until 2006, and since 2007, the yearly estimate has been provided as 184 tonnes (405,000 pounds).

IPHC Regulatory Areas 2C, 3, and 4 (USA: Alaska)

In 2003, the subsistence Pacific halibut fishery off Alaska was formally recognized by the North Pacific Fishery Management Council and implemented by IPHC and NOAA Fisheries regulations. The fishery allows the customary and traditional use of Pacific halibut by rural residents and members of federally recognized Alaska, USA native tribes who can retain Pacific halibut for non-commercial use, food, or customary trade. The NOAA Fisheries regulations define legal gear, number of hooks, and daily bag limits, and IPHC regulations set the fishing season. Prior to subsistence fishing, eligible persons registered with NOAA Fisheries Restricted Access Management to obtain a SHARC. The Division of Subsistence at ADF&G was contracted by NOAA Fisheries to estimate the subsistence harvest in Alaska, USA through a data collection program. A voluntary survey of fishers is conducted by mail or phone, with some onsite visits. Beginning in 2018, this survey is conducted on a biannual schedule, rather than annually. The 2020 estimate has been carried forward for 2022.

In addition to the SHARC harvest, IPHC regulations allow Pacific halibut less than 81.3 cm or 32 inches in fork length (also called U32) to be retained in the IPHC Regulatory Area 4D and 4E commercial Pacific halibut CDQ fishery, under an exemption requested by the North Pacific Fishery Management Council, if the fish are not sold or bartered. The exemption originally applied only to CDQ fisheries in IPHC Regulatory Area 4E in 1998 but was expanded in 2002 to also include IPHC Regulatory Area 4D. The CDQ organizations are required to report to the IPHC the amounts retained during their commercial fishing operations. This harvest is not included in the SHARC program estimate and is reported separately.

Reports for 2022 removals were received from three CDQ management organizations: Bristol Bay Economic Development Corporation (BBEDC), Norton Sound Economic Development Corporation (NSEDC), and Coastal Villages Regional Fund (CVRF).

<u>CDQ - Bristol Bay Economic Development Corporation (BBEDC)</u>

BBEDC requires their fishers to record the lengths of retained U32 Pacific halibut in a separate log, which are then tabulated by BBEDC at the conclusion of the season. The lengths were converted to weights using the IPHC length/weight relationship and summed to estimate the total retained U32

weight. Pacific halibut were landed by BBEDC vessels primarily in King Salmon and Dillingham in a lesser amount. A small amount was landed in Dillingham. BBEDC reported 5 harvesters landed 137 U32 Pacific halibut (<1 tonne; 1,209 pounds).

CDQ - Coastal Villages Regional Fund (CVRF)

CVRF reported that no Pacific halibut were landed by their fishers or received by their facilities.

CDQ - Norton Sound Economic Development Corporation (NSEDC)

NSEDC required their fishers to offload the U32 Pacific halibut for weighing. The fish were not washed nor were the heads removed. The U32 Pacific halibut were then returned to the harvester. NSEDC reported 57 U32 Pacific halibut weighing <1 tonne (664 pounds) were caught in the local CDQ fishery and landed at the Nome plant.

NON-DIRECTED COMMERCIAL DISCARD MORTALITY

The IPHC accounts for non-directed commercial discard mortality by IPHC Regulatory Area and sector. All removals for 2022 are available in Table 2. Historical data are also available on the IPHC website: https://www.iphc.int/data/datatest/non-directed-commercial-discard-mortality- fisheries

Estimating Non-Directed Commercial Discard Mortality

Non-directed commercial discard mortality of Pacific halibut is estimated because not all fisheries have 100% monitoring and not all Pacific halibut that are discarded are assumed to die. Agencies estimate the amount of non-directed commercial discard that will not survive, called non-directed commercial discard mortality.

The IPHC relies upon information supplied by observer programs run by Contracting Party agencies for non-directed commercial discard mortality estimates in most fisheries. Non-IPHC research survey information is used to generate estimates of non-directed commercial discard mortality in the few cases where fishery observations are unavailable. Trawl fisheries off British Columbia, Canada are monitored, and non-directed commercial discard mortality information is provided to IPHC by DFO. NOAA Fisheries operates observer programs off the USA West Coast and Alaska, which monitor the major groundfish fisheries. Data collected by NOAA fisheries observer programs are used to estimate non-directed commercial discard mortality. A breakout of removals from each non-directed commercial fishery by IPHC Regulatory Area and year is available on the IPHC website: https://www.iphc.int/data/datatest/non-directed-commercial-discard-mortality-fisheries.

Non-directed Commercial Discard Mortality by Area

Canada – IPHC Regulatory Area 2B (British Columbia)

In Canada, Pacific halibut non-directed commercial discard mortality in trawl fisheries are capped at 454 tonnes round weight by DFO. Non-trawl non-directed commercial discard mortality is handled under an IFQ system within the directed Pacific halibut fishery cap.

USA – IPHC Regulatory Area 2A (Washington, Oregon, California)

Groundfish fisheries off Washington, Oregon, and California are managed by NOAA Fisheries, following advice and recommendations developed by the Pacific Fishery Management Council. Non-directed commercial discard mortality projected estimates are provided by NOAA Fisheries.

USA – IPHC Regulatory Areas 2C, 3, and 4 (Alaska)

Groundfish fisheries in Alaska are managed by NOAA Fisheries, following advice and recommendations developed by the North Pacific Fishery Management Council. Non-directed commercial discard mortality projected estimates for Alaskan areas are provided by NOAA Fisheries and ADF&G.

IPHC Regulatory Area 2C (Southeast Alaska)

For the federal waters of IPHC Regulatory Area 2C, only non-directed commercial discard mortality by hook-and-line vessels fishing in the outside waters were reported by NOAA Fisheries. These vessels are primarily targeting Pacific cod and rockfish (*Sebastes* spp.) in open access fisheries, and sablefish in the IFQ fishery.

Fisheries occurring within state waters and resulting in Pacific halibut non-directed commercial discard mortality include pot fisheries for red and golden king crab, and tanner crab. Information is provided periodically by ADF&G, and the estimate was rolled forward from 2021 to 2022.

IPHC Regulatory Area 3 (Eastern, Central and Western Gulf of Alaska)

IPHC Regulatory Area 3 is comprised of Areas 3A and 3B. For the purposes of stock assessment and management, IPHC tracks non-directed commercial discard mortality in both IPHC Regulatory Areas. Federal groundfish fisheries operate throughout both areas. Trawl fisheries are responsible for most of the non-directed commercial discard mortality in Regulatory Area 3, with hook-and-line fisheries a distant second. State-managed crab and scallop fisheries are also known to take Pacific halibut as non-directed commercial discard mortality, but data from these state-managed fisheries is currently unavailable.

Estimates of non-directed commercial discard mortality in IPHC Regulatory Area 3 remains challenging. Observer coverage for most fisheries is low. Tendering, loopholes in trip cancelling, and safety considerations likely result in observed trips not being representative of all trips (observed and unobserved) in many regards (e.g., duration, species composition, etc.). Low observer coverage in IPHC Regulatory Area 3 leads to increased uncertainty in these non-directed commercial discard mortality estimates and to potential for bias.

IPHC Regulatory Area 4 (Bering Sea and Aleutian Islands)

The Pacific cod fishery, which is conducted in the late winter/early spring and late summer, is the major contributor to Pacific halibut non-directed commercial discard mortality in IPHC Regulatory Area 4. Almost all vessels are required to have 100% observer coverage because of the vessel's size and requirements of their fishery cooperative; a few small vessels fish Pacific cod in this IPHC Regulatory Area. The high level of observer coverage for fisheries in IPHC Regulatory Area 4 results in reliable estimates of non-directed commercial discard mortality.

Pots are used to fish for Pacific cod and sablefish and are very selective. Non-directed commercial discard mortality rates are quite low, and survival is relatively high. Annual non-directed commercial discard mortality estimates are typically low, usually less than 7 tonnes.

In IPHC Regulatory Area 4CDE non-directed commercial discard mortality estimates have typically been the highest (Table 2) due to groundfish fisheries which target flatfish in the Bering Sea.

IPHC FISHERY-INDEPENDENT SETLINE SURVEY (FISS)

Approximately 188 tonnes (414,046 pounds) of Pacific halibut were landed from the FISS and in 2022 with the amount landed from each IPHC Regulatory Area documented in Table 2. There were no other IPHC research Pacific halibut retained, landed, or sold in 2022.

RECOMMENDATION

That the Commission **NOTE** paper IPHC-2022-IM098-07 Rev_1 which provides an overview of the key fisheries data regarding Pacific halibut removals from fisheries catching Pacific halibut during 2022, including the status of landings compared to fishery limits implemented by the Contracting Parties of the Commission.

INTERNATIONAL PACIFIC HALIBUT COMMISSION

IPHC-2022-IM098-08

IPHC Fishery-Independent Setline Survey (FISS) design and implementation in 2022

PREPARED BY: IPHC SECRETARIAT (K. UALESI , C. JONES, R. RILLERA, T. JACK; 26 OCTOBER 2022)

PURPOSE

To provide a summary of the IPHC Fishery-Independent Setline Survey (FISS) design and implementation in 2022.

BACKGROUND

The annual IPHC Fishery-Independent Setline Survey (FISS) of the Pacific halibut stock was augmented from 2014-2019 with expansion stations that filled in gaps in coverage in the annual FISS. Prior to 2020, the standard grid of stations comprised 1,200 stations. Following the completion in 2019, expansion stations were added to the standard grid in all IPHC Regulatory Areas, now totaling 1,890 stations for the full FISS design (Fig. 1), within the prescribed depth range of 18 to 732 metres (10 to 400 fathoms).

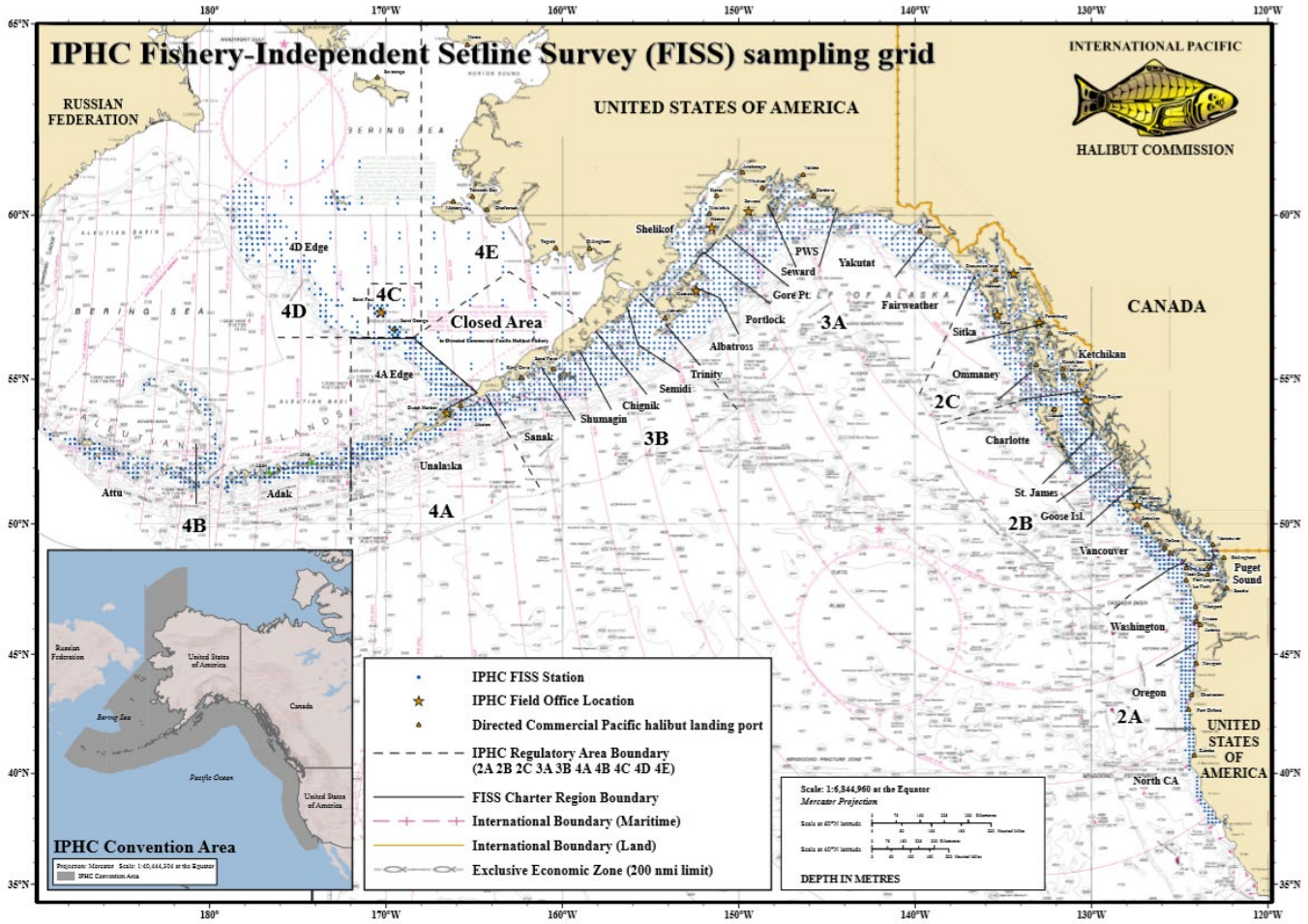


Figure 1. IPHC Fishery-Independent Setline Survey (FISS) with full sampling grid shown.

Prior to 2019, only fixed gear was used to fish FISS sets. With increasing use of snap gear in the commercial fishery, this restriction has limited the number of vessels available for the FISS. Further, any differences between snap and fixed gears (including catch rate differences and differences in fishing locations) may affect our understanding of trends in commercial fishery indices. This has motivated the need for a study comparing the two gear types with this work being done in 2019, 2020,

and again in 2021. While no study was completed in 2022, we recognize the increased use of snap gear and hope to continue the fixed vs snap gear comparison in the future.

Beginning in 2019, individual weight data were collected coastwide from Pacific halibut caught on the FISS to eliminate questions that have arisen regarding the accuracy of estimates that depend on these weights, including weight per unit effort (WPUE) indices of density. Data from IPHC collections from commercial landings and other sources had provided evidence that the current standard length-net weight curve used for estimating Pacific halibut weights on the FISS may have been over-estimating weights on average in most IPHC Regulatory Areas, and that the relationship between weight and length may vary spatially.

2022 FISS design

At the 97th Session of the IPHC Interim Meeting (IM097), the Commission recommended a FISS design for 2022 that included 1,188 stations coastwide (Fig. 2). The design comprised sampling of subareas within IPHC Regulatory Areas 2A, 2B, 3A, 3B, 4A, 4B and 4CDE intended to reduce potential bias (relative to historical observed changes year-to-year) and to achieve a level of precision comparable to or better than recent setline surveys. 2022 sampling in IPHC Regulatory Areas 2C included random subsampling from the full design in IPHC charter region Ketchikan while sampling in IPHC charter regions Ommaney & Sitka included 100% of the full FISS design.

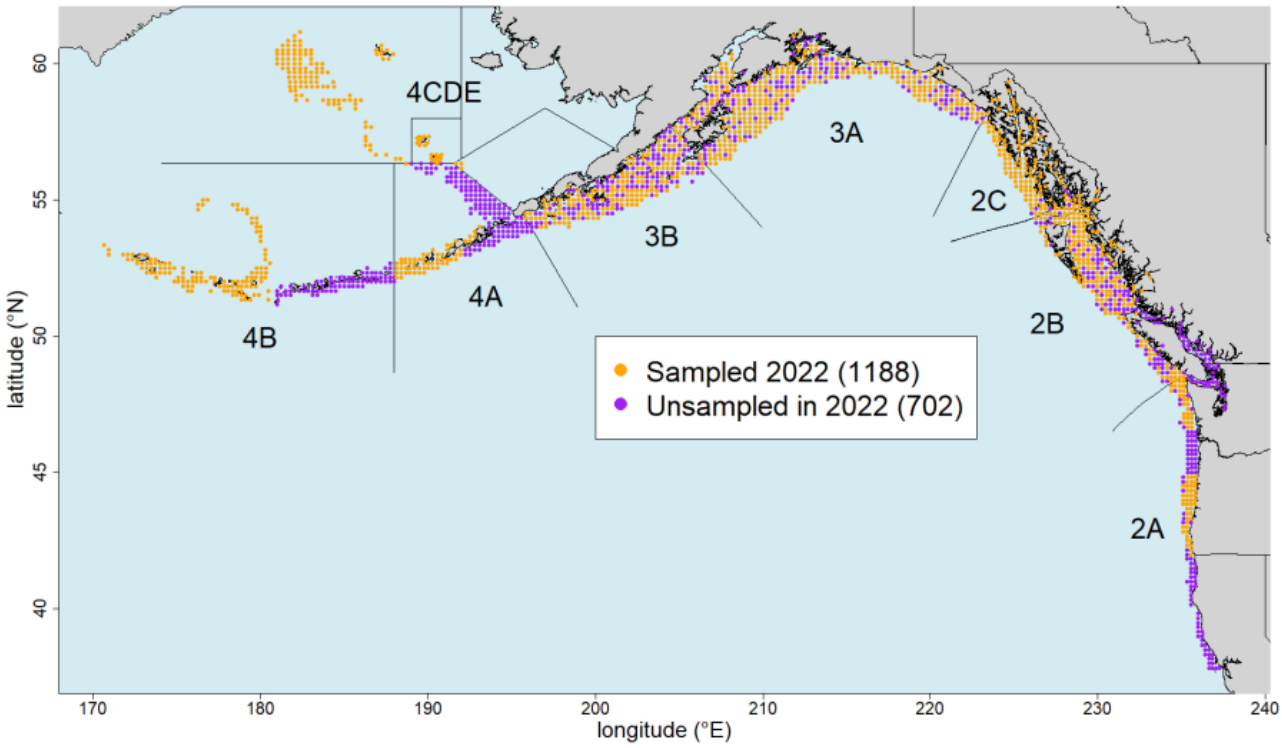


Figure 2. Map of the 2022 FISS design endorsed by the Commission on 1 December 2021. (IPHC-2021-IM097) Purple circles were not sampled in 2022

At the 98th Session of the IPHC Annual Meeting (IPHC-2022-AM098-R), the Commission:

> (para. 38) "***RECALLED*** *the IM097 endorsement of the FISS design options for 2022 (Appendix IVa and b) and provisional endorsement of the proposed designs for 2023 and 2024 (Appendix V) (IPHC-2021-IM097-R, paras. 31, 32), and made no further amendments at AM098."*

IPHC-2021-IM097-R, para. 31 "*The Commission **ENDORSED** optimized design 1 for the 2022 FISS, with full sampling in IPHC Regulatory Area 4CDE (Appendix IV), and optimized design 2, reduced sampling in IPHC Regulatory Area 4CDE (Appendix V), as an alternative if necessary...*"

(para. 38) "*The Commission **NOTED** that the endorsed FISS design for 2022 may undergo further modification depending on the outcome of the 2022 request for tender process, as well as unforeseen in-season logistical issues that IPHC contracted vessels may encounter throughout 2022 (e.g. weather, mechanical).*"

MATERIALS AND METHODS

The IPHC's FISS design encompasses nearshore and offshore waters of the IPHC Convention Area (Fig. 1). The IPHC Regulatory Areas are divided into 29 charter regions, each requiring between 10 and 46 charter days to complete. FISS stations are located at the intersections of a 10 nmi by 10 nmi square grid within the depth range occupied by Pacific halibut during summer months (18 – 732 m [10 – 400 fm]). Figure 2 depicts the 2022 FISS station positions, and IPHC Regulatory Areas.

Fishing vessels are chosen through a competitive bid process where up to four (4) charter regions per vessel may be awarded and typically 10-15 vessels are chosen. In 2022, the process has been clearly documented on the IPHC website for accountability and transparency purposes:https://www.iphc.int/management/science-and-research/fishery-independent-setline-survey-fiss/62-fiss-vessel-recruiting.

In 2022, 9 vessels were chartered to complete the FISS, as detailed in Media Release 2022-007: Notification of IPHC Fishery-Independent Setline Survey (FISS) 2022 Contract Awards.

Sampling protocols

IPHC Setline Survey Specialists (Field) collected data according to protocols established in the 2022 FISS Sampling Manual (IPHC-2022-VSM01).

Sampling challenges - 2022

Of the 1,196 FISS stations planned for the 2021 FISS season (1,188 stations plus eight (8) rockfish index stations in Washington), 862 (72%) were effectively sampled.

Not sampled: A total of 289 initially planned stations were not sampled in 2022. There were challenges with vessel recruitment this season due to 1) increased sablefish quota availability; 2) several vessels transitioning to snap-gear; 3) vessel maintenance; and 4) challenges with vessel crew recruitment.

Due to the challenges with vessel recruitment, the following stations within IPHC charter regions were not sampled: Gore Point (35 stations), Semidi (27 stations), Chignik (35 stations), Shumagin (26 stations), and 4CDE North (40 stations), Attu (61 stations), Portlock (27 stations), Shelikof (9 stations), Ketchikan (12 stations) and Ommaney (12 stations).

In addition, two (2) stations in Sitka were unsampled as they were within Glacier Bay National Park and we were not permitted to complete these stations within the park this year by NOAA. Two (2) stations in Yakutat were unsampled due to the presence of sea ice restricting the vessel's access. One (1) station in Unalaska was also not sampled due to poor weather and tides.

Ineffective stations: Coastwide, forty-five (45) stations were deemed ineffective due to Orca depredation (n=16), Sperm whale depredation (n=15), gear soak time (n=4), shark predation (n=1), sand flea activity (n=1), station moved > 3nmi (n=1), and setting and gear issues (n=7).

Bait (Chum salmon)

The minimum quality requirement for FISS bait is No. 2 semi-bright (Alaska Seafood Marketing Institute grades A through E), headed and gutted, and individually quick-frozen chum salmon. Bait usage is based on 0.17 kilograms (0.37 pounds) per hook resulting in approximately 136 kilograms (300 pounds) per eight skate station. Bait quality was monitored and documented throughout the season and found to meet the standard as described above.

Pre-season: In September 2021 (IPHC Media Release 2021-025), the Secretariat made pre-season bait purchases of approximately 102 tonnes (225,600 lbs) to ensure a smooth start to the 2022 FISS, and to take advantage of advance purchase prices.

RESULTS

Interactive views of the FISS results are provided via the IPHC website and can be found here once published:

https://www.iphc.int/data/setline-survey-catch-per-unit-effort

As in previous years, legal-sized (O32) Pacific halibut that were caught on FISS stations and sacrificed in order to obtain biological data were retained and sold. In addition, beginning in 2020, sub-legal (U32) Pacific halibut that were caught and randomly selected for otolith sampling were also retained and sold. This helps to offset costs of the FISS. FISS vessels also retained for sale incidentally captured rockfish (*Sebastes spp*.) and Pacific cod (*Gadus macrocephalus*). These species were retained because they rarely survive the barotrauma resulting from capture. Most vessel contracts provided the vessel a lump sum payment, along with a 10% share of the Pacific halibut proceeds and a 50% share of the incidental catch proceeds.

The 2022 FISS chartered 8 commercial longline vessels (four Canadian and four USA) during a combined 49 trips and 513 charter days (Tables 1). Otoliths were removed from 10,308 fish coastwide. Approximately 188 tonnes (414,000 pounds) of Pacific halibut, 31 tonnes (69,200 pounds) of Pacific cod, and 32 tonnes (71,400 pounds) of rockfish were landed from the FISS stations.

Table 1a. Effort and landing summary by FISS charter region and vessel for all 2022 stations and all Pacific halibut (sampled U32 and all O32).

IPHC Regulatory Area	Charter Region	Vessel	Vessel Number[1]	Charter Days[2]	Planned Stations	Effective Stations[3]	Pacific halibut Sold (t)[4]	Pacific halibut Sold (lb)[4]	Average Price USD/kg[5]	Average Price USD/lb[5]
2A	Oregon	*Pacific Surveyor*	947061	20	43	42	2	4,172	$13.24	$6.00
2A	Washington	*Pacific Surveyor*	947061	16	37	37	4	8,076	$11.92	$5.40
2B	Charlotte	*Bold Pursuit*	99997	35	75	72	20	43,957	$19.93	$9.04
2B	Goose Island	*Bold Pursuit*	99997	17	32	32	11	23,382	$20.02	$9.08
2B	St. James	*Pender Isle*	27282	20	36	36	12	26,241	$19.73	$8.95
2B	Vancouver	*Bold Pursuit*	99997	18	31	31	7	14,630	$19.59	$8.89
2C	Ketchikan	*Vanisle*	21912	21	35	23	7	16,142	$15.49	$7.02
2C	Ommaney	*Vanisle*	21912	23	52	36	27	58,911	$15.78	$7.16
2C	Sitka	*Vanisle*	21912	32	52	46	22	48,728	$16.88	$7.66

3A	Albatross	*Devotion*	42892	23	35	32	14	31,077	$17.00	$7.71
3A	Fairweather	*Pender Isle*	27282	14	26	26	7	14,508	$17.11	$7.76
3A	Portlock	*Star Wars II*	99997	8	13	12	2	4,562	$13.45	$6.10
3A	Prince William Sound	*St. Nicholas*	45399	35	39	38	8	18,625	$16.25	$7.94
3A	Seward	*St. Nicholas*	45399	26	35	32	5	11,832	$17.52	$7.94
3A	Shelikof	*Star Wars II*	99997	17	36	35	5	10,201	$13.88	$6.30
3A	Yakutat	*Pender Isle*	27282	26	55	51	10	23,080	$16.41	$7.44
3B	Sanak	*Star Wars II*	99997	25	49	45	7	16,402	$15.08	$6.84
3B	Trinity	*Devotion*	42892	14	27	26	7	15,267	$17.06	$7.74
4A	Unalaska	*Devotion*	42892	39	59	50	4	8,393	$15.02	$6.81
4B	Adak	*Kema Sue*	41033	32	45	44	1	2,703	$15.22	$6.90
4B	Attu	*Kema Sue*	41033	10	24	22	1	2,212	$15.22	$6.90
4C	4CDE South	*Kema Sue*	41033	8	20	18	2	3,951	$15.08	$6.84
4D	4CDE Central	*Kema Sue*	41033	19	40	38	2	3,684	$14.99	$6.80
4D	4CDE South	*Kema Sue*	41033	14	37	35	2	3,310	$15.08	$6.84
Closed Area	4CDE	*Kema Sue*	41033	1	3	3	0	0	-	-
Total		**8 Vessels**		**513**	**936**	**862**	**188**	**414,046**	**$17.01**	**$7.72**

1 Canada: Vessel Registration Number and USA: ADF&G vessel number.

2 Days are estimated - some vessels fished two charter regions in one day.

3 Stations that did not meet setting parameters or deemed ineffective are excluded.

4 Net weight (head-off, dressed, washed). May not sum to correct total due to rounding.

5 Ex-vessel price.

Table 1b. Effort and landing summary by FISS charter region and vessel for all 2022 stations and O32 Pacific halibut.

IPHC Regulatory Area	Charter Region	Vessel	Vessel Number[1]	Charter Days[2]	Planned Stations	Effective Stations[3]	Pacific halibut Sold (t) [4]	Pacific halibut Sold (lb)[4]	Average Price USD/kg[5]	Average Price USD/lb[5]
2A	Oregon	*Pacific Surveyor*	947061	20	43	42	2	3,716	$13.78	$6.25
2A	Washington	*Pacific Surveyor*	947061	16	37	37	2	5,407	$12.90	$5.85
2B	Charlotte	*Bold Pursuit*	99997	35	75	72	19	42,187	$19.99	$9.07
2B	Goose Island	*Bold Pursuit*	99997	17	32	32	10	22,778	$20.06	$9.10
2B	St. James	*Pender Isle*	27282	20	36	36	12	25,836	$19.75	$8.96
2B	Vancouver	*Bold Pursuit*	99997	18	31	31	6	14,051	$19.64	$8.91
2C	Ketchikan	*Vanisle*	21912	21	35	23	7	15,568	$15.51	$7.04
2C	Ommaney	*Vanisle*	21912	23	52	36	26	57,462	$15.80	$7.17
2C	Sitka	*Vanisle*	21912	32	52	46	21	46,404	$16.90	$7.67
3A	Albatross	*Devotion*	42892	23	35	32	13	29,458	$17.00	$7.71
3A	Fairweather	*Pender Isle*	27282	14	26	26	6	14,069	$17.12	$7.77
3A	Portlock	*Star Wars II*	99997	8	13	12	2	4,459	$13.50	$6.12

3A	Prince William Sound	*St. Nicholas*	45399	35	39	38	8	18,546	$16.25	$7.37
3A	Seward	*St. Nicholas*	45399	26	35	32	5	11,587	$17.51	$7.94
3A	Shelikof	*Star Wars II*	99997	17	36	35	4	9,899	$13.93	$6.32
3A	Yakutat	*Pender Isle*	27282	26	55	51	10	21,762	$16.41	$7.44
3B	Sanak	*Star Wars II*	99997	25	49	45	6	14,086	$15.18	$6.88
3B	Trinity	*Devotion*	42892	14	27	26	7	14,467	$17.06	$7.74
4A	Unalaska	*Devotion*	42892	39	59	50	3	6,589	$15.30	$6.94
4B	Adak	*Kema Sue*	41033	32	45	44	1	2,591	$15.23	$6.91
4B	Attu	*Kema Sue*	41033	10	24	22	1	2,120	$15.23	$6.91
4C	4CDE South	*Kema Sue*	41033	8	20	18	1	2,967	$15.17	$6.88
4D	4CDE Central	*Kema Sue*	41033	19	40	38	1	2,803	$15.17	$6.88
4D	4CDE South	*Kema Sue*	41033	14	37	35	1	2,469	$15.44	$7.00
Closed Area	4CDE	*Kema Sue*	41033	1	3	3	0	0	-	-
Total		**8 Vessels**		**513**	**936**	**862**	**177**	**391,281**	**$17.13**	**$7.77**

1 Canada: Vessel Registration Number and USA: ADF&G vessel number.

2 Days are estimated - some vessels fished two charter regions in one day.

3 Stations that did not meet setting parameters or deemed ineffective are excluded.

4 Net weight (head-off, dressed, washed). May not sum to correct total due to rounding.

5 Ex-vessel price.

Table 1c. Effort and landing summary by FISS charter region and vessel for all 2022 stations and sampled U32 Pacific halibut.

IPHC Regulatory Area	Charter Region	Vessel	Vessel Number[1]	Charter Days[2]	Planned Stations	Effective Stations[3]	Pacific halibut Sold (t) [4]	Pacific halibut Sold (lb)[4]	Average Price USD/kg[5]	Average Price USD/lb[5]
2A	Oregon	*Pacific Surveyor*	947061	20	43	42	0	456	$8.82	$4.00
2A	Washington	*Pacific Surveyor*	947061	16	37	37	1	2,669	$9.91	$4.50
2B	Charlotte	*Bold Pursuit*	99997	35	75	72	1	1,770	$18.50	$8.39
2B	Goose Island	*Bold Pursuit*	99997	17	32	32	0	604	$18.39	$8.34
2B	St. James	*Pender Isle*	27282	20	36	36	0	405	$18.39	$8.34
2B	Vancouver	*Bold Pursuit*	99997	18	31	31	0	579	$18.32	$8.31
2C	Ketchikan	*Vanisle*	21912	21	35	23	0	574	$14.79	$6.71
2C	Ommaney	*Vanisle*	21912	23	52	36	1	1,449	$15.07	$6.83
2C	Sitka	*Vanisle*	21912	32	52	46	1	2,324	$16.39	$7.44
3A	Albatross	*Devotion*	42892	23	35	32	1	1,619	$17.03	$7.73
3A	Fairweather	*Pender Isle*	27282	14	26	26	0	439	$16.67	$7.56
3A	Portlock	*Star Wars II*	99997	8	13	12	0	103	$11.10	$5.03
3A	Prince William Sound	*St. Nicholas*	45399	35	39	38	0	79	$16.25	$7.37
3A	Seward	*St. Nicholas*	45399	26	35	32	0	245	$17.66	$8.01
3A	Shelikof	*Star Wars II*	99997	17	36	35	0	302	$12.21	$5.54

3A	Yakutat	*Pender Isle*	27282	26	55	51	1	1,318	$16.53	$7.50
3B	Sanak	*Star Wars II*	99997	25	49	45	1	2,316	$14.50	$6.58
3B	Trinity	*Devotion*	42892	14	27	26	0	800	$17.07	$7.74
4A	Unalaska	*Devotion*	42892	39	59	50	1	1,804	$14.00	$6.35
4B	Adak	*Kema Sue*	41033	32	45	44	0	112	$14.82	$6.72
4B	Attu	*Kema Sue*	41033	10	24	22	0	92	$14.82	$6.72
4C	4CDE South	*Kema Sue*	41033	8	20	18	0	984	$14.82	$6.72
4D	4CDE Central	*Kema Sue*	41033	19	40	38	0	881	$14.42	$6.54
4D	4CDE South	*Kema Sue*	41033	14	37	35	0	841	$14.04	$6.37
Closed Area	4CDE	*Kema Sue*	41033	1	3	3	0	0	-	-
Total		**8 Vessels**		**513**	**936**	**862**	**10**	**22,765**	**$15.05**	**$6.83**

1 Canada: Vessel Registration Number and USA: ADF&G vessel number.

2 Days are estimated - some vessels fished two charter regions in one day.

3 Stations that did not meet setting parameters or deemed ineffective are excluded.

4 Net weight (head-off, dressed, washed). May not sum to correct total due to rounding.

5 Ex-vessel price.

Vessels chartered by the IPHC delivered fish to 21 different ports (Tables 2). Fish sales were awarded based on obtaining a fair market price. When awarding sales, the Commission considered the price offered, the number of years that a buyer had been buying and marketing Pacific halibut, how fish were graded at the dock (including the determination of No. 2 and chalky Pacific halibut), and the promptness of settlements following deliveries. Individual sales were evaluated after each event to ensure that the buyer was meeting IPHC standards. Average prices increased from $15.13/kg in 2021 to $17.01/kg in 2022 (Tables 3). This represents a 12.4% increase in price.

Table 2a. FISS Pacific halibut landings by port for all Pacific halibut (sampled U32 and all O32), 2022[1,2].

Offload Port	Trips	Tonnes	Pounds	Total USD	Average Price (USD/kg)	Average Price (USD/lb)
Coos Bay	1	0	891	$5,429.25	$13.43	$6.09
Dutch Harbor	10	13	29,137	$199,997.80	$15.13	$6.86
Homer	3	5	10,043	$66,356.68	$14.57	$6.61
Juneau	3	14	30,550	$238,344.80	$17.20	$7.80
Ketchikan	4	18	40,356	$284,053.50	$15.52	$7.04
King Cove	1	4	9,716	$66,044.50	$14.99	$6.80
Kodiak	6	25	54,484	$407,212.04	$16.48	$7.47
Neah Bay	1	1	2,816	$15,689.39	$12.28	$5.57
Newport	2	1	3,281	$19,619.75	$13.18	$5.98
Petersburg	4	12	26,121	$180,374.30	$15.22	$6.91
Port Angeles	1	1	3,129	$17,081.81	$12.04	$5.46
Port Hardy	5	18	39,176	$355,343.60	$20.00	$9.07
Prince Rupert	5	26	56,333	$506,381.92	$19.82	$8.99
Sand Point	1	1	1,802	$12,006.50	$14.69	$6.66
Seward	7	12	27,037	$207,521.95	$16.92	$7.68

Sitka	4	18	38,953	$300,658.41	$17.02	$7.72
Tofino/Ucluelet	1	5	11,596	$102,617.64	$19.51	$8.85
Valdez	1	2	5,098	$36,960.50	$15.98	$7.25
Vancouver	1	1	1,105	$10,121.68	$20.19	$9.16
Westport	1	1	2,131	$10,876.25	$11.25	$5.10
Yakutat	4	9	20,291	$152,182.50	$16.53	$7.50
Grand Total	**66**	**188**	**391,624**	**$3,194,874.77**	**$17.01**	**$7.72**

[1] Net weight (head-off, dressed, washed).
[2] Prices based on net weight.

Table 2b. FISS Pacific halibut landings by port for O32 Pacific halibut, 2022[1,2].

Offload Port	Trips	Tonnes	Pounds	Total USD	Average Price (USD/kg)	Average Price (USD/lb)
Coos Bay	1	0	829	$5,181.25	$13.78	$6.25
Dutch Harbor	10	11	23,946	$166,024.63	$15.29	$6.93
Homer	3	4	9,815	$65,041.12	$14.61	$6.63
Juneau	3	13	29,464	$230,377.40	$17.24	$7.82
Ketchikan	4	18	39,940	$281,217.50	$15.52	$7.04
King Cove	1	4	8,309	$56,599.31	$15.02	$6.81
Kodiak	6	24	51,888	$387,634.63	$16.47	$7.47
Neah Bay	1	1	1,948	$11,526.95	$13.05	$5.92
Newport	2	1	2,887	$18,043.75	$13.78	$6.25
Petersburg	4	11	24,854	$172,152.05	$15.27	$6.93
Port Angeles	1	1	1,830	$10,732.95	$12.93	$5.87
Port Hardy	5	17	38,316	$348,144.65	$20.03	$9.09
Prince Rupert	5	25	54,351	$489,790.50	$19.87	$9.01
Sand Point	1	1	1,370	$9,630.50	$15.50	$7.03
Seward	7	12	26,713	$204,966.75	$16.92	$7.67
Sitka	4	17	37,109	$286,625.64	$17.03	$7.72
Tofino/Ucluelet	1	5	11,095	$98,453.27	$19.56	$8.87
Valdez	1	2	5,098	$36,960.50	$15.98	$7.25
Vancouver	1	0	1,090	$9,994.19	$20.21	$9.17
Westport	1	1	1,629	$9,387.19	$12.70	$5.76
Yakutat	4	9	18,800	$141,000.00	$16.53	$7.50
Grand Total	**66**	**177**	**391,281**	**$3,039,484.73**	**$17.13**	**$7.77**

[1] Net weight (head-off, dressed, washed).
[2] Prices based on net weight.

Table 2c. FISS Pacific halibut landings by port for sampled U32 Pacific halibut, 2022[1,2].

Offload Port	Trips	Tonnes	Pounds	Total USD	Average Price (USD/kg)	Average Price (USD/lb)
Coos Bay	1	0	62	$248.00	$8.82	$4.00
Dutch Harbor	10	0	5,191	$33,973.17	$14.43	$6.54
Homer	3	0	228	$1,315.56	$12.72	$5.77
Juneau	3	0	1,086	$7,967.40	$16.17	$7.34
Ketchikan	4	0	416	$2,836.00	$15.03	$6.82
King Cove	1	1	1,407	$9,445.19	$14.80	$6.71
Kodiak	6	1	2,596	$19,577.41	$16.63	$7.54
Neah Bay	1	0	868	$4,162.44	$10.57	$4.80
Newport	2	0	394	$1,576.00	$8.82	$4.00
Petersburg	4	1	1,267	$8,222.25	$14.31	$6.49
Port Angeles	1	1	1,299	$6,348.86	$10.78	$4.89
Port Hardy	5	0	860	$7,198.95	$18.45	$8.37
Prince Rupert	5	1	1,982	$16,591.42	$18.46	$8.37
Sand Point	1	0	432	$2,376.00	$12.13	$5.50
Seward	7	0	324	$2,555.20	$17.39	$7.89
Sitka	4	1	1,844	$14,032.77	$16.78	$7.61
Tofino/Ucluelet	1	0	501	$4,164.37	$18.33	$8.31
Valdez	1	0	0	-	-	-
Vancouver	1	0	15	$127.49	$18.74	$8.50
Westport	1	0	502	$1,489.06	$6.54	$2.97
Yakutat	4	1	1,491	$11,182.50	$16.53	$7.50
Grand Total	**66**	**10**	**22,765**	**$155,390.04**	**$15.05**	**$6.83**

[1] Net weight (head-off, dressed, washed).
[2] Prices based on net weight.

Table 3a. FISS landings (total pounds and price) of all Pacific halibut (sampled U32 and all O32) by IPHC Regulatory Area in 2022[1].

IPHC Regulatory Area	2A	2B	2C	3A	3B	4A	4B	4C	4D	Closed Area	Total Weight and Average Price
Tonnes	6	49	56	52	14	4	2	2	3	0	188
Pounds	12,248	108,210	123,781	113,885	31,669	8,393	4,915	3,951	6,994	0	414,046
Price USD/kg	$12.37	$19.85	$16.18	$16.40	$16.04	$15.02	$15.22	$15.08	$15.04	$ -	$17.01
Price USD/lb	$5.61	$9.01	$7.34	$7.44	$7.27	$6.81	$6.90	$6.84	$6.82	$ -	$7.72

1 Net weight (head-off, dressed, washed)

Table 3b. FISS landings (total pounds and price) of O32 Pacific halibut by IPHC Regulatory Area in 2022[1].

IPHC Regulatory Area	2A	2B	2C	3A	3B	4A	4B	4C	4D	Closed Area	Total Weight and Average Price
Tonnes	4	48	54	50	13	3	2	1	2	0	177
Pounds	9123	104,852	119,434	109,780	28,553	6,589	4,711	2,967	5,272	0	391,281
Price USD/kg	$13.26	$19.90	$16.19	$16.40	$16.13	$15.30	$15.23	$15.17	$15.30	$ -	$17.13
Price USD/lb	$6.01	$9.03	$7.34	$7.44	$7.32	$6.94	$6.91	$6.88	$6.94	$ -	$7.77

1 Net weight (head-off, dressed, washed)

Table 3c. FISS landings (total pounds and price) of sampled U32 Pacific halibut by IPHC Regulatory Area in 2022[1].

IPHC Regulatory Area	2A	2B	2C	3A	3B	4A	4B	4C	4D	Closed Area	Total Weight and Average Price
Tonnes	1	2	2	2	1	1	0	0	1	0	10
Pounds	3125	3,358	4,347	4,105	3,116	1,804	204	984	1,722	0	22,765
Price USD/kg	$9.75	$18.44	$15.74	$16.36	$15.16	$14.00	$14.82	$14.82	$14.24	$ -	$15.05
Price USD/lb	$4.42	$8.36	$7.14	$7.42	$6.88	$6.35	$6.72	$6.72	$6.46	$ -	$6.83

1 Net weight (head-off, dressed, washed)

FISS timing

Each year, the months of June, July, and August are targeted for FISS fishing. In 2022, this activity took place from 28 May through 16 September. On a coastwide basis, FISS vessel activity was highest in intensity at the beginning of the FISS season and declined early in August as boats finished their charter regions (Figure 8). All FISS activity was completed by mid-September.

		Week 22	Week 23	Week 24	Week 25	Week 26	Week 27	Week 28	Week 29	Week 30	Week 31	Week 32	Week 33	Week 34	Week 35	Week 36	Week 37	Week 38	Week 39	Week 40
2A	2022		9%	25%	17%	17%	17%	15%												
	2021		19%	15%	13%	8%	23%	10%	14%											
	2019	7%	21%	13%	8%	13%	11%	13%	13%											
	2018	10%	11%	9%	8%	12%	10%	4%	7%	6%	10%	3%	8%	1%						
	2017	8%	7%	7%	5%	6%	7%	1%	6%	4%	7%	10%	8%	8%	4%	6%	4%	2%		
	2016		18%	11%	17%	12%	17%	9%	10%	7%										
	2015	20%	9%	15%	12%	16%	2%	13%	9%	4%										
2B	2022	2%	10%	9%	9%	8%	7%	10%	14%	16%	13%	2%								
	2021		16%	12%	9%	11%	6%	9%	6%	5%	6%	5%	5%	2%	8%					
	2020					2%	14%	16%	11%	6%	6%	10%	7%	1%	9%	13%	6%			
	2019	8%	8%	8%	2%	4%	8%	18%	11%	8%	11%	9%	5%							
	2018	7%	9%	10%	10%	10%	12%	10%	4%	10%	8%	9%	1%							
	2017	10%	10%	7%	8%	5%	15%	18%	17%	10%										
	2016				5%	9%	7%	9%	15%	20%	15%	11%	11%							
	2015	11%	11%	8%	9%	9%	4%	2%	11%	12%	9%	9%	7%							
2C	2022		12%	10%	8%	9%	7%	16%	10%	5%	11%	5%	7%							
	2021	1%	19%	8%	9%	9%	7%	7%	10%	12%	10%	7%								
	2020						14%	11%	7%	9%	6%	7%	18%	14%	8%	5%				
	2019	1%	11%	13%	5%	11%	8%		5%	9%	10%	12%	12%	4%						
	2018				1%	10%	18%	13%	13%	8%	8%	7%	8%	9%	4%					
	2017	15%	15%	10%	15%	13%					7%	9%	15%	2%						
	2016		15%	14%	9%	13%	15%	10%	11%	1%	7%	5%								
	2015	15%	5%		19%	12%	13%	17%	20%											
3A	2022		10%	17%	17%	10%	5%	3%					5%	2%	7%	11%	5%	6%		
	2021		6%	12%	10%	6%	8%	7%	9%	10%	12%	7%	7%	2%	2%	1%				
	2020					0%	13%	11%	12%	16%	12%	11%	7%	5%	4%	5%	3%			
	2019	7%	18%	17%	13%	10%	7%	3%	3%	3%	1%	2%		0%	1%	7%	7%	1%		
	2018	15%	15%	12%	10%	7%	8%	2%	8%	5%	6%	5%	4%	2%	2%					
	2017	14%	9%	11%	11%	9%	10%	9%	8%	6%		3%	3%	2%	3%					
	2016		11%	10%	11%	11%	5%	6%	8%	14%	9%	8%	4%	2%						
	2015	12%	18%	19%	16%	10%	6%	5%	2%	4%	4%	4%								

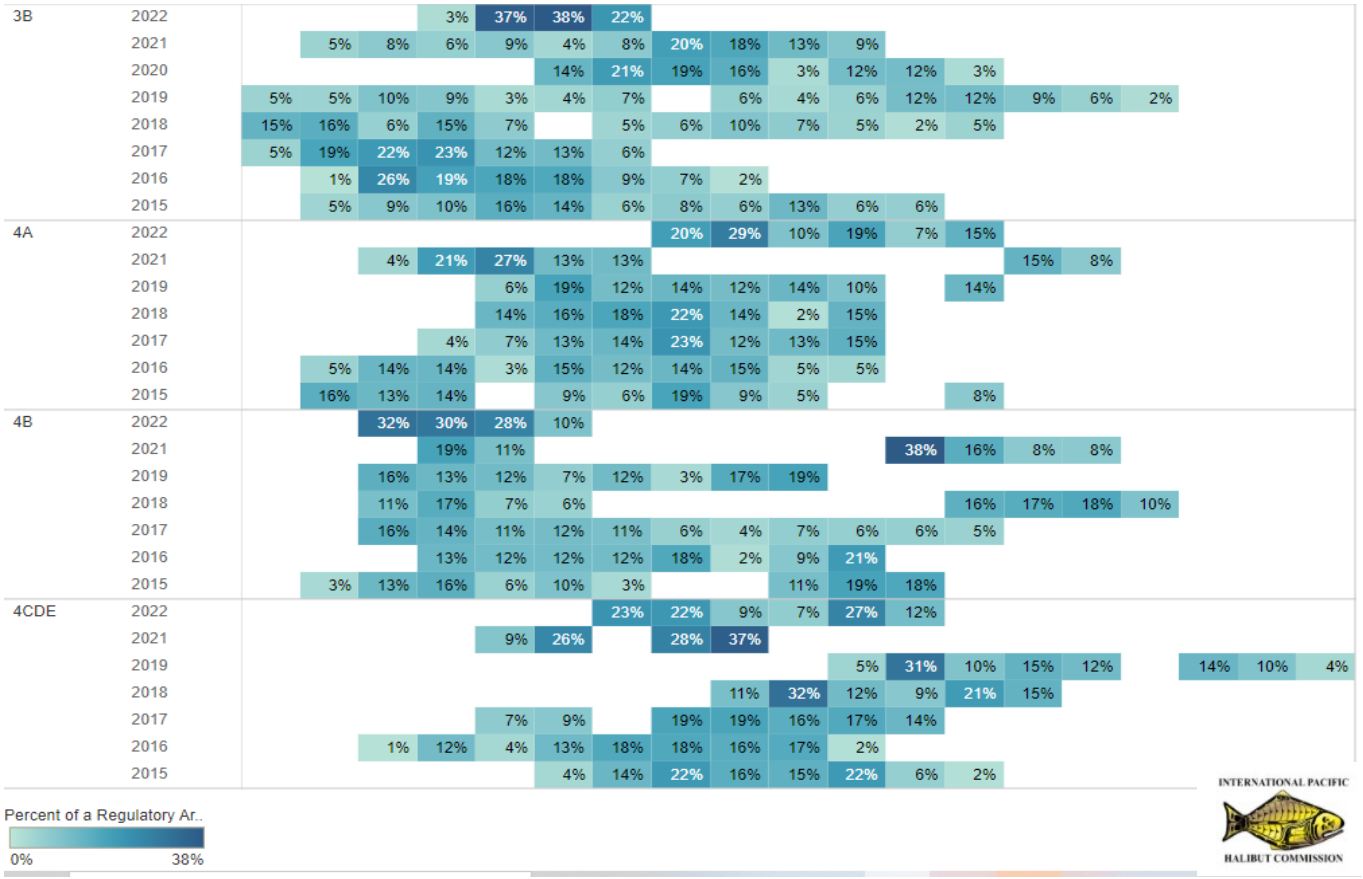


Figure 8. Percent of the total FISS stations completed by IPHC Regulatory Area during each week of the year (2015-2022). Week 22 begins in late May or early June depending on the year.

RECOMMENDATION/S

That the Commission:

1) **NOTE** paper IPHC-2022-IM098-08 which provides a summary of the IPHC Fishery-Independent Setline Survey (FISS) design and implementation in 2022.

APPENDICES

Nil.

Space-time modelling of survey data

PREPARED BY: IPHC SECRETARIAT (R. A. WEBSTER; 26 OCTOBER AND 8 NOVEMBER 2022)

PURPOSE

To provide results of the space time modelling of Pacific halibut survey data for the period 1993-2022.

INTRODUCTION

Since 2016 space-time modelling has been used by the IPHC to produce estimates of mean O32 WPUE (weight per unit effort), all sizes WPUE and all sizes NPUE (numbers per unit effort) indices of Pacific halibut density and abundance. The modelling depends primarily on data from the IPHC's fishery-independent setline survey (FISS, Ualesi et al. 2022), but in the Bering Sea also integrates data from the National Marine Fisheries Service annual trawl survey and the Alaska Department of Fish and Game's annual Norton Sound trawl survey. Both surveys are fishery-independent data sources.

Since 2019, weighing of Pacific halibut onboard FISS charter vessels has meant that the weight data used to compute WPUE now comes almost entirely from observed weights of fish rather than estimates from a length-net weight relationship. For fish without directly measured weights, weights are predicted from a year- and IPHC Regulatory Area-specific length-net weight relationship estimated from the FISS length and weight data. For U32 fish with round weight recorded, net weights are estimated from a round-net weight relationship estimated from coastwide sample data from the 2019 FISS.

RESULTS OF SPACE-TIME MODELLING IN 2022

Figures 1 to 3 show time series estimates of O32 WPUE (most comparable to fishery catch-rates), all sizes WPUE and all sizes NPUE over the 1993-2022 period included in the 2022 space-time modelling. Coastwide, we estimate declines in all three series since 2021, with greatest decline for O32 WPUE (18%) and least for all sizes NPUE (8%). These declines were largely due to decreases in the indices for Region 3, with Region 4 also contributing to the O32 WPUE decrease. Indices in Region 2 have been generally stable since 2021. Estimated 1993-22 time series by IPHC Regulatory Area are in Appendix A.

Tables of model output (time series, stock distribution estimates) are updated annually on the IPHC website at https://www.iphc.int/data/time-series-datasets.

FISS model output may also be explored interactively using the link on this page of the IPHC website: https://www.iphc.int/data/datatest/fishery-independent-setline-survey-fiss.

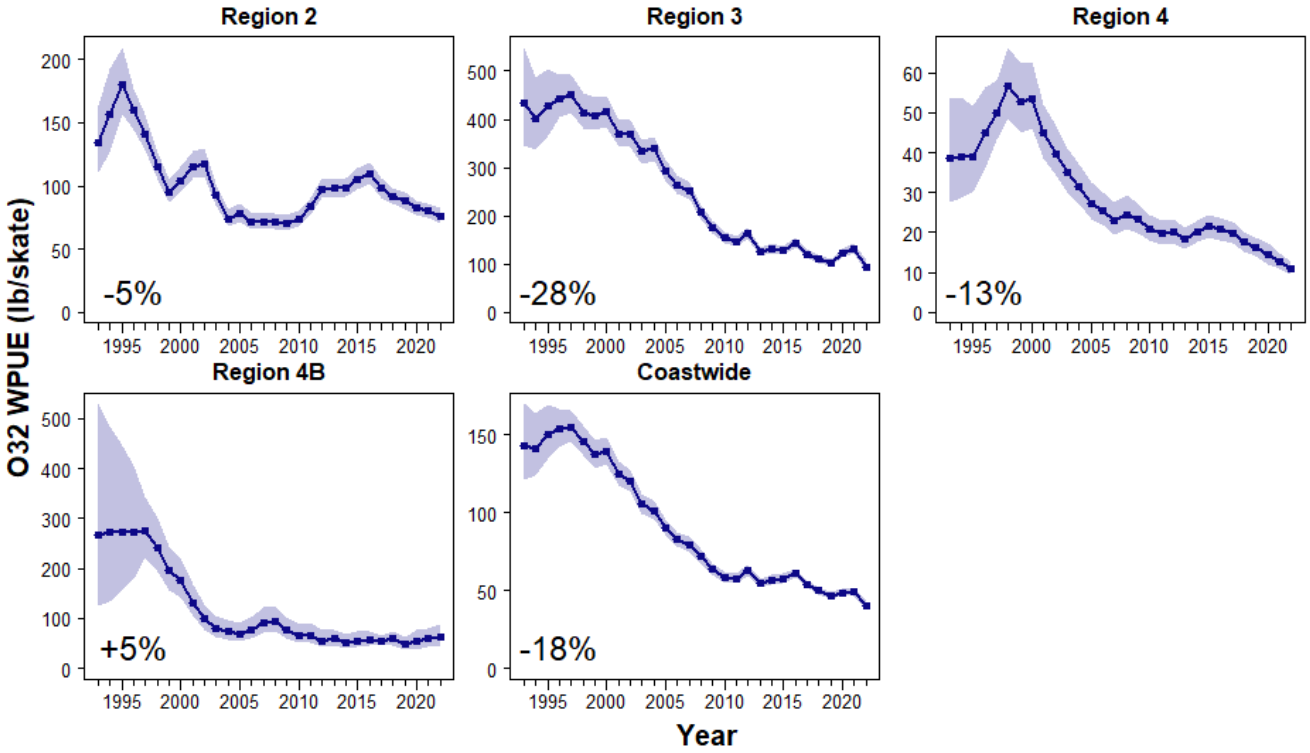


Figure 1. Space-time model output for O32 WPUE for 1993-2022 for Biological Regions. Filled circles denote the posterior means of O32 WPUE for each year. Shaded regions show posterior 95% credible intervals, which provide a measure of uncertainty: the wider the shaded interval, the greater the uncertainty in the estimate. Numeric values in the lower left-hand corners are estimates of the change in mean O32 WPUE from 2021 to 2022.

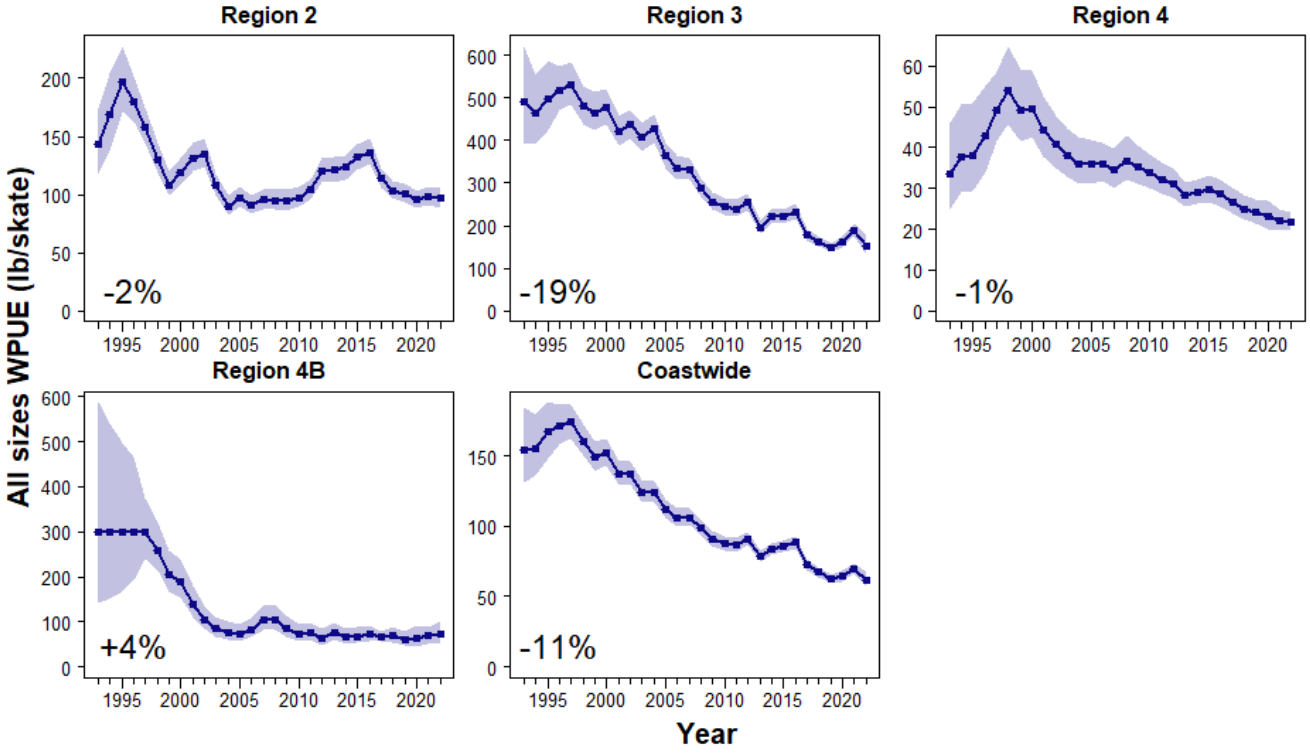


Figure 2. Space-time model output for all sizes WPUE for 1993-2022 for Biological Regions. Filled circles denote the posterior means of all sizes WPUE for each year. Shaded regions show posterior 95% credible intervals, which provide a measure of uncertainty: the wider the shaded interval, the greater the uncertainty in the estimate. Numeric values in the lower left-hand corners are estimates of the change in mean all sizes WPUE from 2021 to 2022.

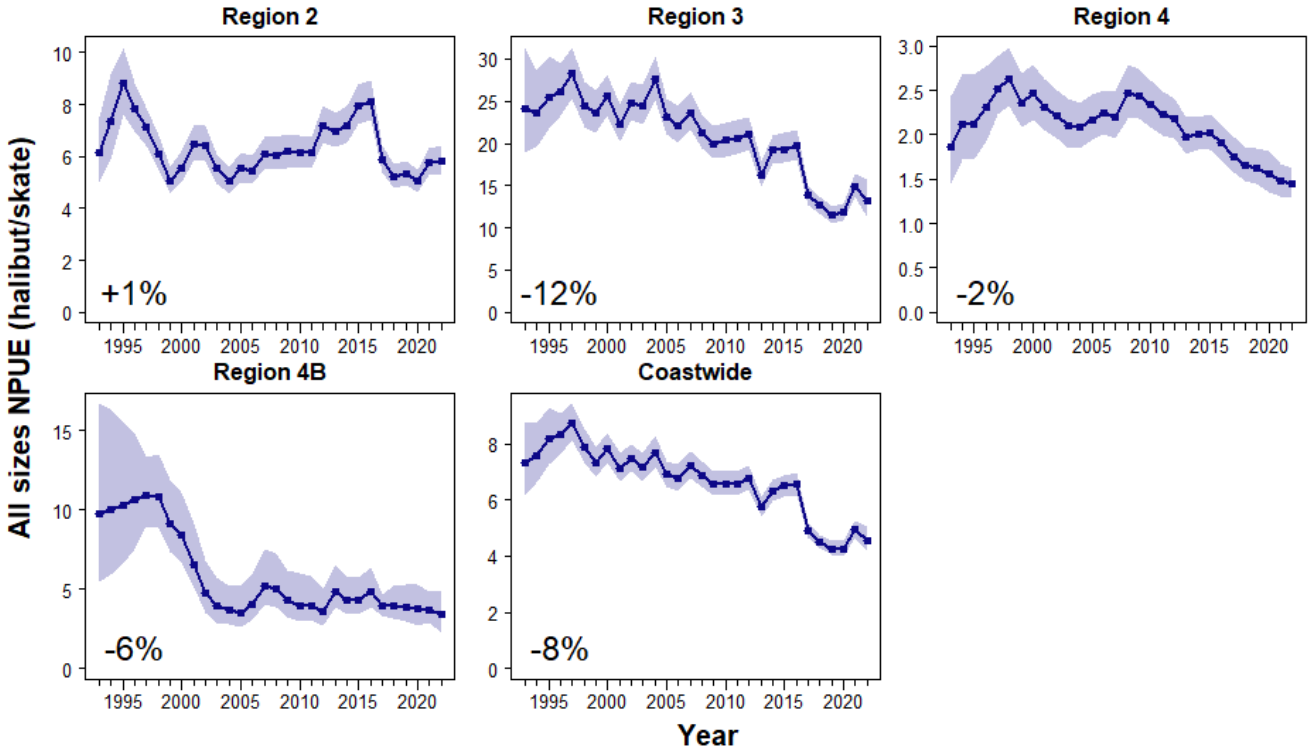


Figure 3. Space-time model output for all sizes NPUE for 1993-2022 for Biological Regions. Filled circles denote the posterior means of all sizes NPUE for each year. Shaded regions show posterior 95% credible intervals, which provide a measure of uncertainty: the wider the shaded interval, the greater the uncertainty in the estimate. Numeric values in the lower left-hand corners are estimates of the change in mean all sizes NPUE from 2021 to 2022.

RECOMMENDATION

That the Commission **NOTE** paper IPHC-2022-IM098-09 Rev_1 which provides results of the space-time modelling of Pacific halibut survey data for 1993-2022.

REFERENCE

Ualesi, K., Jones, C., Rillera, R. and Jack, T. (2022) IPHC Fishery-independent setline survey (FISS) design and implementation in 2022. IPHC-2022-IM098-08.

APPENDIX A

Space-time modelling results by IPHC Regulatory Area

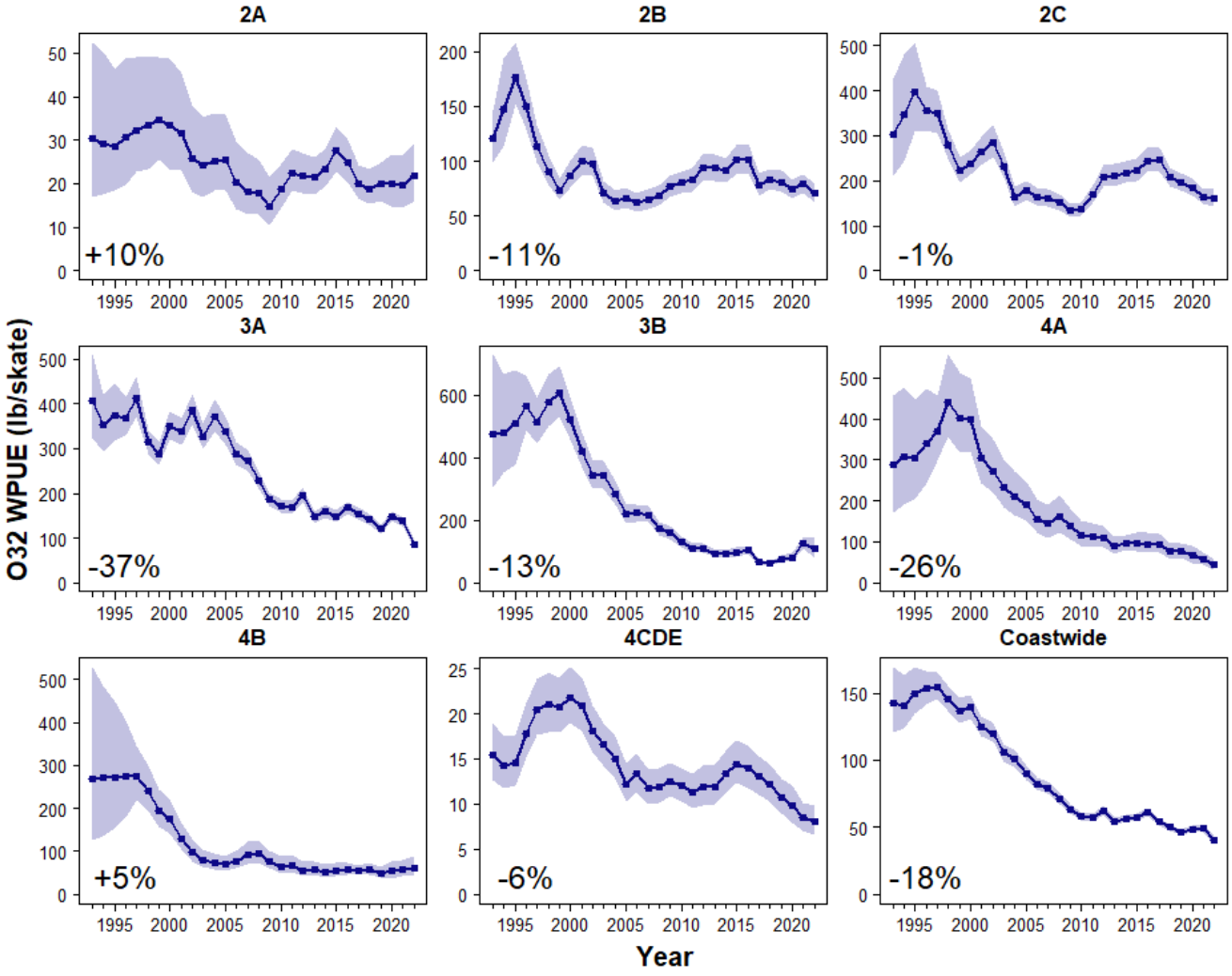


Figure A.1. Space-time model output for O32 WPUE for 1993-2022. Filled circles denote the posterior means of O32 WPUE for each year. Shaded regions show posterior 95% credible intervals, which provide a measure of uncertainty: the wider the shaded interval, the greater the uncertainty in the estimate. Numeric values in the lower left-hand corners are estimates of the change in mean O32 WPUE from 2021 to 2022.

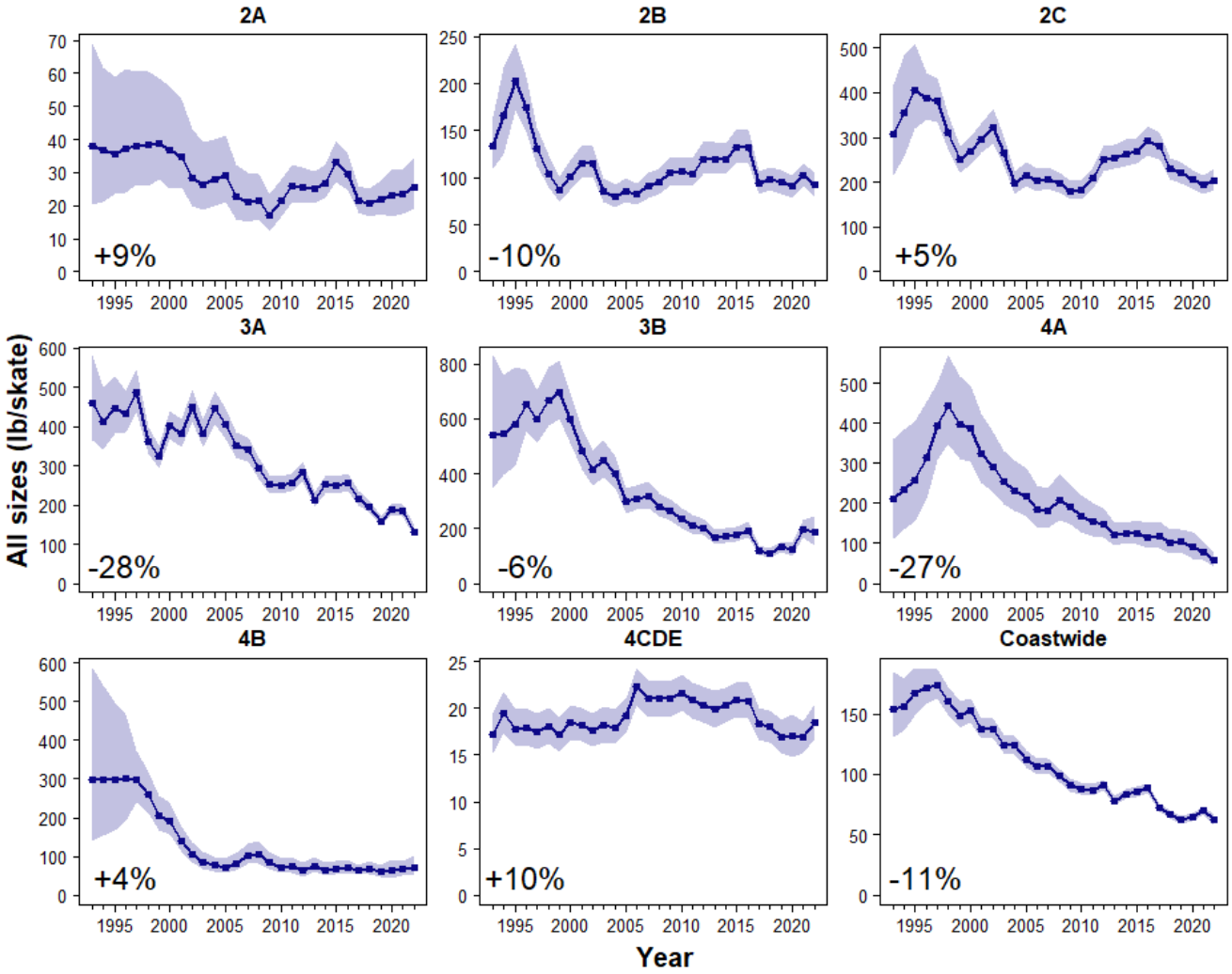


Figure A.2. Space-time model output for all sizes WPUE for 1993-2022. Filled circles denote the posterior means of all sizes WPUE for each year. Shaded regions show posterior 95% credible intervals, which provide a measure of uncertainty: the wider the shaded interval, the greater the uncertainty in the estimate. Numeric values in the lower left-hand corners are estimates of the change in mean total WPUE from 2021 to 2022.

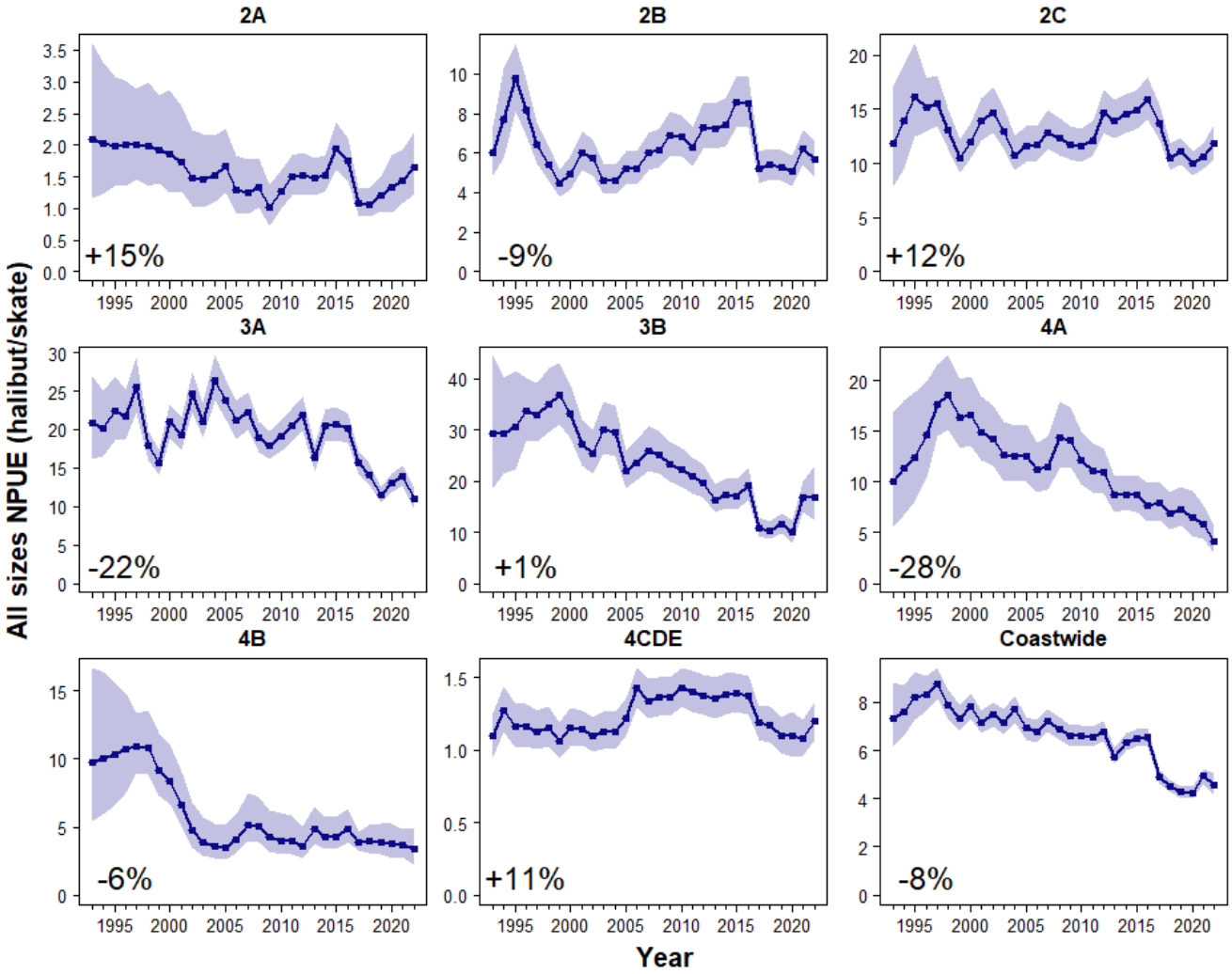


Figure A.3. Space-time model output for all sizes NPUE for 1993-2022. Filled circles denote the posterior means of all sizes NPUE for each year. Shaded regions show posterior 95% credible intervals, which provide a measure of uncertainty: the wider the shaded interval, the greater the uncertainty in the estimate. Numeric values in the lower left-hand corners are estimates of the change in mean total NPUE from 2021 to 2022.

2023-25 FISS design evaluation

PREPARED BY: IPHC SECRETARIAT (R. WEBSTER & D. WILSON; 26 OCTOBER 2022)

PART 1: PRIMARY OBJECTIVE - SAMPLE PACIFIC HALIBUT FOR STOCK ASSESSMENT AND STOCK DISTRIBUTION ESTIMATION (SCIENTIFIC EVALUATION)

PURPOSE

To present proposed science-based designs for the IPHC's Fishery-Independent Setline Survey (FISS) for the 2023-25 period as reviewed and endorsed by the Scientific Review Board.

BACKGROUND

The IPHC's Fishery-Independent Setline Survey (FISS) provides data used to compute indices of Pacific halibut density for use in monitoring stock trends, estimating stock distribution, and as an important input in the stock assessment. Stock distribution estimates are based on the annual mean weight per unit effort (WPUE) for each IPHC Regulatory Area, computed as the average of WPUE of all Pacific halibut and for O32 (greater than or equal to 32" or 81.3cm in length) Pacific halibut estimated at each station in an area. Mean numbers per unit effort (NPUE) is used to index the trend in Pacific halibut density for use in the stock assessment models.

FISS history 1993-2019

The IPHC has undertaken FISS activity since the 1960s. However, methods were not standardized to a degree (e.g., the bait and gear used) that allows for simple combined analyses until 1993. From 1993 to 1997, the annual design was a modification of a design developed and implemented in the 1960s, and involved fishing triangular clusters of stations, with clusters located on a grid (IPHC 2012). Coverage was limited in most years and was generally restricted to IPHC Regulatory Areas 2B through 3B. The modern FISS design, based on a grid with 10 nmi (18.5 km) spacing, was introduced in 1998, and over the subsequent two years was expanded to include annual coverage in parts of all IPHC Regulatory Areas within the depth ranges of 20-275 fathoms (37-503 m) in the Gulf of Alaska and Aleutian Islands, and 75-275 fathoms (137-503 m) in the Bering Sea (IPHC 2012). Annually-fished stations were added around islands in the Bering Sea in 2006, and in the same year, a less dense grid of paired stations was fished in shallower waters of the southeastern Bering Sea, providing data for a calibration with data from the annual National Marine Fishery Service (NMFS) bottom trawl survey (Webster et al. 2020).

Through examination of commercial logbook data and information from other sources, it became clear by 2010 that the historical FISS design had gaps in coverage of Pacific halibut habitat that had the potential to lead to bias in estimates derived from its data. These gaps included deep and shallow waters outside the FISS depth range (0-20 fathoms and 275-400 fathoms), and unsurveyed stations on the 10 nmi grid within the 20-275 fathom depth range within each IPHC Regulatory Area. This led the IPHC Secretariat to propose expanding the FISS to provide coverage of the unsurveyed habitat with United States and Canadian waters. In 2011 a pilot expansion was undertaken in IPHC Regulatory Area 2A, with stations on the 10 nmi grid added to deep (275-400 fathoms) and shallow (10-20 fathoms) waters, the Salish Sea, and other, smaller gaps in coverage. (The 10 fathom limit in shallow waters was due to logistical difficulties

in standardized fishing of longline gear in shallower waters.) A second expansion in IPHC Regulatory Area 2A was completed in 2013, with a pilot California survey between latitudes of 40-42°N.

The full expansion program began in 2014 and continued through 2019, resulting in the sampling of the entire FISS design of 1890 stations in the shortest time logistically possible. The FISS expansion program allowed us to build a consistent and complete picture of Pacific halibut density throughout its range in Convention waters. Sampling the full FISS design has reduced bias as noted above, and, in conjunction with space-time modelling of survey data (see below), has improved precision and fully quantified the uncertainty associated with estimates based on partial annual sampling of the species range. It has also provided us with a complete set of observations over the full FISS design (Figure 1.1) from which an optimal subset of stations can be selected when devising annual FISS designs. This station selection process began in 2019 for the 2020 FISS and continues with the current review of design proposals for 2023-25. Note that in the Bering Sea, the full FISS design does not provide complete spatial coverage, and FISS data are augmented with calibrated data from National Marine Fisheries Service (NMFS) and Alaska Department of Fish and Game (ADFG) trawl surveys (stations can vary by year – 2019 designs are typical for recent years and are shown in Figure 1.1). Both supplementary surveys have been conducted approximately annually in recent years.

Space-time modelling

In 2016, a space-time modelling approach was introduced to estimate time series of weight and numbers-per-unit-effort (WPUE and NPUE), and to estimate the stock distribution of Pacific halibut among IPHC Regulatory Areas. This represented an improvement over the largely empirical approach used previously, as it made use of additional information within the survey data regarding the degree of spatial and temporal of Pacific halibut density, along with information from covariates such as depth (see Webster 2016, 2017). It also allowed a more complete of accounting of uncertainty; for example, prior to the use of space-time modelling, uncertainty due to unsurveyed regions in each year was ignored in the estimation. Prior to the application of the space-time modelling, these unsampled regions were either filled in using independently estimated scalar calibrations (if fished at least once), or catch-rates at unsampled stations were assumed to be equal to the mean for the entire Regulatory Area. The IPHC's Scientific Review Board (SRB) has provided supportive reviews of the space-time modelling approach (e.g., IPHC-2018-SRB013-R), and the methods have been published in a peer-review journal (Webster et al. 2020). Similar geostatistical models are now routinely used to standardise fishery-independent trawl surveys for groundfish on the West Coast of the U.S. and in Alaskan waters (e.g., Thorson et al. 2015 and Thorson 2019).

FISS design objectives

The primary purpose of the annual FISS is to sample Pacific halibut to provide data for the stock assessment (abundance indices, biological data) and estimates of stock distribution for use in the IPHC's management procedure. The priority of the current rationalised FISS is therefore to maintain or enhance data quality (precision and bias) by establishing baseline sampling requirements in terms of station count, station distribution and skates per station. Potential considerations that could add to or modify the design are logistics and cost (secondary design layer), and FISS removals (impact on the stock), data collection assistance for other agencies, and IPHC policies (tertiary design layer). These priorities are outlined in Table 1.1.

Table 1.1 Prioritization of FISS objectives and corresponding design layers.

Priority	Objective	Design Layer
Primary	Sample Pacific halibut for stock assessment and stock distribution estimation	Minimum sampling requirements in terms of: • Station distribution • Station count • Skates per station
Secondary	Long-term revenue neutrality	Logistics and cost: operational feasibility and cost/revenue neutrality
Tertiary	Minimize removals, and assist others where feasible on a cost-recovery basis.	Removals: minimize impact on the stock while meeting primary priority Assist: assist others to collect data on a cost-recovery basis IPHC policies: ad-hoc decisions of the Commission regarding the FISS design

Design review and finalisation process

Since completion of the FISS expansions, a review process has been developed for annual FISS designs created according to the above objectives:

- The Secretariat presents design proposals based only on primary objectives (Table 1.1) to the SRB for three subsequent years at the June meeting (recognizing that data from the current summer FISS will not be available for analysis prior to the September SRB meeting);
- These design proposals, revised (if necessary) based on June SRB input, are then reviewed by Commissioners at the September work meeting;
- At their September meeting, the SRB reviews revisions to the design proposals made to account for secondary and tertiary objectives

Following the review process, designs may be further modified to account for any updates based on secondary and tertiary objectives before being finalised during the Interim and Annual meetings and the period prior to implementation:

- Presentation of FISS designs for 'endorsement' by the Commission occurs at the November Interim Meeting;
- Ad hoc modifications to the design for the current year (due to unforeseen issues arising) are possible at the Annual Meeting;
- The endorsed design for current year is then modified (if necessary) to account for any additional tertiary objectives prior to summer implementation (February-April).

Consultation with industry and stakeholders occurs throughout the FISS planning process, at the Research Advisory Board meeting and particularly in finalizing design details as part of the FISS charter bid process, when stations can be added and other adjustments made to provide

for improved logistical efficiency. We also note the opportunities for stakeholder input during public meetings (Interim and Annual Meetings).
Note that while the review process examines designs for the next three years, revisions to designs for the second and third years are expected during subsequent review periods as additional data are collected. Having design proposals available for three years instead of the next year only assists the IPHC with medium-term planning of the FISS, and allows reviewers (SRB, IPHC Commissioners) and stakeholders to see more clearly the planning process for sampling the entire FISS footprint over multiple years. Extending the proposed designs beyond three years was not considered worthwhile, as we expect further evaluation undertaken following collection of data during the one to three-year period to influence design choices for subsequent years.

PROPOSED DESIGNS FOR 2023-25

The designs proposed for 2023-25 (Figures 1.2 to 1.4) use efficient subarea sampling in IPHC Regulatory Areas 2A, 4A and 4B, and incorporate a randomized subsampling of FISS stations in IPHC Regulatory Areas 2B, 2C, 3A and 3B (except for the near-zero catch rate inside waters around Vancouver Island), with a sampling rate chosen to keep the sample size close to 1000 stations in an average year, a logistically feasible footprint for the annual FISS. In 2021, designs for 2023-24 were also approved subject to later revision (IPHC-2022-AM098-R). The designs developed in 2021 have largely been carried over into the current 2023-24 proposal, with exceptions noted below.

- IPHC Regulatory Area 2A: Sample the highest-density waters of IPHC Regulatory 2A in northern Washington and central/southern Oregon each year of the 2023-25 period, and in 2023 only, add the moderate density waters of southern Washington/northern Oregon and northern California **(revision from previous 2023 design proposal)**.
- IPHC Regulatory Area 4A: Sample the higher-density western subarea of IPHC Regulatory Area 4A in all three years, the medium-density northern shelf edge subarea in 2023 only, and the historically lower-density southeastern subarea in 2025 only.
- IPHC Regulatory Area 4B: Sample the high-density eastern subarea in all three years, and the western subarea in 2023 only **(revision from previous 2023 design proposal)**.

Stations in the moderate-density waters of IPHC Regulatory 2A proposed for 2023 sampling have not been sampled since 2017 (California) or 2019 (WA/OR). This is a revision from previous proposals, which did not include these stations prior to 2025 (Webster 2021). Evaluation of potential designs in IPHC Regulatory Area 2A showed that unless these waters were sampled in 2023, we project that precision targets would not be met, with an expected 2023 coefficient of variation for mean O32 WPUE of 20% (target range is <15%). We have also received anecdotal reports of increasing recreational catch rates in northern California, providing additional motivation for bringing forward sampling in those waters.

A review of commercial catch data shows moderate catch rates in recent years in southeast IPHC Regulatory 4A. With these stations last sampled in 2019, sampling in 2025 will provide an updated understanding of Pacific halibut density in this subarea and inform future decisions on sampling frequency in IPHC Regulatory Area 4A. Note that several stations on the IPHC Regulatory Area 4A shelf edge overlap the NMFS bottom trawl survey (in purple in Figure 1.2, and are not proposed for FISS sampling in the foreseeable future.

In the most recent surveys of IPHC Regulatory Area 4B, the eastern subarea had by far the highest catch rates and is the priority for frequent sampling. The western and central subareas

were approved for sampling in 2022, but only the central subarea is to be sampled due to a lack of charter vessel bids for the western subarea. Thus, the western subarea has been added to the 2023 proposal to reduce the risk of bias.

Following this three-year period, the only remaining waters unsampled since FISS rationalization began in 2020 will be:

- Zero-to-low density waters in IPHC Regulatory Area 2A comprising deep (>275 ftm) and shallow (<20 ftm) stations and northern California south of 40°N (sampled comprehensively in 2017), and low-density waters of the Salish Sea (previously sampled in 2018).
- Near-zero density waters in the Salish Sea in IPHC Regulatory Area 2B (sampled in 2018 only).

We anticipate proposing these stations for sampling in 2026-28, 9-10 years after previous FISS sampling, so that the entire 1890-station FISS grid will have been fished from 2020-28.

The design proposals again include full sampling of the standard FISS grid in IPHC Regulatory Area 4CDE. The Pacific halibut distribution in this area continues to be of particular interest, as it is a highly dynamic region with an apparently northward-shifting distribution of Pacific halibut, and increasing uncertainty regarding connectivity with populations adjacent to and within Russian waters. Ongoing oceanographic (e.g., sea ice and bottom temperatures) and ecosystem (e.g., prey species abundance and distribution) changes in this Regulatory Area highlight the potential for changes in the biology and abundance of Pacific halibut in the Bering Sea. Despite prioritizing comprehensive sampling of this Regulatory Area in 2020-22, in each year logistical challenges have precluded achieving the full design. Therefore, it is retained throughout the current three-year plan, to be re-evaluated when and if sampling is successful.

While the proposed designs continue to rely on randomised subsampling of stations within the core IPHC Regulatory Areas (2B, 2C, 3A and 3B) and logistically efficient subarea designs elsewhere, other designs have been considered and remain as options (Webster 2021, Appendix A).

We note that at SRB020 and SRB021, the SRB endorsed the final 2023 FISS design as presented in Figure 1.2, and provisionally endorsed the 2023-24 designs (Figures 1.3 and 1.4) (IPHC-2022-SRB020-R) while also recognising that the 2023 design will need to be further optimised to ensure other Commission objectives are met, including but not limited to maintaining long-term revenue neutrality (IPHC-2022-SRB021-R).

FISS DESIGN EVALUATION

Precision targets

In order to maintain the quality of the estimates used for the assessment, and for estimating stock distribution, the IPHC Secretariat has set a target range of less than 15% for the coefficient of variation (CV) of mean O32 and all sizes WPUE for all IPHC Regulatory Areas. We also established precision targets of IPHC Biological Regions and a coastwide target (IPHC-2020-AM096-07), but achievement of the Regulatory Area targets is expected to ensure that targets for the larger units will also be met.

Reducing the potential for bias

In IPHC Regulatory Areas in which stations are not subsampled randomly (IPHC Regulatory Areas 2A, 4A and 4B), sampling a subset of the full data frame in any area or region brings with it the potential for bias. This is due to trends in the unsurveyed portion of a management unit (Regulatory Area or Biological Region) potentially differing from those in the surveyed portion. Therefore, we also examine how frequently part of an area or region (subarea) should be surveyed in order to reduce the likelihood of appreciable bias. For this, we use a threshold of a 10% absolute change in biomass percentage: based on historical trends (1993-2021): how quickly can a subarea's percent of the biomass of a Regulatory Area change by at least 10% (e.g., from 15 to 25% of the area's biomass)? By sampling each subarea frequently enough to reduce the chance of its percentage changing by more than 10% between successive surveys of the subarea, we minimize the potential for appreciable bias in the Regulatory Area's index.

We examined the effect of subsampling the FISS stations for a management unit on precision as follows:

- Where a randomised design is not used, identify logistically efficient subareas within each management unit and select priorities for future sampling.
- Generate simulated data for all FISS stations based on the output from the most recent space-time modelling.
- Fit space-time models to the observed data series augmented with 1 to 3 additional years of simulated data, where the design over those three years reflects the sampling priorities identified above.
- Project precision estimates and quantify bias potential for comparison against threshold.

Table 1.2 shows projected CVs following completion of the proposed 2022-25 FISS designs. With these designs, we are projected to maintain CVs within the target range. Estimates from the terminal year are most informative for management decisions, but they also typically have the largest CVs (all else being equal; these are then reduced in subsequent years as observations are available in both adjacent years, due to the temporal correlation). The final column in Table 2 shows the CV projections immediately following the 2023 FISS, which are also within the target range.

Table 1.2 Projected CVs (%) for 2022-25 for O32 WPUE estimated after completion of the proposed 2023-25 FISS designs, and (final column) after completion of the proposed 2023 FISS design only.

Reg. Area	2022	2023	2024	2025	**2023** (Estimated in 2023)
2A	13	12	13	15	14
4A	10	9	10	10	12
4B	12	9	10	12	9

For maintaining low bias, we looked at estimates of historical changes in the proportion of biomass in each subarea, and used that to guide the sampling frequency in future designs. Thus, subareas that have historically had rapid changes in biomass proportion need to be sampled most frequently, and those that are relatively stable can be sampled less frequently. For example, if a subarea's % of its Regulatory Area's biomass changed by no more than 8% over 1-2 years but by up to 12% over three years, we should sample it at least every three years based on the 10% criterion discussed above. These criteria are updated as new data are collected and they therefore respond to updates in our understanding of the rates of change occurring in each subarea.

Based on estimates from the historical times series (1993-2021) of O32 WPUE, the proposed designs for 2023-25 would be expected to maintain low bias by ensuring that it is unlikely that biomass proportions for all subareas change by more than 10% since they were previously sampled (Table 1.3). We note that the lack of sampling in the western subarea of IPHC Regulatory 4B in 2022 means that maximum change from the historical time series for this subarea was 13%, exceeding the 10% threshold. Sampling this historically-variable subarea in 2023 again reduces values to within 10%.

Table 1.3. Maximum expected absolute changes (%) in biomass proportion since previous sampling of subareas that are unsampled in a given year, based on the estimated 1993-2021 time series.

Reg. Area	2022	2023	2024	2025
2A	9	9	9	9
4A	10	7	6	8
4B	13	5	8	10

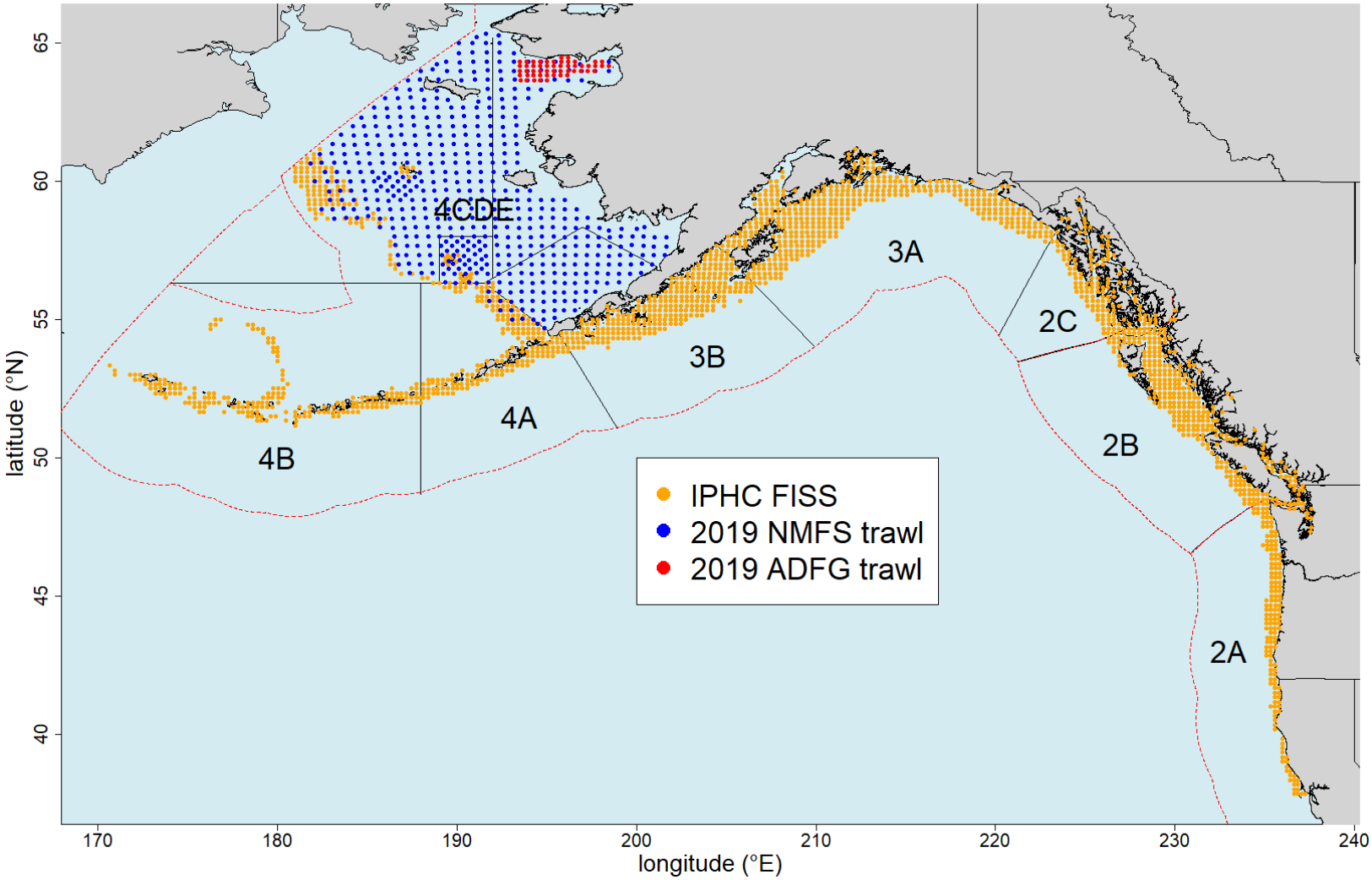


Figure 1.1. Map of the full 1890 station FISS design, with orange circles representing stations available for inclusion in annual sampling designs, and other colours representing trawl stations from 2019 NMFS and ADFG surveys used to provide complementary data for Bering Sea modelling.

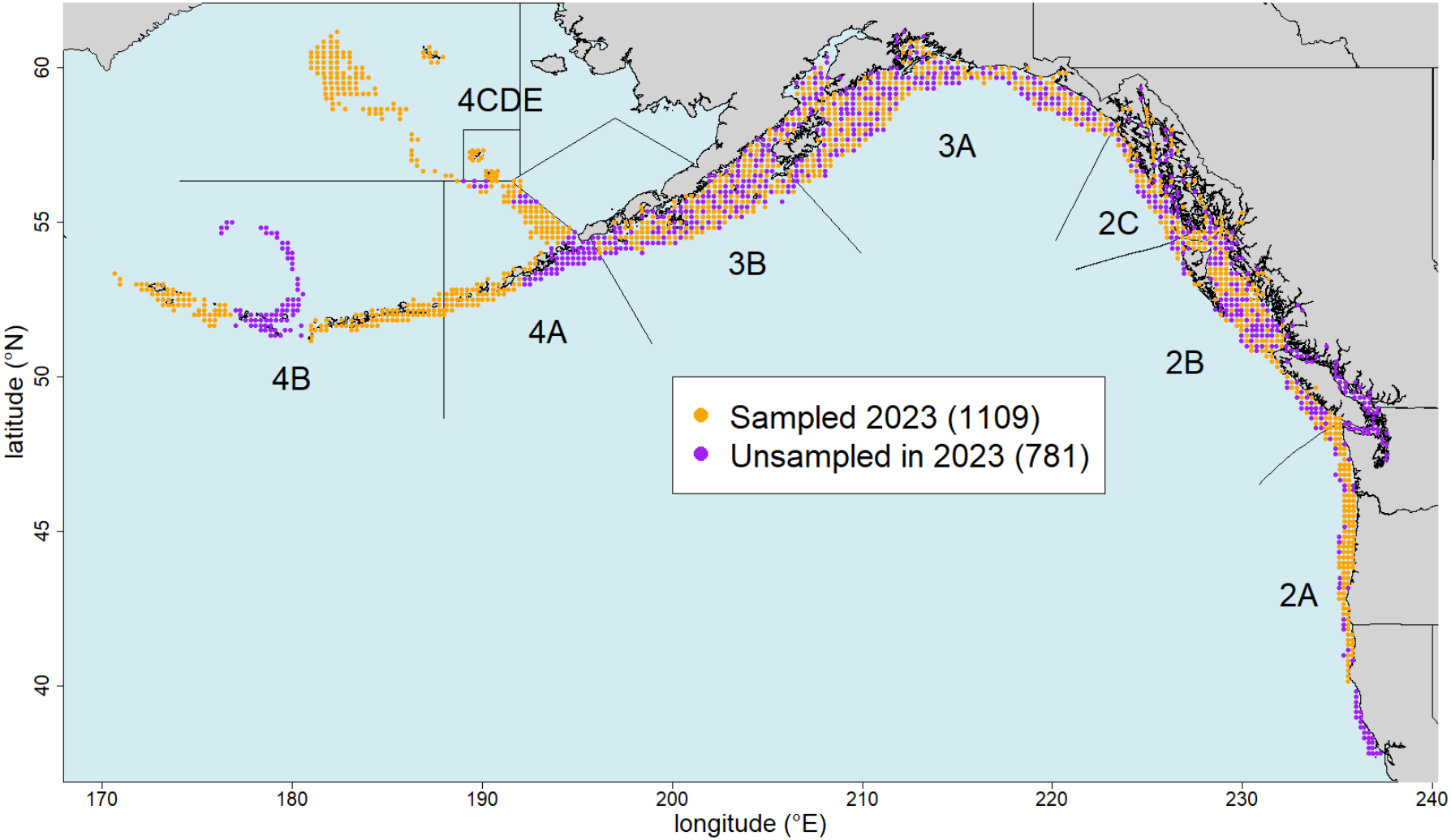


Figure 1.2. Option 1 in Table 2.1. Proposed science-based FISS design in 2023 (orange circles) based on randomized sampling in 2B-3B, and a subarea design elsewhere. Purple circles are optional for meeting data quality criteria.

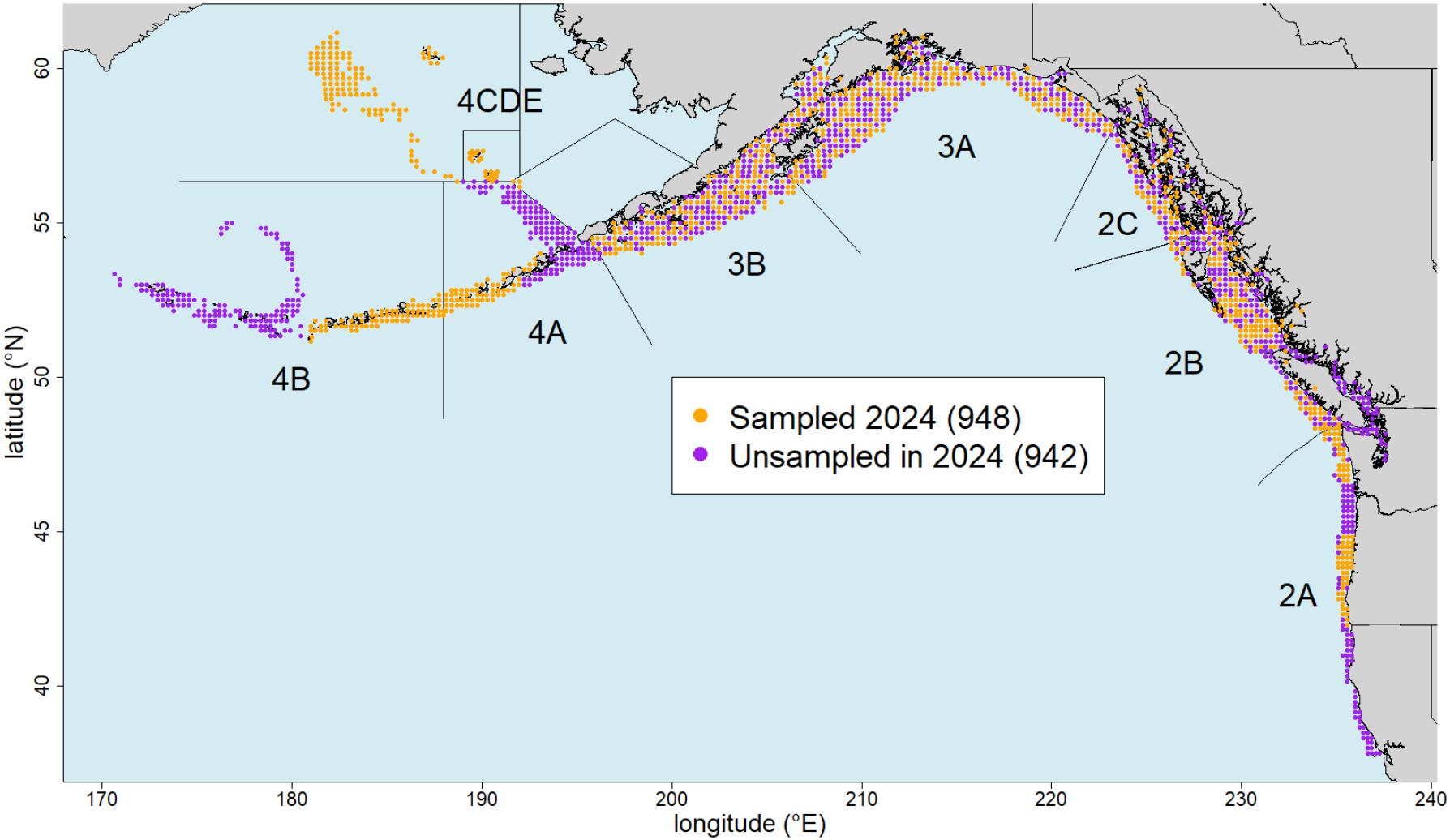


Figure 1.3. Proposed science-based FISS design in 2024 (orange circles) based on randomized sampling in 2B-3B, and a subarea design elsewhere. Purple circles are optional for meeting data quality criteria.

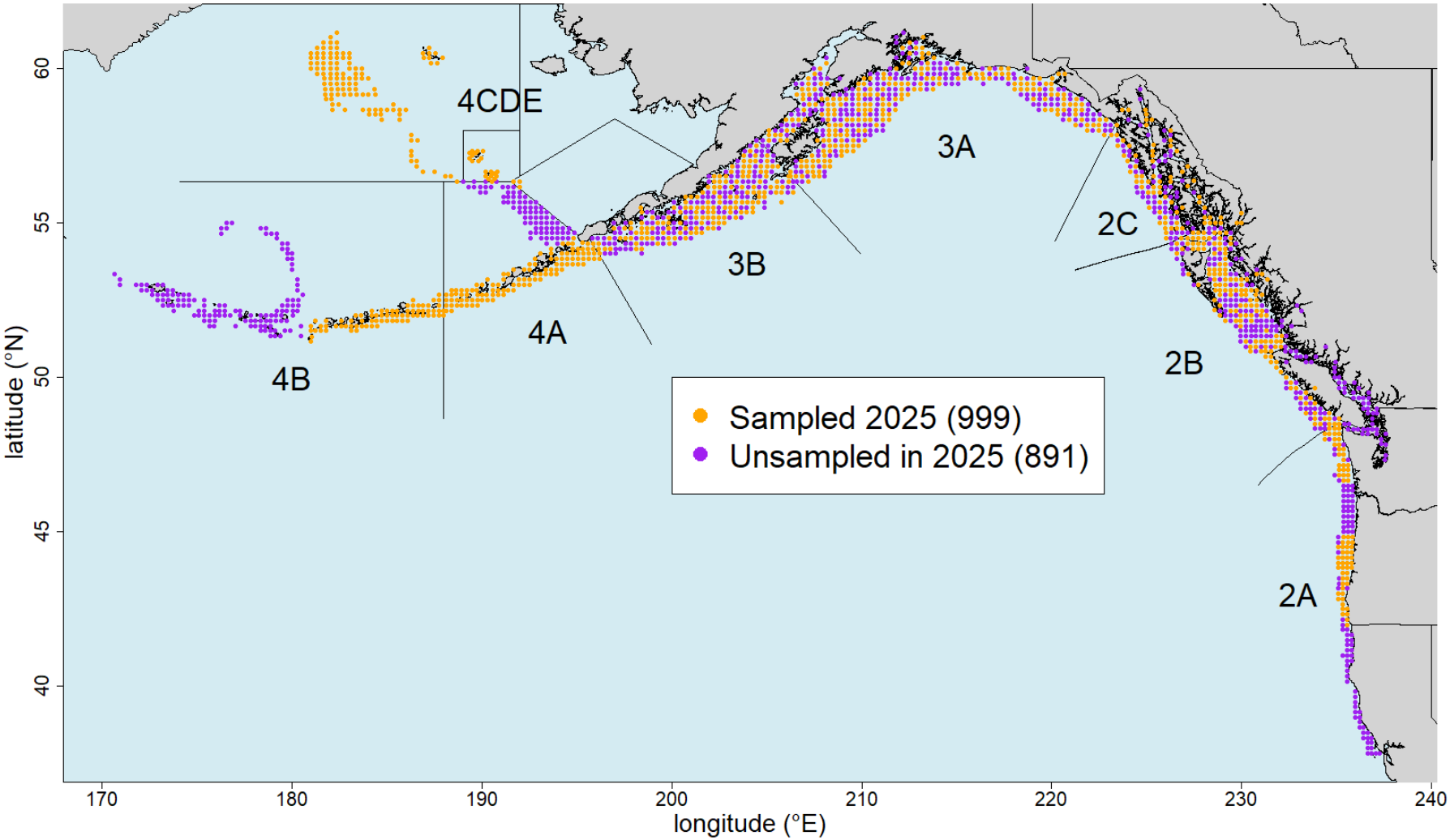


Figure 1.4. Proposed science-based FISS design in 2025 (orange circles) based on randomized sampling in 2B-3B, and a subarea design elsewhere. Purple circles are optional for meeting data quality criteria.

PART 2: OBJECTIVE 2 - LONG-TERM REVENUE NEUTRALITY (COST EVALUATION)

PURPOSE

To present and evaluate a sequence of FISS design options for 2023 optimised to varying degrees for cost.

BACKGROUND

Consideration of cost

Ideally, the FISS design would be based only on scientific needs. However, some Regulatory Areas are consistently more expensive to sample than others, so for these the efficient subarea designs were developed. The purpose of factoring in cost was to provide a statistically efficient and logistically feasible design for consideration by the Commission. During the Interim and Annual Meetings and subsequent discussions, cost, logistics and tertiary considerations (Table 1.1) are also factored in developing the final design for implementation in the current year. It is anticipated that under most circumstances, cost considerations can be addressed by adding stations to the minimum design proposed in this report. In particular, the FISS is funded by sales of captured fish and is intended to have long-term revenue neutrality, meaning that any design must also be evaluated in terms of the following factors:

- Expected catch of Pacific halibut
- Expected Pacific halibut sale price
- Charter vessel costs, including relative costs per skate and per station
- Bait costs
- IPHC Secretariat administrative costs

Balancing these factors may result in modifications to the design such as increasing sampling effort in high-density regions and decreasing effort in low density regions.

FISS design objectives

The primary objective of the annual IPHC Fishery-Independent Setline Survey (FISS) is to sample Pacific halibut to provide data for the stock assessment (abundance indices, biological data) and estimates of stock distribution for use in the IPHC's management procedure. The priority of the current rationalised FISS is therefore to maintain or enhance data quality (precision and bias) by establishing baseline sampling requirements in terms of station count, station distribution and skates per station. Potential considerations that could add to or modify the design are logistics and cost (secondary design layer), FISS removals (impact on the stock), data collection assistance for other agencies, and IPHC policies (tertiary design layer). These priorities were outlined in Table 1.1 in Part 1 of this report.

The following 2023 FISS design options are being provided to ensure that decisions required at IM098 are well informed both in terms of how they would meet the Commission's Primary and Secondary objectives for the FISS. Of these, the first five options are expected to meet data

quality targets in all IPHC Regulatory Areas. Options 6 and 7 are not expected to meet all data quality targets for 2023 but to target the long-term revenue neutrality of the FISS, and thus its viability as a sampling platform. A summary of the design options is in Table 2.1.

Table 2.1. Summary of pros and cons of alternative 2023 FISS design options.

Design	Pros	Cons
Option 1 (Proposed science-based design)	• Precise, low bias estimates coastwide and for all IPHC Regulatory Areas	• Very high cost
Option 2	• Precise, low bias estimates coastwide and for all IPHC Regulatory Areas	• Very high cost
Option 3	• Precise, low bias estimates coastwide and for all IPHC Regulatory Areas	• Very high cost
Option 4	• Precise, low bias estimates coastwide and for all IPHC Regulatory Areas	• High cost
Option 5	• Precise, low bias estimates coastwide and for all IPHC Regulatory Areas	• High cost
Option 6	• Good coastwide estimates of stock trends and distribution • Overall low risk of bias	• Imprecise estimates at ends of stock • Potential for bias at ends of stock • Medium cost
Option 7	• Good coastwide estimates of stock trends • Revenue neutral	• Imprecise estimates at ends of stock with risk of bias • Less precise stock distribution estimates

Option 1: Pre-Optimization Design (science-based design proposal)

Primary objective: The IPHC Secretariat has proposed a FISS design for 2023 (Figure 1.2, discussed in Part 1 above) which is projected to achieve all data quality targets with respect to variance and bias (Webster 2022a, 2022b). The design features a random sample of FISS stations in IPHC Regulatory Areas 2B, 2C, 3A and 3B (the core areas), sampling of high-priority subareas in IPHC Regulatory Areas 2A, 4A and 4B, and full FISS sampling in IPHC Regulatory Area 4CDE.

This design was preliminarily endorsed by the Scientific Review Board (SRB) at their June meeting (SRB020 - IPHC 2022a) as follows:

> IPHC-2022-SRB020-R: (para. 12) "*The SRB ENDORSED the final 2023 FISS design as presented in Fig. 2, and provisionally ENDORSED the 2024-25 designs (Figs. 3 and 4), recognizing that these will be reviewed again at subsequent SRB meetings.*"

Subsequently, the SRB were provided with another opportunity to review the proposed design at their September meeting, with further information provided on how the design would meet

both the primary and secondary Commission FISS objectives (SRB021 - IPHC 2022b). As a result, the SRB again endorsed the proposal, with caveats around long-term revenue neutrality as follows:

> IPHC-2022-SRB021-R: (para. 19) "*The SRB ENDORSED the proposed 2023 FISS design as presented in Fig. 2, and provisionally ENDORSED the 2024-25 designs (Figs. 3 and 4), while also recognising that the 2023 design will need to be further optimised to ensure other Commission objectives are met, including but not limited to maintaining long-term revenue neutrality.*"

Secondary objective: The proposed design (Option 1) detailed above, does not meet the Commission's long-term goal of achieving revenue neutrality for the FISS, as it is projected to run at a budget deficit of approximately **-$2,665,000** due to 1) the proposed number of stations to be sampled (**1,109, with an average of 5.5 skates per set**), 2) the increased operational costs to sample those stations (e.g. vessel running costs, bait, shipping, communications, insurance), and 3) expected further declines in biomass that would result in further declines in expected catch rates in 2023, as noted by the Commission at its 98th Session in January of 2022 (detailed below [*caveat*: these will be updated once the 2022 stock assessment is completed and in time for the IM098, November 2022]).

> IPHC-2022-AM098-R: (para. 43) *The Commission **NOTED** the following outlook for the stock provided by the IPHC Secretariat:*
>
> *"Outlook. The projections for this assessment are more optimistic than those from the 2019 and 2020 assessments due to the increasing projected maturity of the 2012 year-class. This translates to a lower probability of stock decline for 2022 than in recent assessments as well as a decrease in this probability through 2023-24. **There is greater than a 50% probability of stock decline in 2023 (55-64/100) for the entire range of SPR values from 40-46%, which include the status quo TCEY and the F43% reference level.** The 2022 "3-year surplus" alternative, corresponds to a TCEY of 38.0 million pounds (~17,240 t), and a projected SPR of 48% (credible interval 32-63%; [Table 2, Figure 4]. **At the reference level (a projected SPR of 43%), the probability of spawning biomass decline from 2022 to 2023 is 59%**, decreasing to 55% in three years, as the 2012 cohort matures. The one-year risk of the stock dropping below SB30% ranges from 43% at the F46% level to 45% at the at the F40% level of fishing intensity."*

At AM098, the Commission adopted a total mortality level of 41.22 mlbs (18,697 mt), which resulted in an SPR level of ~43%.

> IPHC-2022-AM098-R: (para. 76) "*The Commission ADOPTED the distributed mortality limits for each Contracting Party, by IPHC Regulatory Area, (Table 5) and sector, as provided for in Appendix VI. [Canada: In favour=3, Against=0][USA: In favour=3, Against=0]"*

***Table 5**. Adopted TCEY mortality limits for 2022*

Contracting Party IPHC Regulatory Area	Mortality limit (TCEY) (mlbs)	Mortality limit (TCEY) (metric tonnes)
Canada Total: 2B	**7.56**	**3,429**
USA: 2A	1.65	748
USA: 2C	5.91	2,681
USA: 3A	14.55	6,600
USA: 3B	3.90	1,769
USA: 4A	2.10	953
USA: 4B	1.45	658
USA: 4CDE	4.10	1,860
United States of America Total	**33.66**	**15,268**
Total (IPHC Convention Area)	**41.22**	**18,697**

2023 FISS design alternatives:

The Secretariat has developed six (6) alternative FISS design options that have each been optimised to varying degrees for sampling precision as well as for expected fiscal viability, through the addition and/or removal of stations and the numbers of skates per station.

Option 2: Pre-optimisation Design, no 4CDE

Option 2 design (Figure 2.1) is identical to the Option 1 design (Figure 1.2) except for the removal of all IPHC Regulatory Area 4CDE stations to reduce cost. We anticipate the National Marine Fisheries Service (NMFS) will conduct their annual Bering Sea trawl survey in both the eastern and northern Bering Sea in 2023. All FISS stations in IPHC Regulatory Area 4CDE were fished in either 2021 or 2022, and together with the calibrated trawl data, we expect this to be sufficient to provide us with a precise index with low risk of bias for 2023 for this area.

Based on our analyses (Webster 2022a), we expect this design to meet data quality targets in all IPHC Regulatory Areas and to yield precise, low-bias estimates of WPUE and NPUE indices and stock distribution.

The proposed design does not meet the IPHC's long-term goal of revenue neutrality as it is also projected to run at a deficit of **-$2,202,000** due to 1) the proposed number of stations to be sampled **(969, with an average of 5.5 skates per set),** 2) the increased operational costs to sample those stations (e.g. vessel running costs, bait, shipping, communications, insurance), and 3) expected further declines in biomass that would result in further declines in expected catch rates in 2023, as noted by the Commission at its 98th Session in January of 2022 [caveat: these will be updated once the 2022 stock assessment is completed and in time for the IM098, November 2022].

Option 3: Optimised design #1

Option 3 (Figure 2.2) is identical to the Option 1 design (Figure 1.2) but with an increase in core area station density in revenue-positive FISS regions to help offset costs. As such, it will meet data quality targets in all IPHC Regulatory Areas, and comprehensively monitor the dynamic Bering Sea region.

The proposed design does not meet the IPHC's long term goal of revenue neutrality as it is also projected to run at a deficit of approximately **-$2,128,000** due to 1) the proposed number of stations to be sampled **(1,503, with an average of 5.5 skates per set)**, 2) the increased operational costs to sample those stations (e.g. vessel running costs, bait, shipping, communications, insurance), and 3) expected further declines in biomass that would result in further declines in expected catch rates in 2023, as noted by the Commission at its 98th Session in January of 2022 [caveat: these will be updated once the 2022 stock assessment is completed and in time for the IM098, November 2022].

Option 4: Optimised design #2, with a maximum 6 skates/station, no 4CDE

Option 4 (Figure 2.3) is a cost-optimised version of the Option 1 design (Figure 1.2), with greater station density in the core areas, all proposed subareas to be sampled in IPHC Regulatory Areas 2A, 4A and 4B, but no sampling of the costly FISS stations in IPHC Regulatory Area 4CDE. As with Option 2, we expect this design to meet data quality targets in all IPHC Regulatory Areas and to yield precise, low-bias estimates of WPUE and NPUE indices and stock distribution.

The proposed design does not meet the IPHC's long term goal of revenue neutrality as it is also projected to run at a deficit of approximately **-$1,665,000** due to 1) the proposed number of stations to be sampled **(1,363, with an average of 5.6 skates per set)**, 2) the increased operational costs to sample those stations (e.g. vessel running costs, bait, shipping, communications, insurance), and 3) expected further declines in biomass that would result in further declines in expected catch rates in 2023, as noted by the Commission at its 98th Session in January of 2022 [caveat: these will be updated once the 2022 stock assessment is completed and in time for the IM098, November 2022].

Option 5: Optimised design #2, with a maximum 6 skates/station, no 4CDE

Option 5 (Figure 2.3) has the same station design as Option 4 (based on Option 1), but with a higher maximum number of skates/set to maximise revenue. As such, it is also expected to meet data quality targets in all IPHC Regulatory Areas and to yield precise, low-bias estimates of WPUE and NPUE indices and stock distribution.

The proposed design does not meet the IPHC's long term goal of revenue neutrality as it is also projected to run at a deficit of approximately **-$976,000** due to 1) the proposed number of stations to be sampled **(1,363, with an average of 7.1 skates per set)**, 2) the increased operational costs to sample those stations (e.g. vessel running costs, bait, shipping, communications, insurance), and 3) expected further declines in biomass that would result in further declines in expected catch rates in 2023, as noted by the Commission at its 98th Session in January of 2022

[caveat: these will be updated once the 2022 stock assessment is completed and in time for the IM098, November 2022].

Summary Options 1-5: In any given year, the IPHC Secretariat takes the base design endorsed by the SRB and then optimizes it to target revenue neutrality, the Commission's adopted secondary objective for the FISS. Thus, we are not asking the Commission to consider Options 1-4, but rather, to commence discussions based on Option 5.

Option 5 is expected to meet data quality targets in all IPHC Regulatory Areas and to yield precise, low-bias estimates of WPUE and NPUE indices and stock distribution, while running at a projected deficit of approximately **-$976,000**.

2023 FISS designs that do not meet data quality targets in one or more IPHC Regulatory Areas for 2023 (and implications for future) but aim to move the design towards achieving the secondary objective: revenue neutrality.

Option 6: Design to achieve revenue loss of <$0.5M

Option 6 (Figure 2.4) removes the California and Oregon FISS regions from IPHC Regulatory Area 2A along with all 4CDE FISS stations but retains the highest density subareas of IPHC Regulatory Areas 4A and 4B. For this reason, this design offers a greater probability that variance and bias goals will be met for these areas than Option 7 below. In IPHC Regulatory Area 2A, only stations in the Washington FISS charter region are included, and our analysis (Webster 2022a) implies that this would not be sufficient to meet data quality targets for IPHC Regulatory Area 2A. However, this design includes at least some FISS sampling in all IPHC Regulatory Areas except 4CDE (where NMFS will sample), and we can expect it to yield highly quality estimates of coastwide and bioregion trends, and of the distribution of the stock among Regulatory Areas.

The proposed design does not meet the IPHC's long term goal of revenue neutrality as it is also projected to run at a deficit of approximately **-$469,000** due to 1) the proposed number of stations to be sampled **(1,178, with an average of 7.1 skates per set)**, 2) the increased operational costs to sample those stations (e.g. vessel running costs, bait, shipping, communications, insurance), and 3) expected further declines in biomass that would result in further declines in expected catch rates in 2023, as noted by the Commission at its 98th Session in January of 2022 [caveat: these will be updated once the 2022 stock assessment is completed and in time for the IM098, November 2022].

Option 7: Revenue neutral design

Option 7 (Figure 2.5), like previous designs, increases station density in the high-density core areas above that of the science-based design to improve revenue and thus offset losses in other

areas. To reduce overall costs and achieve revenue neutrality, no sampling is proposed in IPHC Regulatory Areas 2A, 4A, 4B and 4CDE.

Approximately 70-80% of the Pacific halibut stock by weight is estimated to occur in the core areas to be sampled, and with a sample size of 998 FISS stations, this design will continue to provide a precise estimate of the coastwide time series with relatively low bias.

However, it is anticipated that precision targets will not be met in IPHC Regulatory Areas 2A, 4A and 4B, which failed to meet these targets in 2020-21 due a combination of no sampling (2020), sparse sampling (4A, 4B in 2021) and higher than expected variability (2A in 2021). All three areas contain a designated sampling subarea with relatively high density and potential large year-to-year variability in density: in each case, not sampling these subareas in particular leads to high risk of bias in estimates of WPUE and NPUE indices and stock distribution.

This design is likely to result in indices and biological data that maintain the basic stock assessment inputs but with somewhat higher uncertainty for 2023. Direct stock distribution estimates would be uninformed by new survey data for IPHC Regulatory Areas 2A, 4A and 4B and this would create additional uncertainty in the application of management procedures that rely on annual estimates of stock distribution.

Planning for 2024 and 2025: If there is no FISS sampling at the ends of the stock in 2023, the Secretariat's proposal for 2024 will include fishing all subareas of IPHC Regulatory Areas 2A, 4A and 4B that were originally proposed for 2023 (Figure 1.2). A clearer picture will emerge once the 2022 data are included in the space-time modelling, but in one or more of those areas it may be necessary to propose sampling additional stations earlier than previously planned to help bring estimates closer to our precision and bias targets. This may mean adding more stations in 2024 than those in Figure 1.3, or sampling some subareas in both 2024 and 2025 when they otherwise may have been sampled just once in that period. Given the costs and logistical challenges of sampling at the ends of the stock's range, we recognize that implementing such 'catch up' sampling in practice may be difficult without supplemental ad-hoc funding.

The proposed design does meet the IPHC's long term goal of revenue neutrality as it is projected to run at a nominal surplus, effectively neutral at approximately **$15,000** due to 1) the proposed number of stations to be sampled **(998, with an average of 7.3 skates per set)**, 2) the increased operational costs to sample those stations (e.g. vessel running costs, bait, shipping, communications, insurance), and 3) expected further declines in biomass that would result in further declines in expected catch rates in 2023, as noted by the Commission at its 98th Session in January of 2022 [caveat: these will be updated once the 2022 stock assessment is completed and in time for the IM098, November 2022].

Discussion

All designs except Option 7 are expected to provide high quality data for estimation of coastwide stock trends and distribution (Table 2.1). In previous years, the IPHC Secretariat would simply go through this 'optimisation' process internally, and take the design endorsed at the SRB and optimise station density and skate numbers to target revenue neutrality. This would have resulted in us implementing either Option 5 or (most likely) Option 6, with additional input from the Commission.

However, given the highly unpredictable nature of the fishery (with high costs, lower catch rates and associated fish sale revenue) – experienced in 2022 and expected to continue in 2023 – combined with a lack of alternative funding sources for the FISS, **IPHC Secretariat is recommending Commission endorsement of Option 7 for 2023:** Option 7 will maximise the likelihood of achieving revenue neutrality in 2023 and reduce the risks that ongoing deficits pose to funding the FISS in subsequent years.

Proceeding with Option 7 in 2023 would allow for 'normal' stock assessment and management procedure inputs and results, except for annual stock distribution for management use. However, if such coverage gaps persist in subsequent years, then the risk of unmonitored changes in density or distribution occurring increases and estimates from the ends of the stock will become increasingly unreliable. IPHC Regulatory Areas 2A, 4A, 4B and 4CDE are challenging areas to sample, but ongoing sampling reductions will have implications for our overall understanding of stock trends and distribution. Importantly, the Pacific halibut stock and fishery are currently in transition between a strong 2005 year-class and more recent 2011 and 2012 year-classes. While the distribution of these year-classes is likely to become more uniform as they age, a multiple-year sampling gap at the ends of the geographic range (particularly 4A-4CDE) increases the likelihood that stock distribution and therefore realized harvest rates may differ appreciably from those intended by the IPHC's interim management procedure. With reduced precision, the ability of the stock assessment model to update currently predicted trends based on new information is much more limited: increases or decreases in overall stock trend may not be tracked by the assessment model, which relies heavily on the trend information provided by the annual FISS.

Reductions in the FISS in 2023 will have implications for the 2024-2026 FISS designs as well. Current design planning spreads the most challenging charter regions (logistically and financially) over a three-year time-horizon. To 'catch-up' from the much larger variance estimates that would be produced in 2023, an increased level of sampling would be required in subsequent years, including the regions omitted in 2023 as well as at least some of those currently proposed for 2024-25. The longer such gaps in coverage persist, the more difficult it becomes to maintain the quality of time series estimates, and the result may be a period in the time series with permanently high uncertainty around our understanding of stock trends and distribution.

RECOMMENDATION

That the Commission:

1) **NOTE** paper IPHC-2022-IM098-10 that presents the FISS design proposals for 2023-25 together with scientific evaluations of the designs, and cost evaluations of additional 2023 design options;
2) **ENDORSE** revenue neutral design Option 7 for the 2023 FISS, as presented in Figure 2.5 or make modifications with associated funding adjustments;
3) Provisionally **ENDORSE** the proposed designs for 2024-25, as endorsed by the Scientific Review Board at SRB021, recognizing that the 2024-25 designs are expected to be modified in subsequent years.

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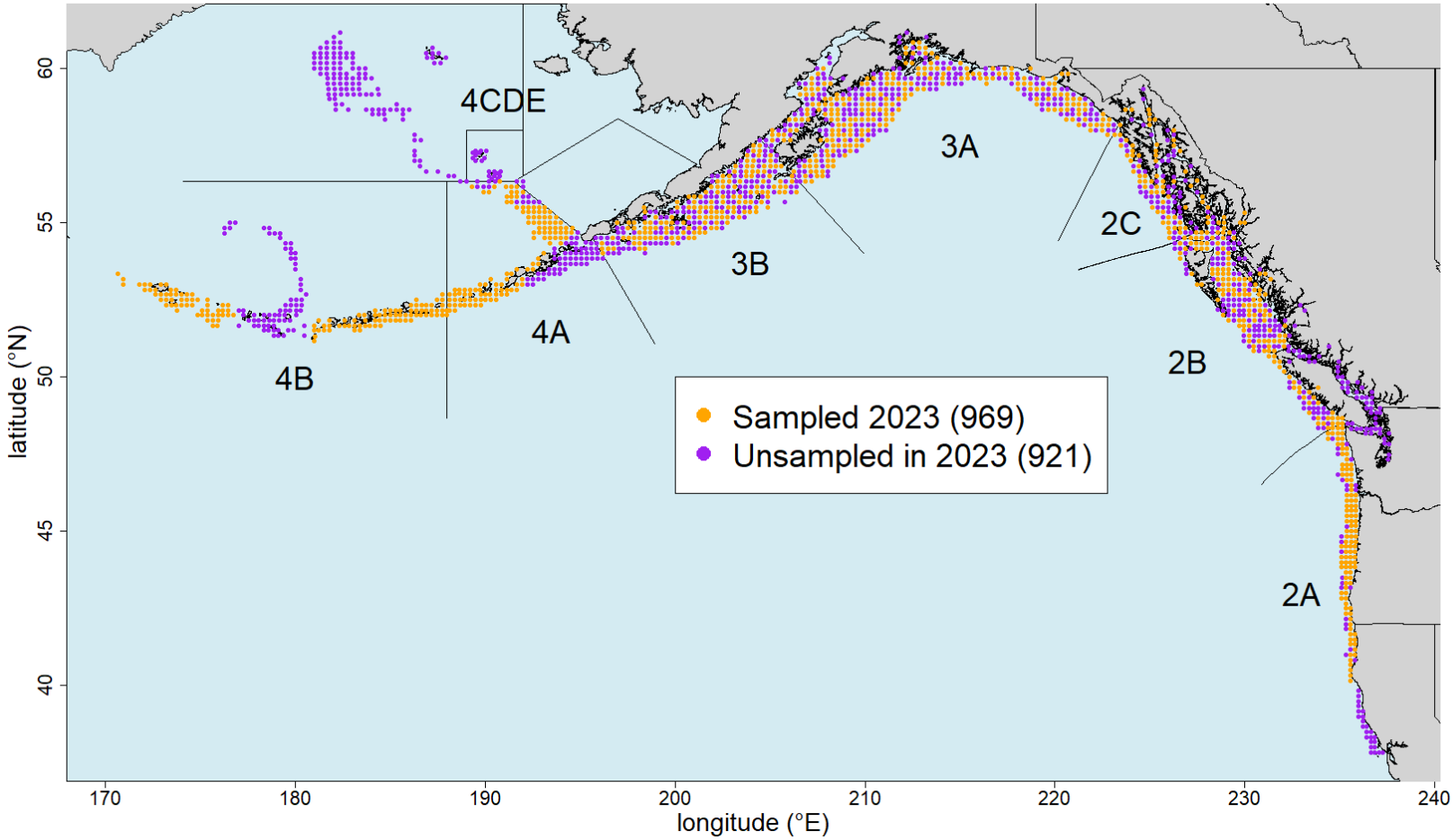

Figure 2.1. Option 2, the science-based design omitting stations in IPHC Regulatory Area 4CDE (Pre-cost optimisation, no 4CDE).

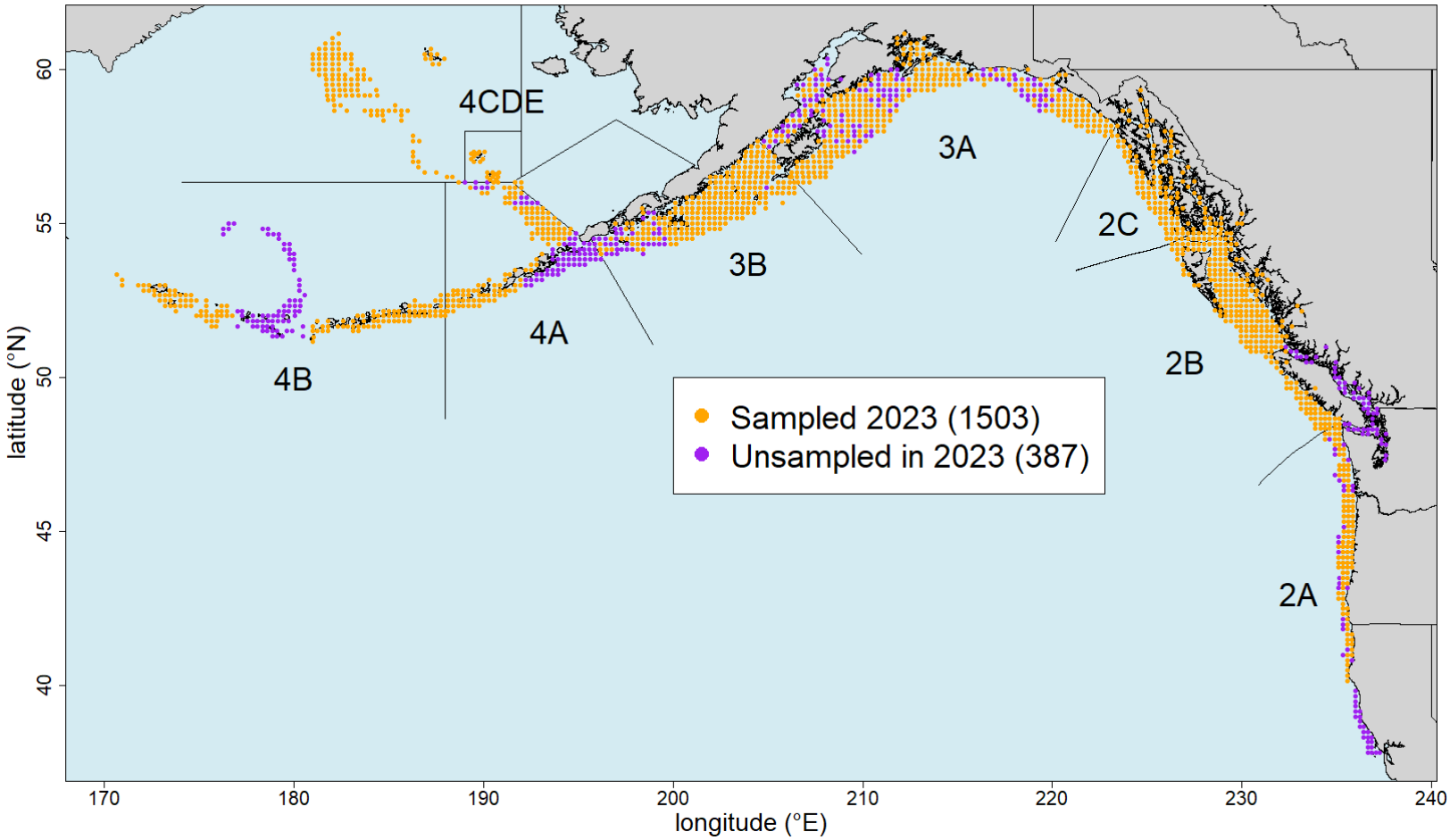

Figure 2.2. Option 3, the science-based design optimised for revenue through increased station density in the core IPHC Regulatory Areas.

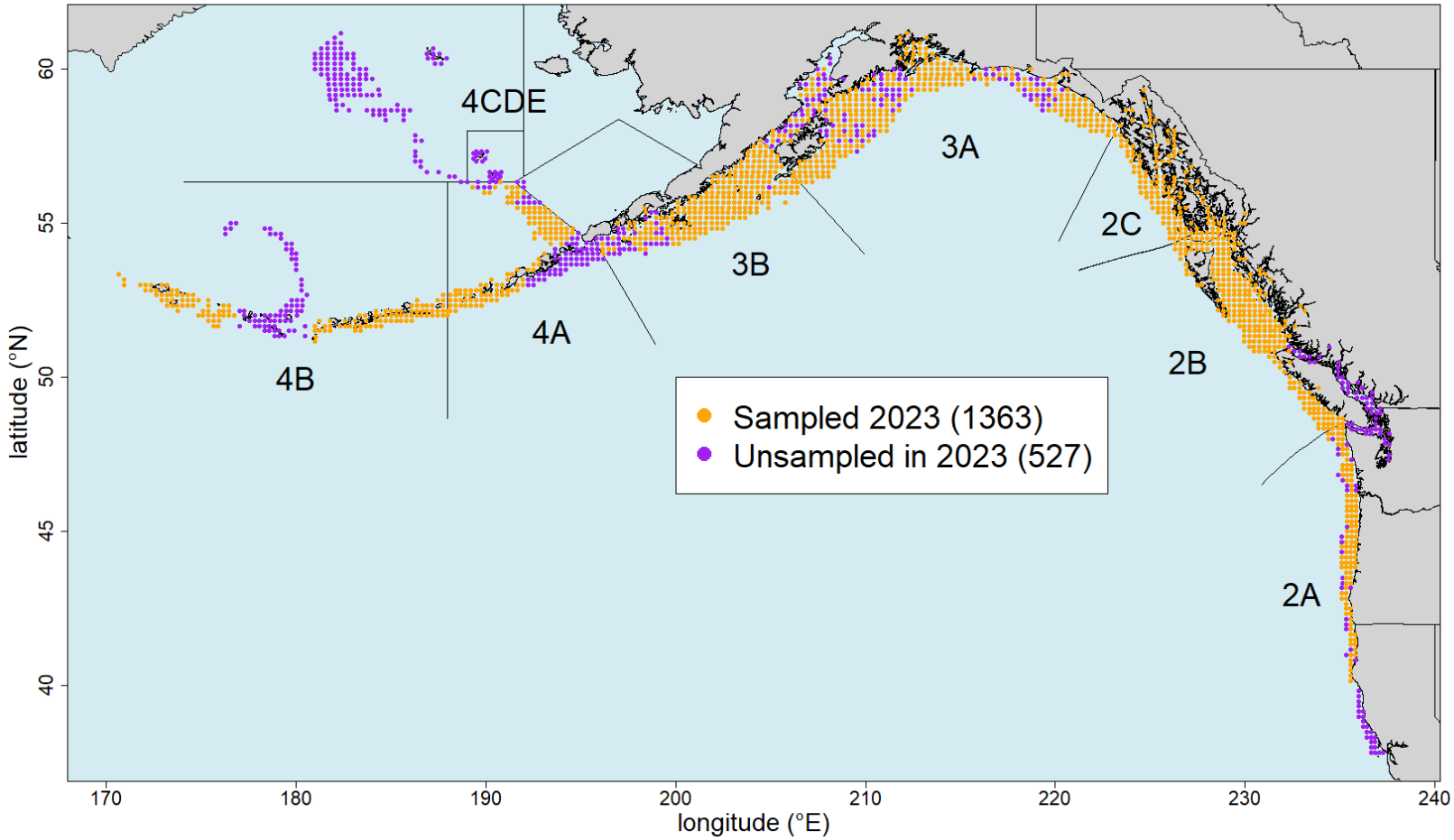

Figure 2.3. Options 4 and 5, optimized for revenue through increased station density in the core IPHC Regulatory Areas but omitting FISS stations from IPHC Regulatory Area 4CDE. Options 4 and 5 differ in terms of the maximum number of skates fished per station (6 vs 8 respectively).

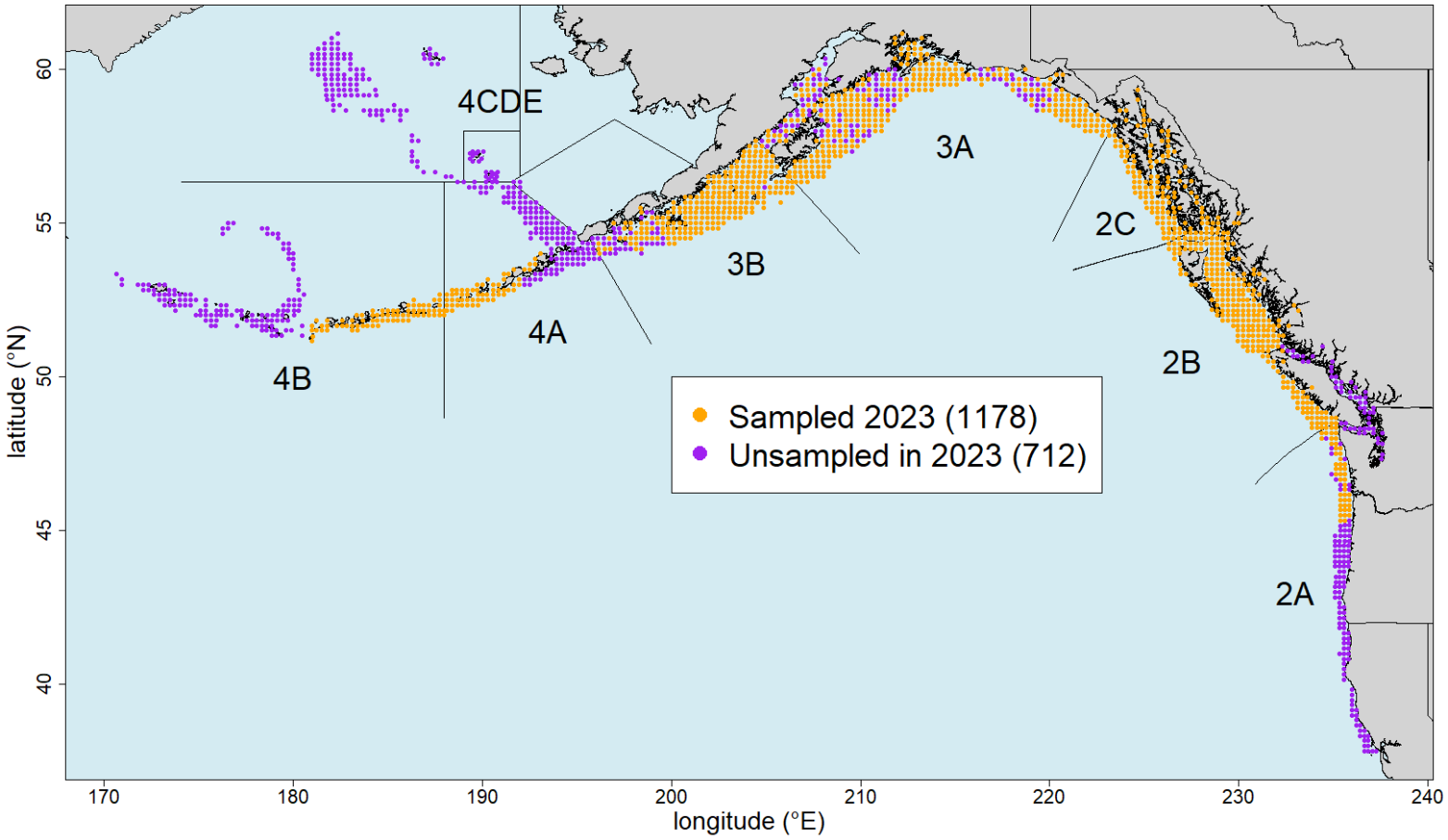

Figure 2.4. Option 6, with core area stations as in Options 3 and 4, but also omitting low-density subareas from IPHC Regulatory Areas 4A and 4B along with stations in Oregon and California (Designed to achieve revenue loss of <$0.5M).

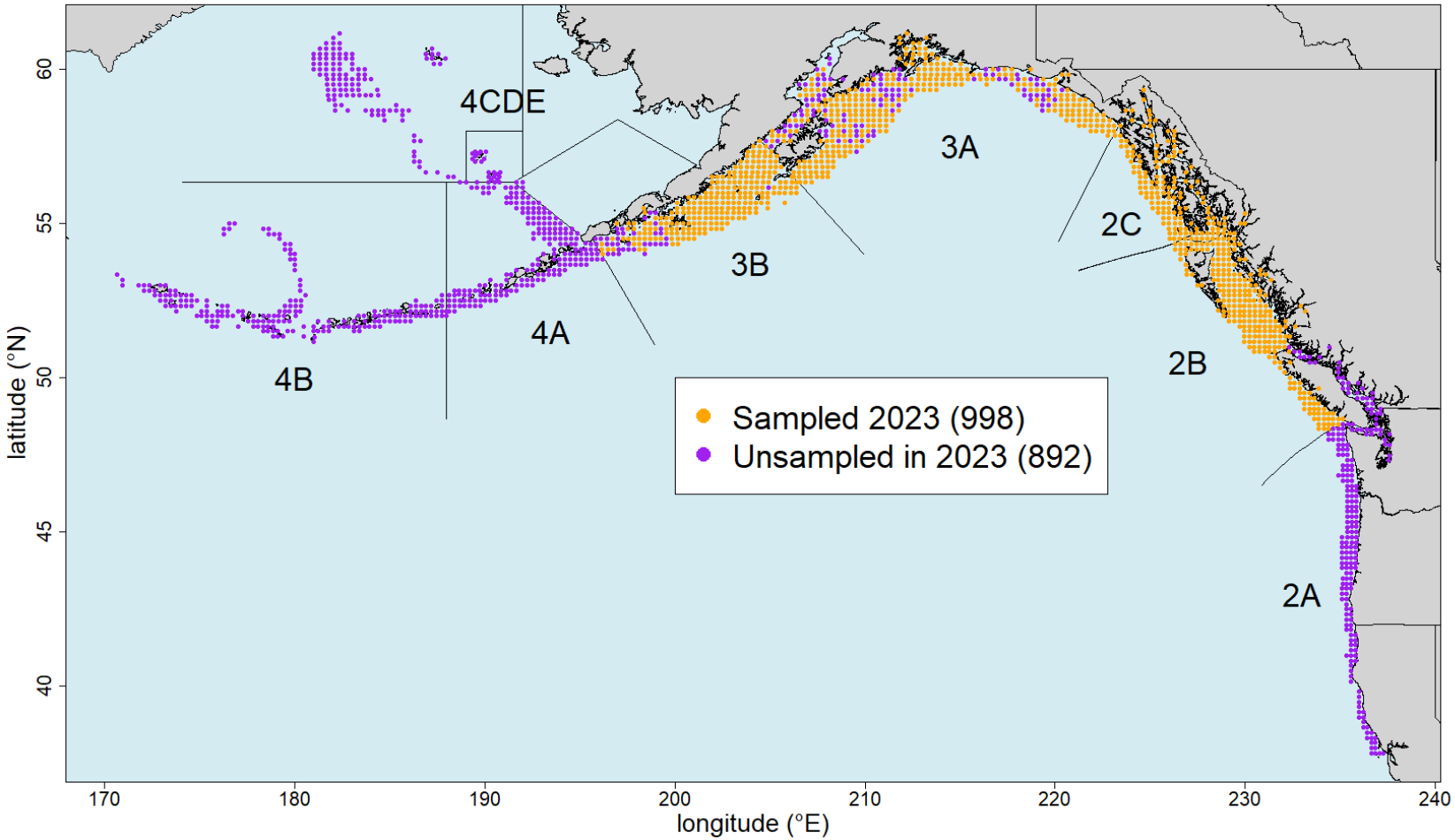

Figure 2.5. Option 7, with FISS sampling in core IPHC Regulatory Areas only (Revenue neutral design).

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Summary of the data, stock assessment, and harvest decision table for Pacific halibut (*Hippoglossus stenolepis*) at the end of 2022

PREPARED BY: IPHC SECRETARIAT (I. STEWART, A. HICKS, R. WEBSTER, AND D. WILSON; 21 OCTOBER & 23 NOVEMBER 2022)

PURPOSE

To provide the Commission with a summary of the data, stock assessment, and harvest decision table at the end of 2022.

INTRODUCTION

In 2022 the International Pacific Halibut Commission (IPHC) undertook its annual coastwide stock assessment of Pacific halibut (*Hippoglossus stenolepis*). This assessment represents a full analysis, following the previous full assessment conducted in 2019, updated in 2020 and again in 2021. Changes from the 2021 assessment were developed and reviewed by the IPHC's Scientific Review Board (SRB), in June (SRB020; IPHC-2022-SRB020-07, IPHC-2022-SRB020-R) and September 2022 (SRB021; IPHC-2022-SRB021-08, IPHC-2022-SRB021-R). Changes to the modelling that were included in the stock assessment and new data for 2022 include:

1. Update the version of the stock synthesis software used for the analysis (3.30.19).
2. Expand the treatment of natural mortality (*M*) to include an informative prior based on longevity and assign increased values at the youngest ages based on meta-analysis of other flatfish species.
3. Improve the basis for data weighting via use of bootstrapped effective sample sizes as model inputs based on the FISS and fishery sampling programs, rather than the raw number of sets/trips used in previous assessments.
4. Estimate *M* in the short time-series Areas-As-Fleets (AAF) model.
5. Include standard updates to mortality estimates from all fisheries, directed commercial fishery and FISS (fishery-independent setline survey) biological and trend information, and other sources including data collected in 2022.

This document provides an overview of the data sources available for the 2022 Pacific halibut stock assessment including the population trends and distribution among IPHC Regulatory Areas based on the modelled IPHC fishery-independent setline survey (FISS), directed commercial fishery data, and results of the stock assessment.

Overall, spawning biomass estimates remain highly consistent with those of recent stock assessments. However, the higher estimated value of natural mortality in the AAF short model when included with the other four models (two of which already estimated natural mortality) strongly affected the ensemble stock assessment estimates of recent and historical fishing intensity. **The 2022 stock assessment estimates a lower level of fishing intensity and higher relative stock status compared to previous assessments, as well as a 26% increase in the yield corresponding to the reference level of fishing intensity ($F_{43\%}$) for 2023 compared to 2022**. Spawning biomass trends appear to have stabilized, as fish from the 2012 year-class, critically important to short-term projections of stock and fishery dynamics, continue to mature.

STOCK AND MANAGEMENT

The stock assessment reports the status of the Pacific halibut (*Hippoglossus stenolepis*) resource in the IPHC Convention Area. As in recent stock assessments, the resource is modelled as a single stock extending from northern California to the Aleutian Islands and Bering Sea, including all inside waters of the Strait of Georgia and the Salish Sea, but excludes known extremities in the western Bering Sea within the Russian Exclusive Economic Zone (Figure 1).

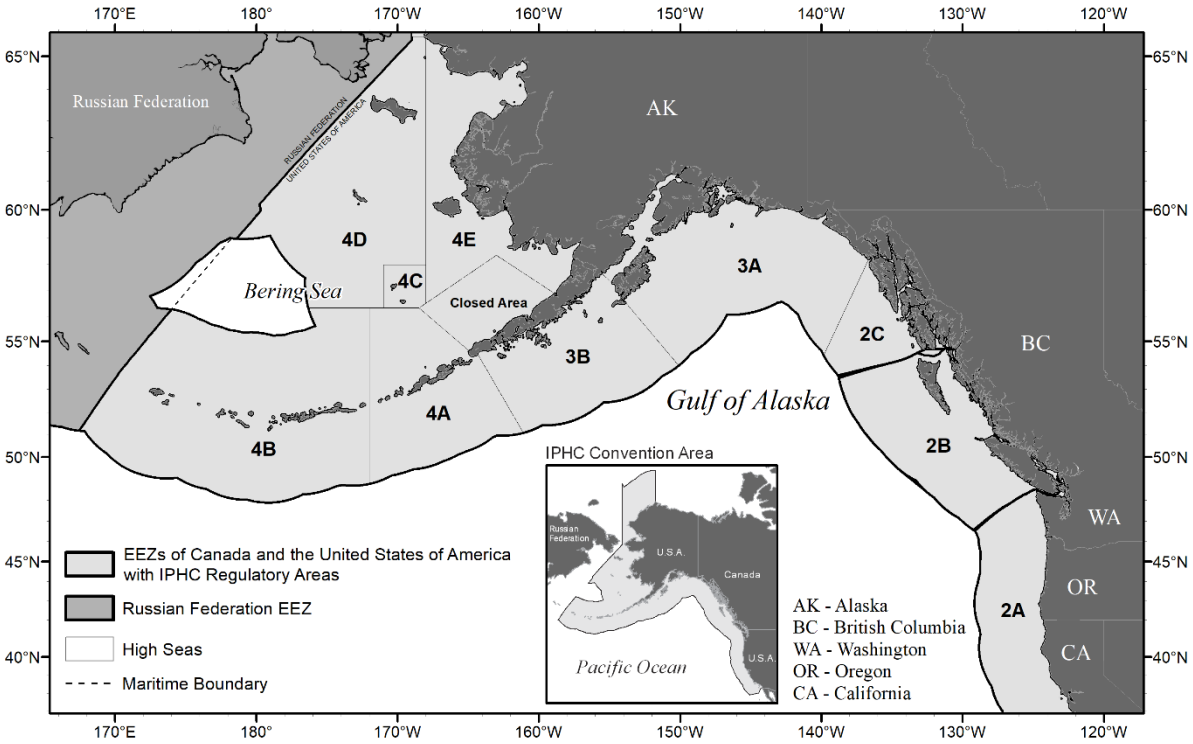


FIGURE 1. IPHC Convention Area (inset) and IPHC Regulatory Areas.

The Pacific halibut fishery has been managed by the IPHC since 1923. Mortality limits for each of eight IPHC Regulatory Areas[1] are set each year by the Commission. The stock assessment provides a summary of recently collected data, and model estimates of stock size and trend. Specific management information is summarized via a decision table reporting the estimated short-term risks associated with alternative management actions. Mortality tables projecting detailed summaries for fisheries in each IPHC Regulatory Area (and reference levels indicated by the IPHC's interim management procedure) will be provided in early January 2022 for use during the IPHC's 99th Annual Meeting (AM099).

DATA

Historical mortality

Known Pacific halibut mortality consists of directed commercial fishery landings and discard mortality (including research), recreational fisheries, subsistence, and discard mortality in fisheries targeting other species ('non-directed' fisheries where Pacific halibut retention is prohibited). Over the period 1888-2022, mortality from all sources has totaled 7.3 billion pounds (~3.3 million metric tons, t). Since 1923, the fishery has ranged annually from 34 to 100 million

[1] The IPHC recognizes sub-Areas 4C, 4D, 4E and the Closed Area for use in domestic catch agreements but manages the combined Area 4CDE.

pounds (15,000-45,000 t) with an annual average of 63 million pounds (~29,000 t; Figure 2). Annual mortality was above this 100-year average from 1985 through 2010 and has averaged 38.1 million pounds (~17,300 t) from 2018-22.

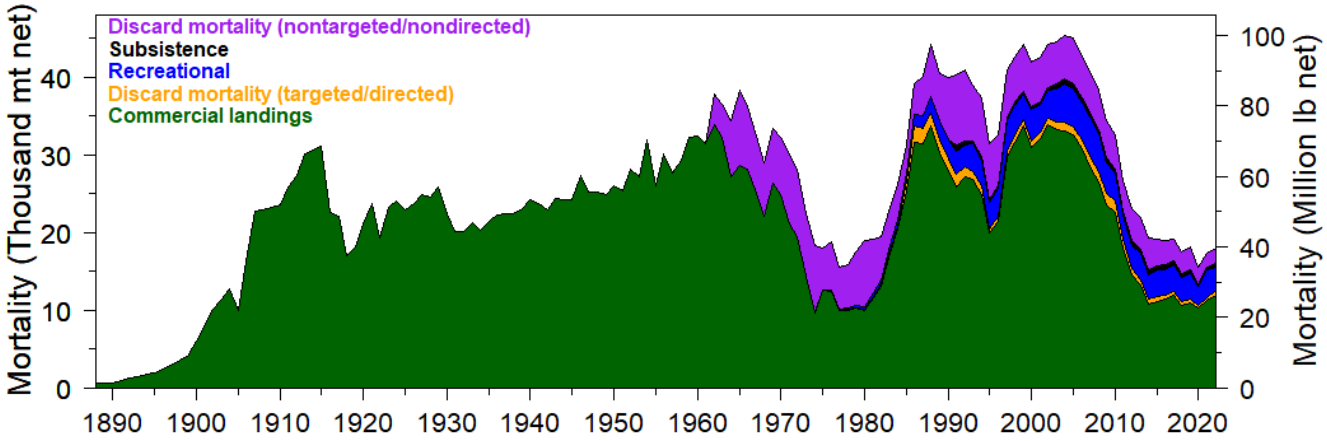


FIGURE 2. Summary of estimated historical mortality by source (colors), 1888-2022.

2022 Fishery and IPHC FISS statistics

Data for stock assessment use are compiled by IPHC Regulatory Area, and then aggregated to four Biological Regions: Region 2 (Areas 2A, 2B, and 2C), Region 3 (Areas 3A, 3B), Region 4 (4A, 4CDE) and Region 4B and then coastwide (Figure 1). The assessment data from both fishery-dependent and fishery-independent sources, as well as auxiliary biological information, are most spatially complete since the late-1990s. Primary sources of information for this assessment include mortality estimates from all sources (IPHC-2022-IM098-07_Rev_1), modelled indices of abundance (IPHC-2022-IM098-08) based on the IPHC's FISS (in numbers and weight) and other surveys, commercial Catch-Per-Unit-Effort (in weight), and biological summaries from both sources (length-, weight-, and age-composition data).

All data sources are reprocessed each year to include new information from the terminal year, as well as any additional information for or changes made to the entire time-series. For 2022, the most important information came from the modelled index of abundance reflecting the 2022 FISS and associated biological sampling. Routine updates of logbook records from the 2022 (and earlier) directed commercial fishery, as well as age-frequency observations and individual weights from the commercial fishery were also included. Directed commercial fishery sex-ratios at age were available for 2021 (building on the time-series from 2017-2020 previously available). All mortality estimates (including changes to the existing time-series where new estimates have become available) were extended to include 2022. All available information was finalized on 1 November 2022 in order to provide adequate time for analysis and modeling. As has been the case in all years, some data are incomplete (commercial fishery logbook and age information), or include projections for the remainder of the year (mortality estimates for ongoing fisheries or for fisheries where final estimation is still pending).

Coastwide commercial Pacific halibut fishery landings (including research landings) in 2022 were approximately 26.1 million pounds (~11,900 t), up 6% from 2021[2]. Discard mortality in non-

[2] The mortality estimates reported in this document are those available on 1 November 2021 and used in the assessment analysis; they include projections through the end of the fishing season.

Report on Current and Future Biological and Ecosystem Science Research Activities

PREPARED BY: IPHC SECRETARIAT (J. PLANAS, 24 OCTOBER 2022)

PURPOSE

To provide the Commission with a description of the biological and ecosystem science research projects conducted and planned by the IPHC Secretariat and contemplated within the Five-year Program of Integrated Research and Monitoring (2022-2026).

BACKGROUND

The primary biological research activities at IPHC that follow Commission objectives are identified and described in the IPHC Five-Year Program of Integrated Research and Monitoring (2022-2026). These activities are summarized in five broad research areas designed to provide inputs into stock assessment (SA) and the management strategy evaluation (MSE) processes, as follows:

1) Migration and Population Dynamics. Studies are aimed at improving current knowledge of Pacific halibut migration and population dynamics throughout all life stages in order to achieve a complete understanding of stock structure and distribution across the entire distribution range of Pacific halibut in the North Pacific Ocean and the biotic and abiotic factors that influence it.
2) Reproduction. Studies are aimed at providing information on the sex ratio of the commercial catch and to improve current estimates of maturity and fecundity.
3) Growth. Studies are aimed at describing the role of factors responsible for the observed changes in size-at-age and at evaluating growth and physiological condition in Pacific halibut.
4) Mortality and Survival Assessment. Studies are aimed at providing updated estimates of discard mortality rates in the guided recreational fisheries and at evaluating methods for reducing mortality of Pacific halibut.
5) Fishing Technology. Studies are aimed at developing methods that involve modifications of fishing gear with the purpose of reducing Pacific halibut mortality due to depredation and bycatch.

A ranked list of biological uncertainties and parameters for SA (Appendix I) and the MSE process (Appendix II) and their links to research activities and outcomes derived from the five-year research plan are provided.

UPDATE ON PROGRESS ON THE MAIN RESEARCH ACTIVITIES

1. Migration and Population Dynamics.

   The IPHC Secretariat is currently conducting studies on Pacific halibut juvenile habitat and movement through conventional wire tagging, as well as studies that incorporate genomics approaches in order to produce useful information on population structure, distribution and connectivity of Pacific halibut. The relevance of research outcomes from these activities for stock assessment (SA) resides (1) in the introduction of possible changes in the structure of future stock assessments, as separate assessments may be constructed if functionally isolated components of the population are found (e.g. IPHC Regulatory Area 4B), and (2) in the improvement of productivity estimates, as this information may be used to define

management targets for minimum spawning biomass by Biological Region. These research outcomes provide the second and third top ranked biological inputs into SA (Appendix I). Furthermore, the relevance of these research outcomes for the MSE process is in biological parameterization and validation of movement estimates, on one hand, and of recruitment distribution, on the other hand (Appendix II).

1.1. Estimation of Pacific halibut juvenile habitat. The IPHC Secretariat recently completed a study to investigate the connectivity between spawning grounds and possible settlement areas based on a biophysical larval transport model (please see paper in the journal Fisheries Oceanography: https://doi.org/10.1111/fog.12512). Although it is known that, following the pelagic larval phase, Pacific halibut begin their demersal stage as approximately 6-month-old juveniles, settling in shallow nursery (settlement) areas, near or outside the mouths of bays (please see paper in *Reviews in Fish Biology and Fisheries*: https://doi.org/10.1007/s11160-021-09672-w), very little information is available on the geographic location and physical characteristics of these areas. In order to fill this knowledge gap and set the stage for future studies to further investigate the connectivity between spawning and nursery grounds, the IPHC Secretariat has initiated studies to identify potential settlement areas for juvenile Pacific halibut throughout IPHC Convention Waters. A first objective of this study is to create a map of suitable settlement habitat by combining available bathymetry information (e.g. benthic sediment composition and shoreline morphological data) and information on recorded presence of age-0, age-1 and age-2 Pacific halibut juveniles as well as absence of young Pacific halibut noted by various nursery habitat projects focused on other flatfish species. Data sources are currently being collected.

1.2. Wire tagging of U32 Pacific halibut. The patterns of movement of Pacific halibut among IPHC Regulatory Areas have important implications for management of the Pacific halibut fishery. The IPHC Secretariat has undertaken a long-term study of the migratory behavior of Pacific halibut through the use of externally visible tags (wire tags) on captured and released fish that must be retrieved and returned by workers in the fishing industry. In 2015, with the goal of gaining additional insight into movement and growth of young Pacific halibut (less than 32 inches [82 cm]; U32), the IPHC began wire-tagging small Pacific halibut encountered on the National Marine Fisheries Service (NMFS) groundfish trawl survey and, beginning in 2016, on the IPHC fishery-independent setline survey (FISS). As of 28 July 2022, 1,330 Pacific halibut have been tagged and released on the 2022 IPHC FISS but no tagging was conducted in the NMFS groundfish trawl surveys in 2022. Therefore, a total of 7,441 U32 Pacific halibut have been wire tagged and released on the IPHC FISS and 135 of those have been recovered to date. In the NMFS groundfish trawl surveys through 2019, a total of 6,421 tags have been released and, to date, 78 tags have been recovered.

1.3. Population genomics. The primary objective of the studies that the IPHC Secretariat is currently conducting is to investigate the genetic structure of the Pacific halibut population and to conduct genetic analyses to inform on Pacific halibut movement and distribution within the Convention Area.

1.3.1. Pacific halibut genome and characterization of the sex determining region in Pacific halibut. The IPHC Secretariat has updated the Pacific halibut genome assembly. The updated Pacific halibut genome has an estimated size of 602 Mb, 24 chromosome-length scaffolds that contain 99.8% of the assembly and a N_{50} scaffold length of 27.3 Mb. The Pacific halibut whole genome sequencing data are openly available in NCBI at https://www.ncbi.nlm.nih.gov/bioproject/622249, under BioProject PRJNA622249, and the updated assembly is openly available in NCBI at https://www.ncbi.nlm.nih.gov/assembly/GCA_022539355.2/ with GenBank assembly accession number GCA_022539355.2. The master record for the whole genome shotgun sequencing project has been deposited at DDBJ/ENA/GenBank under the accession JAKRZP000000000 and is openly available in NCBI at https://www.ncbi.nlm.nih.gov/nuccore/JAKRZP000000000. Sample metadata is openly available in NCBI at https://www.ncbi.nlm.nih.gov/biosample?Db=biosample&DbFrom=bioproject&Cmd=Link&LinkName=bioproject_biosample&LinkReadableName=BioSample&ordinalpos=1&IdsFromResult=622249, under BioSamples SAMN14503176, SAMN25516224, SAMN25600010 and SAMN25600011. This improved genome assembly will increase our ability to resolve Pacific halibut population structure at a fine scale using the proposed approach (Section 1.3.2).

Using the updated genome assembly, we conducted genome-wide analyses of sex-specific genetic variation by pool sequencing by mapping reads from male and female pools to the Pacific halibut genome assembly. We identified a potential sex-determining region in chromosome 9 of approximately 12 Mb containing a high density of female-specific SNPs. Within this sex-determining region, we identified among the annotated genes a potential candidate for the master sex-determining gene in Pacific halibut. Mapping of previously identified Pacific halibut RAD-tags associated with sex (Drinan et al., 2018) to the updated Pacific halibut genome assembly resulted in the alignment of 55 of the 56 RAD-tags, all of which mapped to the putative SD region, including the two tags containing the sex-linked markers currently used for genetic sex identification (2.1.1). These results, together with data on the Pacific halibut genome sequencing and assembly, have been published in the journal *Molecular Ecology Resources* (https://doi.org/10.1111/1755-0998.13641).

1.3.2. Studies to resolve the genetic structure of the Pacific halibut population in the Convention Area. This project has recently received funding from the North Pacific Research Board (NPRB Project No. 2110; Appendix III). The IPHC Secretariat has generated genomic sequences from 610 individual Pacific halibut collected from five spawning groups in different geographic areas (Figure 1) using low-coverage whole-genome resequencing (lcWGR). The lcWGR approach offers a cost-effective way to develop a large number (~millions) of single nucleotide polymorphisms (SNPs) that can be used as genetic markers to evaluate population structure with very high resolution. Using this method, the IPHC Secretariat is working to establish a baseline of genetic diversity using sample collections made during the spawning season and will use this data set

to develop genomic tools (i.e. genetic marker panels) that can be applied to conduct mixed stock analysis and identify the population of origin for samples collected outside of the spawning season.

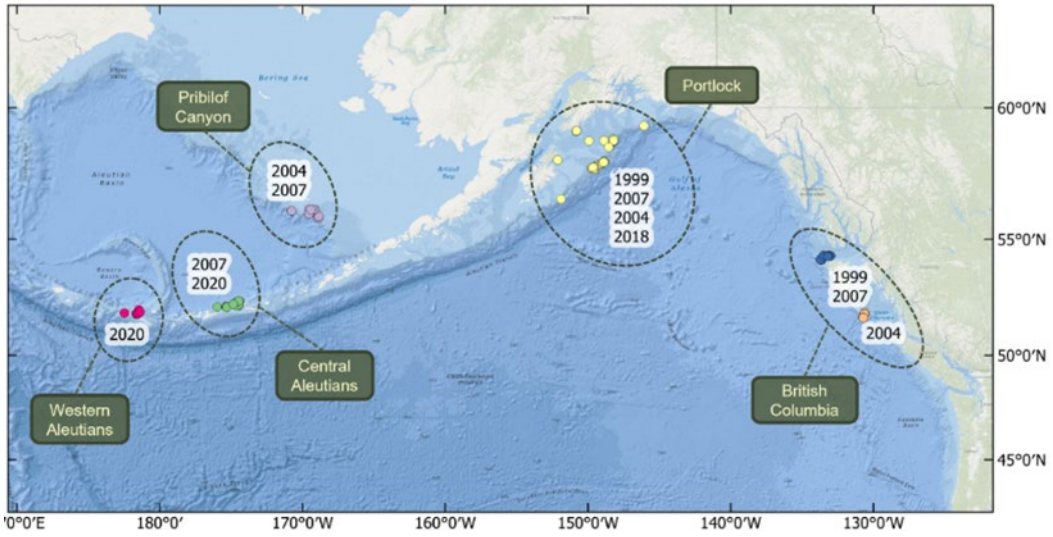


Figure 1. Map of sample collections made during the spawning season used for genomic analysis of population structure in Pacific halibut in the northeast Pacific Ocean.

2. Reproduction.

Research activities in this Research Area aim at providing information on key biological processes related to reproduction in Pacific halibut (maturity and fecundity) and to provide sex ratio information of Pacific halibut commercial landings. The relevance of research outcomes from these activities for stock assessment (SA) is in the scaling of Pacific halibut biomass and in the estimation of reference points and fishing intensity. These research outputs will result in a revision of current maturity schedules and will be included as inputs into the SA (Appendix I), and represent the most important biological inputs for stock assessment (please see document IPHC-2021-SRB018-06). The relevance of these research outcomes for the management and strategy evaluation (MSE) process is in the improvement of the simulation of spawning biomass in the Operating Model (Appendix II).

2.1. Sex ratio of the commercial landings. The IPHC Secretariat has completed the processing of genetic samples from the 2021 aged commercial landings, completing five consecutive years of sex ratio information (2017-2021).

2.2. Maturity assessment. Recent sensitivity analyses have shown the importance of changes in spawning output due to skip spawning and/or changes in maturity schedules for stock assessment (Stewart and Hicks, 2018). Information on these key reproductive parameters provides direct input to stock assessment. For example, information on

fecundity-at-age and fecundity–at-size could be used to replace spawning biomass with egg output as the metric of reproductive capability in SA and management reference points. This information highlights the need for a better understanding of factors influencing reproductive biology and success of Pacific halibut. In order to fill existing knowledge gaps related to the reproductive biology of female Pacific halibut, research efforts are devoted to characterize female maturity and fecundity in this species. Specific objectives of current studies include: 1) histological assessment of the temporal progression of female developmental stages and reproductive phases throughout an entire reproductive cycle; 2) update of maturity schedules based on histological-based data; and, 3) fecundity determinations.

2.2.1. Histological assessment of the temporal progression of female developmental stages and reproductive phases throughout an entire reproductive cycle. The IPHC Secretariat has completed the first detailed examination of temporal changes in female ovarian developmental stages, reproductive phases, and biological indicators of Pacific halibut reproductive development. The results obtained by ovarian histological examination indicate that female Pacific halibut follow an annual reproductive cycle involving a clear progression of female developmental stages towards spawning within a single year. These results provide foundational information for future studies aimed at updating maturity ogives by histological assessment and at investigating fecundity in Pacific halibut. Furthermore, the potential use of easily-obtained biological indicators in predictive models to assign reproductive phase in Pacific halibut was demonstrated. The results of this study have been published in the journals *Journal of Fish Biology* (https://doi.org/10.1111/jfb.14551) and *Frontiers in Marine Science (*https://doi.org/10.3389/fmars.2022.801759).

2.2.2. Update of maturity schedules based on histological-based data. The IPHC Secretariat is undertaking studies to revise maturity schedules in all four Biological Regions through histological (i.e. microscopic) characterization of maturity. The maturity schedule that is currently used in SA was based on past visual (i.e. macroscopic) maturity classifications in the field (FISS). In order to be able to accomplish this objective, the IPHC Secretariat has collected ovarian samples for histology in the 2022 FISS by targeting Biological Regions 2, 3, 4 and 4B. Ovarian samples will be processed for histology in the Fall of 2022 and, subsequently, histological maturity classifications will be conducted by IPHC Secretariat staff to generate biological region-specific maturity ogives.

2.2.3. Fecundity estimations. Different methods for fecundity determinations were investigated and, based on the current literature and recommendations from experts in the field, the auto-diametric method was selected as the method of choice (Witthames et al., 2009). The IPHC Secretariat is currently designing plans for ovarian sample collection for fecundity estimations during the 2023 FISS.

3. Growth.

   Research activities conducted in this Research Area aim at providing information on somatic growth processes driving size-at-age in Pacific halibut. The relevance of research outcomes from these activities for stock assessment (SA) resides, first, in their ability to inform yield-per-recruit and other spatial evaluations for productivity that support mortality limit-setting, and, second, in that they may provide covariates for projecting short-term size-at-age and may help delineate between fishery and environmental effects, thereby informing appropriate management responses (Appendix I). The relevance of these research outcomes for the management and strategy evaluation (MSE) process is in the improvement of the simulation of variability and to allow for scenarios investigating climate change (Appendix II).

   The IPHC Secretariat has conducted studies aimed at elucidating the drivers of somatic growth leading to historical changes in size-at-age by investigating the physiological mechanisms that contribute to growth changes in the Pacific halibut. The two main objectives of these studies have been: 1) the identification and validation of physiological markers for somatic growth; and 2) the application of molecular growth markers for evaluating growth patterns in the Pacific halibut population. Results from these studies are currently being analyzed and a draft manuscript intended for peer-reviewed publication is being prepared.

4. Mortality and Survival Assessment.

   Information on all Pacific halibut removals is integrated by the IPHC Secretariat, providing annual estimates of total mortality from all sources for its stock assessment (SA). Bycatch and wastage of Pacific halibut, as defined by the incidental catch of fish in non-target fisheries and by the mortality that occurs in the directed fishery (i.e. fish discarded for sublegal size or regulatory reasons), respectively, represent important sources of mortality that can result in significant reductions in exploitable yield in the directed fishery. Given that the incidental mortality from the commercial Pacific halibut fisheries and bycatch fisheries is included as part of the total removals that are accounted for in SA, changes in the estimates of incidental mortality will influence the output of the SA and, consequently, the catch levels of the directed fishery. Research activities conducted in this Research Area aim at providing information on discard mortality rates and at producing guidelines for reducing discard mortality in Pacific halibut in the longline and recreational fisheries. The relevance of research outcomes from these activities for SA resides in their ability to improve trends in unobserved mortality in order to improve estimates of stock productivity and represent the most important inputs in fishery yield for SA (Appendix I). The relevance of these research outcomes for the management and strategy evaluation (MSE) process is in fishery parametrization (Appendix II).

   For this reason, the IPHC Secretariat is conducting two research projects to investigate the effects of capture and release on survival and to improve estimates of DMRs in the directed longline and guided recreational Pacific halibut fisheries:

   4.1. Evaluation of the effects of hook release techniques on injury levels and association with the physiological condition of captured Pacific halibut and estimation of discard

mortality using remote-sensing techniques in the directed longline fishery. The results of the study reporting discard mortality rate estimations in the directed longline fishery have been published in the journal *North American Journal of Fisheries Management* (https://doi.org/10.1002/nafm.10711). The results of the second component of this study, namely the relationships among hook release techniques, injury levels, stress levels and physiological condition of released fish, are presently being written for publication in a peer-reviewed journal.

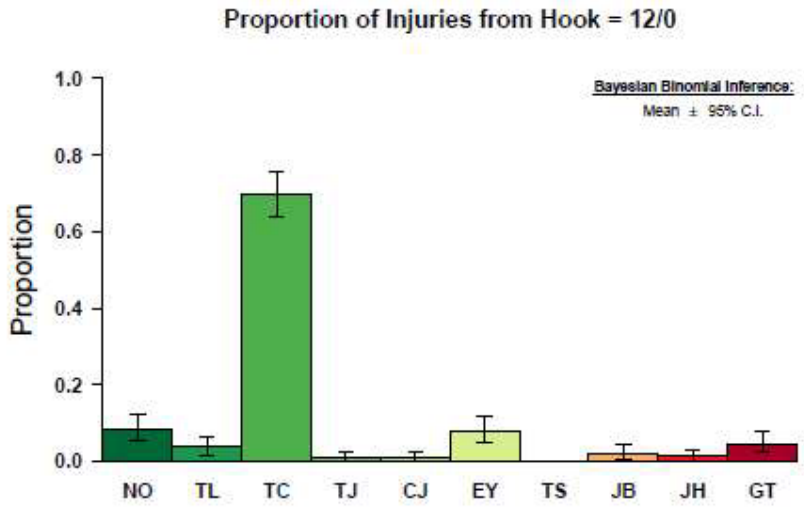
4.2. Estimation of discard mortality rates in the charter recreational sector. The IPHC Secretariat is conducting a research project to better characterize the nature of charter recreational fishery with the ultimate goal of better understanding discard practices in this fishery relative to that which is employed in the directed longline fishery. This project has received funding from the National Fish and Wildlife Foundation and the North Pacific Research Board (Appendix III). The experimental field components of this research project took place in Sitka, Alaska (IPHC Regulatory Area 2C) from 21-27 May 2021, and in Seward, Alaska (IPHC Regulatory Area 3A) from 11-16 June 2021.

The fishing vessels were required to fish 6 rods at a time, three (3) rigged with 12/0 circle hooks and three (3) rigged with 16/0 circle hooks in order to establish a comparison of the two most common gear types used in the Alaskan Pacific halibut recreational fishery, as informed by the survey conducted in 2019 and subsequent discussions. In IPHC Regulatory Area 2C (Sitka, AK), 243 Pacific halibut were captured, sampled and released that were on average 80.1 ± 19.0 cm in fork length (range from 52 to 149 cm) and 7.4 ± 7.5 Kg in weight (range from 1.5 to 49.75 Kg). In IPHC Regulatory Area 3A (Seward, AK), 118 Pacific halibut were captured, sampled and released that were on average 72.5 ± 14.1 cm in fork length (range from 42 to 110 cm) and 5.0 ± 3.3 Kg in weight (range from 0.55 to 17 Kg). Therefore, a total of 361 Pacific halibut were captured, sampled and released in the two research charters conducted

The proportion of the different types of injuries incurred over the hooking and release process were determined for Pacific halibut captured with 12/0 hooks and 16/0 hooks. For Pacific halibut captured with 12/0 hooks, approximately 70% of the fish had injuries corresponding to torn cheek, a type of minor injury that is incurred by the hook penetrating the cheek musculature through a single location during the capture event (Figure 2A). All other injuries were in much smaller proportion. Very similar distribution of injuries were observed in Pacific halibut captured with 16/0 hooks, again with a predominance of torn cheek injuries (Figure 2B). Overall, the predominant injury profile of Pacific halibut captured with either type of hook and subsequently released corresponded to relatively minor injuries.

To date, of the 281 fish that were tagged with opercular wire tags (243 fish in IPHC Regulatory Area 2C and 38 in IPHC Regulatory Area 3A) 28 tags have been recovered (19 from IPHC Regulatory Area 2C and 9 from IPHC Regulatory Area 3A).

A)



B)

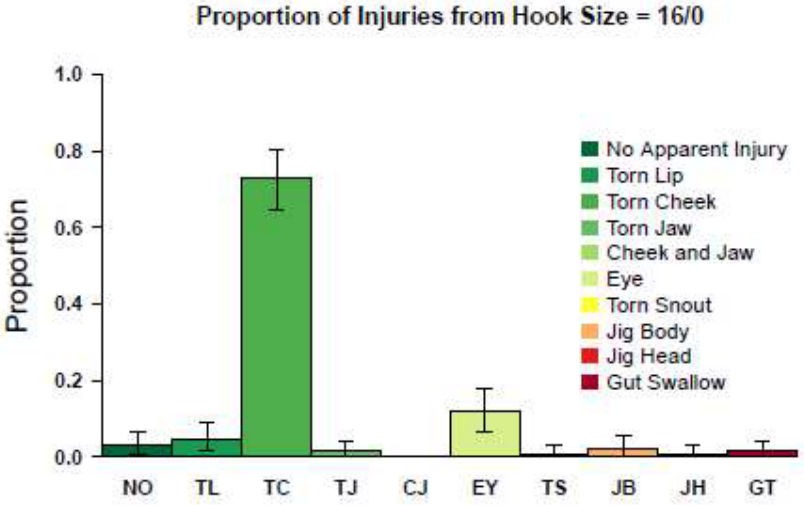


Figure 2. Proportion of the different types of injuries in fish captured with 12/0 hooks (top) and 16/0 hooks (bottom). The legend of injury types corresponds to the abbreviations in the horizontal axis.

In order to directly assess the survival of discarded Pacific halibut from the recreational fisher, 80 fish were tagged with satellite-transmitting electronic archival tags equipped with accelerometers (sPAT tags). To date, 76 out of the 80 released sPAT tags provided data reports. Of the 4 sPAT tags that did not provide data, 2 sPAT tags never reported and 2 tags did not have sufficient data for successful interpretation. Therefore, 95% of the sPAT tags deployed provided survival information, a similar data transmission success as compared to our recently published report on the use of sPATs to evaluate survival of Pacific halibut discarded from the longline fishery (please see paper in the journal *North American Journal of Fisheries Management*: https://doi.org/10.1002/nafm.10711). Of the 76 useable sPAT tags, 48 tags were at liberty for the full duration of the pre-programmed 96-day period, whereas 21 sPAT tags reported prematurely for unknown reasons, with an average time of at liberty reporting

of 37.1 days (range of 3.6-76.8 days). The remaining 7 sPAT tags were physically recovered by fishery captures, with an average time at liberty of 58 days (range of 37.1-69.1 days). Of the physically recovered tags, one was recovered 2 Km from its release location, another one 16 Km from its release location and the remaining 5 tags were recovered less than 0.5 Km from their release location.

Preliminary analysis of the accelerometer data from all 76 tags that successfully reported data, following the survival criteria previously reported (https://doi.org/10.1002/nafm.10711), indicates that only one discarded fish was confidently estimated to have died (its tag reported 8.3 days after deployment). Current analyses are devoted to evaluate whether a second potentially dead fish that reported 32.7 days after deployment fits the "dead" criteria. Therefore, preliminary estimates of discard mortality from the guided recreational fishery point towards a 1.3% discard mortality rate. The deduced preliminary discard mortality rate estimated in the present study is lower than the minimum 4.2% discard mortality rate recently estimated for Pacific halibut discarded from the longline fishery (https://doi.org/10.1002/nafm.10711). The difference in estimated survival between Pacific halibut captured and discarded from the two types of fisheries is consistent with the lower capture (hooking) and release time, under best practice handling conditions, of Pacific halibut captured by the recreational fishery. These results represent the first report of experimentally-derived estimates of discard mortality of Pacific halibut captured and discarded in the recreational fishery.

5. Fishing technology.

The IPHC Secretariat has determined that research to provide the Pacific halibut fishery with tools to reduce Pacific halibut mortality by whale depredation is considered a high priority. This research is now contemplated as one of the research areas of high priority within the 5-year Program of Integrated Research and Monitoring (2022-2026). Towards this goal, the IPHC secretariat has recently obtained funding from NOAA's Bycatch Research and Engineering Program (BREP) to investigate gear-based approaches to catch protection as a means for minimizing whale depredation in the Pacific halibut and other longline fisheries (NOAA Award NA21NMF4720534; Appendix III). The objectives of this study are to: 1) work with fishermen and gear manufacturers, via direct communication and through an international workshop, to identify effective methods for protecting hook-captured flatfish from depredation; and 2) develop and pilot test 2-3 simple, low-cost catch-protection designs that can be deployed effectively using current longline fishing techniques and on vessels currently operating in the Northeast Pacific Ocean.

The first phase of this project consisted in recruiting participants for a catch protection workshop from the scientific community and from the harvesters active in the waters of Alaska, British Columbia and the U.S. west coast. Initial screening of research conducted around the world led to invitations to three different groups actively working on development of catch protection devices (Sago Solutions, Norway; National Institute for Sustainable Development (IRD) – Marine Biodiversity, Exploitation, and Conservation Unit (MARBEC), University of Montpellier – CNRS-INFREMER-IRD National Centre for Scientific Research, Centre d'Etudes Biologiques de Chisé, France; and Fish Tech Inc., United States). In parallel,

harvesters active in the Pacific halibut and Greenland Turbot fisheries as well as scientists involved in marine mammal research were actively recruited for participation. The "1st International Workshop on Protecting Fishery Catches from Whale Depredation (WS001)" was held electronically on 9 February 2022. The Workshop brought together 74 participants from 6 countries, ranging from research scientists to active harvesters. A report summarizing the material presented and discussions was produced and posted in the IPHC's website along with video recordings of the entire workshop: https://www.iphc.int/venues/details/1st-international-workshop-on-protecting-fishery-catches-from-whale-depredation-ws001.

Current efforts are devoted to the development of designs for two devices for field testing in the spring of 2023.

RECOMMENDATION/S

That the Commission:

1) **NOTE** paper IPHC-2022-IM098-12 which provides a report on current and planned biological and ecosystem science research activities contemplated in the IPHC's Five-Year Program of Integrated Research and Monitoring (2022-2026).

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APPENDIX I

List of ranked biological uncertainties and parameters for stock assessment (SA) and their links to potential research areas and research activities

SA Rank	Research outcomes	Relevance for stock assessment	Specific analysis input	Research Area	Research activities
1. Biological input	Updated maturity schedule	Scale biomass and reference point estimates	Will be included in the stock assessment, replacing the current schedule last updated in 2006	Reproduction	Histological maturity assessment
	Incidence of skip spawning		Will be used to adjust the asymptote of the maturity schedule, if/when a time-series is available this will be used as a direct input to the stock assessment		Examination of potential skip spawning
	Fecundity-at-age and -size information		Will be used to move from spawning biomass to egg-output as the metric of reproductive capability in the stock assessment and management reference points		Fecundity assessment
	Revised field maturity classification		Revised time-series of historical (and future) maturity for input to the stock assessment		Examination of accuracy of current field macroscopic maturity classification
2. Biological input	Stock structure of IPHC Regulatory Area 4B relative to the rest of the Convention Area	Altered structure of future stock assessments	If 4B is found to be functionally isolated, a separate assessment may be constructed for that IPHC Regulatory Area	Genetics and Genomics	Population structure
3. Biological input	Assignment of individuals to source populations and assessment of distribution changes	Improve estimates of productivity	Will be used to define management targets for minimum spawning biomass by Biological Region		Distribution
	Improved understanding of larval and juvenile distribution		Will be used to generate potential recruitment covariates and to inform minimum spawning biomass targets by Biological Region	Migration	Larval and juvenile connectivity studies
1. Assessment data collection and processing	Sex ratio-at-age	Scale biomass and fishing intensity	Annual sex-ratio at age for the commercial fishery fit by the stock assessment	Reproduction	Sex ratio of current commercial landings
	Historical sex ratio-at-age		Annual sex-ratio at age for the commercial fishery fit by the stock assessment		Historical sex ratios based on archived otolith DNA analyses
2. Assessment data collection and processing	New tools for fishery avoidance/deterence; improved estimation of depredation mortality	Improve mortality accounting	May reduce depredation mortality, thereby increasing available yield for directed fisheries. May also be included as another explicit source of mortality in the stock assessment and mortality limit setting process depending on the estimated magnitude	Mortality and survival assessment	Whale depredation accounting and tools for avoidance
1. Fishery yield	Physiological and behavioral responses to fishing gear	Reduce incidental mortality	May increase yield available to directed fisheries	Mortality and survival assessment	Biological interactions with fishing gear
2. Fishery yield	Guidelines for reducing discard mortality	Improve estimates of unobserved mortality	May reduce discard mortality, thereby increasing available yield for directed fisheries	Mortality and survival assessment	Best handling practices: recreational fishery

APPENDIX II

List of ranked biological uncertainties and parameters for management strategy evaluation (MSE) and their potential links to research areas and research activities

MSE Rank	Research outcomes	Relevance for MSE	Research Area	Research activities
1. Biological parameterization and validation of movement estimates	Improved understanding of larval and juvenile distribution	Improve parametization of the Operating Model	Migration	Larval and juvenile connectivity studies
	Stock structure of IPHC Regulatory Area 4B relative to the rest of the Convention Area		Genetics and Genomics	Population structure
2. Biological parameterization and validation of recruitment variability and distribution	Assignment of individuals to source populations and assessment of distribution changes	Improve simulation of recruitment variability and parametization of recruitment distribution in the Operating Model		Distribution
	Establishment of temporal and spatial maturity and spawning patterns	Improve simulation of recruitment variability and parametization of recruitment distribution in the Operating Model	Reproduction	Recruitment strength and variability
3. Biological parameterization and validation for growth projections	Identification and application of markers for growth pattern evaluation	Improve simulation of variability and allow for scenarios investigating climate change	Growth	Evaluation of somatic growth variation as a driver for changes in size-at-age
	Environmental influences on growth patterns			
	Dietary influences on growth patterns and physiological condition			
1. Fishery parameterization	Experimentally-derived DMRs	Improve estimates of stock productivity	Mortality and survival assessment	Discard mortality rate estimate: recreational fishery

APPENDIX III

Summary of active research grants during the reporting period

Project #	Grant agency	Project name	PI	Partners	IPHC Budget ($US)	Management implications	Grant period
1	**National Fish & Wildlife Foundation**	Improving the characterization of discard mortality of Pacific halibut in the recreational fisheries (NFWF No. 61484)	IPHC	Alaska Pacific University, U of A Fairbanks, charter industry	$98,902	Bycatch estimates	April 2019 – November 2021
2	**North Pacific Research Board**	Pacific halibut discard mortality rates (NPRB No. 2009)	IPHC	Alaska Pacific University,	$210,502	Bycatch estimates	January 2021 – March 2022
3	**Bycatch Reduction Engineering Program - NOAA**	Gear-based approaches to catch protection as a means for minimizing whale depredation in longline fisheries (NA21NMF4720534)	IPHC	Deep Sea Fishermen's Union, Alaska Fisheries Science Center-NOAA, industry representatives	$99,700	Mortality estimations due to whale depredation	November 2021 – October 2022
4	**North Pacific Research Board**	Pacific halibut population genomics (NPRB No. 2110)	IPHC	Alaska Fisheries Science Center-NOAA	$193,685	Stock structure	December 2021- January 2024
Total awarded ($)					**$602,789**		

IPHC Management strategy Evaluation and Harvest Strategy Policy: FOR DECISION

PREPARED BY: IPHC SECRETARIAT (A. HICKS, I. STEWART & D. WILSON; 18 NOVEMBER 2022)

PURPOSE

To provide the Commission with results of the Management Strategy Evaluation (MSE) simulations of size limit and multi-year stock assessment management procedures (MPs), and to request decisions from the Commission on the Operating Model, Objectives, Performance Metrics, and Management Procedures.

BACKGROUND AND DISCUSSION

1) **Operating Model:** the Scientific Review Board (SRB) has reviewed the IPHC's MSE Operating Model (OM) at the 21st and 22nd Sessions of the Scientific Review Board. The Commission is requested to formally adopt the Operating Model currently in use by the IPHC Secretariat so that we may move forward. Additional details can be found in Appendix A.

2) **Objectives:** The IPHC Secretariat is requesting that the Commission agree to a reduced set of MSE objectives. These are a reduced set of important coastwide objectives taken from the larger set presented in Appendix B and reworded for clarity.

    a. Maintain the long-term coastwide female spawning stock biomass above a biomass limit reference point ($B_{20\%}$) at least 95% of the time.

    b. Maintain the long-term coastwide female spawning stock biomass above a biomass target reference point ($B_{36\%}$) at least 50% of the time.

    c. Limit annual changes in the coastwide TCEY.

    d. Optimise average coastwide TCEY.

3) **Performance Metrics:** The IPHC Secretariat is requesting that the Commission endorse the following Performance Metrics to move forward with, which is a subset from the range of metrics presented in Appendix A:

    P(RSB<20%): Probability that the long-term Spawning Biomass is less than the Spawning Biomass Limit. SB_{Lim}=20% of unfished spawning biomass. This is associated with objective (a) and is reported as a pass if the probability is less than 0.05.

    P(RSB<36%): Probability that the Spawning Biomass is less than the Spawning Biomass Target. SB_{Targ}=36% of unfished spawning biomass. This is associated with objective (b) and is reported as a pass if the probability is less than 0.50.

    Median AAV TCEY: Average annual variability of the short-term TCEY determined as the average difference in the TCEY over a ten-year period. This is a measure of the

inter-annual variability of the TCEY in the next 4-13 years and is associated with objective (c). This is only reported if the spawning biomass objectives are passed.

Median TCEY: The median of the short-term average TCEY over a ten-year period. This is a measure of the TCEY in the next 4-13 years and is associated with objective (d). This is only reported if the spawning biomass objectives are passed.

4) **Management Procedures:** The IPHC Secretariat is requesting that the Commission endorse the following reduced set of MP's to move forward with as part of further testing and for presentation to the Commission at AM099.

   MP-A32: Annual assessment frequency and a 32-inch size limit for the directed commercial fishery.

   MP-A26: Annual assessment frequency and a 26-inch size limit for the directed commercial fishery.

   MP-A0: Annual assessment frequency and no size limit (full retention) for the directed commercial fishery.

   MP-Bb32: Biennial assessment frequency and a 32-inch size limit for the directed commercial fishery. The coastwide TCEY in non-assessment years is determined from the change in the FISS index. The distribution of TCEY in all years is calculated using the FISS observations within a defined distribution procedure.

   MP-Tb32: Triennial assessment frequency and a 32-inch size limit for the directed commercial fishery. The coastwide TCEY in non-assessment years is determined from the change in the FISS index. The distribution of TCEY in all years is calculated using the FISS observations within a defined distribution procedure.

5) **Results:** MSE simulation results are shown below using the four (4) performance metrics described above. The reference fishing intensity, SPR=43%, was used for all MPs. The MP most similar to the current interim harvest strategy is shaded in grey.

MP name	**MP-A0**	**MP-A26**	**MP-A32**	**MP-Bb32**	**MP-Tb32**
Assessment Frequency	**Annual**	**Annual**	**Annual**	**Biennial**	**Triennial**
Size Limit	**0**	**26**	**32**	**32**	**32**
Empirical Rule	**–**	**–**	**–**	**b**	**b**
P(RSB<20%)	PASS	PASS	PASS	PASS	PASS
P(RSB<36%)	PASS	PASS	PASS	PASS	PASS
Median AAV TCEY	17.2%	17.5%	17.8%	17.0%	14.1%
Median TCEY	60.5	59.9	58.3	58.5	58.3

The IPHC Secretariat is currently in the process of updating the IPHC harvest strategy policy document which was first developed in 2019, and will need to be updated based on decisions of the Commission at IM098 and AM099.

RECOMMENDATION/S

1) That the Commission **NOTE**:
    a. paper IPHC-2022-IM098-13 Rev_1, incorporating Appendix A that describes the MSE framework, size limit and multi-year assessment management procedures, and simulation results.
2) That the Commission **ADOPT** the IPHC's MSE Operating Model, noting that further adjustments may be made, at the request of the Commission, to align with the stock assessment as-needed (i.e. conditioning to updated stock assessment outputs).
3) That the Commission **AGREE** to the following MSE priority coastwide objectives:
    a) Maintain the long-term coastwide female spawning stock biomass above a biomass limit reference point (B20%) at least 95% of the time.
    b) Maintain the long-term coastwide female spawning stock biomass above a biomass target reference point (B36%) at least 50% of the time.
    c) Limit annual changes in the coastwide TCEY
    d) Optimise average coastwide TCEY
4) That the Commission **ENDORSE** the following Performance Metrics, associated with the priority coastwide objectives:
    a) **P(RSB<20%)**: Probability that the long-term Spawning Biomass is less than the Spawning Biomass Limit, failing if the value is greater than 0.05.
    b) **P(RSB<36%)**: Probability that the Spawning Biomass is less than the Spawning Biomass Target, failing if the value is greater than 0.50.
    c) **Median AAV TCEY**: Average annual variability of the short-term TCEY determined as the average difference in the TCEY over a ten-year period, reported only if the spawning biomass objectives are passed.
    d) **Median TCEY:** The median of the short-term average TCEY over a ten-year period, reported only if the spawning biomass objectives are passed.
5) That the Commission **ENDORSE** the following reduced set of MPs to move forward with as part of further testing and for presentation to the Commission at AM099.
    a) **MP-A32:** Annual assessment frequency and a 32-inch size limit for the directed commercial fishery.
    b) **MP-A26:** Annual assessment frequency and a 26-inch size limit for the directed commercial fishery.
    c) **MP-A0:** Annual assessment frequency and no size limit (full retention) for the directed commercial fishery.

d) **MP-Bb32:** Biennial assessment frequency and a 32-inch size limit for the directed commercial fishery. The coastwide TCEY in non-assessment years is determined from the change in the FISS index. The distribution of TCEY in all years is calculated using the FISS observations within a defined distribution procedure.

e) **MP-Tb32:** Triennial assessment frequency and a 32-inch size limit for the directed commercial fishery. The coastwide TCEY in non-assessment years is determined from the change in the FISS index. The distribution of TCEY in all years is calculated using the FISS observations within a defined distribution procedure.

6) That the Commission **NOTE** that:

a) for all management procedures evaluated, the long-term relative spawning biomass passed both spawning biomass objectives for all MPs and was more often above the target for SPR values ranging between 40% and 46%;

b) removal of a size limit results in a 3.7% increase, on average, for the short-term median coastwide TCEY and a 2.7% increase, on average, for the long-term median coastwide TCEY. A majority of that increase occurs when reducing the size limit for directed commercial fisheries to 26 inches;

c) without a size limit for the directed commercial fishery, landings of O32 fish would likely decline while U32 landings would likely increase, and the trade-off is dependent on population characteristics such as incoming recruitment and size-at-age;

d) without a size limit for the directed commercial fishery, short-term coastwide directed commercial fishery discard mortality would decline by, on average, 78%;

e) for the directed commercial fishery without a size limit to maintain equal value to the fishery with a 32-inch size limit, the price of U32 fish would have to be near one-half the price of O32 fish, on average, and this equal value price ratio would most likely range between zero and one, depending on stock conditions;

f) a biennial assessment frequency with an empirical rule using FISS observations in non-assessment years shows similar results to an annual assessment;

g) a triennial assessment frequency with an empirical rule using FISS observations in non-assessment years shows a similar short-term median TCEY along with a significant reduction in inter-annual variability of the TCEY;

h) costs and benefits associated with multi-year assessments include those listed in Section 5.2.3.

APPENDIX A

A review of the IPHC MSE process to-date

1 INTRODUCTION

MSE is a process to evaluate management procedures, through simulation, to determine which ones meet defined objectives and are robust to uncertainty and variability. This process involves defining objectives, identifying MPs of interest, performing closed-loop simulations, evaluating the results, and finally applying a MP into practice. At IPHC, primary goals and objectives have been defined with the assistance of the Management Strategy Advisory Board (MSAB), MPs of interest have been identified, and a framework has been developed to conduct closed-loop simulations.

An evaluation was completed in 2021 of management procedures relative to the coastwide scale and distribution of the Total Constant Exploitation Yield (TCEY) to IPHC Regulatory Areas for the Pacific halibut fishery using a recently developed MSE framework. Additional tasks were identified at the 11th Special Session of the IPHC (IPHC-2021-SS011-R) to supplement and extend this analysis for future evaluation (Table 1). Document IPHC-2021-MSE-02 contains details of the current MSE Program of Work.

This document provides a review of the defined objectives used in the evaluation, recommendations on refinement, and an update on the Commission set Program of Work tasks in Table 1. Simulation results for size limits and multi-year stock assessment elements of the SPR-based harvest strategy policy (Figure 1) are compared and contrasted across assumptions of estimation error and decision-making variability.

2 PRIMARY GOALS AND OBJECTIVES

The MSAB has previously suggested four potential goals for evaluating management procedures, and the Commission has identified two of these as primary goals, each one with one or more objectives.

1. Biological Sustainability (also referred to as conservation goal)
   1.1. Keep biomass above a limit to avoid critical stock sizes
2. Optimise directed fishing opportunities (also referred to as fishery goal)
   2.1. Maintain spawning biomass around a level (i.e. a target biomass reference point) that optimises fishing activities
   2.2. Limit variability in mortality limits
   2.3. Provide directed fishing yield

Details of the primary goals and objectives defined by the Commission, along with performance metrics, are shown in Appendix B.

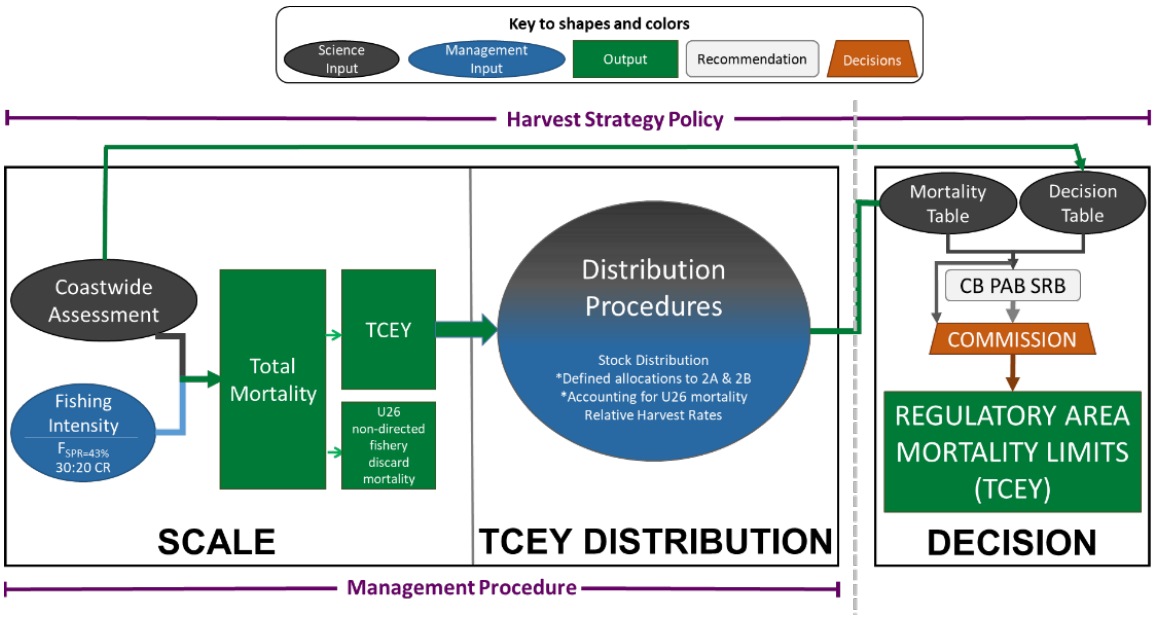

Figure 1. Illustration of the Commission interim IPHC harvest strategy policy (reflecting paragraph ID002 in IPHC-2020-CR-007) showing the coastwide scale and TCEY distribution components that comprise the management procedure. Items with an asterisk are interim agreements that were in place through 2022. The decision component is the Commission decision-making procedure, which considers inputs from many sources, including socio-economic concerns.

Table 1. Tasks recommended by the Commission at SS011 (IPHC-2021-SS011-R para 7) for inclusion in the IPHC Secretariat MSE Program of Work for 2021–2023.

ID	Category	Task	Deliverable
F.1	Framework	Develop migration scenarios	Develop OMs with alternative migration scenarios
F.2	Framework	Implementation variability	Incorporate additional sources of implementation variability in the framework
F.3	Framework	Develop more realistic simulations of estimation error	Improve the estimation model to more adequately mimic the ensemble stock assessment
F.5	Framework	Develop alternative OMs	Code alternative OMs in addition to the one already under evaluation.
M.1	MPs	Size limits	Identification, evaluation of size limits
M.3	MPs	Multi-year assessments	Evaluation of multi-year assessments
E.3	Evaluation	Presentation of results	Develop methods and outputs that are useful for presenting outcomes to stakeholders and Commissioners

The two remaining goals, with undefined objectives are

3. Minimize discard mortality in directed fisheries
4. Minimize discards and discard mortality in non-directed fisheries (bycatch)

Metrics or statistics (both words are used interchangeably) are developed from these objectives. For objectives with defined thresholds and tolerances, performance metrics can be developed. A performance standard is the binary outcome of whether an objective is met and can be determined from the performance metric (e.g. does not exceed the tolerance). Evaluation is performed by examining the metrics associated with the primary objectives, but in many cases additional metrics are useful to understand the trade-offs and important outcomes between management procedures.

2.1 Insights into some primary objectives

The primary objectives have been endorsed by the Commission, but additional clarity on one objective may be useful.

> **IPHC-2022-AM095-R, para 59a.** *The Commission **ENDORSED** the primary objectives and associated performance metrics used to evaluate management procedures in the MSE process (as detailed in paper IPHC-2019-AM095-12).*

> **IPHC-2022-MSAB017-R, para. 28**. *The MSAB **NOTED** that objective 2.1 is stated as a target that has also been interpreted as a threshold and **REQUESTED** clarification from the Commission.*

2.1.1 A spawning biomass target

The development of a spawning biomass target (i.e. a biomass level with a 50% probability of being above or below) was discussed extensively at MSAB013 following the direction of the Commission.

> **AM095-R, para 59c.** *The Commission **RECOMMENDED** the MSAB develop the following additional objective, as well as prioritize this objective in the evaluation of management procedures, for the Commission's consideration.*
>
> *i. A conservation objective that meets a spawning biomass target.*

Four dynamic equilibrium reference points were estimated previously for the Pacific halibut stock: 1) unfished equilibrium dynamic spawning biomass (SB_0), 2) MSY, 3) B_{MSY} as a percentage of SB_0 (RSB_{MSY}), and 4) the equilibrium fishing intensity to achieve MSY using spawning potential ratio (SPR_{MSY}), using three different methods (IPHC-2019-SRB015-11 Rev_1). Estimates of the dynamic equilibrium RSB_{MSY} for Pacific halibut are likely to be in the range of 20% to 30% and SPR_{MSY} to likely be between 30% and 35%. A reasonable RSB_{MSY} proxy, including a precautionary allowance for unexplored sources of uncertainty, would be 30%, and would put a proxy for SB_{MEY} between 36% and 44% given the recommendations of Rayns (2007) and Pascoe et al. (2014).

The objective of maintaining the spawning biomass around a target or above a level that optimises fishing activities was not specifically stated, and objective 2.1 in Appendix A is

ambiguous with the general objective and measurable objective potentially in conflict. Below are some insights into the implications of 'around a target' and 'above a level/threshold'.

2.1.1.1 Around a target

Specifying objective 2.1 in Appendix A as a target implies that a management procedure would be tuned to specifically meet this target with a 50% chance. This means that the expectation is to be above the target spawning biomass half of the time and below the spawning biomass half of the time. How much above and below is not specified. This would typically be accomplished by adjusting the fishing intensity (i.e. SPR) for a specific management procedure until the target is met. If this was a strict performance standard (the probability of 0.5 must be met) it would potentially disregard the trade-offs between the other primary objectives of limiting the variability in mortality limits and provide directed fishing yield. However, other elements introduced into a MP could possibly allow for variability in mortality limits to be minimized, although it would likely result in a complex MP with many elements each aimed at achieving various objectives.

2.1.1.2 Above a level/threshold

Defining objective 2.1 in Appendix A as a threshold would allow some flexibility in the evaluation. However, this could result in a less clear identification of MPs that meet the objectives, and instead focus the evaluation on identifying trade-offs between objectives. A threshold simply means that the spawning biomass may not drop below the threshold more than 50% of the time (i.e. in half of the simulations) but may remain above the threshold more often. This is similar to the biological sustainability objective 1.1. It would identify fishing intensities that would be too high to satisfy this objective, but allow for lower fishing intensities that would possibly meet other objectives.

2.1.1.3 A compromise: Above a target

It may seem contradictory to define an objective using the phrase 'above a target', but that may be useful to allow for flexibility in the evaluation of MPs, increase the importance of other objectives, allow for less complex and more transparent MPs, incorporate the precautionary approach, and meet international fisheries guidance as well as ecocertification standards. Furthermore, the concept of a 'target' could be incorporated into the harvest policy in other ways, such as in a definition of overfishing.

Defining a target is common practice in fisheries and is often combined with balancing other objectives. When describing the precautionary approach, FAO states:

> ***FAO (1996) para. 29****. Targets identify the desired outcomes for the fishery. For example, these may take the form of a target fishing mortality, or a specified level of average abundance relative to the unfished state. In some cases, these targets are likely to be identical with those that would be specified for fisheries management, regardless of whether a precautionary approach was to be adopted. In other cases, targets may need to be adjusted to be precautionary, for example, by setting the target fishing mortality lower than FMSY.*

Furthermore,

> ***FAO (1996) para. 30****. The operational constraints explicitly define the undesirable outcomes that are to be avoided. […]*
>
> ***FAO (1996) para. 34****. […] Precautionary management must adjust targets to be consistent with the constraints*

Allowing for the spawning biomass to be above the target while accounting for other objectives would still meet ecocertification standards, such as those defined by the Marine Stewardship Council (MSC). The criteria to achieve a score of 100 for stock status in relation to achievement of Maximum Sustainable Yield (MSY), according to the MSC fishery standard V2.01, is "there is a high degree of certainty that the stock has been fluctuating around a level consistent with MSY or has been above this level over recent years." This allows for the principle to be met while also allowing for other objectives.

A target may also be used for to define other aspects of the harvest policy. For example, overfishing is defined in the United States as "[…] fishing mortality or total catch that jeopardizes the capacity of a stock or stock complex to produce MSY on a continuing basis" (50 CFR 600.310(e)(2)(i)(B)).[1] Therefore, a fishing intensity that would achieve or drop below the target biomass could possibly define the overfishing limit.

3 MANAGEMENT PROCEDURES FOR EVALUATION

Two categories of MPs were prioritised in the MSE Program of Work for 2021–2023 (Table 1). One was the investigation of size limits (M.1) and the other was to investigate multi-year stock assessments (i.e. not conducting the stock assessment annually; M.3). Due to improvements in the MSE framework, changes in the OM, and alternative MPs, select additional MP elements investigated previously, such as SPR, may need to be re-evaluated.

3.1 Size limits

Since 1973, the IPHC has restricted the directed commercial fishery for Pacific halibut with a 32 inch (81.3 cm) minimum size limit, although other forms of size limits have been in place since 1940 (Myhre 1973). Many investigations of size limits have been completed since then including IPHC (1960), Clark & Parma (1995), Parma (1999), Valero & Hare (2012), Martell et al. (2015a), Martell et al. (2015b), Stewart & Hicks (2018), and Stewart et al (2021). Most of these analyses have focused on short-term effects or effects on reference points. The novelty of this analysis using the MSE framework was to examine long-term effects of different size limits in relation to defined conservation and fishery objectives. Additionally, long-term changes to the stock and fishery distribution as well as changes in productivity were examined.

The Commission requested that three size limits be investigated: 32 inches, 26 inches, and no size limit.

[1] https://www.ecfr.gov/current/title-50/chapter-VI/part-600/subpart-D/section-600.310

> **IPHC-2022-AM098-R, para. 61**: *The Commission **RECALLED** SS011-Rec.01 and **REQUESTED** that the current size limit (32 inches), a 26 inch size limit, and no size limit be investigated. to understand the long-term effects of a change in the size limit.*

An important concept to bring into the evaluation of size limits is market considerations. Stewart et al. (2021) used the ratio between the U32 price and O32 price for Pacific halibut to determine what ratio is necessary for the fishery to break even economically. Here, we call that the Equal Value Price Ration (EVPR) which is calculated as

$$\text{EVPR} = \frac{L_{O32,SL} - L_{O32,NSL}}{L_{U32,NSL}}$$

Where L is landings subscripted with the size category (O32 or U32) and the current size limit (*SL*) or a new size limit (*NSL*). The benefit of this calculation is that it does not rely on the current price for Pacific halibut but focuses on the ratio of prices between the two size categories that would result in the commercial fishery having an equal value with the current or a new size limit. Figure 2 describes the meaning of EVPR for three different ranges of values.

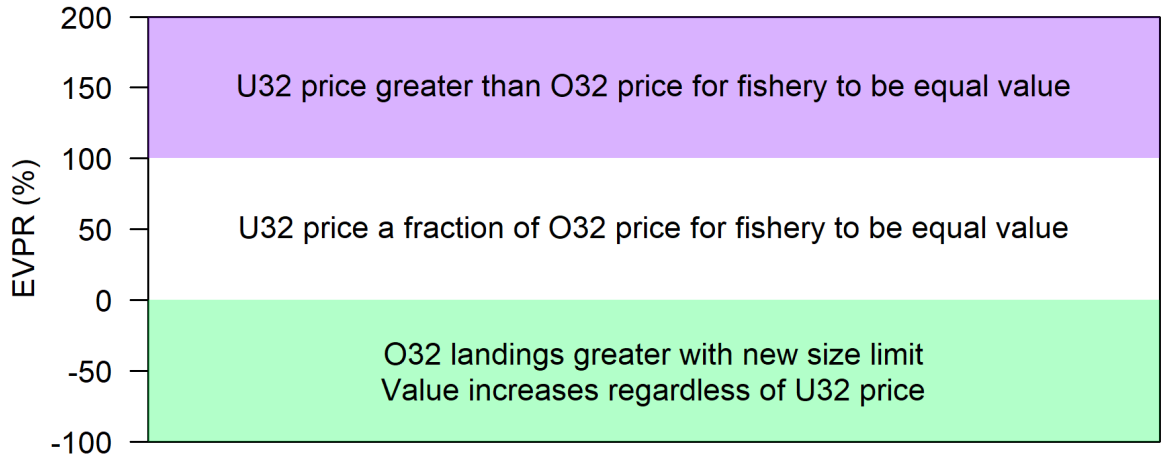

Figure 2. Descriptions of the meaning of EVPR for three different ranges.

The calculation of EVPR does not consider potential changes in the price due to changes in supply or potential savings due to changes in efficiency, and assumes that the prices for O32 and U32 Pacific halibut would change in parallel. A small amount of additional work looking at the impact of supply of the price would provide the value of the fishery in addition to the EVPR, which could be another useful metric for evaluating size limits. It is worth noting that the SRB recently requested a similar product.

> **IPHC-2021-SRB019-R** (para 61): *The SRB **REQUESTED** further information (e.g. inverse demand curves), to be presented at SRB020, on the regional supply-price relationships for commercial landings, as well as localized importance of the Pacific halibut fishery to communities.*

It is unknown what prices will be for U32 Pacific halibut if a size limit was removed, but the FISS has recently begun selling U32 fish, which may be an indicator for the potential price of small fish. This empirical price ratio was near 88% in 2022 and has been above 80% in recent years (see Table 4 in IPHC-2021-ECON-02-R03).

3.2 Multi-year assessments

Management procedures with multi-year assessments incorporate a process where the stock assessment occurs at intervals longer than annually. The mortality limits in a year with the stock assessment can be determined as in previously defined MPs, but in years without a stock assessment, the mortality limits would need an alternative approach. This may be as simple as maintaining the same mortality limits for each IPHC Regulatory Area in years with no stock assessment, or as complex as invoking an alternative MP that does not require a stock assessment (such as an empirical-based MP relying only on data/observations).

The Commission requested that the Secretariat investigate biennial assessments and potentially longer intervals as time allows.

> **IPHC-2022-AM098-R, para 64**: *The Commission **REQUESTED** that multi-year management procedures include the following concepts:*
>
> *a) The stock assessment occurs biennially (and possibly triennial if time in 2022 allows) and no changes would occur to the FISS (i.e. remains annual);*
>
> *b) The TCEY within IPHC Regulatory Areas for non-assessment years:*
>
> *i. remains the same as defined in the previous assessment year, or*
>
> *ii. changes within IPHC Regulatory Areas using simple empirical rules, to be developed by the IPHC Secretariat, that incorporate FISS data.*

Furthermore, in 2022, the SRB made a request for triennial assessments.

> **IPHC-2022-SRB021-R, para. 30**. *The SRB **REQUESTED** that the Secretariat examine MPs based on a three-year assessment cycle with annual TCEY changes proportional to changes in the FISS index because (i) this approach would be simpler and more transparent than a model, which has not yet been developed); (ii) the high benefit to cost ratio for multi-year TCEYs; (iii) it matches the current three-year full assessment cycle; and (iv) the general approach has precedents in other fishery commissions (e.g. Southern Bluefin Tuna).*

There are many different empirical rules that could be applied to determine the TCEY in non-assessment years. We identified three empirical rules for determining IPHC Regulatory Area specific TCEYs in non-assessment years, which either use no observations or FISS observations.

a. The same TCEY from the previous year for each IPHC Regulatory Area.

b. Updating the coastwide TCEY proportionally to the change in the coastwide FISS O32 WPUE and updating the distribution of the TCEY using FISS results and the applied distribution procedure.

c. Maintaining the same coastwide TCEY as the previous year but updating the distribution of the TCEY using FISS results and the applied distribution procedure.

Empirical rule (a) does not update the TCEY in IPHC Regulatory Areas, which may deviate from distribution agreements related to a percentage of the coastwide TCEY, if present, due to changes in the distribution of biomass. Empirical rules (b) and (c) both adjust the distribution of the coastwide TCEY and would maintain any agreements related to distribution.

The Commission has realized that there are benefits and costs associated with multi-year assessments. The Commission has asked the SRB to assist the Secretariat in identifying potential costs and benefits of not conducting an annual stock assessment.

> **IPHC-2022-AM098-R, para 63:** *The Commission REQUESTED that the IPHC Secretariat work with the SRB and others as necessary to identify potential costs and benefits of not conducting an annual stock assessment. This will include a prioritized list of work items that could be accomplished in its place.*

The SRB provided some insight at 20th and 21st Meetings of the Scientific Review Boards.

> **IPHC-2022-SRB020-R, para 27**. *The SRB NOTED that assessment research activities (e.g. paras. 23-26) are examples of work that could be done more extensively in non-assessment years within a multi-year assessment schedule. Other work could include investigating optimal sub-sampling designs for ages, sex-ratio, annual assessment methods to use within the MPs, and well as any of the several topics listed under Stock Assessment Research. The quantifiable costs of multi-year assessments could be estimated within the MSE, for example, of potentially lower average yield for longer assessment cycles to achieve the same levels of risk associated with annual assessments.*

A discussion of costs and benefits is presented after examining the simulation results.

3.3 Modelling distribution

The fisheries in the OM are specified by IPHC Regulatory Area because many of the Commission objectives used to evaluate MPs are specific to IPHC Regulatory Areas and the OM is spatially structured by Biological Region. This makes it necessary to distribute the TCEY across the fisheries to appropriately remove biomass from each Biological Region and allow for the calculation of necessary performance metrics. Distribution procedures have been evaluated (Hicks et al. 2021), but a specific MP has not been implemented. Even though distribution procedures are not currently being evaluated and there is no specific agreement on a single distribution procedure, they are part of the MP and need to be included in the simulations. Therefore, the Commission has recommended five different distribution procedures representing a practicable range to provide a robust analysis of size limits and multi-year assessments.

IPHC-2022-SS012-R, para 11: *The Commission **RECOMMENDED** the following five distribution procedures to be used in the management strategy evaluation of size limits and multi-year assessments, noting that these distribution procedures are for analytical purposes only and are not endorsed by both parties, thus would be reviewed in the future if the Commission wishes to evaluate them for implementation.*

a) Baseline based on recent year O32 FISS results, relative harvest rates of 1.0 for IPHC Regulatory Areas 2-3A, relative harvest rates of 0.75 for IPHC Regulatory Areas 3B-4, and no application of the current interim agreements for 2A and 2B;

b) Baseline based on recent year O32 FISS results, relative harvest rates of 1.0 for IPHC Regulatory Areas 2-3A, relative harvest rates of 0.75 for IPHC Regulatory Areas 3B-4, and current interim agreements for 2A and 2B;

c) Baseline based on recent year O32 FISS results with 1.65 Mlbs to 2A and 20% of the coastwide TCEY to 2B;

d) Baseline based on recent year O32 FISS results, relative harvest rates of 1.0 for IPHC Regulatory Areas 2-3, 4A, and 4CDE, a relative harvest rate of 0.75 for IPHC Regulatory Area 4B, and no agreements for 2A and 2B;

e) Baseline based on recent year O32 FISS results, relative harvest rates of 1.0 for IPHC Regulatory Areas 2-3, 4A, and 4CDE, a relative harvest rate of 0.75 for IPHC Regulatory Area 4B, and current interim agreements for IPHC Regulatory Areas 2A and 2B

Three of the five distribution procedures contain agreements for IPHC Regulatory Areas 2A and 2B (b, c, and e). Decision-making variability for these two areas is set to zero when agreements are in place.

3.4 MP combinations

The simulation time for a single MP may be days, therefore it is useful to identify a minimal set of runs that will provide insight into the performance of each element of the MP of interest. There are six main elements of MPs to evaluate which include the three size limits and three empirical rules for biennial assessments, as presented above, and are combined as shown in Table 2. For each MP, an SPR of 43% was used, with some specific combinations using SPR values of 40% and 46% to further investigate the effects of fishing intensity.

Table 2. Primary MPs to be evaluated. The multi-year assessment specifies the frequency of the stock assessment and the procedure for years without a stock assessment (see Section 3.2).

MP ID	Multi-year assessment	Size Limit (inches)
MP-A32	Annual	32
MP-A26	Annual	26
MP-A0	Annual	0
MP-Ba32	Biennial, empirical rule (a)	32
MP-Bb32	Biennial, empirical rule (b)	32
MP-Bc32	Biennial, empirical rule (c)	32
MP-Tx32	Triennial, empirical rule	32

Additional factors are often useful to investigate to understand how sources of variability affect the outcomes. We examine estimation error (with or without) and decision-making variability (none along with two options) to further examine the specific effects of these sources of variability. Evaluation of the main elements of the MPs under consideration (i.e. size limits and multi-year assessments, Table 2) should be done with estimation error and an appropriate specification of decision-making variability. However, decision-making variability may depend on the MP selected, thus results are available with two decision-making variability options along with no decision-making variability.

4 CLOSED-LOOP SIMULATION FRAMEWORK

The closed-loop framework (Figure 3) with a multi-area operating model (OM) and three options for examining estimation error was initially described in Hicks et al. (2020b). Technical details are updated as needed in IPHC-2022-MSE-01 on the IPHC MSE webpage. Improvements to the framework have been made in accordance with the MSE program of work and a new OM has been developed.

4.1 Development of a new Operating Model

The IPHC stock assessment (Stewart & Hicks 2022) consists of four stock synthesis models integrated into an ensemble to provide probabilistic management advice accounting for observation, process, and structural uncertainty. A similar approach was taken when developing the models for the closed-loop simulation framework along with some other specifications to improve the efficiency when conditioning models and running simulations.

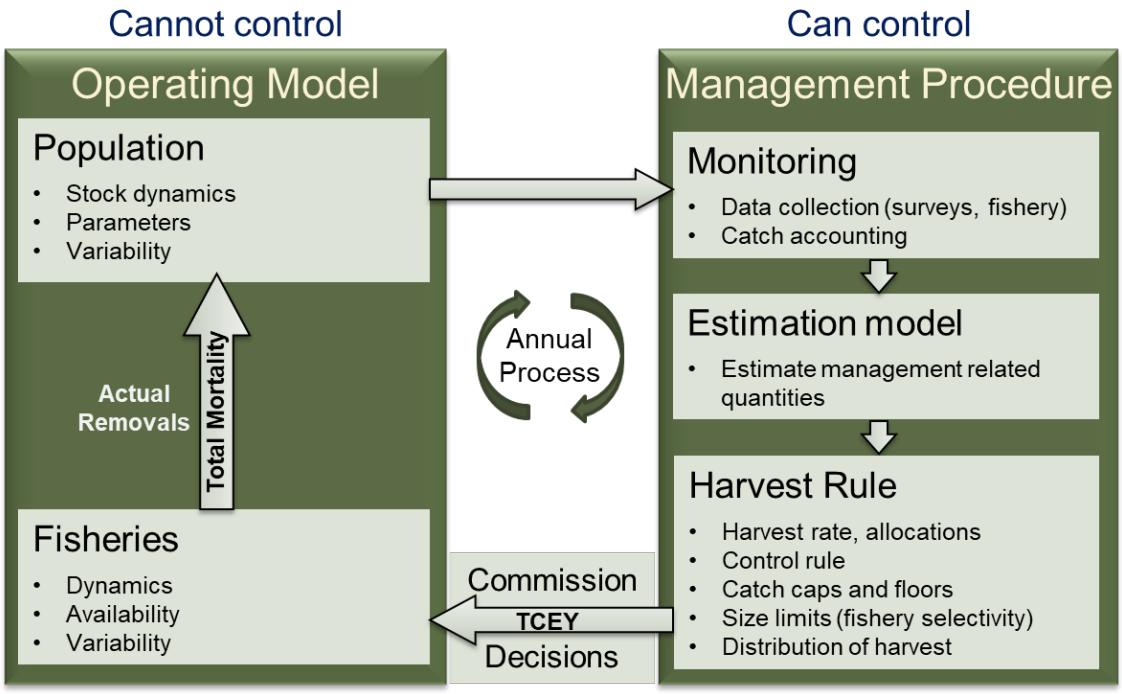

Figure 3. Illustration of the closed-loop simulation framework with the operating model (OM) and the Management Procedure (MP). This is the annual process on a yearly timescale.

4.1.1 General specifications of the OM

The OM is a multi-regional model with population dynamics modelled within and among Biological Regions, and fisheries mostly operating at the IPHC Regulatory Area scale. Four Biological Regions (Figure 4) were defined with boundaries that matched some of the IPHC Regulatory Area boundaries (see Hicks et al 2020b for more description). Thirty-three fisheries were defined for five general sectors (directed commercial, directed commercial discards, non-directed commercial discard, recreational, and subsistence) consistent with the definitions in the recent IPHC stock assessment. Additionally, there are four modelled surveys, one for each Biological Region

To account for structural uncertainty, as with the ensemble stock assessment (Stewart & Hicks 2022), four individual models were integrated into a single OM. The first model was parameterised from and conditioned to results from the long AAF stock assessment model. The second model was parameterised from and conditioned using results from the long CW stock assessment model. Because these two OM models start in 1958, they are called the medium AAF (medAAF) and medium CW (medCW) models. The two remaining models also started in 1958 and were conditioned to the same observations, but parameterised with lower values of natural mortality, as in the 2021 ‘short’ assessment models. These two models are noted as medAAF_lowM and medCW_lowM. All four models are regional models with movement between the four biological regions. The models were independently conditioned to FISS observations and outputs from ensemble stock assessment.

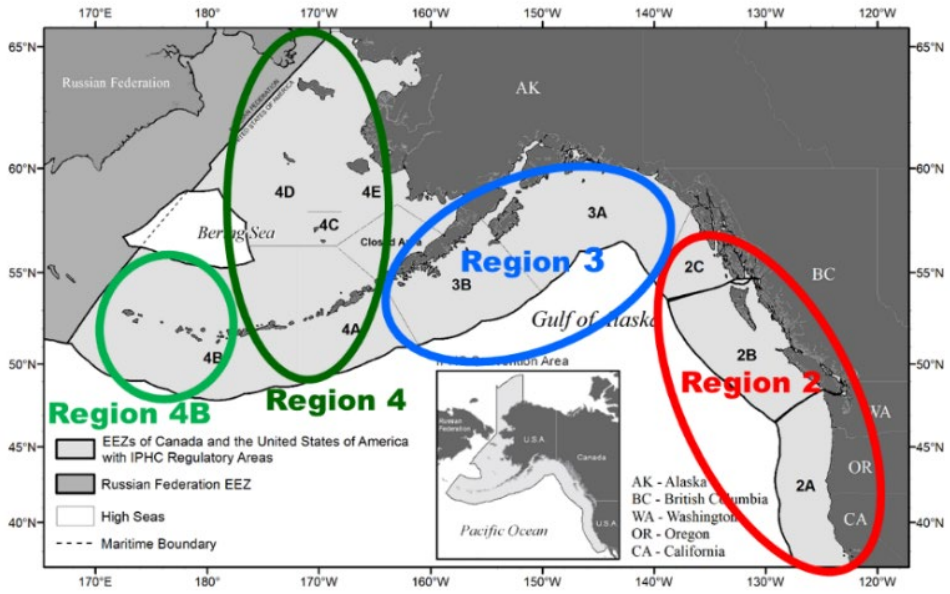

Figure 4. IPHC Regulatory Areas, Biological Regions, and the Pacific halibut geographical range within the territorial waters of Canada and the United States of America.

4.1.2 OM results and outputs

The four OM models generally captured historical trends estimated in spawning biomass as estimated in the ensemble stock assessment. The medCW models fit the lower spawning biomass trend of the long CW assessment model and the medAAF models fit the higher spawning biomass trend of the long AAF assessment model. The lowM models showed a higher probability that the spawning biomass is declining in recent years. The uncertainty in the OM also spanned the 2021 ensemble stock assessment uncertainty, except for the low spawning biomass in the 1970's (Figure 5).

4.2 Projections

The multiple trajectories from the conditioned OM provide replicate time-series of population and fishery processes and are the starting point for the closed-loop simulation to project forward in time using various management procedures (MPs) and assumptions. Processes such as weight-at-age, selectivity/retention deviations, the environmental regime, recruitment, and implementation variability are simulated during the closed-loop simulations. These processes may or may not depend on the size of the population, or a certain demographic. An example of the projection period is shown in Figure 6.

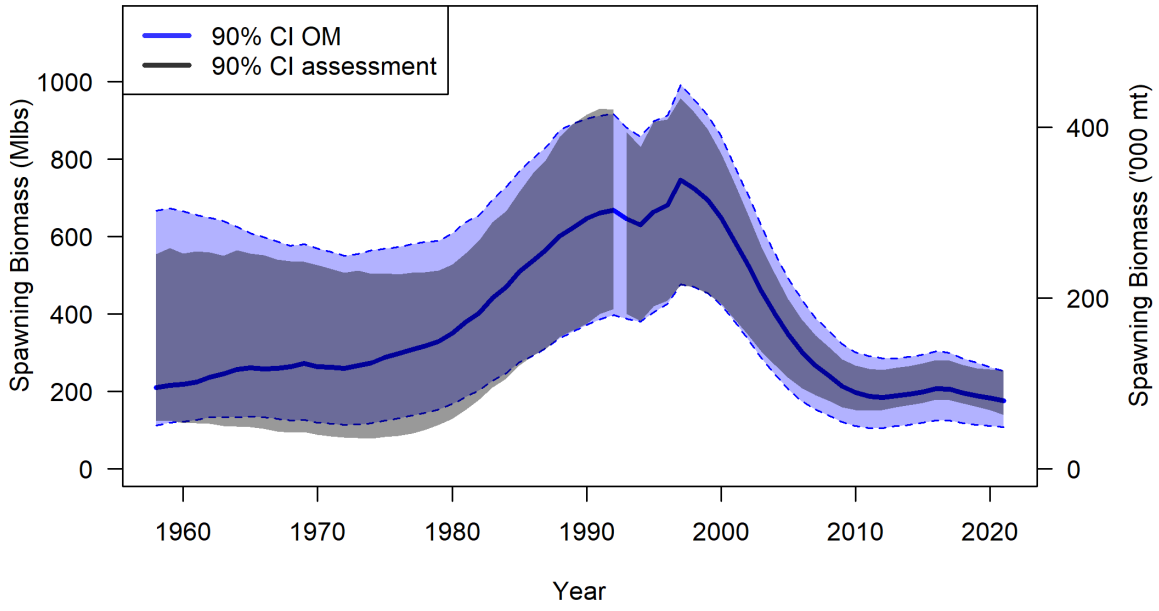

Figure 5. Median, 5th, and 95th quantiles for spawning biomass from the four OM models with the ensemble stock assessment range between the 5th and 95th quantiles shown in grey.

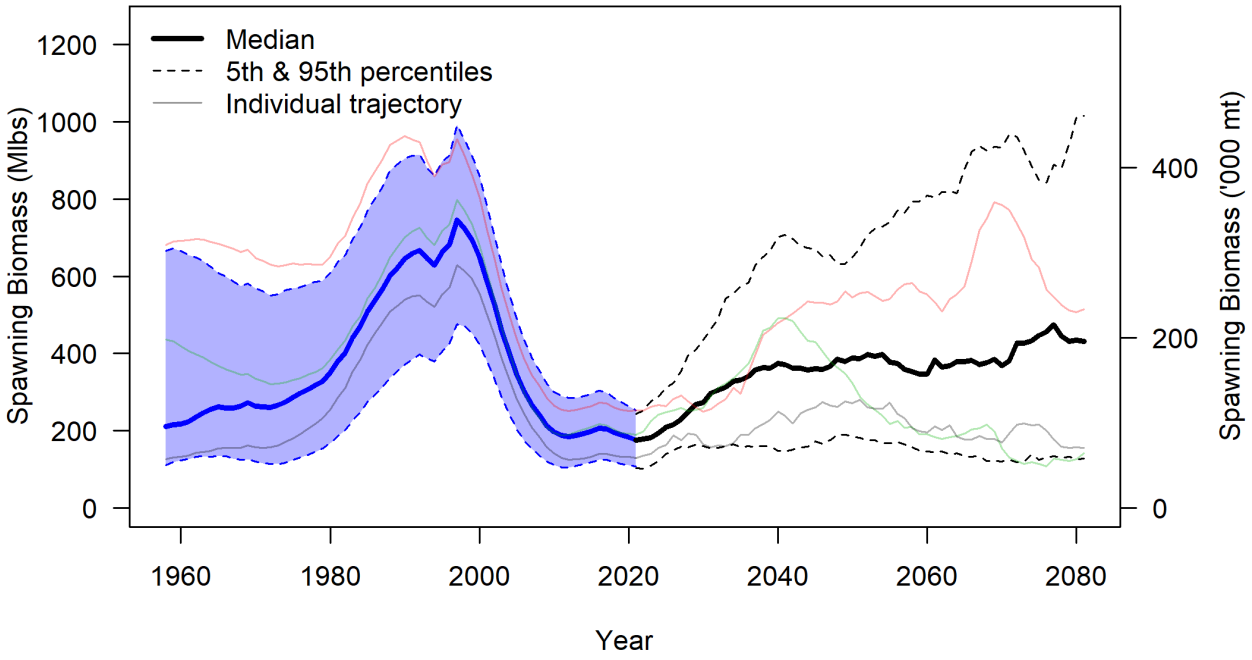

Figure 6. Median, 5th percentile, and 95th percentile of projected spawning biomass when using an SPR of 43%. Three individual trajectories (chosen ad hoc) are shown as thin lines to provide an idea of the variability in one trajectory over the entire period.

4.2.1 Implementation variability and uncertainty

Implementation variability is defined as the deviation of the fishing mortality from the mortality limit determined from an MP. It can be thought of as what actually (or is believed to have) happened compared to the limits that were set. Decision-making variability is the difference between the MP mortality limits and the adopted mortality limits set by the Commission.

Decision-making variability was simulated as a random process that could modify the coastwide TCEY from the MP TCEY and also modify the distribution of the TCEY among IPHC Regulatory Areas. Comparing adopted TCEYs since 2013 to TCEYs from the MP (MP TCEY) to reflect potential variability among IPHC Regulatory Area, two options for decision-making variability were parameterized:

1. The coastwide TCEY is equal to the coastwide TCEY from the MP, but distribution of the TCEY is subjected to decision-making variability.
2. The coastwide TCEY may deviate from the MP, along with distribution, due to decision-making variability. These processes are simulated independently.

Actual decision-making variability may more complex than these simple methods. However, the goal of including decision-making uncertainty in the MSE simulations isn't to exactly simulate what the pattern may be in the future, but to identify the effect of decision-making uncertainty and identify MPs that are robust to a plausible amount of uncertainty and illustrate the costs or benefits of reducing decision-making uncertainty.

4.2.1.1 Realized and perceived implementation uncertainty

Realized uncertainty is currently implemented in the OM by simulating a range of actual non-directed discard mortality, recreational mortality, and subsistence mortality. These are likely the largest sources of realized variability in the Pacific halibut fisheries, which is relatively small compared to many fisheries.

Perceived uncertainty is currently not simulated in the OM but will be considered as work progresses. Perceived uncertainty includes uncertainty related to sampling and estimation of landings and discards, which can include bias and variability for many reasons. Inclusion of perceived uncertainty in the MSE framework will not occur before the 99th Annual Meeting.

4.2.2 Estimation error

Estimation error is the uncertainty in parameters that are estimated for use in a management procedure. For example, relative spawning biomass is used in the 30:20 control rule and is an estimate from the stock assessment. The total mortality given a fixed SPR is also subject to estimation error.

Two options for examining the effect of estimation error were simulated. The first is No Estimation Error, which is useful to understand the intrinsic qualities of a management procedure. The second is Simulated Estimation Error, which simulates the correlated uncertainty in relative spawning biomass and total mortality. This mimics the variability that may arise from a stock assessment, but not may not capture some of the nuances of the estimates from a stock assessment, such as bias and autocorrelation.

4.3 Runs and Scenarios

The primary closed-loop simulations consist of integrating the four OM models with equal weight by simulating an equal number of trajectories/projections from each model. Results from the full set of projections are used to calculate the performance metrics and statistics of interest. It takes a considerable amount of time to complete simulations for one MP. Therefore, an initial set of MPs and options for estimation error and implementation variability were simulated with 500 replicates (25 for each OM model and distribution procedure). To provide the opportunity to evaluate the primary MPs (MP-A with 3 size limits, MP-Ba, MP-Bb, MP-Bc, and MP-Tb; Table 2) with reduced simulation error and improved accuracy of the differences between them, the number of replicates was increased to 1,100 for the primary MPs without decision-making variability and with option 1 for decision-making variability (i.e. distribution only). That is 55 replicates for a specific OM model and distribution procedure.

Scenarios that may be useful to examine include the following:

- Targeting small Pacific halibut,
- Avoiding small Pacific halibut,
- Low or high weight-at-age,
- Low or high recruitment regime.

Currently, some simulations are available for targeting or avoiding small Pacific halibut. Additional scenarios may be completed before the 99th Annual Meeting.

5 RESULTS AND EVALUATION

The MPs were integrated across the distribution procedures, resulting in the primary MPs in Table 2, as distribution is considered an uncertainty in this evaluation. However, any interesting differences between distribution procedures may be reported.

Improvement of the methods to evaluate simulation results and present those for decision-making are ongoing. Current tasks specifically include updates to the MSE Explorer tool, providing additional metrics that may be useful alongside metrics associated with the primary objectives, determining new methods to identify best performing management procedures, and providing new types of plots and tables that effectively communicate the results.

The improvements to the MSE framework, including the updated OM, resulted in some different outcomes compared to the previous OM. However, general conclusions were consistent with previous analyses. The additional years at the end of the historical time-series in the OM resulted in immediate optimistic trends in the spawning biomass (Figure 6) due to a possibly large 2012 year class, a positive PDO regime, and increasing trends in weight-at-age. Therefore, short-term results from this analysis are likely more optimistic than previous analyses.

5.1 Size limits

Applying the three size limits resulted in little change to the biological sustainability performance metrics, but short-term fishery sustainability performance metrics showed some improvements

when lowering the size limit (Table 3 and Appendix C). Biological Sustainability objectives for each Biological Region were met, except for 4B, which was closer to being met as the size limit decreased. The coastwide TCEY, on average, was 2.7% higher (1.6 Mlbs) with a 26-inch size limit and 3.7% higher (2.1 Mlbs) with no size limit. Annual variability in the TCEY was slightly reduced with lower size limits but above 15%.

The percentage gain in the TCEY is variable across years and is higher in the short-term given starting conditions of the projections (Figure 7) There is a very small probability that the TCEY is less without a size limit across all years. The high percent gain in the short-term is due to starting conditions, which declines as recruitment, weight-at-age, and environmental regimes become more integrated across the range of possible values. Therefore, the gains in yield due to lowering the size limit are likely dependent on the current size-at-age and incoming recruitment. Long-term gains in the TCEY were 2.7% (1.7 Mlbs).

The patterns were similar for performance metrics calculated for each IPHC Regulatory Area (Table 4). The median average TCEY in the individual IPHC Regulatory Areas increased between 4.0% and 5.9% except for IPHC Regulatory Area 2A (no change since three of the five distribution procedures had a fixed 1.65 Mlbs). Even though the TCEY in IPHC Regulatory Area 3A showed a modest percent increase without a size limit (4.5%), the absolute increase in the TCEY was over 1 million pounds. Annual variability in the TCEY for each IPHC Regulatory Area showed a slight decrease when removing the size limit but remained above 15% for all areas except 2A.

Table 3. Performance metrics related to primary objectives for size limit MPs with an annual assessment, estimation error and decision-making variability option 1. Biological sustainability metrics are long-term and fishery sustainability are short-term (4–13 years).

MP name	**MP-A0**	**MP-A26**	**MP-A32**
Size Limit	**0**	**26**	**32**
SPR	**0.43**	**0.43**	**0.43**
Replicates	1100	1100	1100
Biological Sustainability			
Median average RSB	38.9%	38.9%	38.8%
P(any RSB_y<20%)	<0.001	<0.001	<0.001
Fishery Sustainability			
P(all RSB<36%)	0.174	0.174	0.180
Median average TCEY	60.5	59.9	58.3
P(any3 change TCEY > 15%)	0.880	0.894	0.906
Median AAV TCEY	17.2%	17.5%	17.8%

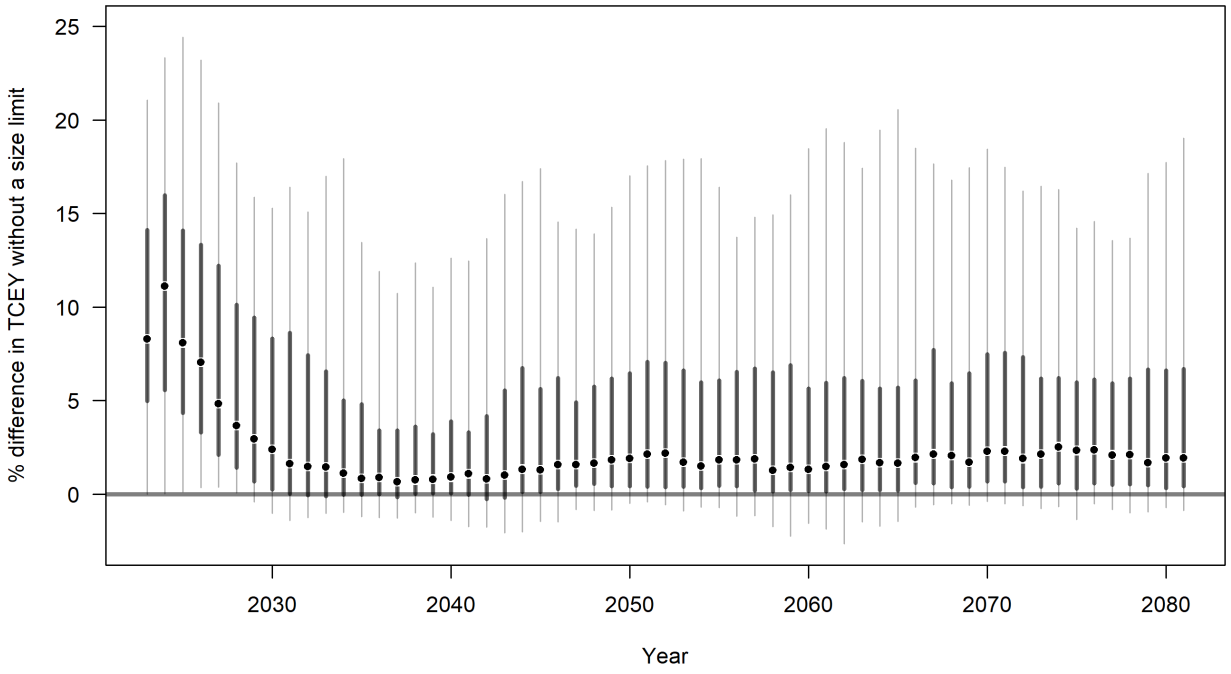

Figure 7. Percent difference in the TCEY without a size limit compared to a 32-inch size limit for each projected year when simulating estimation error and decision-making variability, and using an input SPR equal to 43%. The points are the median, the thin vertical lines connect the 5th and 95th percentiles, and the thick vertical lines connect the 25th and 75th percentiles.

The majority of the gain in median average TCEY and the reduction in annual variability of the TCEY was achieved when lowering the size limit from 32 inches to 26 inches. This is because the directed commercial gear has a low selectivity for Pacific halibut less than 26 inches.

5.1.1 Effects of decision-making variability

Decision-making variability on only the distribution of the TCEY (option1) showed very little difference when compared to results not simulating decision-making variability for all primary metrics except the median average TCEY. Option 2 for decision-making variability (variability on the coastwide TCEY and distribution) typically showed higher values of all primary metrics. However, none of the decision-making variability options changed the relative ranking of the three size limits.

Table 4. Performance metrics related to area-specific primary objectives for size limit MPs with an annual assessment, estimation error and decision-making variability option 1. Fishery sustainability metrics are short-term (4–13 years).

MP name	MP-A0	MP-A26	MP-A32
Size Limit	**0**	**26**	**32**
SPR	**0.43**	**0.43**	**0.43**
Median average TCEY-2A	1.63	1.63	1.62
Median average TCEY-2B	8.86	8.82	8.52
Median average TCEY-2C	6.66	6.6	6.33
Median average TCEY-3A	24.29	24.04	23.24
Median average TCEY-3B	7.42	7.36	7.13
Median average TCEY-4A	3.52	3.48	3.35
Median average TCEY-4CDE	4.06	4.04	3.92
Median average TCEY-4B	2.86	2.82	2.70
P(any3 change TCEY 2A > 15%)	0.254	0.252	0.264
P(any3 change TCEY 2B > 15%)	0.644	0.639	0.679
P(any3 change TCEY 2C > 15%)	0.696	0.711	0.722
P(any3 change TCEY 3A > 15%)	0.738	0.750	0.757
P(any3 change TCEY 3B > 15%)	0.756	0.759	0.777
P(any3 change TCEY 4A > 15%)	0.782	0.778	0.804
P(any3 change TCEY 4CDE > 15%)	0.514	0.527	0.524
P(any3 change TCEY 4B > 15%)	0.771	0.753	0.781
Median AAV TCEY 2A	2.5%	2.6%	2.7%
Median AAV TCEY 2B	16.6%	17.0%	17.4%
Median AAV TCEY 2C	17.8%	17.8%	18.2%
Median AAV TCEY 3A	18.9%	19.1%	19.4%
Median AAV TCEY 3B	19.9%	20.2%	20.7%
Median AAV TCEY 4A	20.0%	20.1%	20.5%
Median AAV TCEY 4CDE	15.0%	15.1%	14.9%
Median AAV TCEY 4B	20.0%	19.8%	20.3%

5.1.2 Effects of fishing intensity (SPR)

Increasing fishing intensity resulted in a higher median TCEY and higher variability in the TCEY. An SPR equal to 40% resulted in the relative spawning biomass to be slightly above the target of 36% in the long-term with a probability of falling below being near 0.42.

The short-term percent gain in the TCEY without a size limit and an input SPR of 40% was greater than the percent gain in the TCEY with an input SPR of 43%. An input SPR of 46% showed a smaller percent gain in the TCEY when eliminating the size limit.

5.1.3 Selectivity scenarios

Two selectivity scenarios were simulated to represent targeting of smaller fish and targeting of larger fish with a size limit of 0 inches. This was implemented by shifting selectivity for the directed commercial fisheries 3 years younger or older. Depending on size-at-age, this could be a significant change in selectivity, thus these scenarios may be extreme cases.

Selecting smaller fish resulted in a lower chance of falling below the target relative spawning biomass, a larger median average TCEY, and lower variability in the TCEY. Selecting larger fish was the opposite with a higher chance of falling below the target relative spawning biomass, a smaller median average TCEY, and higher variability in the TCEY. However, removing the size limit for all of these scenarios resulted in a gain in short-term yield when compared to the current 32-inch size limit assuming recent selectivity.

5.1.4 Other metrics to evaluate size limits

One benefit of lowering or removing the size limit is a decrease in directed commercial discard mortality. Short-term metrics indicate an 78% reduction in the coastwide directed commercial discard mortality (Table 5). Remaining discard mortality would be due to lost gear and regulatory discards. Across IPHC Regulatory Areas, reductions in directed commercial discard mortality would range from 67% to 88%.

Lowering or removing the size limit will likely result in increased yield but with smaller Pacific halibut (U32) in the directed commercial landings. By weight, the directed commercial landings will be composed of a higher percentage of U32 Pacific halibut than the increase in yield (i.e. the weight of O32 directed commercial landings will decrease although the total directed commercial landings increases). Directed commercial landings increased by 4% and 5% for 26-inch and 0-inch size limits, respectively, while the directed commercial landings were composed of 6% and 7% U32 Pacific halibut (Figure 8).

The increase in U32 Pacific halibut in the directed commercial landings may affect the value of the directed commercial fishery if the price for U32 Pacific halibut is less than the price for O32 Pacific halibut. The short-term Equal Value Price Ratio (EVPR) shows a median near 0.5 for both comparisons of no size limit to the current size limit and a 26-inch size limit compared to the current size limit (Figure 9). Most of the distribution of the short-term EVPR was between 0 and 1 although a small proportion was less than 0 (O32 commercial landings increased with a lower size limit) and above 1 (the price of U32 Pacific halibut would have to be greater than the price of O32 Pacific halibut for equal fishery value).

The EVPR varied over years in the projections (Figure 10), with low values in recent years, and an increase in the median to between 0.5 and 1 followed by a long-term median settling near 0.5. As with the potential yield gain, stock conditions, such as the incoming recruitment and size-at-age, are likely driving this variation.

Table 5. Short-term median directed commercial discard mortality (Mlbs, net) for size limit MPs with an annual assessment, estimation error and decision-making variability option 1.

MP name	MP-A0	MP-A26	MP-A32
Size Limit	**0**	**26**	**32**
SPR	**0.43**	**0.43**	**0.43**
Replicates	1100	1100	1100
Median coastwide discard mortality	0.164	0.265	0.755
Median discard mortality 2A	0.004	0.006	0.012
Median discard mortality 2B	0.025	0.038	0.098
Median discard mortality 2C	0.019	0.025	0.058
Median discard mortality 3A	0.054	0.078	0.215
Median discard mortality 3B	0.020	0.045	0.167
Median discard mortality 4A	0.017	0.027	0.090
Median discard mortality 4CDE	0.006	0.011	0.027
Median discard mortality 4B	0.014	0.027	0.076

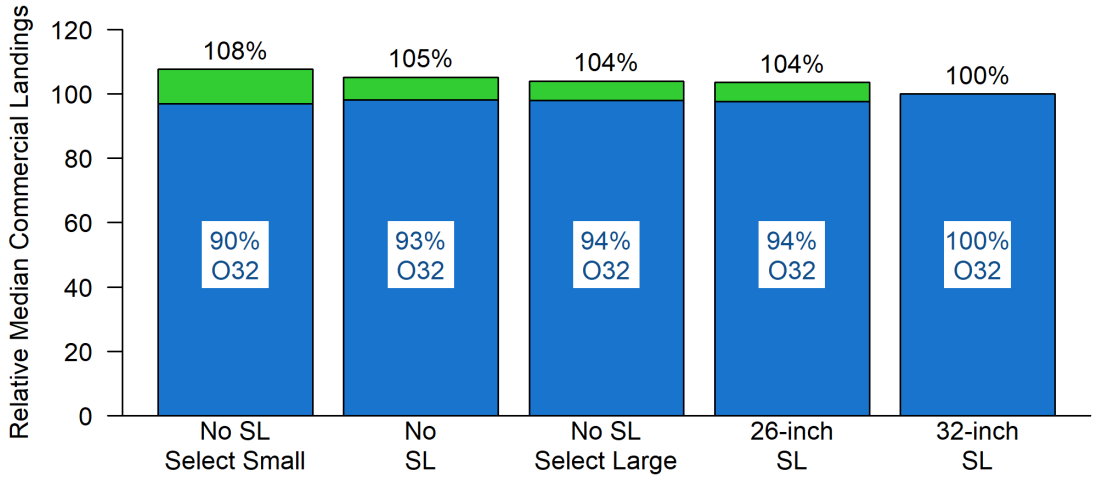

Figure 8. Median directed commercial landings relative to the landings (bar height) with the current size limit (32-inches) for three no size limit scenarios (selecting smaller fish, recent selectivity, and selecting larger fish), a 26-inch size limit, and the current size limit. The percentage of O32 Pacific halibut in the directed commercial landings is shown in blue (bottom) and the percentage of U32 Pacific halibut in the directed commercial landings is shown in green (top).

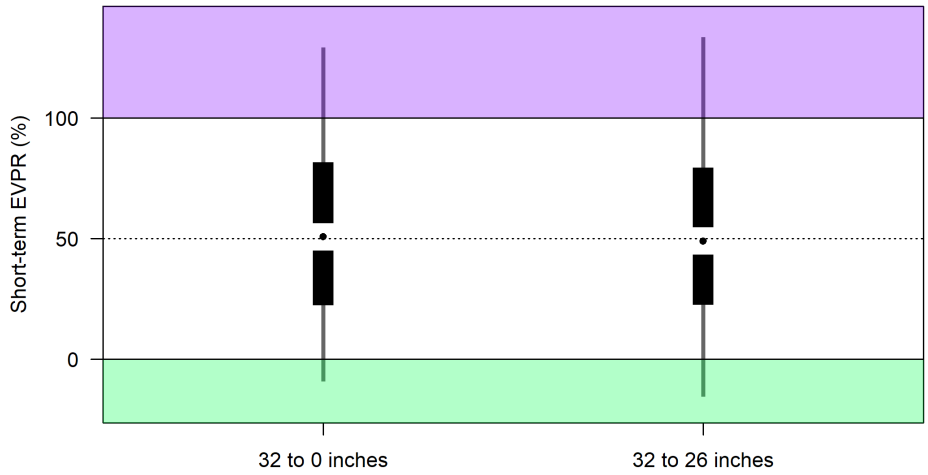

Figure 9. The short-term Equal Value Price Ratio (EVPR) for simulations comparing no size limit to the current size limit (left) and a 26-inch size limit compared to the current size limit (right). The black dot is the median of 1,100 simulations, the thick bar shows the 25th and 75th percentiles, and the thin line shows the 5th and 95th percentiles. Various ranges of values of the EVPR are shaded in colors corresponding to Figure 2.

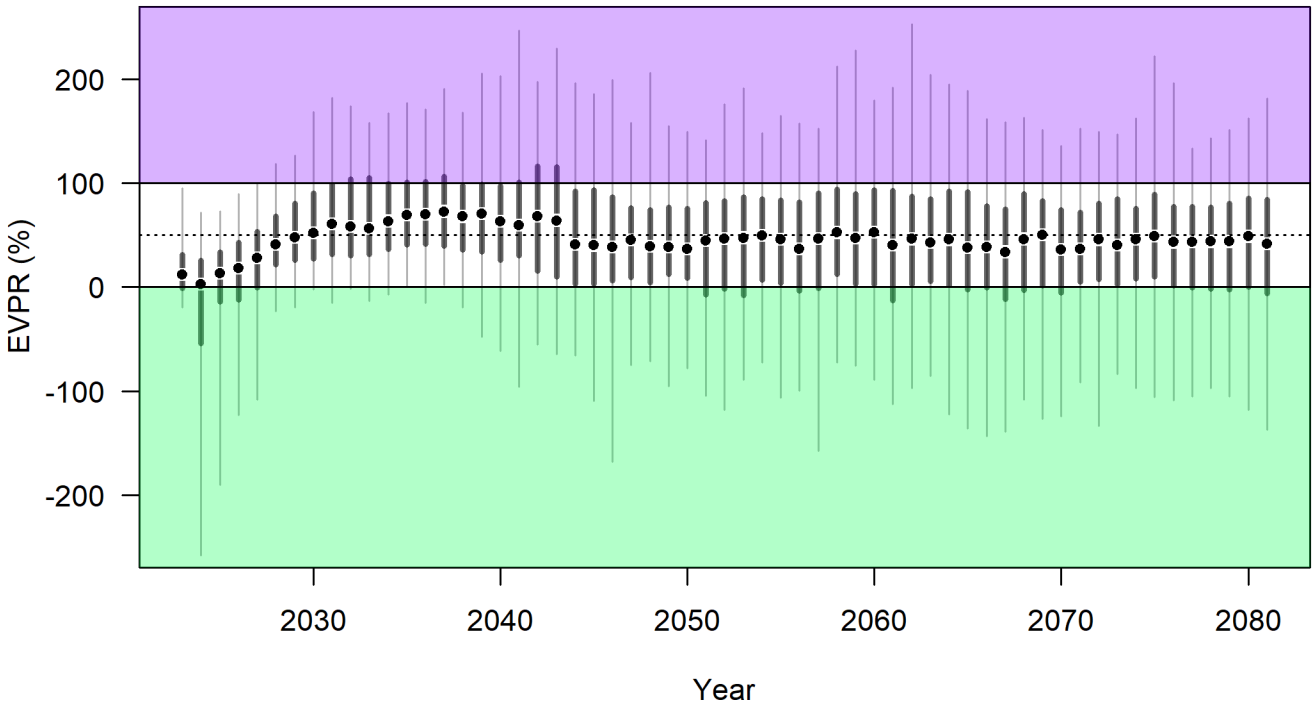

Figure 10. The Equal Value Price Ratio (EVPR) for the directed commercial fishery comparing no size limit to the current size limit for each year for 1,100 simulated projections.

5.2 Multi-year assessments

Simulations of an MP with a biennial assessment frequency were done using three options for non-assessment years: option (a) used the same TCEY in each IPHC Regulatory from the previous assessment year, option (b) updated the coastwide TCEY proportional to the change in the coastwide FISS index and updated distribution using FISS results, and option (c) used a constant coastwide TCEY in non-assessment years but updated distribution using FISS observations. Simulations with a triennial assessment were done using only option (b).

Long-term biological sustainability metrics were very similar across the five MPs and were met with an SPR of 43% (Table 6). The long-term probability that the relative spawning biomass would be less than 36% differed slightly between MPs, with the biennial assessment frequency showing less risk and the triennial frequency showing greater risk than an annual assessment. Differences in the short-term median average TCEY were within 1 million pounds, although the biennial MPs that did not update the coastwide TCEY in non-assessment years (options a & c) were slightly smaller. The annual variability of the TCEY was much less for the biennial assessments using options a and c (which is likely due to the fact that 5 of the 10 years had zero change), slightly less for the biennial assessment with option b, and much less for the triennial assessment frequency with option b. It is not known how much change occurred every other year when the TCEY was able to change, although the probability of a greater than 15% change in the TCEY in three or more years decreased as assessment frequency increased. Long-term fishery sustainability metrics suggested a slightly smaller median average TCEY in the multi-year assessment MPs. The long-term variability in the TCEY was smallest with the triennial assessment frequency, but similar or slightly larger for the biennial assessment frequency (Appendix C).

The patterns in the TCEY across MPs were similar for each IPHC Regulatory Area both in the short-term (Table 7) and the long-term (Appendix C). There were small differences in the median TCEY across IPHC Regulatory Areas, although most were slightly less with multi-year assessments. The variability showed mixed results for the three options with a biennial assessment frequency, but declined significantly with the triennial assessment frequency.

Specifics of the inter-annual changes in the TCEY within the short-term time-period have not been investigated, but one hypothesis for the similar amount of variability of the TCEY for MP-Bb is that the potential change in an assessment or non-assessment year is larger than any single-year change when using an annual assessment frequency. There are no current objectives that would indicate whether a stable 2- or 3-year period with a larger change in the assessment year is preferable to possibly smaller annual changes in the TCEY in non-assessment years.

Table 6. Performance metrics related to primary objectives for annual, biennial, and triennial MPs with a size limit of 32 inches simulated with estimation error and option 1 decision-making variability. Biological sustainability metrics are long-term and fishery sustainability are short-term (4–13 years). In non-assessment years, empirical rules are: a) holds the TCEY constant for each IPHC Regulatory Area, b) adjusts the coastwide TCEY and distribution using most recent FISS results, and c) only adjusts the distribution of the TCEY using most recent FISS results.

MP name	**MP-A32**	**MP-Ba32**	**MP-Bb32**	**MP-Bc32**	**MP-Tb32**
Assessment Frequency	**Annual**	**Biennial**	**Biennial**	**Biennial**	**Triennial**
Size Limit	**32**	**32**	**32**	**32**	**32**
Empirical Rule	**–**	**a**	**b**	**c**	**b**
SPR	**0.43**	**0.43**	**0.43**	**0.43**	**0.43**
Replicates	1100	1100	1100	1100	1100
Biological Sustainability					
Median average RSB	38.8%	38.7%	38.9%	38.7%	39.1%
P(any RSB_y<20%)	<0.001	<0.001	<0.001	<0.001	<0.001
Fishery Sustainability					
P(all RSB<36%)	0.180	0.164	0.164	0.168	0.197
Median average TCEY	58.3	57.8	58.5	57.7	58.3
P(any3 change TCEY > 15%)	0.906	0.682	0.809	0.682	0.628
Median AAV TCEY	17.8%	13.2%	17.0%	13.2%	14.1%

5.2.1 Effects of decision-making variability

Decision-making variability did not change the relative ranking of the MPs. With decision-making variability the median average coastwide TCEY was more similar across all MPs, although differences in the median average TCEY across MPs was very small for all decision-making variability options. Inter-annual variability in the TCEY was slightly reduced with decision-making variability but only for the multi-year MPs (see links in Appendix D).

5.2.2 Effects of fishing intensity (SPR)

A higher fishing intensity (SPR=40%) showed higher long-term probabilities of the relative spawning biomass being below 36%, which were highest in the triennial assessment MP with option (b), but was not greater than 0.50. The TCEY is similar across MPs, although the TCEY from the triennial MP is slightly less in the annual assessment frequency. The variability of the TCEY is higher overall due to higher fishing intensity, and the pattern is similar to that seen with SPR=43%.

Table 7. Short-term fishery-sustainability performance metrics for each IPHC Regulatory Area related to primary objectives for annual, biennial, and triennial MPs with a size limit of 32 inches simulated with estimation error and option 1 decision-making variability.

MP name	**MP-A32**	**MP-Ba32**	**MP-Bb32**	**MP-Bc32**	**MP-Tb32**
Assessment Frequency	**Annual**	**Biennial**	**Biennial**	**Biennial**	**Triennial**
Size Limit	**32**	**32**	**32**	**32**	**32**
Empirical Rule	**–**	**a**	**b**	**c**	**b**
SPR	**0.43**	**0.43**	**0.43**	**0.43**	**0.43**
Replicates	1100	1100	1100	1100	1100
Median average TCEY-2A	1.62	1.60	1.60	1.60	1.60
Median average TCEY-2B	8.52	8.32	8.36	8.29	8.43
Median average TCEY-2C	6.33	6.26	6.39	6.30	6.35
Median average TCEY-3A	23.24	22.90	23.38	23.04	23.39
Median average TCEY-3B	7.13	6.94	7.09	7.04	7.17
Median average TCEY-4A	3.35	3.29	3.39	3.34	3.41
Median average TCEY-4CDE	3.92	3.92	3.94	3.88	3.91
Median average TCEY-4B	2.70	2.72	2.71	2.65	2.72
P(any3 change TCEY 2A > 15%)	0.264	0.207	0.357	0.316	0.288
P(any3 change TCEY 2B > 15%)	0.679	0.383	0.639	0.507	0.432
P(any3 change TCEY 2C > 15%)	0.722	0.419	0.641	0.504	0.434
P(any3 change TCEY 3A > 15%)	0.757	0.456	0.669	0.454	0.447
P(any3 change TCEY 3B > 15%)	0.777	0.486	0.751	0.619	0.526
P(any3 change TCEY 4A > 15%)	0.804	0.458	0.723	0.618	0.496
P(any3 change TCEY 4CDE > 15%)	0.524	0.259	0.430	0.325	0.241
P(any3 change TCEY 4B > 15%)	0.781	0.499	0.709	0.625	0.442
Median AAV TCEY 2A	2.7%	3.8%	4.3%	4.5%	1.9%
Median AAV TCEY 2B	17.4%	13.3%	18.4%	16.7%	15.2%
Median AAV TCEY 2C	18.2%	14.2%	18.2%	16.5%	15.0%
Median AAV TCEY 3A	19.4%	14.8%	19.0%	15.9%	15.3%
Median AAV TCEY 3B	20.7%	15.7%	20.2%	18.0%	16.1%
Median AAV TCEY 4A	20.5%	15.5%	20.8%	19.0%	16.7%
Median AAV TCEY 4CDE	14.9%	11.3%	14.1%	13.2%	11.7%
Median AAV TCEY 4B	20.3%	16.6%	20.5%	19.5%	15.9%

5.2.3 Costs and benefits of multi-year assessments

The Secretariat worked with the SRB to identify costs and benefits of multi-year stock assessments, which are outlined in paragraph 27 from IPHC-2022-SRB020-R and paragraph 30 from IPHC-2022-SRB021-R (see Section 3.2 above). Also incorporating comments from IPHC-2022-MSAB017-R a list of costs and benefits is provided below.

1) Costs include
    a) Detailed management information is not available every year (e.g. stock status),
    b) The TCEY in non-assessment years may not follow stock trends (for options a and c without an empirical rule on coastwide TCEY),
    c) Potentially a small loss in yield (for options a and c with a constant coastwide TCEY across non-assessment years),
    d) Potentially may not meet distribution agreements, if any (only for option a),
    e) A slightly higher chance of a smaller stock size.
2) Benefits include
    a) Reduced inter-annual variability in the TCEY,
    b) Multi-year stability and short-term predictability of the TCEY,
    c) Use of the annual FISS index in a transparent process to determine the TCEY in non-assessment years,
    d) More focused assessment research,
    e) Potential for additional time to collaborate within the Secretariat,
    f) A triennial assessment frequency would be consistent with the current assessment cycle of update and full assessments,
    g) The multi-year approach has precedent at other fisheries commissions

5.3 Additional results anticipated for the 99th IPHC Annual Meeting

Additional results and comparisons may be provided at the 99th Session of the IPHC Annual Meeting (AM099). Elements of interest from MPs examined in previous years may be added. Presentation of the results will likely be improved, and additional performance metrics may also be examined.

6 NEXT STEPS

A secondary set of MPs can be developed based on the performance of the primary set presented above. This may include crossing size limits with biennial assessments, tuning SPR values to best meet objectives, examining different levels of estimation error, incorporating various forms of implementation variability, or examining additional MP elements such as constraints on the inter-annual change in TCEY. This secondary set would not be a full factorial, but instead a specific investigation of relevant factors with the goal to refine the best performing MPs relative to stock and fishery objectives. Other tasks include developing performance metrics for other objectives, such as reducing discard mortality, or specifying and evaluating elements of the Harvest Strategy Policy (e.g. overfishing limit).

An important task for the MSE would be to tune the coastwide specifications to optimise a selected distribution procedure. At a minimum, that would include evaluating SPR values, but may also incorporate investigations of the control rule, size limits, assessment frequency, and

constraints on the inter-annual change in TCEY. Furthermore, the MSE may evaluate elements of distribution procedures for future incorporation by the Commission.

7 SCIENTIFIC ADVICE

7.1 Clarifying a target objective

Objective 2.1 could be phrased consistently as currently stated under measurable objective to reflect that the objective is met when the relative spawning biomass is above the target (Appendix B). This would mean editing the description under "General Objective" in Appendix B to "Maintain spawning biomass [above] a level that optimi[s]es fishing activities". The Commission may choose to "tune" the SPR value such that the relative spawning biomass is more often closer to the target, while accounting for other objectives.

7.2 Size limits

The removal of a size limit meets or optimises all of the primary objectives, resulting in a 3.7% increase, on average, in the short-term median coastwide TCEY and a 2.7% increase, on average, in the long-term median coastwide TCEY. A majority of that increase occurs when reducing the size limit for directed commercial fisheries to 26 inches. Furthermore, short-term and long-term yield in all IPHC Regulatory Areas increased. Reducing the size limit for the directed commercial fishery would replace some directed commercial landings of O32 Pacific halibut with U32 landings. The magnitude of U32 landings at any point in time is dependent on population characteristics such as incoming recruitment and size-at-age. Over the long term, the price for U32 landings would need to be at least 50% of that for O32 landings to maintain a higher value in the absence of a size limit. Without a size limit for the directed commercial fishery, short-term directed commercial fishery discard mortality would decline by, on average, 78% coastwide and between 67% to 88% across IPHC Regulatory Areas.

7.3 Multi-year Assessments

A biennial assessment frequency with an empirical rule using FISS observations in non-assessment years shows similar performance to an annual assessment. This occurs because the FISS index tracks closely with the stock assessment. A triennial assessment frequency with an empirical rule using FISS observations in non-assessment years shows a slight reduction in the long-term TCEY along with a significant reduction in short-term and long-term inter-annual variability in the TCEY. Costs associated with a triennial assessment using an empirical MP that adjusts the coastwide TCEY and distribution using FISS data include 1) lack of detailed management information (e.g. estimates of SPR, stock status) every year, 2) possibly a loss in long-term yield, and 3) a chance of a smaller stock size. Benefits include 1) reduced inter-annual variability in the TCEY, 2) multi-year stability and short-term predictability of the TCEY, 3) use of the annual FISS index in a transparent process, 4) more focused assessment research, 5) potential of additional time for collaboration within the Secretariat, 6) consistency with the three-year cycle of update and full assessments, and 7) following the precedent of other fisheries commissions.

7.4 Uncertainties not included in these MSE simulations

Relevant uncertainty was captured with the use of four OMs and five distribution procedures. However, it is unknown if the range of the five distribution procedures captures the future distribution procedures that are used. An extreme departure from the five distribution incorporated here may have an unexpected outcome on the results.

7.5 Next Steps

An important task for the MSE would be to tune the coastwide specifications to optimise a selected distribution procedure, or further define the range of potential distribution procedures. At a minimum, that would include evaluating SPR values, but may also incorporate investigations of the control rule, size limits, assessment frequency, and constraints on the inter-annual change in TCEY. Updating the Harvest Strategy Policy document would be useful to identify areas that are complete and items that need additional work, which may be informed by further MSE work.

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APPENDICES

Appendix A: Primary objectives defined by the Commission for the MSE

Appendix B: Results using metrics associated with the primary objectives

Appendix C: Supplementary material

APPENDIX B
OBJECTIVES USED BY THE COMMISSION FOR THE MSE

Table A1. Objectives, evaluated over a simulated ten-year period, reviewed by the Commission at the 7th Special Session of the Commission (SS07). Objective 1.1 is a biological sustainability (conservation) objective and objectives 2.1, 2.2, and 2.3 are fishery objectives.

GENERAL OBJECTIVE	MEASURABLE OBJECTIVE	MEASURABLE OUTCOME	TIME-FRAME	TOLERANCE	PERFORMANCE METRIC
1.1. KEEP FEMALE SPAWNING BIOMASS ABOVE A LIMIT TO AVOID CRITICAL STOCK SIZES AND CONSERVE SPATIAL POPULATION STRUCTURE	Maintain a female spawning stock biomass above a biomass limit reference point at least 95% of the time	*SB* < Spawning Biomass Limit (SB_{Lim}) SB_{Lim}=20% unfished spawning biomass	Long-term	0.05	$P(SB < SB_{Lim})$
	Maintain a defined minimum proportion of female spawning biomass in each Biological Region	$p_{SB,2} > 5\%$ $p_{SB,3} > 33\%$ $p_{SB,4} > 10\%$ $p_{SB,4B} > 2\%$	Long-term	0.05	$P(p_{SB,R} < p_{SB,R,min})$
2.1 MAINTAIN SPAWNING BIOMASS AROUND A LEVEL THAT OPTIMIZES FISHING ACTIVITIES	Maintain the coastwide female spawning biomass above a biomass target reference point at least 50% of the time	*SB*<Spawning Biomass Target (SB_{Targ}) SB_{Targ}=36% unfished spawning biomass	Long-term	0.50	$P(SB < SB_{Targ})$
2.2. LIMIT VARIABILITY IN MORTALITY LIMITS	Limit annual changes in the coastwide TCEY	Annual Change (*AC*) > 15% in any 3 years	Short-term		$P(AC_3 > 15\%)$
		Median coastwide Average Annual Variability (AAV)	Short-term		*Median AAV*
	Limit annual changes in the Regulatory Area TCEY	Annual Change (*AC*) > 15% in any 3 years	Short-term		$P(AC_3 > 15\%)$
		Average AAV by Regulatory Area (AAV_A)	Short-term		*Median* AAV_A
2.3. PROVIDE DIRECTED FISHING YIELD	Optimize average coastwide TCEY	Median coastwide TCEY	Short-term		*Median* $\overline{TCEY}$
	Optimize TCEY among Regulatory Areas	Median $TCEY_A$	Short-term		*Median* $\overline{TCEY_A}$
	Optimize the percentage of the coastwide TCEY among Regulatory Areas	Median $\%TCEY_A$	Short-term		*Median* $\overline{\left(\frac{TCEY_A}{TCEY}\right)}$
	Maintain a minimum TCEY for each Regulatory Area	Minimum $TCEY_A$	Short-term		*Median Min(TCEY)*
	Maintain a percentage of the coastwide TCEY for each Regulatory Area	Minimum $\%TCEY_A$	Short-term		*Median Min(%TCEY)*

APPENDIX C
RESULTS USING METRICS ASSOCIATED WITH THE PRIMARY OBJECTIVES

Table B1. Short-term metrics associated with primary objectives for simulations (1,100 replicates) with simulated estimation error, decision-making variability option 1, and SPR=43%.

	MP	MP-A0	MP-A26	MP-A32	MP-Bb	MP-Tb
Short-term	**Biological Sustainability**					
	P(any RSB_y<20%)	0.005	0.005	0.005	0.005	0.005
	Fishery Sustainability					
	P(all RSB<36%)	0.369	0.372	0.376	0.411	0.403
	Median average TCEY	60.46	59.92	58.33	58.46	58.32
	Median average TCEY-2A	1.63	1.63	1.62	1.60	1.60
	Median average TCEY-2B	8.86	8.82	8.52	8.36	8.43
	Median average TCEY-2C	6.66	6.60	6.33	6.39	6.35
	Median average TCEY-3A	24.29	24.04	23.24	23.38	23.39
	Median average TCEY-3B	7.42	7.36	7.13	7.09	7.17
	Median average TCEY-4A	3.52	3.48	3.35	3.39	3.41
	Median average TCEY-4CDE	4.06	4.04	3.92	3.94	3.91
	Median average TCEY-4B	2.86	2.82	2.70	2.71	2.72
	P(any3 change TCEY > 15%)	0.880	0.894	0.906	0.809	0.628
	P(any3 change TCEY 2A > 15%)	0.254	0.252	0.264	0.357	0.288
	P(any3 change TCEY 2B > 15%)	0.644	0.639	0.679	0.639	0.432
	P(any3 change TCEY 2C > 15%)	0.696	0.711	0.722	0.641	0.434
	P(any3 change TCEY 3A > 15%)	0.738	0.750	0.757	0.669	0.447
	P(any3 change TCEY 3B > 15%)	0.756	0.759	0.777	0.751	0.526
	P(any3 change TCEY 4A > 15%)	0.782	0.778	0.804	0.723	0.496
	P(any3 change TCEY 4CDE > 15%)	0.514	0.527	0.524	0.430	0.241
	P(any3 change TCEY 4B > 15%)	0.771	0.753	0.781	0.709	0.442
	Median AAV TCEY	17.2%	17.5%	17.8%	17.0%	14.1%
	Median AAV TCEY 2A	2.5%	2.6%	2.7%	4.3%	1.9%
	Median AAV TCEY 2B	16.6%	17.0%	17.4%	18.4%	15.2%
	Median AAV TCEY 2C	17.8%	17.8%	18.2%	18.2%	15.0%
	Median AAV TCEY 3A	18.9%	19.1%	19.4%	19.0%	15.3%
	Median AAV TCEY 3B	19.9%	20.2%	20.7%	20.2%	16.1%
	Median AAV TCEY 4A	20.0%	20.1%	20.5%	20.8%	16.7%
	Median AAV TCEY 4CDE	15.0%	15.1%	14.9%	14.1%	11.7%
	Median AAV TCEY 4B	20.0%	19.8%	20.3%	20.5%	15.9%

Table B2. Long-term metrics associated with primary objectives for simulations with simulated estimation error, decision-making variability option 1, and an SPR of 43%.

	MP	MP-A0	MP-A26	MP-A32	MP-Bb	MP-Tb
Long-term	**Biological Sustainability**					
	P(any RSB_y<20%)	<0.001	<0.001	<0.001	<0.001	<0.001
	Fishery Sustainability					
	P(all RSB<36%)	0.174	0.174	0.180	0.164	0.197
	Median average TCEY	63.88	63.53	62.21	61.26	62.95
	Median average TCEY-2A	1.63	1.63	1.62	1.61	1.61
	Median average TCEY-2B	9.32	9.21	9.09	8.83	8.97
	Median average TCEY-2C	7.11	7.07	6.97	6.80	6.93
	Median average TCEY-3A	26.10	26.08	25.69	25.43	26.08
	Median average TCEY-3B	8.00	8.03	7.83	7.81	7.99
	Median average TCEY-4A	3.04	3.02	2.92	2.94	2.94
	Median average TCEY-4CDE	3.46	3.40	3.32	3.44	3.46
	Median average TCEY-4B	2.85	2.82	2.70	2.69	2.66
	P(any3 change TCEY > 15%)	0.855	0.852	0.852	0.781	0.515
	P(any3 change TCEY 2A > 15%)	0.226	0.232	0.245	0.340	0.249
	P(any3 change TCEY 2B > 15%)	0.630	0.637	0.637	0.617	0.385
	P(any3 change TCEY 2C > 15%)	0.693	0.704	0.711	0.636	0.281
	P(any3 change TCEY 3A > 15%)	0.720	0.720	0.715	0.631	0.343
	P(any3 change TCEY 3B > 15%)	0.778	0.778	0.784	0.689	0.423
	P(any3 change TCEY 4A > 15%)	0.785	0.788	0.820	0.766	0.500
	P(any3 change TCEY 4CDE > 15%)	0.484	0.464	0.452	0.390	0.218
	P(any3 change TCEY 4B > 15%)	0.776	0.766	0.776	0.760	0.507
	Median AAV TCEY	15.9%	16.1%	16.3%	15.7%	11.9%
	Median AAV TCEY 2A	1.5%	1.5%	1.6%	1.9%	1.3%
	Median AAV TCEY 2B	15.8%	15.8%	16.1%	17.7%	13.7%
	Median AAV TCEY 2C	16.7%	16.9%	17.0%	17.4%	13.1%
	Median AAV TCEY 3A	16.8%	16.9%	17.2%	17.5%	13.4%
	Median AAV TCEY 3B	18.4%	18.0%	18.5%	18.7%	14.6%
	Median AAV TCEY 4A	18.5%	18.7%	19.2%	19.6%	15.3%
	Median AAV TCEY 4CDE	13.6%	13.6%	13.5%	13.0%	9.0%
	Median AAV TCEY 4B	18.3%	18.3%	18.6%	19.3%	15.7%

APPENDIX D
SUPPLEMENTARY MATERIAL

In addition to this document, an MSE technical document is available electronically. This is document IPHC-2022-MSE-01 and is available on the IPHC MSE page (https://www.iphc.int/management/science-and-research/management-strategy-evaluation). Additional updates will be made as time allows.

The MSE Explorer will be updated as additional results are produced.

http://shiny.westus.cloudapp.azure.com/shiny/sample-apps/MSE-Explorer/

Results with 500 simulations, that examine a wider range of options and elements and were presented at MSAB017, are available at

http://shiny.westus.cloudapp.azure.com/shiny/sample-apps/IPHC-MSE-MSAB017/

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APPENDICES

Appendix A: Primary objectives defined by the Commission for the MSE

Appendix B: Results using metrics associated with the primary objectives

Appendix C: Supplementary material

APPENDIX A
PRIMARY OBJECTIVES DEFINED BY THE COMMISSION FOR THE MSE

Table A1. Primary objectives, evaluated over a simulated ten-year period, accepted by the Commission at the 7th Special Session of the Commission (SS07). Objective 1.1 is a biological sustainability (conservation) objective and objectives 2.1, 2.2, and 2.3 are fishery objectives.

GENERAL OBJECTIVE	MEASURABLE OBJECTIVE	MEASURABLE OUTCOME	TIME-FRAME	TOLERANCE	PERFORMANCE METRIC
1.1. KEEP FEMALE SPAWNING BIOMASS ABOVE A LIMIT TO AVOID CRITICAL STOCK SIZES AND CONSERVE SPATIAL POPULATION STRUCTURE	Maintain a female spawning stock biomass above a biomass limit reference point at least 95% of the time	*SB* < Spawning Biomass Limit (SB_{Lim}) SB_{Lim}=20% unfished spawning biomass	Long-term	0.05	$P(SB < SB_{Lim})$
	Maintain a defined minimum proportion of female spawning biomass in each Biological Region	$p_{SB,2} > 5\%$ $p_{SB,3} > 33\%$ $p_{SB,4} > 10\%$ $p_{SB,4B} > 2\%$	Long-term	0.05	$P(p_{SB,R} < p_{SB,R,min})$
2.1 MAINTAIN SPAWNING BIOMASS AROUND A LEVEL THAT OPTIMIZES FISHING ACTIVITIES	Maintain the coastwide female spawning biomass above a biomass target reference point at least 50% of the time	*SB*<Spawning Biomass Target (SB_{Targ}) SB_{Targ}=$SB_{36\%}$ unfished spawning biomass	Long-term	0.50	$P(SB < SB_{Targ})$
2.2. LIMIT VARIABILITY IN MORTALITY LIMITS	Limit annual changes in the coastwide TCEY	Annual Change (*AC*) > 15% in any 3 years	Short-term		$P(AC_3 > 15\%)$
		Median coastwide Average Annual Variability (AAV)	Short-term		*Median AAV*
	Limit annual changes in the Regulatory Area TCEY	Annual Change (*AC*) > 15% in any 3 years	Short-term		$P(AC_3 > 15\%)$
		Average AAV by Regulatory Area (AAV_A)	Short-term		*Median* AAV_A
2.3. PROVIDE DIRECTED FISHING YIELD	Optimize average coastwide TCEY	Median coastwide TCEY	Short-term		*Median* $\overline{TCEY}$
	Optimize TCEY among Regulatory Areas	Median $TCEY_A$	Short-term		*Median* $\overline{TCEY_A}$
	Optimize the percentage of the coastwide TCEY among Regulatory Areas	Median %$TCEY_A$	Short-term		*Median* $\overline{\left(\frac{TCEY_A}{TCEY}\right)}$
	Maintain a minimum TCEY for each Regulatory Area	Minimum $TCEY_A$	Short-term		*Median Min(TCEY)*
	Maintain a percentage of the coastwide TCEY for each Regulatory Area	Minimum %$TCEY_A$	Short-term		*Median Min(%TCEY)*

APPENDIX B
RESULTS USING METRICS ASSOCIATED WITH THE PRIMARY OBJECTIVES

Table B1. Short-term metrics associated with primary objectives for simulations with simulated estimation error, decision-making variability option 1, and an SPR of 43%.

	MP	MP-A	MP-A	MP-A	MP-Bb	MP-Tb
Short-term	**Biological Sustainability**					
	P(any RSB_y<20%)	<0.002	<0.002	<0.002	<0.002	<0.002
	Fishery Sustainability					
	P(all RSB<36%)	0.384	0.385	0.387	0.432	0.459
	Median average TCEY	60.08	59.8	58.15	58.46	58.38
	Median average TCEY-2A	1.63	1.63	1.63	1.61	1.61
	Median average TCEY-2B	9.09	9.03	8.75	8.59	8.74
	Median average TCEY-2C	6.79	6.77	6.47	6.42	6.47
	Median average TCEY-3A	24.41	24.14	23.26	23.19	23.48
	Median average TCEY-3B	7.48	7.45	7.17	7.09	7.38
	Median average TCEY-4A	3.63	3.6	3.43	3.49	3.59
	Median average TCEY-4CDE	4.25	4.22	4.04	4.04	4.02
	Median average TCEY-4B	2.95	2.89	2.79	2.73	2.78
	P(any3 change TCEY > 15%)	0.932	0.942	0.958	0.894	0.694
	P(any3 change TCEY 2A > 15%)	0.262	0.266	0.296	0.368	0.276
	P(any3 change TCEY 2B > 15%)	0.690	0.674	0.736	0.714	0.462
	P(any3 change TCEY 2C > 15%)	0.748	0.768	0.780	0.740	0.432
	P(any3 change TCEY 3A > 15%)	0.758	0.780	0.786	0.752	0.502
	P(any3 change TCEY 3B > 15%)	0.758	0.778	0.790	0.802	0.534
	P(any3 change TCEY 4A > 15%)	0.854	0.834	0.870	0.742	0.538
	P(any3 change TCEY 4CDE > 15%)	0.612	0.624	0.616	0.514	0.288
	P(any3 change TCEY 4B > 15%)	0.834	0.826	0.858	0.760	0.500
	Median AAV TCEY	18.0%	18.2%	18.5%	19.0%	14.2%
	Median AAV TCEY 2A	2.3%	2.3%	2.5%	3.1%	1.6%
	Median AAV TCEY 2B	16.8%	17.5%	18.1%	20.9%	15.3%
	Median AAV TCEY 2C	18.4%	18.7%	19.2%	20.2%	14.9%
	Median AAV TCEY 3A	19.9%	20.1%	20.3%	21.3%	15.1%
	Median AAV TCEY 3B	20.8%	21.5%	21.6%	23.4%	15.7%
	Median AAV TCEY 4A	21.5%	21.6%	22.5%	22.9%	16.3%
	Median AAV TCEY 4B	21.9%	21.8%	22.5%	23.0%	16.2%
	Median AAV TCEY 4CDE	15.7%	16.0%	15.9%	15.6%	12.7%

Table B2. Long-term metrics associated with primary objectives for simulations with simulated estimation error, decision-making variability option 1, and an SPR of 43%.

	MP	MP-A	MP-A	MP-A	MP-Bb	MP-Tb
Long-term	**Biological Sustainability**					
	P(any RSB_y<20%)	<0.002	<0.002	<0.002	<0.002	<0.002
	Fishery Sustainability					
	P(all RSB<36%)	0.143	0.143	0.148	0.156	0.225
	Median average TCEY	73.43	72.73	72.08	73.76	71.51
	Median average TCEY-2A	1.64	1.63	1.63	1.62	1.62
	Median average TCEY-2B	10.10	9.94	9.78	9.64	9.63
	Median average TCEY-2C	7.66	7.64	7.51	7.49	7.51
	Median average TCEY-3A	30.43	30.47	30.16	30.44	29.51
	Median average TCEY-3B	9.02	9.16	8.99	9.01	9.05
	Median average TCEY-4A	3.50	3.48	3.37	3.33	3.31
	Median average TCEY-4CDE	3.75	3.69	3.60	3.74	3.78
	Median average TCEY-4B	3.03	3.00	2.91	2.89	2.85
	P(any3 change TCEY > 15%)	0.890	0.888	0.888	0.798	0.464
	P(any3 change TCEY 2A > 15%)	0.222	0.244	0.252	0.334	0.202
	P(any3 change TCEY 2B > 15%)	0.684	0.692	0.680	0.610	0.328
	P(any3 change TCEY 2C > 15%)	0.712	0.734	0.734	0.626	0.188
	P(any3 change TCEY 3A > 15%)	0.708	0.722	0.712	0.596	0.328
	P(any3 change TCEY 3B > 15%)	0.772	0.772	0.780	0.724	0.378
	P(any3 change TCEY 4A > 15%)	0.844	0.838	0.870	0.776	0.498
	P(any3 change TCEY 4CDE > 15%)	0.534	0.530	0.504	0.400	0.236
	P(any3 change TCEY 4B > 15%)	0.832	0.806	0.816	0.744	0.450
	Median AAV TCEY	15.7%	15.9%	16.3%	15.3%	10.4%
	Median AAV TCEY 2A	1.5%	1.6%	1.6%	1.9%	1.1%
	Median AAV TCEY 2B	15.5%	15.6%	16.0%	17.0%	11.7%
	Median AAV TCEY 2C	16.1%	16.5%	16.5%	17.4%	11.5%
	Median AAV TCEY 3A	16.6%	16.6%	17.0%	17.1%	11.8%
	Median AAV TCEY 3B	17.9%	17.5%	18.1%	18.0%	13.2%
	Median AAV TCEY 4A	18.8%	19.0%	19.6%	19.5%	14.1%
	Median AAV TCEY 4B	18.4%	18.5%	18.8%	19.1%	14.5%
	Median AAV TCEY 4CDE	14.1%	14.4%	14.1%	13.4%	9.3%

APPENDIX C
SUPPLEMENTARY MATERIAL

In addition to this document, an MSE technical document is available electronically. This is document IPHC-2022-MSE-01 and is available on the IPHC MSE page (https://www.iphc.int/management/science-and-research/management-strategy-evaluation). Additional updates will be made as time allows.

The MSE Explorer will be updated as additional results are produced.

http://shiny.westus.cloudapp.azure.com/shiny/sample-apps/MSE-Explorer/

IPHC Fishery Regulations: Proposals for the 2022-23 process

PREPARED BY: IPHC SECRETARIAT (B. HUTNICZAK; 28 OCTOBER 2022)

PURPOSE

To provide the Commission with an indication of the IPHC Fishery Regulations proposals that the IPHC Secretariat, Contracting Parties, and other stakeholders have submitted or indicated they expect to submit for consideration by the Commission in the 2022-23 process.

BACKGROUND

Recalling the IPHC Fishery Regulations proposals submission and review process instituted in 2017, this paper is intended to provide an indication of the fishery regulations proposals being submitted to the Commission in the 2022-23 process.

Fishery regulations proposals from the Contracting Parties and other stakeholders are typically received later in the process, although proposals submitted ahead of the IM098 deadline are included in the full form. Proposals deferred in the 2021-2022 process are included by default unless withdrawn.

***Note: DEADLINES**: The dates for submission of regulatory proposals for consideration by the Commission in the 2022-23 process are as follows:*

1) *98th Session of the IPHC Interim Meeting (IM098) is **31 October 2022***
2) *99th Session of the IPHC Annual Meeting (AM099) is **24 December 2022***

DISCUSSION

A listing of the preliminary titles, subjects, and sponsors for IPHC Fishery Regulations proposals expected to be considered as part of the 2022-23 process is provided at **Appendix I**.

RECOMMENDATION

That the Commission:

1) **NOTE** paper IPHC-2022-IM098-14, which provides the Commission with an indication of the IPHC Fishery Regulations proposals that the IPHC Secretariat, Contracting Parties, and other stakeholders have submitted or indicated they expect to submit for consideration by the Commission in the 2022-23 process.

APPENDICES

Appendix I: Preliminary titles, subjects, and sponsors for IPHC Fishery Regulations proposals for consideration in the 2022-23 process.

APPENDIX I

Preliminary titles, subjects, and sponsors for IPHC Fishery Regulations proposals for consideration in the 2022-23 process.

Ref. No.	Title	Brief description
IPHC Secretariat		
IPHC-2022-IM098-PropA1	Mortality and Fishery Limits (Sect. 5)	To provide clear documentation of mortality and fishery limits within the IPHC Fishery Regulations: Mortality and Fishery Limits (Sect. 5). *Mortality and fishery limits tables will be filled when the Commission adopts TCEYs for the individual IPHC Regulatory Areas.*
IPHC-2022-IM098-PropA2	Commercial Fishing Periods (Sect. 9)	To specify fishing periods for the directed commercial Pacific halibut fisheries within the IPHC Fishery Regulations: Commercial Fishing Periods (Sect. 9).
IPHC-2022-IM098-PropA3	Fishing Period Limits (Sect 14) & Licensing Vessels for IPHC Regulatory Area 2A (Sect. 15) – Accommodation of the transition of management in the IPHC Regulatory Area 2A	To accommodate the transition of management in the IPHC Regulatory Area 2A from the IPHC to the PFMC and NOAA Fisheries (Sect. 14 & 15). *See more details in IPHC-2022-IM098-04 and IPHC-2022-IM098-INF03. This proposal will also have implications for sections the IPHC Fishery Regulations other than Sect. 14 & 15.*
IPHC-2022-IM098-PropA4	IPHC Fishery Regulations: minor amendments	To improve clarity and consistency in the IPHC Fishery Regulations.
Contracting Parties		
IPHC-2022-IM098-PropB1	Recreational (Sport) Fishing for Pacific Halibut – IPHC Regulatory Areas 2C, 3A, 3B, 4A, 4B, 4C, 4D, 4E (Sect. 29) - Charter Management Measures in IPHC Regulatory Areas 2C and 3A	**Proponent**: USA (NOAA Fisheries) To provide charter management measures reflective of fishery limits for the recreational fisheries in IPHC Regulatory Areas 2C and 3A.
IPHC-2022-IM098-PropB2	Recreational (Sport) Fishing for Pacific Halibut - IPHC Regulatory Area 2B (Sect. 28) - Daily bag limit in IPHC Regulatory Area 2B	**Proponent**: Canada (Fisheries and Oceans Canada); submitted 28 October 2022 To propose the daily bag limit of up to three fish per day per person in the recreational fishery in IPHC Regulatory Area 2B.
IPHC-2022-IM098-PropB3	Recreational (Sport) Fishing for Pacific Halibut - IPHC Regulatory Areas 2C, 3A, 3B, 4A, 4B, 4C, 4D, 4E (Sect. 29) - Onboard consumption	**Proponent**: USA (NOAA Fisheries); submitted 25 October 2022 To propose adding flexibility to existing recreational (sport) Pacific halibut fishing regulations in Alaska Regulatory Areas and allow limited consumption of recreationally-caught Pacific halibut on board charter vessels and pleasure craft, while retaining existing regulations that provide effective enforcement of daily bag limits and possession limits.

Stakeholders		
IPHC-2022-IM098-PropC1 Rev_1	Recreational (Sport) Fishing for Pacific Halibut - IPHC Regulatory Areas 2C, 3A, 3B, 4A, 4B, 4C, 4D, 4E (Sect. 29) - Processing Pacific halibut for eating and preservation	**Proponent**: John Fields, recreational fisherman (submitted 30 August 2022; revision submitted 6 October 2022) To propose an exception that allows recreational fishermen in Alaska Regulatory Areas who do not return to port each day to process Pacific halibut for eating and/or preservation, subject to measures to facilitate enforcement of the applicable daily bag limits (Proposal No. 1); or exclude preserved and consumed on board fish from applicable possession limits (Proposal No. 2); or create a narrow exception that allows for limited processing of a single fish per day for consumption only (Proposal No. 3). *Proposal No. 1 was deferred by the Commission at the AM098 (IPHC-2022-AM098-R, para. 84).*
IPHC-2022-IM098-PropC2	Mortality and Fishery Limits (Sect. 5) - TCEY floor in IPHC Regulatory Area 2A	**Proponent**: Patrick DePoe, Makah Tribe (submitted 28 October 2022) To propose a constant TCEY floor in IPHC Regulatory Area 2A.

IPHC Rules of Procedure – Draft amendments

PREPARED BY: IPHC SECRETARIAT (D. WILSON & A. HICKS, 25 OCTOBER 2022)

PURPOSE

To provide the Commission with proposed amendments to the current IPHC Rules of Procedure (2022).

BACKGROUND AND DISCUSSION

In accordance with Rule 19, paragraph 1 of the IPHC Rules of Procedure (2022), which states:

> "1. *These Rules of Procedure should be reviewed for their consistency and appropriateness at least biennially*.",

Rule 6 – Sessions of the Commission

Sessions of the Commission are currently defined as a Regular Session or a Special Session, both of which have specific operating rules and an order of business as defined in Rule 8, unless specified otherwise.

Over the past years, the IPHC Secretariat has also held a number of informal 'Information Sessions' for the Commission. An informational session for the Commission or subsidiary bodies may be useful at certain times, such as the annual Stock Assessment information session held in November of each year prior to the formal Interim Meeting; or the informal Management Strategy Evaluation (MSE) information session held on 19 May 2022 to help MSAB members prepare for MSAB017 given that they had not met as a subsidiary body since early 2020.

At present, there are no specific rules or agreed processes for information sessions. Thus, at the request of the Chairperson of the Commission, we propose to include a definition for Informational Session in Rule 6 of the IPHC Rules of Procedure, and associated deadline for announcements, papers and presentations, as follows:

Informational Session

11bis. The Chairperson and Vice-Chairperson of the Commission may call for an informational session at any time.

12bis. An Informational Session will not be announced via the IPHC website, but will be announced electronically to specific invitees.

12bis. A report is not required from an Informational Session, unless agreed by the Chairperson and Vice-Chairperson at the time the Session was requested.

13bis. Invitations to an Informational Session shall be issued not less than 15 days in advance of the date fixed for the opening of the Information Session, unless otherwise agreed by the Chairperson and Vice-Chairperson, and may be exclusive to specific subsidiary bodies or invitees.

14bis. Any documents to be discussed and presentations to be given at an Informational Session of the Commission should aim to be provided to invitees **10 days** before the date fixed for the opening of the Special Session, unless otherwise decided by the Chairperson and Vice-Commission in consultation with the Secretariat.

15bis. The procedure of an Informational Session established in accordance with paragraph Rule 6, para 11 shall be governed *mutatis mutandis* by the Rules of Procedure of the Commission.

Challenges: The Commission should be aware that there may be challenges meeting deadlines for some information sessions, such as the Stock Assessment information session in late November each year. The above wording should be carefully considered before adoption.

Rule 8 – Order of Business

For the last two (2) years, the IPHC Secretariat has been publishing all presentations for the Commission and its subsidiary bodies no later than 10 days prior to the commencement of the relevant meeting. This was at the request of Commissioners during the 2019 Work Meeting. This has worked well for both the Secretariat, Commission, and interested stakeholders. We propose to formalise this current voluntary deadline into Rule 8 – Order of Business as follows:

Working documents/papers

4. Any documents to be discussed at a Session of the Commission shall be submitted to the Executive Director no less than **30 days** before the date fixed for the opening of the Session, unless otherwise decided by the Commission. Documents received later than 30 days in advance of the Session shall be deemed as Information Papers only.

4bis. Any presentations to be given at a Session of the Commission shall be submitted to the Executive Director no less than **10 days** before the date fixed for the opening of the Session, unless otherwise decided by the Commission.

Rule 14 – Subsidiary Bodies

On 19 May 2022 the IPHC Secretariat held an informal Management Strategy Evaluation (MSE) information session (from 1-4 pm PST) for the MSAB and other interested stakeholders. The purpose of this information session was to present an update on progress of the MSE work and provide information to MSAB members that may help them prepare for MSAB017, a Regular Session of the MSAB, in October 2022.

Therefore, the presentation was finalised the day before to reflect the work that was done immediately up to that meeting. As there were no outcomes being sought from the information session, more weight was placed on ensuring the presentation was up-to-date with all activities. Thus, the powerpoint was provided the morning of for members to follow and have for future reference.

The only document of relevance, was that published for the Scientific Review Board (SRB) on 13 May 2022, which was provided to the MSAB on the same day it was published for the SRB. A useful document and associated ppt was provided at that time via a link to the MSE paper for the SRB, which was available on the SRB020 meeting website (IPHC-2022-SRB020-06).

https://www.iphc.int/venues/details/20th-session-of-the-iphc-scientific-review-board-srb020' which was published on 12 May 2022, 7 days before the informal MSE information session.

Subsequent to the information Session, the Chair of the Commission requested we draft an addition to IPHC Rules of Procedure to add a document and presentation deadline for informal information sessions. To accommodate this request, the following text could be added:

Rule 14 – Subsidiary Bodies

2bis. All informal informational sessions for subsidiary bodies shall operate under the Rules of Procedure for Informational Sessions of the Commission (Rule 6, paras. 11bis-15bis) *mutatis mutandis*, and Rule 8, para 4bis.

Appendix V - Management Strategy Advisory Board (MSAB) – Terms of Reference and Rules of Procedure

Subsequent to the 98th Session of the IPHC Annual Meeting (AM098), the Commission met intersessionally to consider both the MSE Program of Work, as well as the Commission's annual budget which includes the activities of the MSAB. In doing so, the Commission decided via intersessional decision IPHC-2022-ID001 (IPHC-2022-CR-007) as follows:

> *"IPHC-2022-ID001: The Commission:*
>
> *d) AGREED that it would like at least one in-person/hybrid MSAB meeting in 2023. This could occur in mid-2023 or in the standard October time slot (October 2023). In doing so, the MSAB membership may need to be reviewed and travel expenses for non-government members capped."*

As part of the intersessional decision process the Commission also advised of its intention to revisit the MSAB membership/representation as specified in the IPHC Rules of Procedure, and that the two Contracting Parties would be discussing internally with their delegations ways to 'rationalise' the membership and representation. The Commission's stated goal is to reduce meeting costs (travel) for non-government members, noting that government employees are required to pay for their own meeting attendance. The Commission will provide feedback on the internal discussions described above and provide direction to the Secretariat on how it would like to procced.

At present, the cost of an in-person MSAB meeting is budgeted at **~US$40,000**. However, the precise cost for the 1st in-person MSAB meeting post-COVID-19 is likely to be higher due to airline costs. The costs are estimated as follows for 29 Board members for a 4-day MSAB meeting:

- Travel (flights, car) for non-Government members: $15,000
- Catering (lunches and function): US$2,500
- Per diem: Lodging (US$232/day) for non-Government members x 20: $18,560
- Per diem: Meals and Incidentals: (US$79/day – lunches and 1 x dinner provided) for non-Government members x 20: $4,000

The Commission has also directed the IPHC Secretariat to '*provide the Commission with potential governance reforms for the MSAB, via a working paper for the WM2022 which details the current membership, Terms of Reference and Rules of Procedure for the MSAB*.'

Provided at Appendix I are the current Terms of Reference and Rules of Procedure for the MSAB. Potential governance reforms are suggested in tracked-changes.

The MSAB017 considered potential updates to the Rules of Procedure and provided the following advice for the Commission's consideration. Where feasible, suitable edits have been accommodated in Appendix I.

*(para. 11) The MSAB **NOTED** the Commission, as part of its intersessional decision process, had agreed to revisit the MSAB membership/representation as specified in the IPHC Rules of Procedure, and that the two Contracting Parties would be discussing internally with their delegations, ways to 'rationalise' the membership and representation. The Commission's stated goal is to reduce meeting costs (travel) for non-government members, noting that government employees are required to pay for their own meeting attendance. The Commission will provide feedback on the internal discussions described above and provide direction to the Secretariat on how it would like to procced.*

*(para. 12) **NOTING** the proposed amendments to the MSAB Terms of Reference and Rules of Procedure, the MSAB **REQUESTED** the Commission note the following comments:*

a. Membership continuity through various aspects of the Program of Work is desirable;

b. Term limits should be staggered, wherever feasible, to facilitate continuity within the Board;

c. Continuity would be well served by first term limits remaining at four (4) years, with subsequent terms at two (2) years, and without a limit on the number of terms that could be served by an individual board member. Some members expressed that term renewal limits were not supported as they would likely undercut consistency, member expertise, and contributions to the MSE process;

d. Should the Commission decide to limit the number of terms a member may serve, it should consider more than two (2) terms as a limit;

e. Should the number of term limits be implemented, the Commission is requested to clarify how current members would be impacted, noting some have been on the board for greater than 10-13 years.

*(para. 13) The MSAB **NOTED** the removal of "environmental conditions" in para. 2c) and **AGREED** that retention of that phrase would be within the mandate of the MSAB.*

*(para. 14) The MSAB **NOTED** the proposed rationalisation of MSAB member numbers/seats that have been vacant for a number of years, and that some MSAB members preferred not to reduce total membership numbers/seats. Others felt that some reduction could be possible, at the Commission's discretion. The current equity in membership seats between Contracting Parties and representation across a range of interests, as well as the importance of maintaining those, was seen as important.*

*(para. 15) **NOTING** well defined opportunities for observers and the general public to participate in meetings of the Commission and subsidiary bodies (Rule 12, IPHC Rules of Procedure 2022), the MSAB **AGREED** that a possible method to support continuity is to allow for alternate members.*

*(para. 16) The MSAB **AGREED** that if necessary, a limit could be placed on the number of in-person attendees at each meeting that are paid for by the Commission. This could be*

supported by a hybrid meeting format whereby a portion of the membership attends in-person and another portion via electronic means.

*(para. 17) The MSAB **REQUESTED** the following minor amendments to the MSAB Rules of Procedure be incorporated in the current update:*

a) Review terminology throughout and ensure consistency, e.g.: Fisheries vs fishery; Session vs meeting;

b) Para. 3: Change 'employees' to 'board members' at the end of para. 3;

c) Para. 7: Co-Chairpersons: no limit to the number of co-chairperson terms.

Membership (as of 25 Oct 2022): There are currently 29 seats on the Board, including 8 government seats.

Membership category	Member	Canada	U.S.A.	Current Term commencement	Current Term expiration
Commercial harvesters (6-8)					
1	Sporer, Chris	CDN Commercial		9-May-17	31-Dec-22
2	Hauknes, Robert	CDN Commercial		9-May-17	31-Dec-22
3	Grout, Angus	CDN Commercial		3-Dec-19	31-Dec-22
4	Vacant	CDN Commercial			Vacant
5	Odegaard, Per		USA Commercial	9-May-17	31-Dec-22
6	Falvey, Dan		USA Commercial	9-May-17	31-Dec-22
7	Johnson, James		USA Commercial	17-Apr-19	16-Apr-23
8	Vacant		USA Commercial		Vacant
Recreational/ Sport fisheries (2-4)					
1	Ashcroft, Chuck	CDN Sportfishing		17-Apr-19	16-Apr-23
2	Vacant	CDN Sportfishing			Vacant
3	Marking, Tom		USA Sportfishing (CA)	9-May-19	8-May-23
4	Braden, Forrest		USA sportfishing (AK)	17-Apr-19	16-Apr-23
Processors (2-4)					
1	Parker, Peggy	US/CDN Processing	US/CDN Processing	9-May-19	8-May-23
2	Mirau, Brad	CDN Processing		9-May-19	8-May-23
3	Vacant	CDN Processing			Vacant

Membership category	Member	Canada	U.S.A.	Current Term commencement	Current Term expiration
4	Vacant		USA Processing		Vacant
5	Drobnica, Angel		USA Processing	17-Apr-19	16-Apr-23
First Nations / Tribal / Agency appointments					
First Nations/ Tribal fisheries (2-4)					
1	Lane, Jim	CDN First Nations		9-May-17	31-Dec-22
2	Vacant	CDN First Nations			Vacant
3	Mazzone, Scott		USA Treaty Tribes	9-May-19	8-May-23
4	Peterson, Joseph		USA Treaty Tribes	7-May-20	31-Dec-22
Government Agencies (4-8)					
1	Keizer, Adam	DFO		9-May-19	8-May-23
2	Huang, Ann-Marie	CDN Science Advisor		10-May-18	31-Dec-22
3	Vacant	DFO			Vacant
4	Iverson, Kurt		NOAA-Fisheries	13-Oct-22	12-Oct-26
5	Hulson, Pete		USA Science Advisor	13-Jul-22	12-Jul-26
6	Hall, Heather		PFMC	17-Oct-22	16-Oct-26
7	Bush, Karla		NPFMC	25-Oct-21	24-Oct-23
8	Webster, Sarah		ADFG	24-Sep-19	31-Dec-22

RECOMMENDATION/S

That the Commission:

1) **NOTE** paper IPHC-2022-IM098-15 which proposed amendments to the current IPHC Rules of Procedure (2022) and suggest any further improvements.

APPENDICES

Appendix I: Management Strategy Advisory Board (MSAB) – Terms of Reference and Rules of Procedure (2022): Draft revisions as requested by the Commission.

Appendix I
Management Strategy Advisory Board (MSAB) – Terms of Reference and Rules of Procedure

(The MSAB shall operate under the Rules of Procedure of the Commission *mutatis mutandis*, except where specific provisions are laid down in the Convention or in these Rules of Procedure.)

I. Terms of reference

1. The Management Strategy Advisory Board (MSAB), on which individuals representing harvesters (commercial, sport, and subsistence), fisheries managers, processors, IPHC Secretariat, science advisors and other experts as required may be represented. The primary role of the MSAB is to advise the Commission on objectives, performance metrics, management procedures, and results arising from the Management Strategy Evaluation (MSE) process.

2. The MSAB will:

   a) recommend clear measurable objectives and performance metrics for the fisheries;

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

   c) advise the IPHC Secretariat about plausible fisheries-related scenarios for investigation, which include aspects of the fisheries that cannot be managed by the IPHC (e.g. environmental conditions and removals under the management authority of a domestic management agency or changes in fisheries dynamics);

   d) encourage and allow members to propose tentative or exploratory ideas without prejudice to future discussions;

   e) assist with interpreting results and identifying important trade-offs between management procedures;

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

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

   h)

II. Representation

3. The MSAB will include the following interests (in alphabetical order): harvesters (commercial, sport, and subsistence), fisheries managers, processors, science advisors and other experts as required may be represented, and be facilitated by the IPHC Secretariat. Upon request, the IPHC shall cover the travel costs, in accordance with IPHC travel policies, for non-State and non-Federal board members, to attend one (1) MSAB session each year.

    a) Harvesters: Commercial fisheries (6-8, max 4 from each Contracting Party)

    b) First Nations/Tribal fisheries (2-4, max 2 from each Contracting Party)

    c) Government agencies (incl. domestic management representatives and science advisors to each Contracting Party) (4-8; max of 4 from each Contracting Party)

    d) Processors (2-4; max of 2 from each Contracting Party)

    e) Recreational/Sport fisheries (2-4; max of 2 from each Contracting Party)

    Representation may not be distributed throughout IPHC Regulatory Areas, but may be a consideration when determining membership.

4. The term of MSAB members will be four (4) years, and members may serve [two (2)] additional terms of two (2) years, at the discretion of the IPHC.

III. Officers

5. The MSAB will be co-chaired, one from Canada and one from the United States of America. Co-Chairpersons will be appointed by the MSAB from its membership described in para. 3.

6. The Co-Chairpersons will:

    a) convene and adjourn meetings and preside over them, ensuring that meetings are conducted in an orderly, efficient, transparent, and respectful manner;

    b) assist in drafting the report during the meeting;

    c) present the MSAB's decisions, recommendations, and advice to the Commission;

d) promote interactive dialogue, and enable all perspectives to be heard within the constraints of the time available;

e) support bringing issues to closure by ensuring that there is clarity on the topics being discussed, a summation of the collective advice of MSAB, and acknowledgement of any outstanding issues or concerns; and

f) identify areas where there are conflicts and support processes through which those conflicts can be addressed.

7. The term of the Co-Chairpersons will be two (2) years, and they may serv additional terms at the discretion of the MSAB.

IV. Sessions of the MSAB

8. **Time and Place**: The MSAB meets at least once each year The MSAB may also meet at other times and places, or via electronic means, facilitated by the IPHC Secretariat to consider specific issues, to produce specific documents or other products, or for an update on progress from the IPHC Secretariat (e.g. an informational session).

9. **Agenda**: As per the Commission's Rules of Procedure.

V. Intersessional process and ad-hoc working groups

10. The MSAB may set up ad-hoc working groups to consider particular issues and report back to the MSAB.

VI. Reports and Records

11. A report shall be adopted at each Session of the MSAB.

12. The report shall embody the MSAB's recommendations, including, when requested, a statement of minority views.

13. A copy of the final report from each MSAB session shall be forwarded by the IPHC Executive Director to the Contracting Parties and to the Commissioners no later than **15 days** after the close of the Session.

14. All reports shall be available on the Commission's website.

FY2022 Independent auditing process

PREPARED BY: IPHC SECRETARIAT (D. WILSON, A. KEIKKALA; 25 OCTOBER 2022)

PURPOSE

To provide the Commission with the process for completion of the Independent External Auditors Report for FY2022, as per Regulation 14 of the IPHC Financial Regulations (2021).

> ***Regulation 14 – External Audit***
> "*1. The accounts of the Commission shall be audited annually by external auditors recommended by the FAC and appointed by the Commission. The Auditors shall be appointed for a term of three (3) years, and may be reappointed to multiple terms.*"

BACKGROUND

9 October 2022: The existing three (3) year contract with Moss Adams to undertake and complete annual Statement Audits for FY2020, FY2021, and FY2022, was reconfirmed for FY2022 through the signing of an Engagement Letter details the FY2022 professional services to be provide.

Included in the engagement letter are the Audit timings for FY2022:

> *"We expect to begin our audit on approximately October 31, 2022, ….. and issue our report no later than December 19, 2022."*

In accordance with paragraph 2, Regulation 14, of the IPHC Financial Regulations (2022) (shown below) the IPHC Secretariat commenced the provision of the initial Provided By Client (PBC) list of items to the independent external auditor (25 days after the end of the FY2022 fiscal year).

> (para. 2) "*The contents identified in the Auditors Provided By Client (PBC) list shall be submitted by the Executive Director to the Auditors appointed by the Commission not later than **sixty (60)** days after the end of a fiscal year.*"

12 October 2022: Moss Adams commenced their audit process.

19 December 2022: In accordance with paragraph 7, Regulation 14, of the IPHC Financial Regulations (2021) (shown below) the independent external auditors will provide the final report to the IPHC Secretariat on 19 December 2022 (80 days after the end of the FY2022 fiscal year, 10 days ahead of the deadline set-forth in the IPHC Financial Regulations, to ensure adequate review time).

> (para. 7) "*The Auditors shall prepare a report on the accounts certified, and shall discuss their report with the Executive Director prior to submission to the FAC and Commission. The Auditors shall submit their report to the Commission, via the FAC, no later than **90 days** following the end of the fiscal year to which the accounts relate."*

Next steps: As in previous years, the auditors will present their findings to the Commission via weblink in early 2023. The final auditors report will then be provided to the FAC099 in late January 2023 for final review, and the endorsement by the Commission at AM099.

The total expected costs for the Statement Audit (FY2022) is US$29,000.

RECOMMENDATIONS

That the Commission:

1) **NOTE** paper IPHC-2022-IM098-16 that provided the process for the independent external auditors report for FY2022, as per Regulation 14 of the IPHC Financial Regulations (2021).

APPENDICES

Nil.

FY2023 Budget – Update

PREPARED BY: IPHC SECRETARIAT (D. WILSON & A. KEIKKALA, 25 OCTOBER 2022)

PURPOSE

To provide the Commission with an update on the FY2023 budget (financial period: 1 October 2023 to 30 September 2023), including potential modifications based on the 2023 FISS sampling design.

BACKGROUND

In accordance with Rule 11, paragraphs 4-10 '*Intersessional decision-making*' of the IPHC Rules of Procedure (2022), the following intersessional Commission decision was announced via IPHC Circular 2022-007, to adopt the FY2023 budget (provided at Appendix I):

IPHC-2022-ID001: The Commission:

1) **NOTED** paper IPHC-2022-ID001 which provided revised budget estimates for FY2023 (1 October 2022 to 30 September 2023) for approval, noting the outcomes of the 12th Special Session of the Commission (SS012).

2) **ADOPTED** the FY2023 budget (1 October 2022 to 30 September 2023), as detailed in Appendix I [*of IPHC-2022-ID001*], including the Contracting Party contributions to the General Fund as follows:
    - Canada: Contribution to the General Fund: **US$900,407**
    - U.S.A.: Contribution to the General Fund: **US$4,157,760**

3) **NOTED** the extra-budgetary (IFCP Fund deficit and Headquarters lease/maintenance) contributions from each Contracting Party for FY2023 as follows:
    - Canada:
        - 50% Contribution to the IFCP Fund deficit (former staff pension plan): **US$127,848**
    - U.S.A.:
        - 50% Contribution to the IFCP Fund deficit (former staff pension plan): **US$127,848**
        - Contribution to the headquarters building lease and maintenance costs: **US$489,250**

DISCUSSION

FY2022 was the IPHC's second year implementing a Fund-based accounting system. As such, there were areas identified throughout the year where expense allocation to specific Funds was deemed appropriate and subsequently implemented. An example being salary & wages, and benefits, which are now allocated fully across funds on monthly schedule based on actual

Secretariat work schedules. This has brought a heightened level of accounting accuracy across our core programs and activities.

It is expected that further refinements to the FY2023 budget will be presented at the upcoming Finance and Administration Committee (FAC099) in January 2023. It should be noted that this will not result in an overall budget adjustment that would impact Contracting Party contributions for FY2023, but rather, will assist the Secretariat in better reporting our expenses.

Fund 40 - FISS: Noting that the budget for Fund 40 – FISS is tentative until the final 2023 design is agreed to, the Secretariat will be providing a revised FY2023 budget at the upcoming FAC099 in January 2023 for adoption.

Fund 40 - FISS does not receive funding from Contracting Party contributions, but rather has a goal of long-term revenue neutrality.

RECOMMENDATION/S

That the Commission **NOTE** paper IPHC-2022-IM098-17 which provided the Commission with an update on the FY2023 budget (financial period: 1 October 2022 to 30 September 2023), including potential modifications based on the 2023 FISS sampling design.

APPENDICES

Appendix I: FY2023 Financial Budget – Adopted 16 March 2022

APPENDIX I
FY2023 Financial budget – Adopted 16 March 2022

Account Number	Account Name	10 - General FY2023	20 - Research FY2023	30 - Statistics FY2023	10,20,30 - TOTAL FY2023	40 - FISS FY2023	10,20,30, 40 - TOTAL FY2023
Income							
40000	Contracting Party Contributions						
40000.01	Canada	$ -	$ -	$ -	$ 900,407.00	$ -	$ 900,407.00
40000.02	United States of America	$ -	$ -	$ -	$ 4,157,760.00	$ -	$ 4,157,760.00
	Total 40000 - Contracting Party Contributions	$ 2,953,585.20	$ 912,193.00	$ 1,192,388.80	**$ 5,058,167.00**	$ -	$ 5,058,167.00
40055	Headquarters (Lease & Maintenance)	$ 489,250.00	$ -	$ -	$ 489,250.00	$ -	$ 489,250.00
40060	Other Income	$ -	$ -	$ -	$ -	$ -	$ -
40100	Grants, Contracts & Agreements	$ -	$ 232,140.37	$ 664,458.64	$ 896,599.01	$ 34,289.00	$ 930,888.01
40200	Interest Income	$ -	$ -	$ -	$ -	$ -	$ -
40200.01	Bank Interest	$ 772.50	$ -	$ -	$ 772.50	$ -	$ 772.50
40200.02	CD Interest	$ -	$ -	$ -	$ -	$ -	$ -
	Total - Other Income	$ 490,022.50	$ 232,140.37	$ 664,458.64	**$ 1,386,621.51**	$ 34,289.00	$ 1,420,910.51
40850	Fish Sales						
40350.01	Fish Sales - Pacific Halibut	$ -	$ -	$ -	$ -	$ 4,886,450.04	$ 4,886,450.04
40350.02	Fish Sales - Byproduct	$ -	$ -	$ -	$ -	$ 60,564.00	$ 60,564.00
	Total 40350 - Fish Sales	$ -	$ -	$ -	$ -	$ 4,947,014.04	$ 4,947,014.04
	Total Income	$ 3,443,607.70	$ 1,144,333.37	$ 1,856,847.44	**$ 6,444,788.51**	$ 4,981,303.04	**$ 11,426,091.55**
Expense							
Personnel Expenses							
50000	Salaries & Wages	$ 1,857,345.50	$ 667,739.10	$ 1,269,265.54	$ 3,794,350.14	$ 1,056,809.36	$ 4,851,159.50
50100	Benefits	$ 652,394.56	$ 244,966.27	$ 461,888.94	$ 1,359,249.77	$ 289,124.08	$ 1,648,373.85
50100.09	Medical Reimbursement - Retiree	$ 93,263.37	$ -	$ -	$ 93,263.37	$ -	$ 93,263.37
50200	Training & Education	$ 36,050.00	$ 18,477.00	$ 21,630.00	$ 76,157.00	$ 56,238.00	$ 132,395.00
50800	Personnel Related Expenses	$ 5,665.00	$ -	$ 10,300.00	$ 15,965.00	$ 37,467.28	$ 53,432.28
50300.01	Scholarship Awards	$ 8,000.00	$ -	$ -	$ 8,000.00	$ -	$ 8,000.00
	Total Personnel Expenses	$ 2,652,718.43	$ 931,182.37	$ 1,763,084.48	**$ 5,346,985.28**	$ 1,439,638.72	$ 6,786,624.00
Operational Expenses							$ -
51000	Publications	$ 5,150.00	$ 7,500.00	$ 9,270.00	$ 21,920.00	$ -	$ 21,920.00
51100	Mailing and Shipping	$ 6,180.00	$ 7,000.00	$ 5,150.00	$ 18,330.00	$ 128,750.00	$ 147,080.00
51200	Travel	$ 90,700.00	$ 14,825.00	$ 20,600.00	$ 126,125.00	$ 121,041.48	$ 247,166.48
51300	Meeting and Conference Expenses	$ 121,500.00	$ -	$ -	$ 121,500.00	$ -	$ 121,500.00
51400	Technology	$ 139,050.00	$ -	$ 2,163.00	$ 141,213.00	$ -	$ 141,213.00
	Total Operational Expenses	$ 362,580.00	$ 29,325.00	$ 37,183.00	**$ 429,088.00**	$ 249,791.48	$ 678,879.48
Fees and Contract Expenses							
52000	Professional Fees	$ 226,600.00	$ -	$ 1,458.48	$ 228,058.48	$ -	$ 228,058.48
52200	Other Fees and Charges	$ 51,500.00	$ -	$ -	$ 51,500.00	$ 10,300.00	$ 61,800.00
52300	Leases and Contracts	$ 25,750.00	$ 39,019.00	$ 36,050.00	$ 100,819.00	$ 1,996,487.11	$ 2,097,306.11
54000	Communications	$ 30,900.00	$ -	$ 3,605.00	$ 34,505.00	$ 20,600.00	$ 55,105.00
	Total Fees and Contract Expenses	$ 334,750.00	$ 39,019.00	$ 41,113.48	**$ 414,882.48**	$ 2,027,387.11	$ 2,442,269.59
Facilities and Equipment Expenses							
53000	Equipment Expense	$ 20,600.00	$ -	$ 4,120.00	$ 24,720.00	$ 15,450.00	$ 40,170.00
53100	Supplies Expense	$ 25,750.00	$ 144,807.00	$ 2,678.00	$ 173,235.00	$ 772,500.00	$ 945,735.00
53200	Maintenance and Utilities	$ 113,300.00	$ -	$ 2,488.48	$ 115,788.48	$ 10,300.00	$ 126,088.48
53300	Facility Rentals	$ 463,500.00	$ -	$ 6,180.00	$ 469,680.00	$ 13,390.00	$ 483,070.00
	Total Facilities and Equipment Expenses	$ 623,150.00	$ 144,807.00	$ 15,466.48	**$ 783,423.48**	$ 811,640.00	$ 1,595,063.48
Other Expenses							
55000	Budget Contingency	$ -	$ -	$ -	$ -	$ -	$ -
	Total Other Expenses	$ -	$ -	$ -	$ -	$ -	$ -
	Total Expense	$ 3,973,198.43	$ 1,144,333.37	$ 1,856,847.44	$ 6,974,379.24	$ 4,528,457.31	$ 11,502,836.55
	FISS cost-recovery (10% overhead)	$ (452,845.73)	$ -	$ -	$ (452,845.73)	$ 452,845.73	$ -
	Net Income (Loss)	**($76,745.00)**	**$0.00**	**$0.00**	**($76,745.00)**	**$0.00**	**($76,745.00)**
	50 - Reserve (Fund transfer)	$ 76,745.00	$ -	$ -	76,745.00	$ -	$ 76,745.00
60 - IFCPF Deficit							
40050	IFC Pension						
40050.01	IFC Pension - Canada	$ 127,848.00	$ -	$ -	$ 127,848.00	$ -	$ 127,848.00
40050.02	IFC Pension - United States of America	$ 127,848.00	$ -	$ -	$ 127,848.00	$ -	$ 127,848.00
	Total 40050 - IFC Pension	**$ 255,696.00**	**$ -**	**$ -**	**$ 255,696.00**	**$ -**	**$ 255,696.00**

IPHC Fishery Regulations:

Mortality and Fishery Limits (Sect. 5)

PREPARED BY: IPHC SECRETARIAT (25 OCTOBER 2022)

PURPOSE

To provide clear documentation of mortality and fishery limits within the IPHC Fishery Regulations: Mortality and Fishery Limits (Sect. 5).

BACKGROUND

The Commission considers new and revised IPHC Fishery Regulations, including proposed changes to mortality and fishery limits, and makes changes as deemed necessary at each Annual Meeting. In the absence of changes being deemed necessary, the existing IPHC Fishery Regulations remain in effect.

In accordance with the IPHC Convention[1], the Contracting Parties may also implement fishery regulations that are more restrictive than those adopted by the IPHC.

This proposal is to amend IPHC Fishery Regulations Section 5, '*Mortality and Fishery Limits,'* to reflect Total Constant Exploitation Yield (TCEY) values adopted by the IPHC and the applicable fishery sector limits resulting from those TCEY values according to existing Contracting Party domestic catch sharing arrangements.

DISCUSSION

Changes to IPHC Fishery Regulations Section 5, '*Mortality and Fishery Limits,'* provide clear documentation of the limits for fishery sectors within defined Contracting Party domestic catch sharing arrangements, which are themselves tied to the mortality distribution (TCEY) decisions of the Commission. This section includes a table of the TCEY values adopted by the Commission for clarity, and to emphasize the role of the TCEY values as the basis for the subsequent setting of sector allocations through the operation of the Contracting Parties' existing catch sharing arrangements. Both the TCEY and the fishery sector allocation table will be populated as TCEY decisions are made for each IPHC Regulatory Area by the Commission during the 99th Session of the IPHC Annual Meeting (AM099) in January 2023.

Benefits/Drawbacks: The benefit is a clear identification of fishery limits resulting from Commission decisions on distributed mortality (TCEY) values for each IPHC Regulatory Area. The potential drawback is a misconception that the resulting catch sharing arrangements and associated fishery limits are within the Commission's mandate, when in fact they are the

[1] The Convention between Canada and the United States of America for the Preservation of the [Pacific] Halibut Fishery of the Northern Pacific Ocean and Bering Sea.

responsibility of the Contracting Parties. The intention is to reinforce that distinction by clarifying which decisions are made by the Commission.

Sectors Affected: This proposal affects all sectors of the Pacific halibut fishery.

Appendix A provides details on the suggested regulatory language.

ADDITIONAL DOCUMENTATION

None

RECOMMENDATIONS

That the Commission:

1) **NOTE** regulatory proposal IPHC-2022-IM098-PropA1, which provides the Commission with an opportunity to recall the format of the IPHC Fishery Regulations: *Mortality and Fishery Limits* (Sect. 5), to be populated at the 99th Session of the IPHC Annual Meeting (AM099) in January 2023.

APPENDICES

Appendix A: Suggested regulatory language

APPENDIX A

SUGGESTED REGULATORY LANGUAGE

5. Mortality and Fishery Limits

(1) The Commission has adopted the following distributed mortality (TCEY) values:

IPHC Regulatory Area	***Distributed mortality limits (TCEY) (net weight)***	
	Tonnes (t)	**Million Pounds (Mlb)**
Area 2A (California, Oregon, and Washington)		
Area 2B (British Columbia)		
Area 2C (southeastern Alaska)		
Area 3A (central Gulf of Alaska)		
Area 3B (western Gulf of Alaska)		
Area 4A (eastern Aleutians)		
Area 4B (central and western Aleutians)		
Areas 4CDE (Bering Sea)		
Total		

(2) The fishery limits resulting from the IPHC-adopted distributed mortality (TCEY) limits and the existing Contracting Party catch sharing arrangements are as follows, recognising that each Contracting Party may implement more restrictive limits:

IPHC Regulatory Area	***Fishery limits (net weight)***	
	Tonnes (t)	**Million Pounds (Mlb)**
Area 2A (California, Oregon, and Washington)		
Non-tribal directed commercial (south of Pt. Chehalis)		
Non-tribal incidental catch in salmon troll fishery		
Non-tribal incidental catch in sablefish fishery (north of Pt. Chehalis)		
Treaty Indian commercial		
Treaty Indian ceremonial and subsistence (year-round)		
Recreational – Washington		
Recreational – Oregon		
Recreational – California		
Area 2B (British Columbia) (combined commercial and recreational)		
Commercial fishery		
Recreational fishery		
Area 2C (southeastern Alaska) (combined commercial and guided recreational)		

Commercial fishery (includes XX Mlb landings and XX Mlb discard mortality)		
Guided recreational fishery (includes landings and discard mortality)		
Area 3A (central Gulf of Alaska) (combined commercial and guided recreational)		
Commercial fishery (includes XX Mlb landings and XX Mlb discard mortality)		
Guided recreational fishery (includes landings and discard mortality)		
Area 3B (western Gulf of Alaska)		
Area 4A (eastern Aleutians)		
Area 4B (central and western Aleutians)		
Areas 4CDE (Bering Sea)		
Area 4C (Pribilof Islands)		
Area 4D (northwestern Bering Sea)		
Area 4E (Bering Sea flats)		
Total		

* Allocations resulting from the IPHC Regulatory Area 2A Catch Share Plan are listed in *pounds*.

IPHC Fishery Regulations:

Commercial Fishing Periods (Sect. 9)

PREPARED BY: IPHC SECRETARIAT (25 OCTOBER 2022)

PURPOSE

To specify fishing periods for the directed commercial Pacific halibut fisheries within the IPHC Fishery Regulations: Commercial Fishing Periods (Sect. 9).

BACKGROUND

Each year, the International Pacific Halibut Commission (IPHC) selects fishing period dates for the directed commercial Pacific halibut fisheries in each of the IPHC Regulatory Areas. Historically, the first management measures implemented by the IPHC were to limit periods when fishing was allowed. Biological factors considered in the past when setting fishing period dates included migration and spawning considerations, neither of which is now used as a basis for determining fishing periods.

These dates have varied from year to year, and in recent years have allowed directed commercial fishing to begin sometime in March and end sometime in November or December for all IPHC Regulatory Areas with the exception of the IPHC Regulatory Area 2A.

DISCUSSION

The IPHC Secretariat proposes that the commercial fishing periods for all IPHC Regulatory Areas be set at AM099 following stakeholder input.

Moreover, should the transition of management authority of the IPHC Regulatory Area 2A non-tribal directed commercial Pacific halibut fishery from the IPHC to the Pacific Fishery Management Council (PFMC) and NOAA Fisheries be completed, the need for setting dates for the 2A derby fishery would no longer be an IPHC consideration and the dates would be set by the Contracting Party within the overall commercial fishing period dates. This will be consistent with the IPHC Convention[1], which states that the Contracting Parties may implement fishery regulations that are more restrictive than those adopted by the IPHC. In this case, Sect. 9(4) will be replaced with a subsection referring to regulations promulgated by NOAA Fisheries and published in the Federal Register.

More information on the transition of management in the IPHC Regulatory Area 2A can be found in IPHC-2022-IM098-04 and IPHC-2022-IM098-INF03. Final action by the PFMC on 2023 non-tribal directed commercial Pacific halibut fishery regulations for NOAA Fisheries implementation is scheduled for 3 November 2022 (see PFMC November 2022 briefing book).

Benefits/Drawbacks: This proposal clearly indicates that the decision on commercial fishing periods is within the Commission's mandate and the season dates can be changed annually.

[1] The Convention between Canada and the United States of America for the Preservation of the [Pacific] Halibut Fishery of the Northern Pacific Ocean and Bering Sea.

Moreover, it clarifies that more strict fishing periods can be implemented by the Contracting Party.

Sectors Affected: Commercial Pacific halibut fisheries in each IPHC Regulatory Area.

Appendix A provides details on the suggested regulatory language.

ADDITIONAL DOCUMENTATION

Appendix B includes a situation summary for the PFMC final action on the 2023 non-tribal directed commercial Pacific halibut fishery regulations for NOAA-Fisheries implementation.

RECOMMENDATIONS

That the Commission:

1) **NOTE** regulatory proposal IPHC-2022-IM098-PropA2, which provides the Commission with an opportunity to recall the format of the IPHC Pacific Halibut Fishery Regulations: *Commercial Fishing Periods* (Sect. 9), to be filled at the 99th Session of the IPHC Annual Meeting (AM099) in January 2023.

APPENDICES

Appendix A: Suggested regulatory language

Appendix B: Situation summary for the PFMC Final Action on the 2023 non-tribal directed commercial Pacific halibut fishery regulations.

APPENDIX A
SUGGESTED REGULATORY LANGUAGE

9. Commercial Fishing Periods

(1) The fishing periods for each IPHC Regulatory Area apply where the fishery limits specified in section 5 have not been taken.

(2) Unless the Commission specifies otherwise, commercial fishing for Pacific halibut in all IPHC Regulatory Areas may begin no earlier in the year than 1200 local time on ~~6 March~~DD MMMM.

(3) All commercial fishing for Pacific halibut in all IPHC Regulatory Areas shall cease for the year at 1200 local time on ~~7 December~~DD MMMM.

~~(4) The first fishing period in the IPHC Regulatory Area 2A non-tribal directed commercial fishery[2] shall begin at 0800 on the fourth Tuesday in June and terminate at 1800 local time on the subsequent Thursday, unless the Commission specifies otherwise. If the Commission determines that the fishery limit specified for IPHC Regulatory Area 2A in Section 5 has not been exceeded, it may announce a second fishing period of up to three fishing days to begin on Tuesday two weeks after the first period, and, if necessary, a third fishing period of up to three fishing days to begin on Tuesday four weeks after the first period.~~

(4) Regulations pertaining to the non-tribal directed commercial fishing periods in the IPHC Regulatory Area 2A will be promulgated by NOAA Fisheries and published in the Federal Register. This fishery will occur between the dates and times listed in paragraphs (2) and (3) of this Section.

(5) Notwithstanding paragraph (4) of this Section~~, and paragraph (6) of section 12~~, an incidental catch fishery[3] is authorized during the sablefish seasons in IPHC Regulatory Area 2A in accordance with regulations promulgated by NOAA Fisheries. This fishery will occur between the dates and times listed in paragraphs (2) and (3) of this section.

(6) Notwithstanding paragraph (4) of this Section~~, and paragraph (6) of section 12~~, an incidental catch fishery is authorized during salmon troll seasons in IPHC Regulatory Area 2A in accordance with regulations promulgated by NOAA Fisheries. This fishery will occur between the dates and times listed in paragraphs (2) and (3) of this section.

[2] The non-tribal directed fishery is restricted to waters that are south of Point Chehalis, Washington, (46°53.30′ N. latitude) under regulations promulgated by NOAA Fisheries and published in the Federal Register.

[3] The incidental fishery during the directed, fixed gear sablefish season is restricted to waters that are north of Point Chehalis, Washington, (46°53.30′ N. latitude) under regulations promulgated by NOAA Fisheries at 50 CFR 300.63. Landing restrictions for Pacific halibut retention in the fixed gear sablefish fishery can be found at 50 CFR 660.231.

APPENDIX B

SITUATION SUMMARY FOR THE PFMC FINAL ACTION ON THE 2023 NON-TRIBAL DIRECTED COMMERCIAL PACIFIC HALIBUT FISHERY REGULATIONS

Agenda Item E.2
Situation Summary
November 2022

2023 COMMERCIAL-DIRECTED FISHERY REGULATIONS – FINAL ACTION

The transfer of management responsibilities for the Area 2A non-tribal commercial-directed Pacific Halibut fishery (Directed Fishery) from International Pacific Halibut Commission (IPHC) to Pacific Fishery Management Council (Council) and National Marine Fisheries Service (NMFS) is in its final stages and expected to complete by 2023. As part of the transfer, it was agreed to utilize the September/November Catch Sharing Plan revision process to solicit stakeholder input and consider regulations for the upcoming year. Collaboration with IPHC has been a vital part of the success of the transfer, and their continued support will be essential as the management agencies navigate the management process into the future.

At the September 2022 meeting, the Council adopted for public review a status quo season structure for 2023 described as:

> A series of three-day openings, beginning at 8 a.m. on the fourth Tuesday in June and ending at 6 p.m. on the Thursday of that week. Additional three-day openings would occur every other week, Tuesday through Thursday, until the directed fishery allocation is obtained.

Once adopted, the Council-recommended season structure for 2023 will be forwarded to NMFS for consideration.

Council Action:

Adopt Final 2023 Commercial Directed Fishery Regulations for NMFS Implementation.

Reference Materials:

1. If received, Public Comments are electronic only (see e-portal).

Agenda Order:

E.2 2023 Commercial-Directed Fishery Regulations – Final Action — Robin Ehlke
   a. Reports and Comments of Management Entities and Advisory Bodies
   b. Public Comment
   c. **Council Action**: Adopt Final 2023 Non-Tribal Commercial Directed Halibut Fishery Regulations for NMFS Implementation

PFMC
10/04/22

IPHC Fishery Regulations:

Fishing Period Limits (Sect 14) & Licensing Vessels for IPHC Regulatory Area 2A (Sect. 15) – Accommodation of the transition of management in the IPHC Regulatory Area 2A

PREPARED BY: IPHC SECRETARIAT (26 OCTOBER 2022)

PURPOSE

To accommodate the transition of management in the IPHC Regulatory Area 2A from the IPHC to the Pacific Fishery Management Council (PFMC) and NOAA-Fisheries. This proposal is mainly related to IPHC Fishery Regulations Sect. 14 & 15, but will have implications on other sections, as detailed below.

BACKGROUND

At its November 2020 meeting, the PFMC took the final action and adopted a set of management alternatives accommodating the transition of management in the IPHC Regulatory Area 2A. The PFMC decided to utilize September and November Catch Sharing Plan process to consider the directed fishery framework, including guidance for vessel limits and in-season changes for NOAA-Fisheries implementation. Moreover, the decision was made to charge NOAA-Fisheries with issuing permits for all 2A Pacific halibut fisheries: directed commercial, incidental salmon troll, incidental sablefish, and recreational charter.

The proposed rule (87 FR 44318) implementing the 2A management transition was published on 26 July 2022 and remained open for comments until 25 August 2022. NMFS is currently in the process of preparing the final rule with the input from the public.

More information on the transition of management in the IPHC Regulatory Area 2A can be found in IPHC-2022-IM098-04 and IPHC-2022-IM098-INF03.

DISCUSSION

NOAA-Fisheries has authority to promulgate Pacific halibut fishing regulations under the Northern Pacific Halibut Act of 1982 for the directed commercial fishery provided such regulations are consistent with broader IPHC Fishery Regulations.

Should the transition of management authority of the IPHC Regulatory Area 2A non-tribal directed commercial Pacific halibut fishery from the IPHC to the PFMC and NOAA-Fisheries be completed as planned, and management of 2A Pacific halibut fisheries commence prior to the 2023 fishing period under NOAA-Fisheries, there will be a need for number of amendments in the IPHC Fishery Regulations assuring their consistency with the new management regime.

Presented here suggested regulatory language is intended for preliminary discussion and may be adjusted depending on the content of the final rule implementing the 2A transition.

Benefits/Drawbacks: Following the transition, NOAA-Fisheries would assume responsibility for issuing vessels permits to fish for Pacific halibut in commercial and recreational charter fisheries in Area 2A, and for issuing annual management measures for the directed commercial fishery. These actions would be in addition to actions NOAA-Fisheries already undertakes such as issuing annual management measures for the Area 2A recreational fisheries (applicable to both charter and private anglers), consistent with the recommendations from the PFMC and the framework in the PFMC's Catch Sharing Plan. PFMC is a suitable forum for discussing annual management measures for the directed commercial fishery. The potential drawback is that the IPHC will not have a direct access to the list of vessels licensed to fish Pacific halibut in the IPHC Regulatory Area 2A post-transition. Discussions on data sharing arrangements are ongoing.

Sectors Affected: This proposal affects all sectors of the Pacific halibut fishery in the IPHC Regulatory Area 2A.

Appendix A provides details on the suggested regulatory language.

ADDITIONAL DOCUMENTATION

None

RECOMMENDATIONS

That the Commission:

1) **NOTE** regulatory proposal IPHC-2022-IM098-PropA3, which accommodates the transition of management in the IPHC Regulatory Area 2A from the IPHC to the Pacific Fishery Management Council (PFMC) and NOAA-Fisheries, should it be ready for the implementation prior to the 2023 fishing season, as planned.

APPENDICES

Appendix A: Suggested regulatory language

APPENDIX A

SUGGESTED REGULATORY LANGUAGE

3. Definitions

(1) In these Regulations, […]

~~(k) "license" means a Pacific halibut fishing license issued by the Commission pursuant to Section 15;~~

(k) "permit" means a Pacific halibut fishing license issued by NOAA Fisheries;

12. Application of Commercial Fishery Limits

(1) Notwithstanding the fishery limits described in Section 5, regulations pertaining to the division of the IPHC Regulatory Area 2A fishery limit between the directed commercial fishery and the incidental catch fishery as described in paragraphs (5) and (6) of Section 9 will be promulgated by NOAA Fisheries and published in the Federal Register.

~~(2) The Commission shall determine and announce to the public the date on which the fishery limit for IPHC Regulatory Area 2A will be taken.~~

(2) Notwithstanding the fishery limits described in Section 5, if NOAA Fisheries determines that the IPHC Regulatory Area 2A non-tribal directed fishery limit has been reached, no additional directed commercial fishing periods will be announced and the directed commercial fishery will close.

(3) Notwithstanding the fishery limits described in Section 5, the commercial fishing in IPHC Regulatory Area 2B will close only when all Individual Vessel Quotas (IVQ) and Individual Transferable Quotas (ITQ) assigned by DFO are taken, or on the date when fishing must cease as specified in Section 9, whichever is earlier.

(4) Notwithstanding the fishery limits described in Section 5, IPHC Regulatory Areas 2C, 3A, 3B, 4A, 4B, 4C, 4D, and 4E will each close only when all Individual Fishing Quotas (IFQ) and all CDQ issued by NOAA Fisheries have been taken, or on the date when fishing must cease as specified in Section 9, whichever is earlier.

~~(5) If the Commission determines that the fishery limit specified for IPHC Regulatory Area 2A in Section 5 would be exceeded in an additional directed commercial fishing period as specified in paragraph (4) of Section 9, the fishery limit for that area shall be considered to have been taken and the directed commercial fishery closed as announced by the Commission.~~

~~(6) When under paragraphs (1), (2), and (5) the Commission has announced a date on which the fishery limit for IPHC Regulatory Area 2A will be taken, no person shall fish for Pacific halibut in that area after that date for the rest of the year, unless the Commission has announced the reopening of that area for Pacific halibut fishing.~~

14. Fishing ~~Period Limits~~ in IPHC Regulatory Area 2A

(1) No person shall fish for Pacific halibut from a vessel, nor possess Pacific halibut on board a vessel, used either for commercial fishing or as a charter vessel in IPHC Regulatory Area 2A, unless issued a permit valid for fishing in IPHC Regulatory Area 2A by NOAA Fisheries according to [Fill with the final CFR reference].

(2) It shall be unlawful for any vessel to retain more Pacific halibut than authorized by that vessel's ~~license~~ permit in any fishing period for which ~~the Commission has announced~~ a fishing period limit is announced by NOAA Fisheries in the Federal Register.

(3) The operator of any vessel that fishes for Pacific halibut during a fishing period when fishing period limits are in effect must, upon commencing an offload of Pacific halibut to a commercial fish processor, completely offload all Pacific halibut on board said vessel to that processor and ensure that all Pacific halibut is weighed and reported on State fish tickets.

(4) The operator of any vessel that fishes for Pacific halibut during a fishing period when fishing period limits are in effect must, upon commencing an offload of Pacific halibut other than to a commercial fish processor, completely offload all Pacific halibut on board said vessel and ensure that all Pacific halibut are weighed and reported on State fish tickets.

(5) The provisions of paragraph (3) are not intended to prevent retail over-the-side sales to individual purchasers so long as all the Pacific halibut on board is ultimately offloaded and reported.

~~(5) When fishing period limits are in effect, a vessel's maximum retainable catch will be determined by the Commission based on:~~

~~(a) the vessel's overall length in feet and associated length class;~~

~~(b) the average performance of all vessels within that class; and~~

~~(c) the remaining fishery limit.~~

~~(6) Length classes are shown in the following table:~~

~~Overall Length (in feet)~~	~~Vessel Class~~
~~1-25~~	~~A~~
~~26-30~~	~~B~~
~~31-35~~	~~C~~
~~36-40~~	~~D~~
~~41-45~~	~~E~~
~~46-50~~	~~F~~
~~51-55~~	~~G~~
~~56+~~	~~H~~

(6) Fishing period limits in IPHC Regulatory Area 2A apply only to the non-tribal directed Pacific halibut fishery referred to in paragraph (4) of Section 9.

~~15. Licensing Vessels for IPHC Regulatory Area 2A~~

~~(1) No person shall fish for Pacific halibut from a vessel, nor possess Pacific halibut on board a vessel, used either for commercial fishing or as a charter vessel in IPHC Regulatory Area 2A, unless the Commission has issued a license valid for fishing in IPHC Regulatory Area 2A in respect of that vessel.~~

~~(2) A license issued for a vessel operating in IPHC Regulatory Area 2A shall be valid only for operating either as a charter vessel or a commercial vessel, but not both.~~

~~(3) A vessel with a valid IPHC Regulatory Area 2A commercial license cannot be used to recreationally (sport) fish for Pacific halibut in IPHC Regulatory Area 2A.~~

~~(4) A license issued for a vessel operating in the commercial fishery in IPHC Regulatory Area 2A shall be valid for one of the following:~~

~~(a) the directed commercial fishery during the fishing periods specified in paragraph (4) of Section 9;~~

~~(b) the incidental catch fishery during the sablefish fishery specified in paragraph (5) of Section 9; or~~

~~(c) the incidental catch fishery during the salmon troll fishery specified in paragraph (6) of Section 9.~~

~~(5) A vessel with a valid license for the IPHC Regulatory Area 2A incidental catch fishery during the sablefish fishery described in paragraph (4)(b) may also apply for or be issued a license for the directed commercial fishery described in paragraph (4)(a).~~

~~(6) A license issued in respect to a vessel referred to in paragraph (1) of this Section must be carried on board that vessel at all times and the vessel operator shall permit its inspection by any authorized officer.~~

~~(7) The Commission shall issue a license in respect to a vessel from its office in Seattle, Washington, upon receipt of a completed "Application for Vessel License for the Pacific Halibut Fishery" form.~~

~~(8) A vessel operating in the directed commercial fishery in IPHC Regulatory Area 2A must have submitted its "Application for Vessel License for the Pacific Halibut Fishery" form no later than 2359 local time on 30 April, or the first weekday in May if 30 April is a Saturday or Sunday.~~

~~(9) A vessel operating in the incidental catch fishery during the sablefish fishery in IPHC Regulatory Area 2A must have submitted its "Application for Vessel License for the Pacific Halibut Fishery" form no later than 2359 local time on 29 May, or the next weekday in May if 29 May is a Saturday or Sunday.~~

~~(10) A vessel operating in the incidental catch fishery during the salmon troll fishery in IPHC Regulatory Area 2A must have submitted its "Application for Vessel License for the Pacific Halibut Fishery" form no later than 2359 local time on 15 March, or the next weekday in March if 15 March is a Saturday or Sunday.~~

~~(11) Applications are submitted on the IPHC Secretariat webpage.~~

~~(12) Information on the "Application for Vessel License for the Pacific Halibut Fishery" form must be accurate.~~

~~(13) The "Application for Vessel License for the Pacific Halibut Fishery" form shall be completed by the vessel owner.~~

~~(14) Licenses issued under this Section shall be valid only during the year in which they are issued.~~

~~(15) A new license is required for a vessel that is sold, transferred, renamed, or for which the documentation is changed.~~

~~(16) The license required under this Section is in addition to any license, however designated, that is required under the laws of the United States of America or any of its States.~~

~~(17) The United States of America may suspend, revoke, or modify any license issued under this Section under policies and procedures in U.S. Code Title 15, CFR Part 904.~~

21. Receipt and Possession of Pacific Halibut

(1) No person shall receive Pacific halibut caught in IPHC Regulatory Area 2A from a United States of America vessel that does not have on board the ~~license~~ permit required by Section ~~15~~14(1) [as amended].

23. Fishing by United States Indian Tribes

(1) Pacific halibut fishing in IPHC Regulatory Area Subarea 2A-1 by members of United States treaty Indian tribes located in the State of Washington shall be regulated under regulations promulgated by NOAA Fisheries and published in the Federal Register:

(a) Subarea 2A-1 includes the usual and accustomed fishing areas for Pacific Coast treaty tribes off the coast of Washington and all inland marine waters of Washington north of Point Chehalis (46°53.30′ N. lat.), including Puget Sound. Boundaries of a tribe's fishing area may be revised as ordered by a United States Federal court;

(b) Section ~~15 (Licensing Vessels for IPHC Regulatory Area 2A)~~ 14(1) [as amended] does not apply to commercial fishing for Pacific halibut in Subarea 2A-1 by Indian tribes; and

(c) ceremonial and subsistence fishing for Pacific halibut in Subarea 2A-1 is permitted with hook and line gear from 1 January through 31 December.

Minor edits throughout for consistency in Sections numbering.

IPHC Fishery Regulations: minor amendments

PREPARED BY: IPHC SECRETARIAT (25 OCTOBER 2022)

PURPOSE

To improve clarity and consistency in the IPHC Fishery Regulations.

BACKGROUND

This proposal would make minor clarifying amendments to the existing IPHC Fishery Regulations. The proposed revisions are a result of a review by the Secretariat and consultations with domestic agencies.

DISCUSSION

Periodically, the IPHC Fishery Regulations are reviewed to ensure they are clear, concise, consistent, and current. The proposed revisions, which are outlined below in detail, are a result of a holistic review performed by the Secretariat, as well as discussions with the domestic agencies. Input from Contracting Parties was sought to streamline the process of adopting the revised regulations at the 99th Session of the IPHC Annual Meeting (AM099).

Proposed amendments to the 2023 IPHC Fishery Regulations:

1. Section 3, Definitions would include a definition of the total constant exploitation yield (TCEY). This term is used throughout the regulations, but no formal definition was included in the document.
2. Minor edits throughout for stylistic consistency among Sections.

Benefits/Drawbacks: The benefit is clearer and more consistent regulations that are easier to use. There are no known drawbacks.

Sectors Affected: This proposal affects all sectors of the Pacific halibut fishery.

Appendix A provides details on the suggested regulatory language.

ADDITIONAL DOCUMENTATION

None

RECOMMENDATIONS

That the Commission:

1) **NOTE** regulatory proposal IPHC-2022-IM098-PropA4, which recommends changes to improve the clarity and transparency of the IPHC Fishery Regulations.

APPENDICES

Appendix A: Suggested regulatory language

APPENDIX A

SUGGESTED REGULATORY LANGUAGE

1. Section 3, Definitions would include a definition of the total constant exploitation yield (TCEY);

3. Definitions

(1) In these Regulations, […]

(u) "total constant exploitation yield (TCEY)" means the mortality comprised of Pacific halibut from directed fisheries and that from non-directed fisheries greater than 26 inches (66 cm) in length;

2. Minor edits throughout for stylistic consistency among Sections.

8. Retention of Tagged Pacific Halibut

(3) Any Pacific halibut that bears a Commission external tag will not count against commercial fishing period limits, Individual Vessel Quota~~s~~ (IVQ), Individual Transferable Quota (ITQ), Community Development Quota~~s~~ (CDQ), or Individual Fishing Quota~~s~~ (IFQ), and are not subject to size limits in these regulations, but should still be recorded in the landing record.

12. Application of Commercial Fishery Limits

(3) Notwithstanding the fishery limits described in Section 5, the commercial fishing in IPHC Regulatory Area 2B will close only when all ~~Individual Vessel Quotas (~~IVQ~~)~~ and ~~Individual Transferable Quotas (~~ITQ~~)~~ assigned by DFO are taken, or on the date when fishing must cease as specified in Section 9, whichever is earlier.

(4) Notwithstanding the fishery limits described in Section 5, IPHC Regulatory Areas 2C, 3A, 3B, 4A, 4B, 4C, 4D, and 4E will each close only when all ~~Individual Fishing Quotas (~~IFQ~~)~~ and all CDQ issued by NOAA Fisheries have been taken, or on the date when fishing must cease as specified in Section 9, whichever is earlier.

13. Fishing in ~~Regulatory~~ IPHC Regulatory Areas 4D and 4E

(1) Section 13 applies only to any person fishing for, or any vessel that is used to fish for, IPHC Regulatory Area 4E ~~Community Development Quota (~~CDQ~~)~~ Pacific halibut, IPHC Regulatory Area 4D CDQ Pacific halibut, or IPHC Regulatory Area 4D IFQ received by transfer by a CDQ organization provided that the total annual Pacific halibut catch of that person or vessel is landed at a port within IPHC Regulatory Areas 4E or 4D.

21. Receipt and Possession of Pacific Halibut

(8) The master or operator of a Canadian vessel that was engaged in Pacific halibut fishing must weigh and record all Pacific halibut on board said vessel at the time offloading commences and record on Provincial fish tickets or Federal catch reports: the date; locality; name of vessel; the name(s) of the person(s) from whom the Pacific halibut was purchased; and the scale weight obtained at the time of offloading of all Pacific halibut on board the vessel including the pounds purchased, pounds in excess of IVQ~~s~~ or ITQ~~s~~, pounds retained for personal use, and pounds discarded as unfit for human consumption. All Pacific halibut must be weighed with the head on and the head-on weight must be recorded on the Provincial fish tickets or Federal catch reports as specified in this paragraph, unless the Pacific halibut is frozen at sea and exempt from the head-on landing requirement at Section 19(2).

IPHC Fishery Regulation Proposal:

Recreational (Sport) Fishing for Pacific Halibut - IPHC Regulatory Area 2B (Sect. 28) - Daily bag limit in IPHC Regulatory Area 2B

SUBMITTED BY: CANADA (FISHERIES AND OCEANS CANADA) (28 OCTOBER 2022)

Directed Commercial ☐ Recreational ☒ Subsistence ☐ Non-directed commercial ☐ All ☐

All Regulatory Areas ☐ All Alaska Regulatory Areas ☐ All U.S. Regulatory Areas ☐

2A ☐ 2B ☒ 2C ☐ 3A ☐ 3B ☐ 4A ☐ 4B ☐ 4C ☐ 4D ☐ 4E ☐

PURPOSE

To propose the daily bag limit of up to three fish per day per person in the recreational fishery in IPHC Regulatory Area 2B.

EXPLANATORY MEMORANDUM

Canada is proposing changes to section 28 (Recreational (Sport) Fishing for Pacific Halibut – IPHC Regulatory Area 2B) of the IPHC Fishery Regulations to allow a maximum daily bag limit of three (3) fish per day, per person. The purpose of the proposed change is to align IPHC fishery regulations with Canada's domestic sportfishing regulations, to simplify unnecessary regulatory complexity, and to retain Canada's ability and autonomy to manage its domestic fishery.

The Commission previously supported and approved an increase in the Canadian daily bag limit from two (2) per day, to three (3) per day, on a one-year basis from 1 April 2021 to 31 March 2022, and once again from 1 April 2022 to 31 March 2023. Annually the Sport Fishing Advisory Board (SFAB) works with Fisheries and Oceans Canada (DFO) to model a pre-season fishing plan with the objectives of maintaining a full recreational season (February to December) and supporting the recreational sector's access to the Total Allowable Catch (TAC) it is allocated. Canada used this conditional flexibility and implemented an increase to the daily bag limit from two (2) fish per day to three (3) fish day in both August 2021 and August 2022. This flexibility has increased Canadian domestic benefits, whilst ensuring that the recreational sector fished conservatively early in the season to allow for a full season, and remained well within its TAC.

The IPHC daily bag limit of two (2) fish per day constrains Canada's flexibility to make critical in-season changes to the fishing plan to support meeting TAC goals and Canadian domestic fishery objectives.

The SFAB has a long history of collaborating with DFO in Canada's endeavours to achieve IPHC objectives, while maximizing Canadian domestic objectives. DFO and SFAB meet monthly in-season to review timely and robust recreational catch estimates to consider and evaluate appropriate fishery management measures. Increased regulatory flexibility would augment the existing successful management tool kit to achieve improved fishery performance.

Canada had previously submitted these proposed changes to section 28 (Recreational (Sport) Fishing for Pacific Halibut – IPHC Regulatory Area 2B) for consideration at the 98th Session of the IPHC Annual meeting (AM098). The conditional flexibility that was implemented in 2021 was carried forwarded to the 2022 season, pending further information. A detailed presentation of Canada's Recreational Halibut Fishery management and monitoring measures was delivered at the 12th Special Session of the IPHC (SS012) on 25 February 2022.

RECOMMENDATIONS

That the Commission:

1) **NOTE** IPHC Fishery Regulation proposal IPHC-2022-IM098-PropB2, which proposes the daily bag limit of up to three fish per day per person in the recreational fishery in IPHC Regulatory Area 2B.

APPENDICES

Appendix A: Suggested Regulatory Language.

APPENDIX A

SUGGESTED REGULATORY LANGUAGE

28. Recreational (Sport) Fishing for Pacific Halibut—IPHC Regulatory Area 2B

(1) In all waters off British Columbia:[6, 7]

(a) the recreational (sport) fishing season will open on 1 February unless more restrictive regulations are in place;

(b) the recreational (sport) fishing season will close when the recreational (sport) fishery limit allocated by DFO is taken, or 31 December, whichever is earlier; and

~~(c) the daily bag limit is two (2) Pacific halibut of any size per day, per person, except that between 1 April 2021 and 31 March 2023 only, DFO may implement a daily bag limit of three (3) Pacific halibut per day, per person.~~

(c) the daily bag limit is three (3) Pacific Halibut of any size per day, per person.[6,7]

(2) In British Columbia, no person shall fillet, mutilate, or otherwise disfigure a Pacific halibut in any manner that prevents the determination of minimum size or the number of fish caught, possessed, or landed.

(3) The possession limit for Pacific halibut in the waters off the coast of British Columbia is three Pacific halibut.[6, 7]

[6] DFO could implement more restrictive regulations for the recreational (sport) fishery, therefore anglers are advised to check the current Federal or Provincial regulations prior to fishing.

[7] For regulations on the experimental recreational fishery implemented by DFO check the current Federal or Provincial regulations.

IPHC Fishery Regulation Proposal:

Recreational (Sport) Fishing for Pacific Halibut—IPHC Regulatory Areas 2C, 3A, 3B, 4A, 4B, 4C, 4D, 4E (Sect. 29) – Onboard consumption

SUBMITTED BY: UNITED STATES OF AMERICA (NOAA-FISHERIES) (25 OCTOBER 2022)

Directed Commercial ☐ Recreational ☒ Subsistence ☐ Non-directed commercial ☐ All ☐

All Regulatory Areas ☐ All Alaska Regulatory Areas ☒ All U.S. Regulatory Areas ☐

2A ☐ 2B ☐ 2C ☐ 3A ☐ 3B ☐ 4A ☐ 4B ☐ 4C ☐ 4D ☐ 4E ☐

PURPOSE

To propose adding flexibility to existing recreational (sport) Pacific halibut fishing regulations in Alaska Regulatory Areas and allow limited consumption of recreationally-caught Pacific halibut on board charter vessels and pleasure craft, while retaining existing regulations that provide effective enforcement of daily bag limits and possession limits.

EXPLANATORY MEMORANDUM

This proposal would add flexibility to existing recreational (sport) Pacific halibut fishing regulations in Convention waters in and off Alaska. It would allow limited consumption of recreationally-caught Pacific halibut on board charter vessels and pleasure craft, while also retaining existing regulations that provide effective enforcement of daily bag limits and possession limits.

In order to provide effective enforcement of daily bag limits and possession limits, current IPHC recreational (sport) fishing regulations at §29(1)(d) limit the extent to which Pacific halibut may be filleted on board charter vessels and pleasure craft. The regulations allow each halibut to be cut into no more than 2 ventral pieces, 2 dorsal pieces, and 2 cheek pieces, and leaving a patch of skin on each piece.

This proposal would amend §29(1)(d) to allow one (1) of either the dorsal or ventral pieces from one (1) halibut to be consumed by persons on board the charter or pleasure vessel.

RECOMMENDATIONS

That the Commission:

1) **NOTE** IPHC Fishery Regulation proposal IPHC-2022-IM098-PropB3, which adds flexibility to existing recreational (sport) Pacific halibut fishing regulations in Alaska Regulatory Areas and allow limited consumption of recreationally-caught Pacific halibut on board charter vessels and pleasure craft, while retaining existing regulations that provide effective enforcement of daily bag limits and possession limits.

APPENDICES

Appendix A: Suggested Regulatory Language.

APPENDIX A

SUGGESTED REGULATORY LANGUAGE

Amend §29(1)(d) (governing IPHC Regulatory Areas 2C, 3A, 3B, 4A, 4B, 4C, 4D, 4E) to allow limited consumption of recreational (sport) caught Pacific halibut on charter vessels and pleasure craft, as follows:

29. Recreational (Sport) Fishing for Pacific Halibut—IPHC Regulatory Areas 2C, 3A, 3B, 4A, 4B, 4C, 4D, 4E

(1) In Convention waters in and off Alaska: […]

(d) no person shall possess on board a vessel, including charter vessels and pleasure craft used for fishing, Pacific halibut that have been filleted, mutilated, or otherwise disfigured in any manner, except (i) on charter vessels and pleasure craft used for fishing, ~~that~~ each Pacific halibut may be cut into no more than 2 ventral pieces, 2 dorsal pieces, and 2 cheek pieces, with a patch of skin on each piece, naturally attached; and (ii) either one dorsal piece or one ventral piece from one Pacific halibut on board may be consumed;

IPHC Fishery Regulation Proposal:

Recreational (Sport) Fishing for Pacific Halibut—IPHC Regulatory Areas 2C, 3A, 3B, 4A, 4B, 4C, 4D, 4E (Sect. 29) - Processing Pacific halibut for eating and preservation

SUBMITTED BY: JOHN FIELDS, RECREATIONAL FISHERMAN (30 AUGUST & 6 OCTOBER 2022)

Directed Commercial ☐ Recreational ☒ Subsistence ☐ Non-directed commercial ☐ All ☐

All Regulatory Areas ☐ All Alaska Regulatory Areas ☒ All U.S. Regulatory Areas ☐

2A ☐ 2B ☐ 2C ☐ 3A ☐ 3B ☐ 4A ☐ 4B ☐ 4C ☐ 4D ☐ 4E ☐

PURPOSE

To propose an exception that allows recreational fishermen in Alaska Regulatory Areas who do not return to port each day to process Pacific halibut for eating and/or preservation, subject to measures to facilitate enforcement of the applicable daily bag limits (Proposal No. 1); or exclude preserved and consumed on board fish from applicable possession limits (Proposal No. 2); or create a narrow exception that allows for limited processing of a single fish per day for consumption only (Proposal No. 3).

EXPLANATORY MEMORANDUM

This proposal is submitted on behalf of John Fields by his counsel, Matthew Krueger of Foley & Lardner LLP and Bryan Schroder of Cashion Gilmore & Lindemuth.

1. Background

Mr. Fields is a life-long recreational angler who has been taking several trips per year to Southeast Alaska with his family and friends for the last 30 years. Mr. Fields maintains his own boat in Sitka, Alaska. During the trips, which typically last about five to six days, Mr. Fields and his guests anchor out on his boat and generally return to port just once, if at all, during the trip to refuel. In all of these trips—well over 50 in total—Mr. Fields and his guests have always complied with the daily bag limits.

On these trips, Mr. Fields and his guests want to catch and eat or freeze meal-sized portions of Pacific halibut that they catch within the daily bag limit. But the International Pacific Halibut Commission's ("IPHC") current regulations effectively prohibit recreational anglers who, like Mr. Fields, do not return to port each day from doing so. Specifically, § 29(1)(d) of the 2022 Fishery Regulations promulgated by the IPHC provides:

> *In Convention waters in and off Alaska … [n]o person shall possess on board a vessel, including charter vessels and pleasure craft used for fishing, Pacific halibut that have been filleted, mutilated, or otherwise disfigured in any manner, except that each Pacific halibut may be cut into no more than 2 ventral pieces, 2 dorsal pieces, and 2 cheek pieces, with a patch of skin on each piece, naturally attached … .*

The National Oceanic and Atmospheric Administration ("NOAA"), which is the agency responsible for enforcement of the Fishery Regulations in Convention waters in and off Alaska, has interpreted this provision as ***prohibiting any consumption*** of sport-caught halibut while on board a vessel. *See Regulations Summary and Frequently Asked Questions for Unguided Pacific Halibut Fishing in Alaska*, NOAA FISHERIES Alaska Region (April 15, 2022), https://media.fisheries.noaa.gov/2022-04/ak-unguided-halibut-faq.pdf ("Eating halibut onboard a vessel in Alaska waters is not allowed because it necessarily involves mutilating or disfiguring halibut other than in a manner allowed by the regulations.").

Further, by limiting the number of pieces into which a fish may be cut and by requiring that a piece of skin remain attached to each piece, the current Fishery Regulations effectively prohibit recreational anglers like Mr. Fields who do not return to port each day from being able to process and preserve halibut in reasonable, meal-sized portions. The Regulations therefore impose an unreasonable hardship on all recreational anglers who, like Mr. Fields, do not return to port each day.

The hardship is not theoretical: Mr. Fields received a Written Warning from a NOAA enforcement officer who boarded his boat on September 1, 2021, and determined that Pacific halibut had been processed in a way that did not comply with 50 C.F.R. § 300.66(m) and § 29(1)(d) of the Fishery Regulations. Mr. Fields and his six guests were each licensed anglers. In total, they had only approximately eight small halibut—an amount that was well within the daily bag limit. Nonetheless, the official issued the Warning on the ground that the halibut were filleted into more than two ventral pieces and two dorsal pieces, with no skin remaining. The enforcement officer issued the Warning even though she had no trouble determining that Mr. Fields and his guests had complied with the applicable daily bag limit.

Mr. Fields filed an appeal with NOAA, asking that the Written Warning be vacated. In his appeal, Mr. Fields demonstrated that § 29(1)(d) of the Fishery Regulations is arbitrary and capricious, and contrary to law. He also proposed several alternative, less restrictive means by which he could demonstrate his compliance with the applicable daily bag limits. While NOAA agreed to vacate the portion of the Written Warning that found a violation of 50 C.F.R. § 300.66(m), it refused to vacate the portion that found a violation of § 29(1)(d). NOAA also refused to consider Mr. Fields' proposed alternative means of demonstrating his compliance with the daily bag limits, and it directed Mr. Fields to propose any such changes to the IPHC:

> *To the extent that Respondent believes the IPHC should consider a change to the Annual Management Measures in this manner, an appeal of a Written Warning is not the appropriate forum to consider such changes. Instead, the respondent is able to submit these alternatives as comments and have IPHC consider the alternatives when publishing the Annual Management Measures.*

Decision on Appeal of Written Warning at 6, Appeal No. AK2106039 (January 20, 2022).

Nor is the hardship limited to Mr. Fields: The 2018 IPHC Annual Meeting received five proposals to allow recreational anglers who do not return to port each day to catch and consume or process halibut. *See* IPHC-2018-AM094-R. Following are excerpts from the proposals, which underscore the unfair burden imposed by the current regulations:

- The regulations "do not allow for proper processing and preservation of the catch" for recreational anglers who do not "return to day for processing their catch. … The result … is that any surplus

fish caught and not immediately consumed must be wasted and not kept on board to satisfy the regulations." A. Cooper Proposal, IPHC-2018-AM094-PropC2.

- "While [the regulations] may make sense for the day fisherman who brings their catch back to port for processing and storage at their home ashore, it is impractical for the long term or full time cruiser. To minimize waste the current regulation below should be revised to permit processing and storage aboard the vessel in usable portion sizes with the skin removed." W. Cornell Proposal, IPHC-2018-AM094-PropC12.

- "The result of these [regulations] is that any surplus fish caught and not immediately consumed must be wasted and not kept on board" vessels that do not return to port each day "to satisfy the regulations." M. Cowart Proposal, IPHC-2018-AM094-PropC9.

- "The current IPHC regulation prevents personal use of Halibut on the boat" where the angler does not return to port each day "and prevents the proper preservation of the catch for future use." D. Robertson Proposal, IPHC-2018-AM094-PropC6.

- "The current halibut regulations do not allow for long term preservation and storage of halibut for personal use aboard pleasure vessels. The inability to package and preserve fish in serving size portions will result in waste and therefore increase the number of halibut required to supplement a family's diet." L. Thompson Proposal, IPHC-2018-AM094-PropC7.

The IPHC convened a Working Group to address this issue but took no action, despite the clear and unreasonable burden the regulation places on recreational anglers like Mr. Fields. *See* IPHC-2018-AM094-R.

2. Mr. Fields' Prior Proposal to the IPHC

In December 2021, Mr. Fields submitted a proposal to the IPHC for consideration at its 2022 Annual Meeting that took place on January 24-28, 2022. *See* IPHC-2022-AM098-PropC1. The proposal asked the IPHC (1) to harmonize the Fishery Regulations across areas by eliminating the heightened restrictions that apply only to Alaska, and (2) to create an exception for recreational anglers to process halibut on board their vessels if they comply with certain logging requirements. Under Mr. Fields' proposal, an angler would have to photograph the halibut alongside a measuring device and label any packages with the date, the sequence number of the halibut caught (*e.g.*, 1 of 2 of the daily bag limit), and a sequence letter reflecting the portion of the halibut in the package (*e.g.*, A, B, C, D, etc.). The angler would also have to keep a log recording the same information.

The IPHC considered Mr. Fields' proposal during the January 27, 2022, session of the Annual Meeting. During that session, the commissioners noted that Mr. Fields' proposal was reasonable, and they expressed an interest in modifying the regulations to allow for consumption of halibut while on board a vessel in waters in and off Alaska. However, they emphasized the need for coordination with the agencies tasked with enforcing the regulations and ultimately deferred any action until a later meeting. The final report of the 2022 Annual Meeting reflects that the IPHC "noted and deferred" Mr. Fields' proposal pending "additional discussion with enforcement agencies." Report of the 98th Session of the IPHC Annual Meeting (AM098), IPHC-2022-AM098-R, par. 85-86.

Shortly after the conclusion of the IPHC's 2022 Annual Meeting, Mr. Fields followed up by letter with NOAA's Alaska Regional Office to reiterate his request that the IPHC's regulations be amended to allow for both consumption and processing of halibut while on board a vessel in and off the waters of

Alaska. Mr. Fields requested an opportunity for further discussion with NOAA, but he did not receive a meaningful response.

3. The Current Regulation is Arbitrary and Capricious, and Contrary to Law

Section 29(1)(d) of the 2022 Fishery Regulations promulgated by the IPHC prohibits recreational anglers from cutting up Pacific halibut on board their vessels in portions that can be consumed or frozen in reasonable, meal-sized portions. In so doing, § 29(1)(d) imposes restrictions on processing Pacific halibut caught in certain areas beyond the restrictions imposed by § 300.66(m) and far beyond the purpose of the underlying Convention and Northern Pacific Halibut Act. The heightened restrictions are arbitrary and capricious, and contrary to law, both on their face and as applied to someone like Mr. Fields. This is so for several reasons.

First, on their face, the heightened restrictions effectively prohibit a whole category of recreational fishing—*i.e.*, recreational fishing by anglers who do not return to port each day—in a manner that is contrary to the express provisions of the governing Convention. The Convention makes clear in Article I, § 5 that its primary purpose is to regulate "commercial halibut fishing," while allowing "sport fishing for halibut." To be sure, § 5 provides that "sport fishing for halibut" is subject to IPHC "regulations and permit and licensing requirements, including the payment of fees." But § 5 then emphasizes that besides those basic requirements, "sport fishing for halibut and other species by nationals and vessels of each Party may be conducted in Convention waters." Section 5 reiterates: "All provisions of this Convention except this paragraph, refer to commercial halibut fishing."

Read in context, the Convention's main purpose is to regulate commercial fishing, not recreational anglers like Mr. Fields. The Convention contemplates that any regulations created for sport fishing would facilitate responsible sport fishing, not prohibit it. Yet, § 29(1)(d) effectively prohibits fishing by a whole category of recreational anglers—those who like Mr. Fields do not return to port each day, or do not have access to facilities where they can process and store the fish that they catch when they do return to port. Prohibiting halibut fishing by recreational anglers who do not return to port each day is a plain violation of the Convention. And it does not provide a "fair and equitable distribution of access privileges in the fishery." *Cf.* 16 U.S.C. § 1853(b)(6) (setting forth the factors to be considered for creating a fishery management plan under U.S. law).

Second, on their face, the heightened restrictions draw an arbitrary distinction between Pacific halibut caught "[i]n Convention waters in and off Alaska," and Pacific halibut caught in other areas, including California, Oregon, Washington, and British Columbia. Only the former are subject to heightened restrictions on processing. *See* 2021 Fishery Regulations, §§ 27(3) & 28(2). That is, for regulatory areas that include California, Oregon, Washington, and British Columbia, the Fishery Regulations simply provide that "no person shall fillet, mutilate, or otherwise disfigure a Pacific halibut in any manner that prevents the determination of minimum size or the number of fish caught, possessed, or landed." *See* §§ 27(3) & 28(2). Although Mr. Fields had processed the fish in more than six pieces and removed the skin, the NOAA officer was still able to determine that the size and daily bag limits were not exceeded. Thus, the exact same conduct that led to Mr. Fields receiving the Warning would have been perfectly permissible if Mr. Fields had been fishing in waters off of Oregon, for instance, rather than waters off of Alaska.

Third, the heightened restrictions are also arbitrary and capricious, and contrary to law, as applied to a person in Mr. Fields' particular circumstances. The restrictions' obvious purpose is to facilitate enforcement of the daily bag limits for Pacific halibut. But when applied to a recreational angler who has only a small number of Pacific halibut on board his boat at any given time, the restrictions serve no purpose

other than effectively to prohibit the recreational angler from either eating or freezing the fish that he has caught without first returning to port. The result is that recreational fishermen who take multi-day trips without returning to port, or who do not have access to facilities for processing and storing fish other than on their vessels, face an unfair choice: They must either forgo fishing for Pacific halibut altogether or know that any halibut they catch will necessarily go to waste. *See* 2018 Regulatory Proposals cited above.

4. Mr. Fields' Renewed Proposals and the Improvements They Offer

As detailed above, Mr. Fields has raised his concerns regarding the hardships that § 29(1)(d) of the IPHC's Fishery Regulations impose with both NOAA and the IPHC. Mr. Fields' concerns echo those that caused the IPHC to convene a working group on this issue more than four years ago, yet § 29(1)(d) remains unchanged, despite the commissioners' stated interest in modifying the Regulations to ease these hardships. To bring renewed attention to this issue, Mr. Fields is resubmitting his previous proposal to amend the Fishery Regulations to remove the unlawful prohibition on the ability of recreational anglers who do not return to port each day to consume and preserve halibut. He is also submitting for consideration a second proposal that offers an alternative means of accomplishing the same goal, and a third proposal that carves out an even narrower exception for consumption only.

A. Proposal No. 1 (Logging of Processed Halibut)

Mr. Fields' first proposal has two features. First, the proposal would amend § 29(1)(d) to make the restrictions on processing fish in Alaska consistent with the processing restrictions in other IPHC regulatory areas. Second, the proposal would further amend § 29(1)(d) to provide a new exception for recreational fishers to further process fish if they comply with certain logging requirements.

i. Harmonize Alaska's Restrictions with Other Regions' Restrictions

The first feature would eliminate the heightened restrictions that apply only to recreational anglers in Convention waters in and off Alaska by amending § 29(1)(d) so it is consistent with the restrictions that apply to recreational anglers in regulatory areas 2A (California, Oregon, and Washington) and 2B (British Columbia). As noted, the provisions that govern regulatory areas 2A and 2B neither specifically limit the number of pieces into which a Pacific halibut may be cut nor require that a patch of skin remains naturally attached to each piece. Instead, the restrictions governing regulatory areas 2A and 2B simply provide that "no person shall fillet, mutilate, or otherwise disfigure a Pacific halibut in any manner that prevents the determination of minimum size or the number of fish caught, possessed, or landed." 2022 Fishery Regulations, §§ 27(3) & 28(2). The proposal would make the same restrictions that apply in areas 2A and 2B also apply in Alaska.

This feature brings appropriate consistency to the IPHC regulations and removes an unreasonable distinction between the enforcement regime in Alaska versus other regions. This feature would also give recreational anglers in Alaska some additional flexibility in how they process Pacific halibut for eating or preserving on board their vessels. At the same time, the proposal would maintain the same safeguards that the IPHC has deemed sufficient to allow effective enforcement of bag and possession limits in other regulatory areas.

Standing alone, however, the proposed restriction still could be read to prohibit recreational anglers like Mr. Fields from cutting halibut into small pieces for eating and meal-sized processing, to the extent doing so prevents authorized officers from determining the number and size of fish caught. Further, standing alone, the proposed restriction does not give clear instructions to recreational anglers like Mr.

Fields regarding exactly how much they can process Pacific halibut. We therefore also propose adding the second feature, a limited exception for recreational anglers.

ii. Add a New Exception for Recreational Fishers Who Log Catches

The second feature would add an exception for recreational fishers who are on board a pleasure craft used for fishing that would permit them to cut Pacific halibut into smaller pieces and remove the skin for consumption or preservation, provided they comply with specific procedures. Those procedures would require the angler to take a photograph of the halibut alongside a measuring device so the authorized officer could determine the size of the halibut. The angler would also be required to label any packages with the halibut according to the date, the sequence of the fish caught (*e.g.*, 1 of 2 of the daily bag limit), and with a sequence letter to reflect the portion of the fish in the package (*e.g.*, A, B, C, D, etc.). For example, if an angler processed the first halibut he caught that day into 9 pieces, each package would be labeled with the date, the number "1," and a letter going from A to I. Finally, the angler would be required to keep a log that recorded the same information.

This proposal would allow an authorized officer easily to compare the required photograph showing the size of the fish to the log and to each portion of packaged fish on board the vessel, quickly determining if the packages correspond to what the log and photograph represent. If the vessel had more fish than what was represented, the authorized officer could determine that the size or daily limits were violated. Critically, this proposal still leaves in place a prohibition on processing fish in ways that prevent the determination of the minimum size or number of fish caught so that if an angler did not comply with each requirement of the exception, the angler could still be held accountable for violating daily bag and size limits. This proposal is also limited in scope, applying only to pleasure craft and not applying to charter vessels.

We considered including with this proposal a reporting requirement for an angler who intends to use the exception. Specifically, the angler could be required to notify an authorized officer before embarking on a trip of the angler's intended length of trip, areas of travel, and names of licensed anglers. Upon finishing the trip, the angler could be required to submit a copy of the photographs and log to the authorized officer. This reporting requirement would allow the IPHC to track how many recreational anglers are making use of the new exception so that the IPHC could evaluate its impact and make modifications in future years. In addition, the requirement could enhance awareness and increase compliance among anglers who would otherwise face enforcement if they did not report their activities.

We opted not to include the above-described reporting requirement, however, for two reasons. First, we are mindful that implementing such a requirement would impose additional record-keeping burdens on authorized officers. Second, we believe that a reporting requirement is likely unnecessary, given the lack of evidence that recreational anglers who do not return to port each day are responsible for any significant number of violations. Nonetheless, we stand ready to amend our proposal to include a reporting requirement if doing so would give the IPHC additional comfort in adopting a new exception.

By adopting this proposal, the IPHC would be removing an unreasonable hardship that has led to recurring complaints by recreational anglers like Mr. Fields—a hardship that the IPHC recognized in 2018 by forming a working group. The proposal would give recreational anglers in Alaska who do not return to port each day the ability to enjoy the halibut they catch for consumption and for processing in meal-sized portions. The proposal offered here would also remedy the unlawfully arbitrary and capricious nature of the current regulations.

B. Proposal No. 2 (Exception for Preserved Halibut)

Mr. Fields' second proposal would leave § 29 unchanged while amending § 3 (Definitions) to add a new subsection specifying that, as used in § 29 (governing Recreational (Sport) Fishing for Pacific Halibut in IPHC Regulatory Areas 2C, 3A, 3B, 4A, 4C, 4D, and 4E), the terms "possess," "possession," "possessed," and "possess on board" refer only to unpreserved fish and do not include preserved fish or fish that is consumed on board a vessel. The new subsection would define "preserved fish" as fish prepared in such a manner as to remain fit for human consumption after 15 days. The proposed new subsection would ease the restrictions that § 29 imposes in two narrow but important ways. First, it would allow for both consumption of halibut and processing of halibut for later consumption while leaving intact § 29(1)(d)'s general prohibition against "possess[ing] on board a vessel … Pacific halibut that have been 'filleted, mutilated, or otherwise disfigured in any manner.'" Second, it would allow sport fishermen who do not regularly return to port to possess on their vessels more than two daily bag limits, notwithstanding § 29(1)(c), provided that the fish have been preserved in the manner specified in the new subsection.

Notably, the proposed modifications to § 3 of the Fishery Regulations generally track the language of the Alaska Administrative Code and the provisions of the Code that regulate possession of sport-caught fish. *See* 5 AAC 75.010(b) ("A person may possess only the limit of fish allowed for the water on which that person is fishing."); 5 AAC 75.995(a)(20) & (21) (defining "possession limit" and "preserved fish"). This proposal thus has the benefit of adopting an approach that has already been implemented and proven workable in Alaska.

C. Proposal No. 3 (Exception for Consumption Only)

Mr. Field's third proposal would leave § 29 largely unchanged while adding a narrow exception to allow recreational anglers to process a single Pacific halibut per day for consumption only while on board a pleasure craft. To ensure that authorized officers are able to enforce daily bag limits, the proposal would require a recreational angler who processes a halibut for consumption while on board a pleasure craft to maintain one quarter of the fish with the skin naturally attached. This proposal would not fully eliminate the hardship imposed on recreational anglers who do not return to port each day, in that these anglers would still be prohibited from processing halibut for preservation and later consumption. However, it would mitigate that hardship with minimal changes to the current regulation.

4. Potential Negative Impacts

The above proposals would not create any negative impacts. In explaining its unwillingness to recommend changes, the 2018 IPHC Working Group stated that § 29(1)(d) is "necessary for the enforcement of the bag and possession limits among sport fishermen," and that it had not received "a consistent, easily verifiable option that would … still allow effective enforcement of the bag and possession limits." IPHC-2018-IM094-INFO2, Appendix I, at p. 3.

Each of Mr. Fields' proposals leaves in place the general prohibition against mutilating or disfiguring Pacific halibut in a way that prevents enforcement of the daily bag limits while carving out narrow exceptions for the small class of sport fisherman who, like Mr. Fields, do not return to port each day and want to be able to consume or preserve for later consumption the Pacific halibut they catch. Mr. Fields' first proposal offers a consistent, easily verifiable method for authorized officers to enforce the size and daily bag limits for recreational anglers who do not return to port each day. Mr. Fields' second proposal adopts an approach that is currently being used in Alaska with no significant issues. Finally, Mr. Field's third proposal takes an even more conservative approach by allowing an exception for consumption only.

Notably, we are not aware of, and the 2018 IPHC Working Group did not cite, any data indicating that fishing by recreational anglers who do not return to port each day contributed to a significant amount of halibut catches or violations of the size or daily bag limits. Indeed, that is highly unlikely to be the case because there are relatively few recreational anglers who do not return to port each day. The current regulations—and the 2018 IPHC Working Committee's position—apply a blunt, broad tool against recreational fishers who, given the lack of evidence, when combined with common sense, appear to have a de minimis effect on the fishery. So far, NOAA has provided no evidence of harm, only unsupported speculation. We offer here a scalpel to address the issue properly, without harming all of the recreational anglers who do not return to port each day and fish responsibly.

RECOMMENDATIONS

That the Commission:

1) **NOTE** fishery regulation proposal IPHC-2022-IM098-PropC1 Rev_1, which adds an exception that allows recreational fishermen in Alaska Regulatory Areas who do not return to port each day to process Pacific halibut for eating and/or preservation, subject to measures to facilitate enforcement of the applicable daily bag limits (Proposal No. 1); excludes preserved and consumed on board fish from possession limits applicable to recreational fishermen in Alaska Regulatory Areas (Proposal No. 2); or adds an exception that allows recreational fishermen in Alaska Regulatory Areas to process a single Pacific halibut per day for consumption while onboard a pleasure craft, so long as they preserve a quarter with skin to allow for verification of bag limits by enforcement officials (Proposal No. 3).

APPENDICES

Appendix A: Suggested Regulatory Language.

APPENDIX A

SUGGESTED REGULATORY LANGUAGE

Proposal No. 1: Amend § 29(1) (governing IPHC Regulatory Areas 2C, 3A, 3B, 4A, 4B, 4C, 4D, 4E) to be consistent with § 27(3) (governing IPHC Regulatory Area 2A) and § 28(2) (governing IPHC Regulatory Area 2B), and add an exception that allows recreational fishermen on pleasure craft to process Pacific halibut for eating and/or preservation, subject to measures to facilitate enforcement of the applicable daily bag limits, as follows:

29. Recreational (Sport) Fishing for Pacific Halibut—IPHC Regulatory Areas 2C, 3A, 3B, 4A, 4B, 4C, 4D, 4E

(1) In Convention waters in and off Alaska:

…

(d) No person shall possess on board a vessel, including charter vessels and pleasure craft used for fishing, Pacific halibut that have been filleted, mutilated, or otherwise disfigured in any manner~~, except that each Pacific halibut may be cut into no more than 2 ventral pieces, 2 dorsal pieces, and 2 cheek pieces, with a patch of skin on each piece, naturally attached.~~ that prevents the determination of minimum size or the number of fish caught, possessed, or landed; except that any person who, while on board a pleasure craft used for fishing, may further fillet or otherwise process Pacific halibut for immediate consumption or preservation for later consumption if the person does all of the following:

(i) Maintain on board the pleasure craft and available for inspection by an authorized officer a photograph of each Pacific halibut caught. The Pacific halibut must be photographed alongside a measuring device that allows an authorized officer who inspects the photograph to determine the length of the Pacific halibut. Each photograph must be accompanied with information indicating the date and approximate time at which the Pacific halibut in the photograph was caught.

(ii) For each Pacific halibut processed for later consumption, store the Pacific halibut in a package or packages labeled with (A) the date and approximate time at which the Pacific halibut was caught, (B) the length of the Pacific halibut, (C) a sequence number corresponding to the daily bag limit (i.e. 1 of 2), and (D) a sequence letter corresponding to a portion of the Pacific halibut in the package (i.e., A, B, C, etc.).

(iii) Maintain on board the pleasure craft and available for inspection by an authorized officer a log of each Pacific halibut caught. The log must specify (A) the date and approximate time at which each Pacific halibut was caught, (B) the length of each Pacific halibut, (C) the sequence number corresponding to the daily bag limit (i.e., 1 of 2), and (D) an indication of the portions of the Pacific halibut packaged for later consumption (i.e., A, B, C, etc.).

Proposal No. 2: Amend § 3 (Definitions) to add subsection (o) (all following sections to be re-lettered in order) as follows:

3. Definitions

(1) In these Regulations,

…

(o) For Recreational (Sport) Fishing in IPHC Regulatory Areas 2C, 3A, 3B, 4A, 4B, 4C, 4D, 4E, governed under §29, "possess," "possession," "possessed," and "possess on board" means unpreserved fish that a person has on a vessel. Preserved fish are not considered possessed or possessed on board. Fish consumed on board are also not considered as possessed or possessed on board. "Preserved fish" means fish prepared in such a manner, and in an existing state of preservation, as to be fit for human consumption after a 15-day period, and does not include unfrozen fish temporarily stored in coolers that contain ice or dry ice or fish that are lightly salted;

Proposal No. 3: Amend § 29(1) (governing IPHC Regulatory Areas 2C, 3A, 3B, 4A, 4B, 4C, 4D, 4E) to add an exception that allows recreational fishermen on pleasure craft to process Pacific halibut for consumption, as follows:

29. Recreational (Sport) Fishing for Pacific Halibut—IPHC Regulatory Areas 2C, 3A, 3B, 4A, 4B, 4C, 4D, 4E

(1) In Convention waters in and off Alaska:

…

(d) No person shall possess on board a vessel, including charter vessels and pleasure craft used for fishing, Pacific halibut that have been filleted, mutilated, or otherwise disfigured in any manner~~,~~ except that each Pacific halibut may be cut into no more than 2 ventral pieces, 2 dorsal pieces, and 2 cheek pieces, with a patch of skin on each piece, naturally attached. Notwithstanding the prior sentence, while on board a pleasure craft used for fishing, a person may further fillet or otherwise process one Pacific halibut per day for immediate consumption, provided that the person maintains at least one quarter of that Pacific halibut with a patch of skin, naturally attached.

IPHC Fishery Regulation Proposal:

Mortality and Fishery Limits (Sect. 5) - TCEY floor in IPHC Regulatory Area 2A

SUBMITTED BY: PATRICK DEPOE, MAKAH TRIBE (28 OCTOBER 2022)

Directed Commercial ☐ Recreational ☐ Subsistence ☐ Non-directed commercial ☐ All ☒

All Regulatory Areas ☐ All Alaska Regulatory Areas ☐ All U.S. Regulatory Areas ☐

2A ☒ 2B ☐ 2C ☐ 3A ☐ 3B ☐ 4A ☐ 4B ☐ 4C ☐ 4D ☐ 4E ☐

PURPOSE

To propose a constant TCEY floor in IPHC Regulatory Area 2A.

EXPLANATORY MEMORANDUM

From 2019 to 2022, Regulatory Area 2A has received a fixed TCEY allocation of 1.65Mlbs. This allocation, put in place in accordance with the Makah Tribe's 2019 proposal, has provided a consistent and biologically justified TCEY for an Area which has minimal impact on the larger halibut biomass to the north. Regulatory Area 2A represents a small fraction of the Region 2 allocation, and of the overall Pacific halibut stock. As such, a higher IPHC Regulatory Area 2A TCEY than what may be indicated by the biological distribution of the stock estimate which the IPHC Secretariat generates will not create a biological conservation concern. This has been demonstrated in recent years with the 4-year 1.65Mlbs agreement resulting in high rates of attainment in various sectors and no observed drop in survey WPUE/NPUE outside of expected variability relating to recent FISS design choices. In addition, prior to the 4-year agreement in 2019, the Commission has set TCEYs higher than the levels suggested by the harvest decision table.

Recent experience suggests that a constant TCEY floor in IPHC Regulatory Area 2A can be sustained by the biomass available in Region 2. Historically, variable TCEY allocations and declines below a certain threshold in fishery limits from year to year created significant uncertainty and hardship for 13 halibut tribes and three coastal states (California, Oregon and Washington) dependent on the Pacific halibut fisheries in IPHC Regulatory Area 2A. A stable TCEY of 1.65Mlbs reduces the variability and uncertainty for all fisheries in IPHC Regulatory Area 2A, and should be used as a floor level in annual TCEY decisions.

RECOMMENDATIONS

That the Commission:

1) **NOTE** fishery regulation proposal IPHC-2022-IM098-PropC2, which proposes a constant TCEY floor in IPHC Regulatory Area 2A.

APPENDICES

Appendix A: Suggested Regulatory Language.

APPENDIX A

SUGGESTED REGULATORY LANGUAGE

Adopt a TCEY for IPHC Regulatory Area 2A that supports a TCEY no lower than 1.65Mlb. In years when the distribution would indicate a TCEY higher than 1.65Mlb is available, that number would be adopted.

The IPHC mortality projection tool for 2023 mortality limits

PREPARED BY: IPHC SECRETARIAT (I. STEWART; 19 OCTOBER 2022)

PURPOSE

This document provides a description of the IPHC's web-based mortality projection tool (https://www.iphc.int/data/projection-tool) for setting mortality limits in 2023.

BACKGROUND

Since 2019, IPHC Secretariat has provided an interactive tool in support of the IPHC's process for setting Pacific halibut mortality limits based on the coastwide TCEY and the distribution of that mortality among IPHC Regulatory Areas. The tool has been updated each year to reflect the IPHC's interim management procedure and all associated modifications and agreements in place each year.

THE MORTALITY PROJECTION TOOL

The tool relies on previously calculated stock assessment outputs representing a broad range of total mortality. These include projections of spawning stock size and fishing intensity, such that alternative harvest levels can be evaluated in the context of the harvest decision table as well as relative trends. The tool is divided into five components:

1) Inputs
2) Summary results
3) Biological distribution
4) Detailed sector mortality information
5) Graphics

A brief description of each of these is provided below.

Inputs

The first section of the tool provides the user with inputs primary information:

1) The total distributed mortality limit (TCEY) in millions of net[1] pounds.
2) The percent of the distributed mortality limit (TCEY) assigned to each IPHC Regulatory Area.

Previous versions of this tool have provided default values that reflected the IPHC's interim management procedure, as it was specified at the time. The Secretariat will look for guidance from the Commission during IM098 on the default values to use for the 2023 tool, as the previous interim agreement was specified to apply for the period from 2019-2022 (AM095; para. 69).

The distribution percentages for each IPHC Regulatory Area can be adjusted manually, and are intended to sum to 100%, if they do not, the total will be highlighted in red, and the inputs will be automatically rescaled so that the sum of the distributed mortality limits across all IPHC Regulatory Area will exactly match the coastwide total input.

[1] Net pounds refer to the weight with the head and entrails removed; this is approximately 75% of the round (wet) weight.

There are two optional inputs, with drop-down menus, specifying:

1) The basis for projecting non-directed discard mortality. The default projection, consistent with the IPHC's Interim Management Procedure (specified during AM096 para. 97), is to use the three-year average non-directed discard mortality from the most recent year. Alternatives include the previous year's estimates and the values consistent with full regulatory attainment of domestic non-directed discard mortality limits.
2) The units of mortality measurement. This can either be millions of net pounds (default) or net metric pounds.

Summary results

The second section of the tool provides the projected coastwide SPR for comparison with the harvest decision table. In addition, this section reports the distributed mortality limit (TCEY) for each IPHC Regulatory Area; the total can be compared to the total input above to verify that the calculations are working properly. The total mortality limit (all sizes and sources of mortality, including U26 non-directed discard mortality of Pacific halibut) is also summarized by IPHC Regulatory Area.

Biological and fishery distribution

The third section of the mortality projection tool provides the most current modelled estimates of stock distribution by Biological Region, compared to the distributed mortality limits (TCEY). These two values are then used to project a harvest rate by Biological Region, standardized such that Region 3 (IPHC Regulatory Areas 3A and 3B) is always equal to a value of 1.0 and the other Regions (2, 4 and 4B) are relative to that value.

Detailed sector mortality information

This section provides a full distribution of mortality among IPHC Regulatory Areas and fishery sectors. Calculations are based on catch sharing agreements used by the domestic agencies for IPHC Regulatory Areas 2A, 2B, 2C, 3A, and 4CDE (4CDE allocating among sub-Areas). Static projections are used for non-directed discard mortality (see above), and subsistence mortality (based on the most recent estimates available). Discard mortality in directed fisheries scales with the landings based on the most recently observed rates for each fishery. The total of this section (matching the total in the summary results) provides the best projection of all sizes and sources of Pacific halibut mortality based on the specified mortality limits.

Graphics

The last section of the projection tool provides a series of five graphical results updated to reflect the inputs made by the user. These graphics are similar to those provided in the annual stock assessment and/or presentation material.

The first figure uses previously calculated three-year projections for a range of coastwide TCEY (and corresponding SPR) values to illustrate the coastwide spawning biomass trend associated with the specified inputs to the tool. Uncertainty is shown as a shaded region, with the projected period highlighted by the brighter color relative to the darker estimated time-series. Importantly, not all possible SPR values are available, so the closest value available is reported. The

projected SPR is reported above the figure, and a warning will be returned if the user has specified a coastwide TCEY outside of the range of values available, or if the value lies between the pre-calculated grid.

The second figure provides a bar chart of the time-series of estimated relative fishing intensity with 95% confidence intervals. The inputs to the projection tool provide the basis for the projected fishing intensity, shown as the hatched bar at the end of the series. Values are relative to the IPHC's Interim Management procedure, currently based on an SPR of 43% (see description above), such that values above the target represent higher fishing intensity.

The third figure provides a graphical display of the relative harvest rates by Biological Region as reported in the ***Biological and fishery distribution*** section.

The fourth and fifth figures provided the detailed sector mortality information (allocations) in both absolute values (millions of net pounds) and relative values (percent of the projected mortality) by IPHC Regulatory Area.

DISCUSSION

There may be some alternatives (e.g., evaluations of alternative relative harvest rates by IPHC Regulatory Area) that will not be possible using this tool. Such alternatives will continue to be produced by the Secretariat staff as needed to support all meetings and decision-making.

UPDATE SCHEDULE

The existing mortality projection tool (for evaluation of 2022 mortality limits) will be updated in early January 2023 for use during the 2023 Annual Meeting (AM099). This update will include the final end-of-year 2022 mortality estimates from various fisheries as well as guidance from the Commission on default values.

REFERENCES

IPHC. 2020. Report of the 96th Session of the IPHC Annual Meeting (AM096).

Transition of management in the IPHC Regulatory Area 2A: outreach material

PREPARED BY: IPHC SECRETARIAT (27 OCTOBER 2022)

PURPOSE

To provide outreach material intended to inform stakeholders about the transition of management in IPHC Regulatory Area 2A.

BACKGROUND

When deemed helpful, the IPHC Secretariat prepares outreach materials intended to inform the general public about aspects particularly relevant to the state of the Pacific halibut stock and its management.

DISCUSSION

Appendix A includes the outreach material intended to inform stakeholders about the transition of management in IPHC Regulatory Area 2A.

RECOMMENDATIONS

That the Commission:

1) **NOTE** document IPHC-2022-IM098-INF03 providing outreach material informing stakeholders about the transition of management in IPHC Regulatory Area 2A.

APPENDICES

Appendix A: outreach material intended to inform stakeholders about the transition of management in IPHC Regulatory Area 2A.

Transition of Management in the IPHC Regulatory Area 2A

Background

In October 2018, the IPHC provided to the Pacific Fishery Management Council (PFMC) a draft of a regulatory proposal for longer fishing periods in the non-treaty directed commercial Pacific halibut fishery in the IPHC Regulatory Area 2A. This came as a result of safety concerns with the derby-style fishing with only two or three 10-hour openings per season. In response to the IPHC's proposal, the PFMC developed a list of management concerns, noting that it could consider the structure of the directed fishery more broadly. At its April 2019 meeting, the PFMC reviewed the report prepared by its staff which highlighted management considerations that included licensing and in-season management. Further direction by the PFMC was provided and included the PFMC's intent to manage the directed commercial Pacific halibut fishery.

In the discussions following the April 2019 meeting, the IPHC expressed willingness to work with the PFMC to develop a mutually agreeable transition plan. It has been noted that the National Marine Fisheries Service (NMFS) has authority to enact Pacific halibut fishing regulations under the Northern Pacific Halibut Act of 1982 for the directed commercial fishery provided such regulations are consistent with broader IPHC Fishery Regulations. As such, the fishery could transition to the PFMC/NMFS management with little change to the fishery structure in the immediate future (i.e., it would remain a derby-fishery), while the PFMC could revisit the fishery structure in the future.

At its November 2020 meeting, the PFMC took the final action and adopted a set of management alternatives accommodating the 2A transition. The PFMC decided to utilize September and November Catch Sharing Plan process to consider the **directed fishery framework**, including guidance for **vessel limits and in-season changes** for NMFS implementation. Moreover, the decision was made to charge NMFS with **issuing permits for all 2A Pacific halibut fisheries**: directed commercial, incidental salmon troll, incidental sablefish, and recreational charter. However, the administrative complexity did not allow for accommodation of the transition on time for the 2021 fishing season, as originally planned.

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INTERNATIONAL PACIFIC HALIBUT COMMISSION

Status of implementation

The proposed rule (87 FR 44318) implementing the 2A management transition was published on 26 July 2022 and remained open for comments until 25 August 2022. NMFS is currently in the process of preparing the final rule with the input from the public. Some concerns remain regarding the proposed application deadlines (15 days to 2 months earlier than what has been in place for many years for licensing through the IPHC) and the timing of openings after the initially announced opening.

Additionally, NMFS is in process of collecting information necessary to issue permits by early 2023. It is also expected that NMFS will manage the non-tribal directed commercial fishery beginning in 2023, including in-season actions. In the early stages of the transition, the IPHC Secretariat will be supporting NMFS, offering expertise gained through years of experience in fisheries management in the IPHC Regulatory Area 2A.

Moving forward, annual management alternatives for the 2A Pacific halibut fisheries will be considered through the PFMC process at its September and November meetings. The PFMC and NMFS have stated that maintaining the general season structure with vessels limits consistent with the protocols developed by IPHC for the directed fishery is the most efficient and stable path forward. This will be especially important in the next few years as NMFS navigates the new process and logistics related to management of this fishery.

More information

For more information on implementation by NMFS, contact nmfs.wcr.halibut@noaa.gov. For questions on IPHC Fishery Regulations, contact IPHC Secretariat at secretariat@iphc.int.

Offloading Pacific halibut in Newport, Oregon